



Implementing Neuromarketing in the Enterprise: Factors That Impact the Adoption of Neuromarketing in Major Spanish Corporations

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Technological advances in the field of neuroscience have generally been well-received in the entertainment and advertising industries, where there are great commercial benefits linked to knowing the most intimate aspects of how audiences and consumers respond to different messages. Despite this interest in the results of neuroscience research, large enterprises seem to resist implementing them in their marketing activities, thus limiting the development of the discipline. This research reflects on the main factors that impact the adoption of neuromarketing within large-scale enterprises, both from a bibliographical and an empirical perspective. This review included ethical, economic, professional, technological, and cultural aspects. A review of secondary sources was undertaken to understand the current state of neuromarketing and its place within large-scale enterprises. This review suggested that a series of internal and external factors may be limiting its adoption, including organizational culture, lack of knowledge and training, uncertainty about its results and/or concerns about the cost of this methodology. To validate the results of the bibliographical research, a structured, self-administered online questionnaire was designed to be distributed amongst a senior decision makers within large companies in Spain. The aims of this survey were to diagnose the level to which major corporations in Spain are aware of and employ neuromarketing; and to identify the internal and external factors that may be limiting or driving its rate of adoption. Before running a full-scale study, a pilot test was undertaken to, among others, validate the sampling methods and survey distribution strategy and to measure the impact of some major challenges that had been identified during survey design. The pilot study did succeed in reaching highly qualified respondents, but its low response rate highlighted a major issue in the research design: the sampling method cannot scale efficiently. A full review of the sampling strategy and survey distribution method is needed before a full-scale study can be launched. The data gathered in the pilot study can't be considered representative or statistically valid; they are, at best, preliminary findings that will need to be validated by further research. The responses do suggest that neuromarketing techniques are not used in the majority of large Spanish companies and that the general level of knowledge on the subject is not very high.

The results also suggest that neuromarketing has a good reputation amongst industry practitioners and that, if current trends are confirmed, its adoption will increase significantly in the future. The main factors that would drive the adoption of neuromarketing are the culture of innovation of the companies themselves and the direct alignment of neuromarketing techniques to the market research needs on the company. Further research in this area should take into account the learnings provided by this pilot.

Keywords: neuromarketing, advertising, neuroscience, ethics, multinationals, marketing, large-scale corporations

INTRODUCTION

The diffusion of innovation theory studies the evaluation, adoption, and implementation of innovations (Prescott and Conger, 1995) in the fields of ideas, products, practices, and philosophies (Kaminski, 2011). In recent years, marketing and commercialization aspects have become increasingly relevant when analyzing innovation processes (Brem and Viardot, 2015). The marketing function plays an essential role in innovation management, as it interacts with many stakeholders in the innovation process, from the R&D department to potential customers. In this respect, neuromarketing tools can be used to validate product or even messaging innovations before their commercial launch (Brem and Viardot, 2015).

Innovation diffusion theory has been studied from the perspective of factors and stages. Diffusion is a process that includes several stages that are manifested in the adoption and implementation. The adoption of innovation is a sequential process: knowledge (awareness), conviction (interest), decision (evaluation), implementation (trial), and confirmation (adoption) (Nooteboom, 1994). The implementation of innovation may require changes to task organization, task processes and technology necessary for innovation deployment (Prescott and Conger, 1995).

This theory also mentions the existence of a great variety of contextual factors that impact the diffusion of innovations within organizations. Askarany and Smith (2008) group them in three main categories: characteristics of innovations, characteristics of adopters, and other external factors. Prescott and Conger (1995) highlight the importance that environmental factors have in the adoption of innovation.

The literature states that the size of a company is one of the factors that affects its capacity to adopt innovation (Nooteboom, 1994; Askarany and Smith, 2008). According to this, large companies will benefit from the availability of capital to fund innovations and risk taking, as well as to hire managerial and technical specialists (Askarany and Smith, 2008); they will also be more likely to have an existing infrastructure in place (know-how, technology, processes) that can be needed to implement and adopt innovations successfully (Nooteboom, 1994). This research aims to explore how large Spanish corporations have adopted neuromarketing techniques, a significant innovation in the field of market research.

Neuromarketing is a field of research that employs neuroscience and physiological research techniques for the study of consumer behavior and decision making. Neuromarketing

reveals information that is not provided by traditional qualitative and quantitative techniques in order to predict consumers preferences (Hubert and Kenning, 2008; Plassmann et al., 2012, 2015). In the last decades, there has been a “boom” in the use of neuroscience methods for diverse commercial purposes, mainly in areas such as television and advertising (Crespo-Pereira and Legerén-Lago, 2017; Crespo-Pereira et al., 2017; Harris, 2019; Calvert et al., 2020). Advertising and media have always tried to apply new technologies for a better understanding of the human brain in order to create more effectiveness in campaigns and content, however the term neuromarketing was not coined at the very first moment. The inclusion of neuroscience for commercial purposes has a long tradition. Krugman (1971, 1975) and Sutherland (2007) are the pioneers in the use of physiological techniques to study the interest of individuals to ads and media stimuli in the 60s and 70s. However, the embryonic state of technology, the research design and the interpretation of results did not have a significant impact in the field (Anderson, 2007). At the time, limitations in technology and in the body of knowledge meant that the development of neuromarketing as a field of study would not happen until some decades later.

The “decade of the brain” (1999–2000) was decisive for the advancement of knowledge on the human brain. Computer science and new neuroimaging technologies would change the perspectives of neuroscience research forever (Albright et al., 2000; Martín-Rodríguez et al., 2004; Cooper and Shallice, 2010). The development of technology and imaging techniques was vital to increase the implementation of neuroscience in the study of consumers and the birth of neuromarketing. In 1999, Professors Gerald Zaltman and Stephen Kosslyn from Harvard University, filed a patent for “Neuroimaging as a marketing tool” (Fischer et al., 2010) and in 2002 the term neuromarketing was coined by a professor at Erasmus Research Institute of Management, Ale Smidts (Babu and Vidyagar, 2012). Since then, the term became more popular and visible. Over the last years, the inclusion of the neuromarketing as a topic in the academia has increased exponentially, from 2 articles in 2004 to 88 in 2019 in the Scopus database. But not only in academia: in 2004, Google registered more than 800,000 hits (Hubert and Kenning, 2008; Gang et al., 2012) and in 2012 more than 1,4 million (Javor et al., 2013).

The inclusion of neuromarketing research among global companies has increased in the last decades for various reasons like the improvement of non-invasive technology and the reduction of its cost. In the decade of 2010s, more than 100 companies were operating worldwide (Spence, 2016). Nowadays, bodies such as the Neuromarketing Science &

Business Association integrate close to 90 neuromarketing consultancies companies in 42 countries (Cherubino et al., 2019).

Europe is the continent with the highest of members (54), followed by Central and South America (27), Asia (13), and North America (11). The United States of America and United Kingdom are the individual countries in which the highest number of companies are based (10 each) (Cherubino et al., 2019).

The “boom” created around neuromarketing is linked to its high potential to deliver a better understanding of the unconscious aspects that drive human behavior and decision making. Given this ability for a better comprehension of individual behavior, criticism has been linked to this discipline. Neuromarketing must face many barriers; both internal (e.g., a lack of awareness of the benefits of neuromarketing) and external (e.g., the development of technology, its cost, the timing, the validity, the existence of multidisciplinary teams, the bad image of this discipline, and ethical and legal issues) (Crespo-Pereira et al., 2016; Spence, 2016). The next sections of this literature review will describe the main internal and external factors that impact the adoption of neuromarketing within major corporations.

EXTERNAL FACTORS THAT INFLUENCE NEUROMARKETING

The Reputation of Neuromarketing

Historically, neuromarketing has been considered a pejorative term; and, to some degree, this perception still remains to this day. To a significant degree, the way neuromarketing has been represented in the popular press has contributed to this perception, as mentions about neuromarketing made no attempt to improve the understanding of this discipline (Pop et al., 2014). In fact, not only were the findings of neuromarketing research presented in an incorrect way, but claims tended to focus on “embellishing the findings” (Spence, 2016:276). In the same way that neuromarketing consultancies and academics must respect ethics when undertaking their research and reporting evidence-based citations and claims (Fisher et al., 2010), journalists should also consider ethical considerations in their work. In this respect, journalism has contributed to a distorted image of neuromarketing since the invasiveness of its techniques are said to manipulate individuals’ behavior (Pop et al., 2014; Bakardjieva and Kimmel, 2017). As seen in academia, the publication of articles about neuroscience has doubled between 2000 and 2006. However, when reporting on neuroscience research, the press has tended to “*create dramatic headlines, push thinly disguised ideological arguments, or support particular policy agendas*” (O’Connor et al., 2012, p. 225).

Journalistic language about this type of research focused on the idea of a “buy button” for manipulating the decisions of consumers (Fisher et al., 2010; Pop et al., 2014). However, even marketing specialists and academic researchers have employed

this idea of the “buy button” in their writings (Pop et al., 2009; Vashishta and Balaji, 2012).

Marketers have traditionally turned to psychology to understand both the theory and reality of consumer behavior and the factors that influence it (Kotler and Keller, 2016). With the appearance of pioneering technologies in the research of unconscious decision-making in the 1990s, the transfer of knowledge between academics and marketing practitioners contributed to the development of neuromarketing (Plassmann et al., 2015; Levallois et al., 2019). The collaboration between experts in multiple fields, including neuroscientists among others, is key for high quality research (Crespo-Pereira et al., 2016).

Teams and universities that have taken part in commercial neuromarketing research have been criticized (Fisher et al., 2010; Stanton et al., 2017), due to a perception in academic circles that research undertaken for commercial purposes is less ethical and rigorous than purely academic research (Hensel et al., 2017). As the term “neuromarketing” was associated with commercial research, these negative connotations have led to the introduction of the alternative term “consumer neuroscience” to identify scientific and academic research in this field (Hubert and Kenning, 2008; Oullier and Sauneron, 2010). Although some researchers have suggested that these terms are interchangeable, provided academic standards and procedures are maintained (Khushaba et al., 2013), there is much discussion about this in the literature (Hubert and Kenning, 2008; Kenning and Linzmajer, 2010; Plassmann et al., 2015). It has been observed that some commercial research companies like Nielsen or Millard Brown also prefer to use the term Consumer Neuroscience.

In this context, creating multidisciplinary teams combining both industry practitioners and academics could be the factor that adds rigor and ethics to research undertaken with commercial purposes, as long as academic standards and processes are kept, and the ethics committees of these research institutions and universities review and approve the proposed research (Crespo-Pereira et al., 2016; Levallois et al., 2019). Commercial research projects must comply with the same ethical requirements as academic research, mainly by obtaining data through informed consent and the protection of research subjects (Murphy et al., 2008). The code of ethics developed by the Neuromarketing Science and Business Association (NMSBA, n.d.) has raised awareness of the importance of ethical behavior in neuromarketing practice. It has been argued however, that research firms that offer neuromarketing services may exaggerate the potential of this research; frequently refrain from peer review or from publishing their data; are unclear about their rules for research; and they usually keep control of the data they collect (Stanton et al., 2017).

Ethics

Neuroscience allows researchers to understand an individual’s emotions, purchasing choices and to explain unconscious responses (Bakardjieva and Kimmel, 2017). The main application of neuromarketing is the use of neuroscience technology for commercial purposes and decision making. Therefore,

companies that use this market research must deal with ethical concerns linked to consumers and its implications (Stanton et al., 2017).

Ethics in neuromarketing have been treated from many different areas: freedom of choice and autonomy (Fisher et al., 2010), dignity and autonomy, confidentiality of data, and the protection of vulnerable groups, discrimination, stigmatization or coercion of particular individuals and groups (Bakardjieva and Kimmel, 2017), exposure of consumers' content, recording property rights, data right of use and distribution (Pop et al., 2014), invasion of privacy (Bakardjieva and Kimmel, 2017; Stanton et al., 2017), control and threats to consumer autonomy (Stanton et al., 2017), consumer privacy (Wilson et al., 2008). Special treatment is given to its power to influence elections and the political process (Hensel et al., 2017).

Questions have been raised about the capabilities of neuromarketing. It has been stated that it is not able to predict the decisions of individual consumers, but that it can help understand changes in preferences (Venkatraman et al., 2012). Although it can help generate more effective messages and content (Crespo-Pereira and Legerén-Lago, 2017), it cannot manipulate the free will of consumers so that they lose control of their actions (Stanton et al., 2017). Neuromarketing is not of itself a morally questionable practice, nor is it the only way to influence consumers in an unconscious manner (Chartrand, 2005). After all, the objective of neuromarketing is no different from the goal of regular marketing research: to identify marketing opportunities, optimize marketing actions, monitor performance and to improve marketing processes (Kotler and Keller, 2016).

Two main areas of ethical concerns about neuromarketing have been identified: the protection of groups who may be harmed or exploited by the research, and the protection of individual autonomy when neuromarketing reaches a critical level of effectiveness (Murphy et al., 2008; Hensel et al., 2017). In this respect, some of the ethical challenges related to neuromarketing are also found in traditional marketing, whilst others are considered unrealistic, as they claim neuromarketing to have powers that do not currently exist (Stanton et al., 2017).

Limitations of Technology and Sample Size

Neuromarketing technology has limitations; however, in the last decades these technological problems are being overcome (Wilson et al., 2008; Álvarez del Blanco, 2011). Traditionally, neuroscience techniques have been very costly, but the cost of neuromarketing technology has decreased over time. Has this reduction in cost affected the validity of neuromarketing studies?

Concerns about the scientific validity of neuromarketing studies have been pointed out by various studies (Bakardjieva and Kimmel, 2017; Hensel et al., 2017). Sample size is key for the validity for predicting responses in any areas of interest (Ohme et al., 2011). Transparency about the methodologies and measurements used in neuromarketing studies are especially important in a commercial environment (Schwartz et al., 2016; Hensel et al., 2017), as they are decisive for the statistical validation and reliability of results (Pop et al., 2014).

Sample size is often determined by the cost of neuroscience techniques; therefore, budgets can impact the selection of tools and the size of the sample (Zurawicki, 2010). These limitations may call into question the validity of the research (Hubert and Kenning, 2008). Besides this, it has been pointed out that similar results about specific brain activation on marketing stimuli have been found across studies all over the world (Kenning and Linzmajer, 2010). This aspect would minimize the uncertainty of the effectiveness of neuromarketing tools in research (Kenning and Linzmajer, 2010). In contrast, it has also been shown that reactions to stimuli can be completely different across individuals (Tanakinjal et al., 2015) and between genders (Guixeres et al., 2017). Neuromarketing simply does not have the capability to develop messages that will influence a large and varied number of people. On the contrary, it has been suggested that content must be designed specifically for individual population groups (Guixeres et al., 2017).

The origin of neuromarketing tools lies in neuroscience clinical equipment (Pop et al., 2014). These initial clinical tools, such as electroencephalography (Anderson, 2007) and other physiological techniques (Solnais et al., 2013), were invasive and not very precise, so neuroscience research was mostly limited to individuals with brain damage and was hampered by technical limitations and poor research design (Anderson, 2007). In recent decades, the appearance and improvement of new neuroimaging technology and big data computational processing allowed neuroscience to have a better understanding of the human brain (Cooper and Shallice, 2010). These technological advances would benefit not only neuroscience, but also other areas such as economics and the understanding of the value of emotion in decision making (Kahneman, 2003). The search for a biological trace in decision-making in the field of economics would mark the beginning of neuroeconomics (Sharp et al., 2012; Glimcher and Fehr, 2013), that would in turn lead to the theoretical and methodological foundation of neuromarketing. Neuromarketing has highlighted the role that emotions play in marketing decision making; it has shown how rational processes are conditioned by unconscious emotional aspects that actually contribute to making good choices (Kahneman, 2012).

Neuromarketing techniques vary from one another. The classification by Bercea (2012) shows three types of tools: those that record metabolic brain activity (functional magnetic resonance imaging (fMRI), positron emission tomography), those that record electrical brain activity (transcranial magnetic stimulation, steady-state topography, magnetoencephalography, electroencephalography (EEG), and functional near-infrared spectroscopy) and those that do not record brain activity (facial coding, implicit association testing, eye tracking, heart rate, skin conductance, facial electromyography, and measurement of physiological responses). The cost of use and the type of variables studied and data obtained among these tools varies significantly (Babu and Vidyagar, 2012).

Neuromarketing has become a part of marketing research thanks to the democratization and accessibility of neurophysiological monitoring techniques (Gang et al., 2012). Nowadays, it is common to find devices based on the aforementioned technologies that have been designed specifically

for commercial purposes; these devices are typically cheaper and easier to use than their clinical counterparts, and their data collection capabilities have been optimized for the needs of commercial studies. For example, low-cost commercial EEGs do not need to use caps filled with conductive gel to guarantee conductivity, can be prepared for use in a short time and have fewer sensors than clinical EEGs, reducing the amount of unnecessary data collected (Liu et al., 2012).

Research published by the Neuromarketing and Business Association (NMSBA, 2018) suggests that the cost of neuromarketing techniques can impact their popularity. **Figure 1** illustrates how more affordable techniques such as EEG, eye tracking and biometrics experienced a strong increase in popularity between 2014 and 2018. In the same period, the popularity of fMRI, one the most expensive techniques, decreased slightly. This trend is also seen among other studies (Fisher et al., 2010; Crespo-Pereira et al., 2016).

The interpretation of neuro measures is also a delicate issue. Usually, the incorporation of traditional methods is recommended to complement the results (Varan et al., 2015) and also because the insight provided by neuromarketing technology may be “too basic” (Tanakinjal et al., 2015). Interpretation is a hard and complex task that is influenced by a large variety of forces (Plassmann et al., 2012, 2015; Canli and Amin, 2020). Environmental context is important since research conducted in labs may produce results that do not reflect human brain processes in a real context (Tanakinjal et al., 2015). Also, interpretation should follow evidence and/or hypotheses and specialists from different areas should be involved in the process (Crespo-Pereira et al., 2016).

INTERNAL FACTORS THAT INFLUENCE NEUROMARKETING

Some researchers argue that the main internal factor that conditions the level of adoption of neuromarketing by companies

is the lack of experience with this discipline (Crespo-Pereira et al., 2016, 2017). In this respect, most companies may not have enough knowledge to supervise and evaluate neuromarketing research (Hensel et al., 2017; Stanton et al., 2017).

Other studies suggest that companies do not use neuromarketing more widely because of senior management fears and lack of confidence in the discipline (Crespo-Pereira et al., 2016). In this regard, neuromarketing practitioners may exaggerate the power and benefits of the studies whilst the use of neuroscience techniques can give a false air of credibility to studies that have not necessarily followed the scientific protocol (García and Saad, 2008). Although technology becomes more sophisticated and the experience levels of researchers increases over time, the effectiveness of neuromarketing within companies needs to be measured in terms of return on investment (ROI) (Crespo-Pereira et al., 2016). It is significant that other studies show that senior management of advertising agencies consider neuromarketing to be more efficient than traditional research methods (Hensel et al., 2017). This would suggest that advertisers could become prescribers of neuromarketing techniques, thus driving the adoption and consolidation of the discipline in corporate circles.

The growth of this type of market research in the medium and long term will be determined by its capability to optimize business investment, since research suggests that there is the belief that neuromarketing does not provide enough value for money (Crespo-Pereira et al., 2016). Also, it must be pointed out that neuroscience methods in market research must now compete against new formulae such as Big Data that have recently been the subject of increased attention (Crespo-Pereira et al., 2017).

The growth of this discipline also depends on the organizational cultures of companies. It is worth noting that not all companies and countries share the same habits and attitudes toward market research activities (Crespo-Pereira et al., 2016). For example, English-speaking countries have the highest

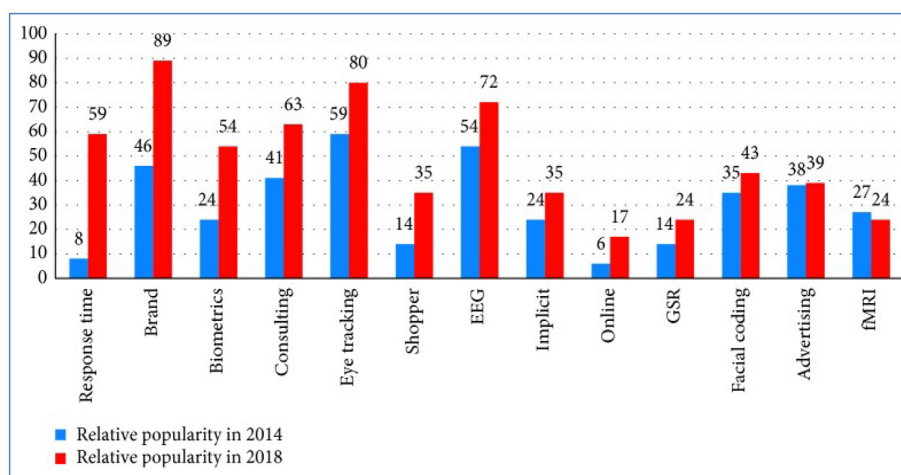


FIGURE 1 | Relative popularity of selected neuromarketing methods, 2014 vs. 2018 (NMSBA, 2018).

number of neuromarketing consultants. Besides this difference in attitudes, clients may prefer to be discreet about their use of neuromarketing techniques for reasons of public image and reputation (Hensel et al., 2017) and to avoid the leak of sensitive information to competitors (Tanakinjal et al., 2015).

METHODOLOGY

The literature review that provided the theoretical framework for this research suggested that large companies are more likely to adopt innovations, as they tend to have the resources and infrastructure needed to implement them successfully (Nooteboom, 1994; Askarany and Smith, 2008). However, this secondary research also suggested that neuromarketing research techniques still need to overcome many barriers to adoption in corporate circles (Crespo-Pereira et al., 2016; Spence, 2016). A number of internal and external factors that may be impacting this rate of adoption were also identified (Hensel et al., 2017; Stanton et al., 2017).

The aims of this research were to discover the level of awareness of neuromarketing within major corporations in Spain; to determine how many of these organizations actually use neuromarketing techniques; and to measure how the internal and external factors identified in the literature impact the rate of adoption of neuromarketing within these companies.

As defined by the European Commission (2003), large enterprises are those that have more than 250 employees and have annual turnover exceeding 50 million euro or a balance sheet total over 43 million euro. According to Spanish government sources, in August 2020 there were 4,553 large enterprises in Spain (Ministerio de Industria Comercio y Turismo, 2020).

Reaching the right persons within these corporations, senior decision makers, was identified as both a critical success factor and a major challenge when designing this research. The following criteria were defined to identify qualified respondents within Spanish large enterprises: professionals active in the field of market research or in areas that use market research in their decision making process (marketing, commercial, digital, etc.); with at least seven years of experience; with mid-level or higher management responsibilities (with job titles like senior manager, group product manager or higher); and with direct knowledge of and/or responsibility for the market research activities undertaken by their respective employers.

To collect data from such a sizeable population, a structured survey strategy was chosen as the most appropriate approach, as it is an economical way to gather standardized data that can then be analyzed using quantitative methods (Gill and Johnson, 2010; Saunders et al., 2016). A self-administered, online questionnaire was designed, as this survey distribution method is recommended in cases such as this one, where respondents don't have much time at their disposal (Hernández Sampieri et al., 2010).

Obtaining a high response rate was another challenge that was identified when designing this research. This is an important success factor to ensure the quality of the data gathered in questionnaire-based research (Groves and Peytcheva, 2008;

Saunders et al., 2016). The use of online distribution methods, however, typically results in lower response rates than other survey distribution modes (Hernández Sampieri et al., 2010; Saunders, 2012b; Saunders et al., 2016).

Pilot testing a questionnaire is always good practice (Bell and Waters, 2014), but in this case it was considered especially relevant, due to the major challenges mentioned above. Apart from verifying the questionnaire design and identifying possible data recording issues (Hernández Sampieri et al., 2010; Saunders et al., 2016), a pilot test would also help validate the survey distribution strategy and sampling methods, understand how a full-scale study could be put at risk due to issues in the survey design, and provide initial data on which to run preliminary analyses. The results of this pilot study are presented below.

Sample Selection

The process to identify and select the sample for this pilot study went through several phases and was based on a purposive sampling approach. Two criteria were defined to select participants in this pilot: they should meet the European Commission (2003) requirements to be classified as large corporations and they should be likely users of neuromarketing techniques.

As large companies are more likely to adopt innovations (Nooteboom, 1994; Askarany and Smith, 2008), the initial focus of this pilot test was the largest of them all. The largest companies in Spain, form the IBEX 35 index. IBEX 35 is the domestic and international benchmark for the Spanish stock market and it is composed of the 35 most liquid securities traded on the Spanish stock market (BME - Bolsas y Mercados Españoles, 2020). It is reviewed twice annually and can be considered the Spanish equivalent of other international financial indexes like the FTSE 100, S&P 500, or the Nikkei 225.

The assumption used in the selection process was that companies that offer consumer goods or services and have a direct relationship with consumers (i.e., they have a Business-to-Consumer (B2C) business model) are more likely to use neuromarketing technology in their market research activities. These companies, therefore, would be selected for this pilot.

All companies listed in the Madrid stock exchange are grouped in one of seven basic sectors, according to a classification that was originally implemented in 2005 (Bolsa de Madrid, 2019). For the purpose of this research, four sectors were identified as offering consumer goods or services: consumer goods, consumer services, technology & telecommunications, and financial services. Detailed analysis was undertaken to understand the business model of the IBEX35 companies in these sectors. As of April 2020, 13 IBEX35 companies were identified as having a B2C business model. These 13 companies formed the initial sample for this test.

Having selected the companies, the next challenge became to identify the decision makers who should be invited to take part in the study. The corporate websites for these companies provided a useful initial source of information, as all public listed companies must publish information about their organizational structure and senior management team. This information was complemented by further research, mostly in social networks

such as LinkedIn or Twitter. One individual per company was identified by these methods. They were contacted using electronic means to explain the objectives of this research and how their responses would be treated in a confidential manner. They were then invited to take part in the survey, by completing a self-administered online structured questionnaire.

Unfortunately, this activity produced a very low number of responses: of the 13 companies contacted, only three responses were received. The normal challenges faced when undertaking this type of research targeted at senior managers of large corporations were possibly compounded by the impact of the SARS-CoV-2 pandemic that affected Spain and other European countries between the months of March and June 2020. Whilst a 23% response rate falls within the expected response rate for online surveys (Hernández Sampieri et al., 2010; Saunders et al., 2016), such a low number of responses was not enough to achieve the objectives of the pilot test.

To increase the number of responses, companies outside the IBEX35 were contacted in a second phase of the pilot. These companies would also be classified as large corporations and be likely users of neuromarketing, based on their activity sector and B2C business model. To select them, convenience sampling methods were used, leveraging the contacts in the researchers' professional social media profiles. Although the issues with using convenience sampling are understood, it can be argued that, as stated by Saunders (2012a), this sample meets purposive sample selection criteria that are relevant to the research aim.

During this second phase, 60 individuals, representing 60 different companies, were contacted; eight responses were received, resulting in a 13% response rate. Overall, the global response rate for the pilot test was 15%, with a total of 11 responses received from 73 companies.

Questionnaire Design

In order to achieve the objectives of this research, the online, self-administered questionnaire that participants were asked to complete included a total of 15 multiple-choice questions. In order to maximize the response rate, efforts were taken to make the questionnaire as user-friendly as possible. The researchers estimated that participants would need <5 min to complete questionnaire.

The questions were structured in the following sections:

- Segmentation of respondents
- Market research activity
- Personal attitude to neuromarketing
- Use of neuromarketing in the company
- Factors that impact the level of adoption of neuromarketing
- Evolution of neuromarketing in the future

Further information on the questionnaire is provided in the next section which presents the results of the pilot.

PRELIMINARY RESULTS

Responses Received

After the two-phase process described above, a total of 11 responses to the questionnaire were submitted and validated. Each response represented a different company.

For confidentiality reasons, the specific companies that took part in the survey cannot be named. It can be confirmed, however, that they include some of the best-known corporations operating in the Spanish market today. Three of the companies are part of IBEX 35. As **Figure 2** illustrates, most of these companies operate in the consumer goods and technology & telecommunication sectors; the service sector is also represented.

The individuals who completed the questionnaire are senior decision makers within their respective companies. Sample job titles of the respondents include Market Research Director, Marketing Director, Head of Digital, Global Marketing Director, Commercial Director, etc. All the respondents have direct knowledge of and, in some cases, direct responsibility for the market research activity undertaken by their respective employers. The functional areas they represent are Digital (4 respondents), Marketing (3), General Management (3) and Market Research (1).

Market Research Activity

Respondents were asked to list the type of market research activities undertaken by their company currently. A total of 10 different types were suggested: personal interviews, telephone interviews, mail surveys, online surveys, mystery shopper, in-depth interview, focus groups, semi-structured interviews, non-structured interviews, and secondary sources.

As **Figure 3** shows, the majority of companies represented in the survey are not very active in the field of marketing research space: six respondents state that their company undertakes three or fewer types of market research. At the other end of the spectrum, three respondents state their companies are very active in this field, undertaking eight or more types of market research activities.

Personal Attitudes to Neuromarketing

Firstly, respondents were asked if they knew what neuromarketing is. They were then asked to rate their level of knowledge on the subject on a scale from 1 to 5, where 1 is "very low" and 5 is "very high." They were also asked to rate how useful they consider neuromarketing to be, using a similar scale.

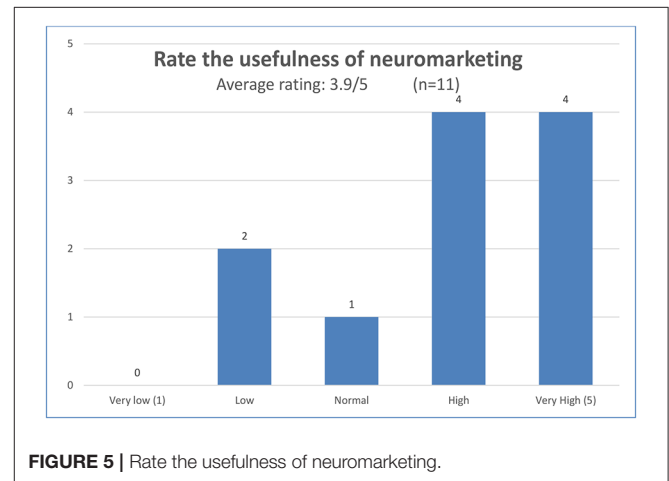
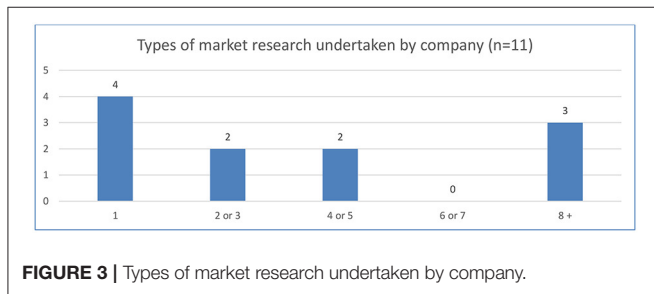
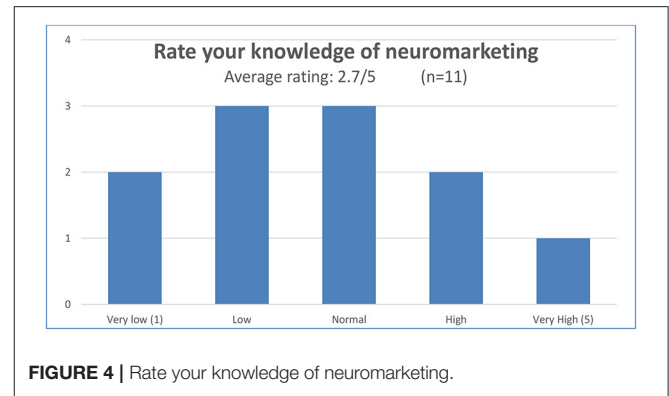
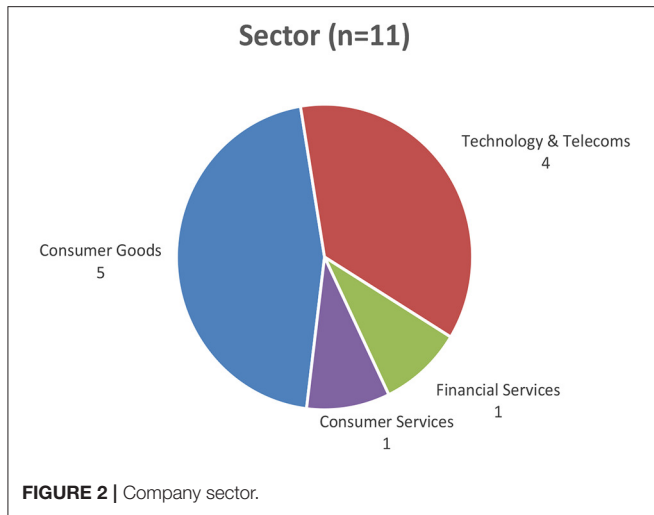
All respondents confirmed that they knew what neuromarketing is.

As **Figure 4** illustrates, only three respondents rated their knowledge of neuromarketing as "high" or "very high." Almost half of the respondents rate their knowledge as "low" or "very low." Average rating is 2.7 out of 5.

Neuromarketing is considered "useful" or "very useful" by eight respondents (see **Figure 5**).

Use of Neuromarketing in the Company

This section of the questionnaire was designed to gain an understanding on the level of usage of neuromarketing in the respondents' respective companies. Firstly, they were asked if the company used neuromarketing techniques. The respondents that answered "Yes" to this question were then asked further questions on what it was used for, the type of neuromarketing techniques employed and how frequently they were used. Finally, these respondents were asked to rate how useful neuromarketing techniques were for their company.



Of the 11 companies represented in this survey, only four confirmed they used neuromarketing in their market research activities (see **Figure 6**). It is worth mentioning that the three most active companies in the field of market research (see section Market Research Activity above) have all used neuromarketing techniques.

These companies state that they have used neuromarketing techniques for a wide variety of purposes, including, among others, to optimize web usability and audio-visual content, to test advertising campaigns, to improve packaging, and to understand user tastes and preferences better.

Respondents were asked to list the neuromarketing techniques they have employed in their companies, with a total of 12 techniques listed. Only three respondents answered this question, listing a total of four techniques. Eye tracking has been used by all three companies; two of them have used facial coding; skin conductance and electroencephalography have been mentioned by one respondent.

These four companies have employed mostly external resources (both staff and equipment) to carry out neuromarketing techniques. Three of the respondents state they use neuromarketing techniques “frequently” or “very frequently.”

Three out of the four companies that have used neuromarketing consider it has been “useful” or “very useful.” Average rating is 4.25 out of five.

Factors That Influence the Level of Adoption of Neuromarketing

All respondents, independently of whether they use neuromarketing techniques or not, were asked to rate the importance of 10 different factors that can have an impact of the level of adoption of neuromarketing in their companies. As has already been mentioned, these factors had been identified during the literature review phase of this research. Each factor was rated on a scale of 1 to 5, where 1 was “low importance” and 5 was “high importance.” The individual responses were aggregated in order to obtain an average rating for each factor. **Figure 7** displays the average rating of all responses.

Overall, “Culture of innovation” is the highest-rated factor with an average rating of 3.6 out of five. However, there are five other factors that are also rated quite highly (3.4 and 3.5 out of 5). It is worth noting that internal and external factors are equally represented in this top-6 ranking. At the other end of the scale, “Cost” is the lowest-rated factor, with an average rating of 2.7 out of 5.

Evolution of Neuromarketing in the Future

The final question in the survey asked respondents to estimate how they see the use of neuromarketing techniques evolving over the next 5 years. A significant majority of respondents (9 out of 11

respondents) stated that they expect neuromarketing to be used “more” or “much more” than today (see **Figure 8**). None of the respondents expect to see the use of neuromarketing decline in the future.

CONCLUSIONS

The aim of this research was to reflect on the main factors that impact the development of neuromarketing within large corporations, both from a bibliographical and an empirical perspective. This review included ethical, economic, professional, technological, and cultural aspects.

The diffusion of innovation theory studies how innovations are evaluated, adopted, and implemented within organizations (Prescott and Conger, 1995). Larger companies are more likely to adopt innovations, as they have advantages over smaller ones (Nooteboom, 1994; Askarany and Smith, 2008). This theory provides a framework with which to understand the adoption of neuromarketing by companies. In the last decades, there has been a “boom” in the use of neuroscience methods for commercial purposes, mainly in areas such as television and advertising (Crespo-Pereira and Legerén-Lago, 2017; Crespo-Pereira et al., 2017; Harris, 2019; Calvert et al., 2020). A review of the existing literature, however, suggests that large enterprises seem to resist implementing neuromarketing techniques, due to the impact of a series of internal and external factors (Crespo-Pereira et al., 2016; Spence, 2016). External factors include concerns about the reputation of neuromarketing (Fisher et al., 2010; Pop et al., 2014; Spence, 2016), ethical issues (Murphy et al., 2008; Fisher et al., 2010; Hensel et al., 2017; Stanton et al., 2017), limitations of technology, and sample sizes (Wilson et al., 2008; Álvarez del Blanco, 2011; Bakardjieva and Kimmel, 2017; Hensel et al., 2017). Internal factors include organizational culture (Crespo-Pereira et al., 2016; Hensel et al., 2017), lack of knowledge and training (Hensel et al., 2017; Stanton et al., 2017), uncertainty about its results (Crespo-Pereira et al., 2016), and/or concerns about the cost of this methodology (Fisher et al., 2010; Crespo-Pereira et al., 2016).

To validate the results of the bibliographical research, a structured, self-administered online questionnaire was designed, intended to be distributed amongst senior decision makers of large enterprises in Spain. The aims of this research were to discover the level of awareness of neuromarketing within major corporations in Spain; to determine how many of these organizations actually use neuromarketing techniques; and to measure how the internal and external factors identified in the literature impact the rate of adoption of neuromarketing within these companies.

Two major challenges were identified when designing this research: to identify and connect with the qualified respondents within large companies; and to obtain a response rate that would produce high quality results. A pilot test is always useful (Bell and Waters, 2014), but in this case it was considered especially necessary as it could be used to validate the sampling methods and survey distribution strategy, to gain insight into how a full-scale study could be put at risk due to issues in the survey design, and to provide initial data on which to run preliminary analyses.

The results of the pilot study are mixed. On a positive note, it did identify minor technical issues with the questionnaire that were easily remediated. More importantly, it did succeed in reaching the qualified respondent that the researchers were aiming for. The responses collected in the pilot have indeed been

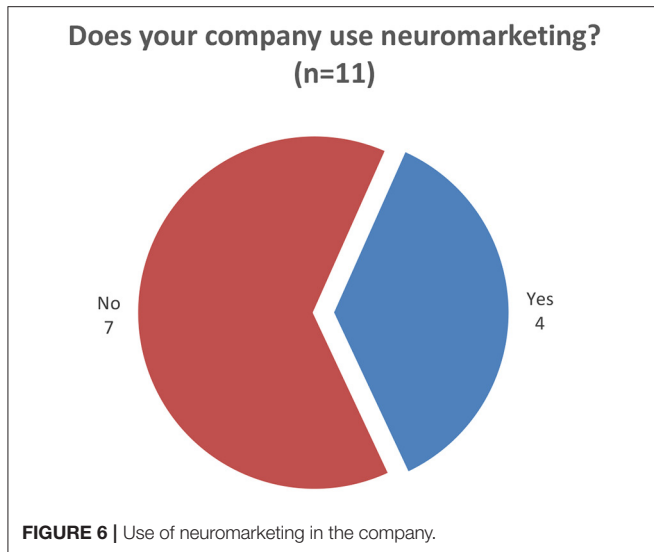


FIGURE 6 | Use of neuromarketing in the company.

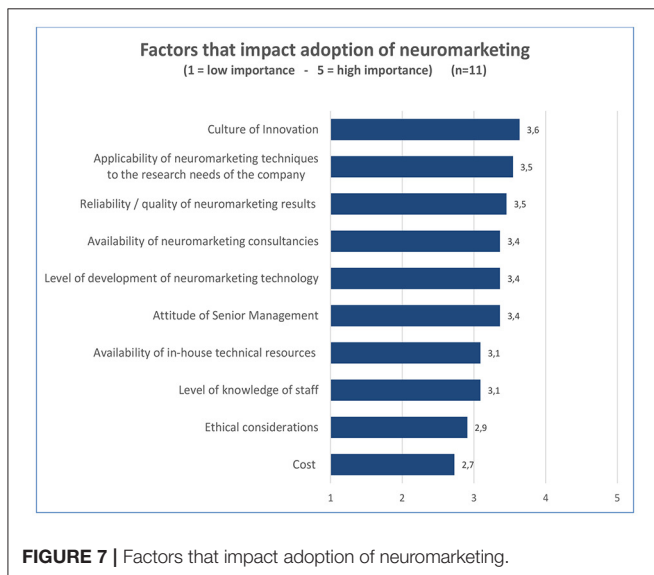


FIGURE 7 | Factors that impact adoption of neuromarketing.

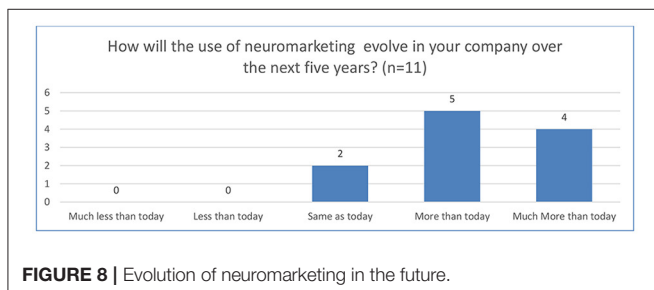


FIGURE 8 | Evolution of neuromarketing in the future.

provided by senior decision makers in some of Spain's largest companies. Based on this, it could be argued that this has been a valuable exercise.

A more careful analysis of the respondents, however, shows that the pilot study has been more effective in reaching consumers of marketing research (10 respondents) rather than market research practitioners themselves (only one respondent). This seems like a wasted opportunity that can be attributed to the sampling methods used in the pilot. Before a full-scale study is launched, these will need to be reconsidered to ensure that a more balanced response is obtained.

But the low response rate in this pilot has highlighted the major issue in the current research design: its sampling method cannot scale efficiently. The approach chosen for the pilot proved to be more labor-intensive and time-consuming than initially planned and only produced a very low number of responses. Increasing the response level to obtain better quality data would require far more resources that are available to the researchers. Before moving on to a full-scale survey of large companies in Spain, the researchers need to overhaul their sampling strategy and survey distribution method.

The low number of responses gathered during the pilot study mean that the data collected cannot be considered representative or even statistically valid. They are, at best, preliminary findings that will need to be validated by further research.

The responses to the survey do suggest that neuromarketing techniques are not widely used in large Spanish corporations, and that the level of knowledge on the subject is not very high. Neuromarketing techniques seem to be used by companies that are more active or sophisticated in their market research activities. These initial results could potentially validate the idea suggested by several authors that barriers do exist to the adoption of neuromarketing in corporate environments (Crespo-Pereira et al., 2016; Spence, 2016). But the fact that a significant majority of respondents consider neuromarketing to be "useful" or very "useful," and their expectation that their companies will use neuromarketing more in the future, would suggest that the reputation of neuroscience amongst industry practitioners is not as bad as stated by some authors (Fisher et al., 2010; Pop et al., 2014; Spence, 2016).

The data collected in the pilot tend to suggest that some external factors do have a significant impact on the rate of adoption of neuromarketing. The external factors that have been rated the highest by the respondents are the "reliability/quality of neuromarketing results," the "availability of neuromarketing consultancies" and the "level of development of neuromarketing technology." But other external factors that have received attention in academic circles ("cost" and "ethical concerns" for

example) have not been rated as highly by the respondents of the survey. Further research is needed on this subject.

Internal factors may also be limiting the adoption of neuromarketing in large corporations, but not all of them have the same importance. The preliminary results suggest that a "lack of knowledge of internal staff," "availability of in-house technical resources" or even the "attitude of senior management" are relatively unimportant, when compared to having a "culture of innovation" or the "applicability of neuromarketing techniques to the research needs of the company." If validated by further research, this would reinforce the argument presented by Crespo-Pereira et al. (2016) that the ROI is the key factor that will determine whether or not large-scale organizations add neuromarketing techniques to their market research toolbox.

Due to the low number of responses received and the methodology that was used to obtain them, the results of this survey cannot be considered statistically significant and should not be considered representative of the situation of neuromarketing within major corporations in Spain. At the same time, they should not be dismissed out of hand, due to the economic importance of the companies represented in the survey and the high qualification of the individuals that have completed the questionnaire. They could, perhaps, be considered early indicators of trends in the industry that will need to be validated by further research in this area. To be successful, this research will need to take into account the learnings provided by this pilot study.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

ETHICS STATEMENT

Ethical review and approval was not required for the study on human participants in accordance with the local legislation and institutional requirements. Written informed consent to participate in this study was provided by the participants' legal guardian/next of kin.

AUTHOR CONTRIBUTIONS

All authors contributed to conception and design of the study. JA-M created and managed the online survey. VC-P, BL-L, and JA-M wrote sections of the manuscript. All authors contributed to manuscript revision, read, and approved the submitted version.

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Conflict of Interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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