

CHAPTER 14

THEORETICAL APPROACH TO BIG DATA ANALYTICS AND NEUROMARKETING: ADVANCES IN UNDERSTANDING CONSUMER TRENDS

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ABSTRACT

The daily life of individuals is on a path of digital transformation. This process creates a paradigm shift in consumer trends analysis and consumer behaviour. Consequently, a positivist and digitally supported perspective in the process of the analysis of consumer trends has emerged. Competences like intuition and foresight have begun to be supported with data analysis. This is because digital technologies cause consumers to produce data through devices and platforms. Moreover, techniques such as neuromarketing, which integrates neuroscience with marketing, create new opportunities for consumer trend analysis. This paper aims to shed light on the concept of digital transformation, and on the ways in which reliable data and scientifically-supported methods such as big data and neuromarketing contribute to the analysis of consumer trends. In this sense, it also contributes to the use of digital measurement in a marketing context and to the development of a positivist marketing perspective.

Keywords: Consumer trends analysis, big data analytics, neuromarketing

1. Introduction

For many years surveys, in-depth interviews and focus group studies have been conducted in order to learn about the consumption behavior of individuals. The findings from these studies have guided marketing professionals in the process of establishing a marketing strategy. It is possible to define these methods as conventional consumer trend research methods. They have two significant features which are outdated in today's digitally transformed marketing atmosphere. Firstly, consumers who were involved in the research process had a passive role. They would respond to pre-designed questions or they would be given limited freedom when it came to responding to semi-structured questions. Secondly, intuition and the experience of marketing professionals played a crucial role and it was an integral part in the process of strategy establishment. However, digital technologies have now totally transformed daily life. Consequently, a paradigm shift has occurred in the analysis process of consumer behaviour and consumer trends. It is possible to state that consumer trends analysis has now started to be based on a more positivist perspective compared to the past.

New technological developments enable individuals to actively express their opinion about a product or service. In addition, digital transformation and technological devices have become an integral part of daily life. Consequently, a vast amount of data is being produced. The most important features of this data are reliability and honesty due to the fact that data is produced by consumers voluntarily. In this sense, big data analytics are creating new opportunities for developing an understanding of consumer trends. This enables professionals to put their consumers into categories and provide relevant services more efficiently by identifying unprecedented patterns.

The neuromarketing approach is another example of the transformation of consumer trends analysis conducted in a positivist way. It is clear that neuromarketing relies on direct and honest signals. However, these direct signals are not the data created via digital devices, social media or other platform activities. They are brain signals which are collected through various neuroimaging techniques. Neuromarketing is the integration of the marketing discipline with neuroscience methods and it presents massive potential to analyze consumer trends. The goal is to better understand consumers' unconscious processes. Neuromarketing is not only about consumer preferences, but also about feelings, expectation and motivation. The interaction between neuroscience and marketing can enable professionals to understand why consumers behave or act the way they do. Therefore, better solutions can be created for businesses.

This paper provides background information on digital transformation and it aims to explain the positivist paradigm shift in terms of analyzing consumer trends and digital measurement through presenting advances of big data analytics and neuromarketing. It delves into big data and neuromarketing at a conceptual level and it highlights the cases of certain applications.

2. Big Data

In a digitally sieged age, when the number of persons applying for an e-residency program exceeds the number of weekly births in Estonia (Korjus, 2017), when states accept virtual currencies as a digital asset (State of Wyoming, 2019), when gardening is supported with sensors and smart phone applications (Edyn, 2016) along with many other developments, it can easily be predicted that a huge amount of data is created as a result of digitalization.

Taking the figures presented by IBM Big Data & Analytics Hub (2013), 10 billion mobile devices will be in use by 2020, 294 billion emails sent every day, over 1 billion Google searches done every day, trillions of sensors will monitor, track and communicate with each other and populate the internet of things with real-time data, 30+ petabytes of user-generated data will be stored, accessed and analysed on Facebook, and 230+ million Tweets sent each day.

The digitalization process, and an exponentially increasing data traffic, together direct us to a specific term: big data. Cox and Ellsworth, (1997), researchers at NASA, stated that “Visualization provides an interesting challenge for computer systems: data sets are generally quite large, taxing the capacities of main memory, local disk, and even remote disk. We call this the problem of big data”, and with this statement they introduced the term ‘big data’ to the literature. Big data consists of three components, namely volume, variety and velocity. Volume refers to the amount of data, variety refers to the structure (structured, unstructured, semi-structured) and granulation of data, while velocity refers to data rate. The new data flows fast and the time span in which they create value is getting shorter and shorter (Fasel, 2014). Volume, variety and velocity, the three main features of big data, have caused data to surpass the capabilities of its ingestion, storage, analysis and processing by conventional systems. Big Data means very large data sets, with both structured and unstructured data, that come at high speed from different sources (Fowdur et. al., 2018). This term should not be used only for characterising huge amount of data. Big data has a revolutionary philosophy not only in terms of technical aspects, but also with regard to obtaining information from the data. In this light of this latter point, using a radical techno-optimist approach, it can be suggested that big data analyses will allow new intellectual break-throughs. Stephens-Davidowitz (2017)

provides a new perspective on the philosophy of this concept by explaining the strengths of big data from four aspects.

1. Big data provides unprecedentedly diverse new types of data.
2. Although people still have thoughts or questions which they do not express, they cannot avoid sharing them with the digital world (e.g. searches on internet). In this way, a second reliable aspect of big data is revealed in that it provides honest data.
3. Big data provides the opportunity to focus on sub-sets.
4. Big data allows researchers to conduct several cause-effect experiments.

At this point, the important characteristic which must be emphasized is not the size of the data, but the immeasurable innovative shift which this data size creates on the analysis processes. This innovative shift not only allows us to address daily phenomena from a positivist point of view, but also strengthens the prediction and measuring capabilities of individuals and organizations.

For instance, the results of the research conducted by Youyou, Kosinski and Stillwell (2015) underline that computer models need 10, 70, 150, and 300 likes (on Facebook), respectively, in order to know a person better than an average work colleague, cohabitant or friend, family member and spouse. In addition, people's personalities can be predicted automatically without involving human social-cognitive skills. A previous study conducted by Kosinski, Stillwell and Graepel (2013) revealed that easily accessible digital records of behaviour such as Facebook Likes, can be used to automatically and accurately predict a range of highly sensitive personal attributes including sexual orientation, ethnicity, religious and political views, personality traits, intelligence, happiness, use of addictive substances, parental separation, age, and gender. Another study which collected 19 million Facebook status updates written by 136,000 participants revealed significant results on the relation of language usage on social media and personality, gender and age. These results highlight that neurotic people disproportionately use the phrase 'sick of' and the word 'depressed' or that males use the possessive 'my' when mentioning their 'wife' or 'girlfriend' more often than females use 'my' when referring to their 'husband' or 'boyfriend' (Schwartz et al., 2013).

As understood from the above-mentioned cases, big data analyses have allowed people to observe several patterns which could not have been realized until now. The discovery of these implicit patterns has served to improve the quality of people's daily lives and increase the added value of organizations in many fields varying from health and space science, to

mail transport and online series broadcasting. It is not hard to predict that such a shift, which provides a significant added value to efficiency, will be used by private organizations to follow consumer trends and develop marketing strategies. Various scholarly studies have indicated that big data analytics has the potential to contribute to marketing oriented activities. For example, the Institute for Public Relations (2016) indicated that the public relations profession must continue to evolve alongside big data. Another example is that of Erevelles, Fukawa & Swayne (2016) who underlined that radical innovation enables firms to create greater value through big data. Similarly, Kuş, Efremov and Suhadolc (2018) stated that data-oriented perspective transforms phases of digital marketing communications and enables brands to personalize their message. Moreover, Michael and Miller (2013) argued a long time ago that big data will be a game-changer for understanding consumer trends:

“Advances in data storage and mining technologies make it possible to preserve increasing amounts of data generated directly or indirectly by users and analyse it to yield valuable new insights. For example, companies can study consumer purchasing trends to better target marketing.”

Moreover, the fact that the media necessary for yielding maximum benefit from big data are being developed makes it easier to conduct data-driven consumer behaviour tests. Hofacker, Malthouse and Sultan (2016) suggest that:

“The environments that enable Big Data; social, online and mobile; also enable rigorous tests, often with strong external validity.”

Approaching the subject based on the big data perspective suggested by Stephens-Davidowitz, it is important to understand how big data analyses can be used for discovering consumer trends.

The activities of Walmart provide an intriguing example for drawing attention to the functionality of big data in terms of predicting consumer trends. Reviewing its data bases in 2004, the company analysed whether there was a correlation between the weather conditions and consumption habits. The findings suggest that consumers buy a significant amount of goods before a storm. However, it was interesting to discover the fact that the sales of Pop-tart, a famous breakfast product, particularly increased at an immense rate. Walmart located Pop-tart products next to storm equipment within its stores and thereby increased its sales (Mayer-Schönberger & Cukier, 2013; Stephens-Davidowitz, 2017).

In today's market, one of the most important parameters for creating added value is relevancy. Relevancy is of vital importance for platforms, the product of which is the content. This is because contents, which attract the attention of the target audience, are provided on a constant basis, and the user, who becomes a member of a platform for consuming content, remains on the platform, continually providing added value to it. This added value is seen in different ways such as producing content for the platform, clicking on the advertisements provided by the platform, continuing to pay monthly membership fees to the platform or shopping more on the platform. However, in addition to this, the user keeps creating data for the platform at any moment that he/she stays on the platform. These data processes, which are followed by the measurement processes conducted, are used for understanding patterns, thus increasing relevancy and user experience.

Mayer-Schönberger and Ramge (2018) states that platforms like Spotify and Apple Music aim to match the music preferences of users with suggested songs, while Netflix and Amazon make product suggestions for the same purpose. Regarding the Netflix example, it is stated that Netflix uses several different algorithms at the same time for suggesting content to the users (McAlone, 2016; Molina Fernandez, 2018). It is of great importance for Netflix to provide its users with contents that match their needs and to suggest these contents to the users in order to keep its subscribers on the system. For this reason, Netflix predicts user needs by means of big data analyses and provides various suggestions to them. Netflix even organized a competition, in which an award of 1 million U.S. Dollars was given to a company or a person, who could increase the accuracy of this suggestion system by 10% (Bennet & Lanning, 2007; Hallinan & Striphas, 2016). In this context, it is possible to argue that a new, highly positivist business order has emerged, in which consumer trends are predicted by means of big data analyses, and in which accuracy and relevancy have gained importance.

It can be suggested that in the marketing activities which are carried out within the framework of this business order, intuition is gradually replaced by advanced measurement methods. This is because big data analyses allow creating perspectives outside the traditional paradigm in order to understand consumer trends in a collective manner. This system, which can be called the culture of analytics, refers to a cycle, which is centered around big data. Gutierrez (2016) argues that for companies like Amazon and Netflix, using data in innovative ways does not only depend on being technically developed, but that they achieve this since they have a culture of analytics that covers all aspects of the organization. Gutierrez suggests that four different components, namely 1) existence of a purpose, (2) linking insights to

actions, (3) pushing analytics to business end-points and (4) creating feedback loops, are necessary in order to develop analytic strategy.

A culture of analytics is a mindset, which is related to each and every component of an enterprise. As a result of this, it can be argued that this mindset can apply to understanding consumer trends. In this context, this process is a measurement cycle, which is centered around big data and in which each phase complements each other. This cycle is a process in which big data as a potential is converted into a kinetic value by means of processes that comprise data-driven thought as a philosophy and positivism, and use data mining in technical terms. It is possible to make use of Hofacker, Malthouse & Sultan's (2016) thoughts for defining this cyclical process created by big data. According to these researchers, "Big Data have the potential to further our understanding of each stage in the consumer decision-making process. While the field has traditionally moved forward using a priori theory followed by experimentation, it now seems that the nature of the feedback loop between theory and results may shift under the weight of Big Data."

Considered from the perspective of big data, the whole process of understanding consumer behaviours is only a matter of cyclic measurement. This is because big data analyses, which are conducted for measuring consumer behaviours, allow for the development of applications intended for consumers, while data obtained as a result of measuring the success of the application makes it possible to optimise the applications developed for consumers. In addition to this, this cyclic process also comprises four components, which are related to a culture of analytics.

This conceptual framework and these examples suggest that data is analysed with innovative perspectives and new forms of understanding in order to measure consumer trends. Measurements which are implemented for detecting consumer trends are now carried out using the analysis of data with more volume, velocity and variety. As this process is executed, the aims are to reveal the patterns which were not realized before, and to interpret, and understand human behaviour from a data-driven perspective. In an age of creating added value through the means of including the digital footprints of consumers to the data set, big data is only one of the means used for measuring and understanding consumer trends. Neuromarketing is another method, which aims to measure the behaviours of consumers by positing a positivist perspective to the essence of the application.

3. Neuromarketing – influences on consumer motivation and behavior

Let us go for a moment to imagine a traditional mini market research as a focus group. Regardless of whether there is a polemic about the type of packaging of a given product, its functional peculiarities or its price, it often obtains very arbitrary responses from the respondents, which do not support the validity of the results. This is because the majority of decisions in the customer's brain are made at the subconscious level. Sometimes it seems like consumers do not think the way they feel and do not say what they think. Human thoughts are very complex, often filled with extremely contradictory requirements, so it is difficult to anticipate real needs in business transactions. Well, welcome to the world of neuromarketing!

For a long period of time, marketing communicators exclusively used traditional methods to create effective marketing campaigns. It is astounding but true that every year millions of dollars are spent on some new products and services that ultimately do not come to life at all. Numerous media messages never attract consumer attention. As consumers' emotions represent a great mirror in which one can see in what way and how the purchasing decision is processed, both good understanding and cognitive response have always been a real research challenge (Slijepcevic, Popovic Sevic & Radojevic, 2018). For this reason, it would be absurd to underestimate the existence of neuromarketing and all its research tools, which make it easier to penetrate and interpret consumer awareness. Thanks to neuromarketing techniques, significant data from the "inside", which speak more about a consumer's feelings, incentives, beliefs and attitudes, are obtained. Neuromarketing research is thus focused on the part of unconscious processing in the human (consumer) brain, which is largely inaccessible to most traditional market research techniques (Bakardjieva & Kimmel, 2017).

Through neuromarketing techniques, marketers accurately determine the desires, tastes, perceptions and emotions within consumer behavior. Respondents in the context of neuromarketing research are not ambiguous and are not in a position to provide desirable answers as in traditional research techniques, primarily in surveys and focus groups. Neuromarketing examines the domain of the unconscious in the consumer, and this is the main reason for the distinction results in relation to the aforementioned conventional market research methods. In this way marketing researchers allow far more objective insight into the psychological reactions of a potential customer during his/her exposure to a marketing message or the purchase process. Neuromarketing provides objective analysis of influencing consumer behavior, focusing on the subconscious and emotions. Brainwaves,

facial expression and visualization of brain activity explicitly reflect the views, opinions and emotions of consumers and become more reliable parameter in detecting their behaviour.

Neuromarketing is defined as the practical application of consumer neuroscience knowledge for managerial purposes. On the other hand, consumer neuroscience is an area of science that deals with all the neural processes that are based on economic consumption, with all its psychological and behavioural aspects (Reimann, Schilke, Weber, Neuhaus & Zaichkowsky, 2011). Through neuromarketing, this subconscious level of the buyer's brain is quantified, explained, and explored. There are two spheres in it. The first is based on intuitive and emotionally based purchasing decisions, and the other, being very well designed, is based on a rational buying decision. While traditional marketing is based on detecting consumer behaviour that has an awareness of a person, neuromarketing determines the unconscious identity of that same consumer.

Nowadays, companies are more than interested in tracking, anticipating and even influencing the behaviour of their target consumer public, whether they are consumers (products), users (services), public companies, non-profit sector, etc. They are at the point of no longer questioning the use of neuroscience for marketing purposes, which aims to have an adequate understanding of the behaviour of the target group and which makes the neuromarketing process more efficient and possibly more cost-effective. Indeed, consumers today have problems with the verbalisation of their thoughts, and this greatly complicates the job of marketing communicators and market researchers. Many organisations attempt to understand the importance of neuromarketing as much as they can to more easily identify human needs, and to keep in line with consumer behaviour. Some researchers believe that the ability to anticipate the needs of consumers in the future is far more important than the reasons why consumers behave in a certain way (Spence, 2019). In this way, there would be a significant rationalisation of costs so that marketing budgets would be targeted.

Researchers working in different fields, starting with psychology, economics, neuroscience and marketing, synergistically examine various neurobiological systems and come to conclusions about consumer preferences and the flow of purchasing, which ultimately establishes synchronicity between the design of the usable values of products, design, price, distribution, and promotional tools. Through a seemingly ordinary walk in the supermarket, analysis can take into account both consumer research in the purchasing process and cognitive neuroscience. It is very important how consumer preferences are shaped, in cooperation with all external inputs such as sociological, cultural, economic and demographic indicators. To what extent do gender, age, hobbies, religions, professions and the like significantly determine

the process of shaping consumer preferences about a particular product and/or service? And how do they do this? It is certain that neurocognitive processes significantly influence the transformation of consumer preferences. This is best seen through a two-way study of the functioning of the consumer's brain. Firstly, we monitor how consumers respond to marketing communications that are either traditional or Internet-based, and then explicitly perform other tasks (searching for product information, product selection, product use, etc.)

The basic issue of neuromarketing related to the testing of consumer behaviour concerns buying decisions, as well as the way in which consumers examine different products and service alternatives based on perceived values and costs. The next set of tests are specific consumer interests, which act like the 'reward' value system, and are especially found in the food and money domain. More precisely, a favourite trademark or an extremely well-designed product will present a kind of prize stimulus in the brain of the consumer, which will be a special trigger of motivations and will have an impact on the definitive purchase of the given product.

In the field of consumer neuroscience, researchers continually study the process of making consumer purchasing decisions through all their development phases, and until now, there has been no single model of thought that would demonstrate how integrated unconscious processes such as attention, recall and the reward/rejection system work (Block et al., 2015). It is therefore essential to create a unique and integrated model that will help to more effectively monitor the process of making a consumer decision in its holistic meaning. From the above, it follows that there is no "miraculous button" that opens up direct routes to the consumer's brain. The fact is that products and services that "rewardingly" affect the consumer through perceived value are not equivalent to the 'wondrous button'. Neuromarketing is not a shortcut to consumers, nor is it a consumer's mind reader, but it is certain that thanks to its tools, we can target and perform consumer selection more efficiently (Stanton et al., 2017).

Of course, one should not lose sight of the fact that consumer behaviour has a basis in two types of motivation systems, both positive and negative. An example of the first type of behaviour with positive motivation is to go to your favourite restaurant, while the negative motivation, for example, is the purchase of medicines. At the same time, our consumer sees both emotional and rational appeals in the commercial sky. Through a different spectrum of emotional appeals, one wants to evoke an interesting event from childhood or youth, something that brings us to a memory of something precious and where, even often driven by impulses, we can in an unplanned manner buy a product or service. On the other hand, with rational appeals, consumers want to focus very strongly on the organisation through figures,

statistics and any other quantum determination of the value of the given product. However, in most consumer decisions, the impression is that irrational motives still prevail. This is certainly the case with foodstuffs, cosmetic products, and even when buying a car! Depending on life situations, consumers do not necessarily have to be strictly determined by the action of emotional or rational appeals; often they are combined. Through the use of various media, consumers now have the opportunity to research and read the opinions of other users before and after the use of a product or service (Slijepčević & Radojević, 2018).

Neuromarketing research is not based only on the study of the brain of consumers, but also includes the examination of the entire nervous system, which means loosening psychological and cognitive processes of the respondents. Thanks to modern neuromarketing, researchers can measure muscle movement on the subject (all the muscles of the face and body), hormonal imbalances, blood pressure, and thus can anticipate the behavior of individuals. The neuromarketing observation of consumers includes so-called visual processing through consumer attention and his/her recollection when it comes to certain characteristic features of the product. Typical examples are the advertising messages, slogans, the logo of certain brands, the design of the given products, but also other aesthetic components, represented by colours and shapes, which are processed in the form of a visual stimulus in the brain of the consumer (Solnais, Andreu-Perez, Sánchez-Fernández & Andréu-Abela, 2013).

Neuromarketing takes place in artificial conditions, and this, in turn, limits the application of research results within the real consumer world. At the same time however, through neuromarketing an insight into the functioning of the human (consumer) brain is achieved, which no other research can provide. Indeed, no research except for neuromarketing can pinpoint whether a viewer and a listener of one video and audio commercial in a specific second of broadcasting noticed the keywords of the promotion and how he/she reacted to certain music in that same advertisement. However this is achieved thanks to the EEG (electroencephalography) device, very current in neuromarketing research. In this way, through neuroscience methods, marketing researchers are significantly assisted. They are provided with the help of reliable measurement of the effects of commercial content, which consumers are unable or unwilling to articulate precisely (Hsu & Yoon, 2015). In this way, thanks to complex neuromarketing tools, market communicators are directly helped to choose the best part of the content of the advertisement, i.e. how to achieve maximum engagement of consumers. This eliminates entire parts of the advertising content that are ineffective in transmitting messages and more destructively affect the target audience (Conick, 2018). In this way, in situations where the company has a limited range of products, a marketing budget

is certainly saved, and no product is offered as a product to the mass market, but is directed to the company's target group.

On the other hand, taking an example of a billboard advertising a product for children in a traditional form of marketing communication with a targeted audience, precisely due to the eye-tracking neuromarketing method, it can be determined whether the potential customer looks more closely at the baby or at the product being advertised on the same advertisement. What is more, a deeper analysis of this technique can provide more complex information regarding, for example, the facial expression of our observer. Marketing agencies already have a great deal of understanding of the importance of shaping campaigns using tools that explore the activity of the consumer's brain, such as functional magnetic resonance imaging fMRI, which gives the perfect image of blood mobility in the brain of the respondents as a result of a particular marketing message.

It is quite certain that neuromarketing, as a new scientific paradigm, has its advantages and disadvantages and that it is more expensive than traditional types of research. But if you are planning to launch even more complex marketing campaigns or a complex re-branding requirement, it makes sense to use neuromarketing research techniques. It is believed that the most intensive application of neuromarketing tools in immediate market practice was mainly due to the following factors: scientific knowledge about the functioning of the brain, the development of neuroscientific tools and equipment for conducting neuromarketing research, and the visible advantages of application of new knowledge for marketing purposes (Morin & Renvoise, 2018).

After almost two decades, the field of consumer neuromarketing has taken significant steps forward in generating new insights into consumer behaviour. More precisely, it has contributed to a more comprehensive understanding of the ways in which consumers' value all that is marketed. Thanks to neuromarketing tools, and through consumer neuroscience, marketers now have maps that display evaluation models and evaluations at different stages of the purchasing process, which provide important information on consumer behaviour (Plassmann, Venkatraman, Huettel & Yoon, 2015). In this way, it certainly creates a much sharper picture of the decision-making process on the purchase, which begins with the consumer attention and memory and then builds emotions. This confirms that, due to neuromarketing from the cognitive aspect of consumer behaviour, it has switched to an affective (emotional) aspect of consumer tracking.

Market communicators can implement neuromarketing tools in order to better understand why customers intend to buy a particular product or service, which significantly helps them promote products and services through the use of celebrity figures or in the association with a social event. There are several areas where tangible benefits and results from neuromarketing monitoring of consumers are rightly expected: monitoring and designing new empirical tests for several different consumer groups; establishing new mechanisms that take into account the psychological context of consumers through a variety of biological factors such as hormones and genes, and monitoring factors that are most responsible for consumer preferences and final purchasing decisions (Shiv & Yoon, 2012).

A group of authors believes that neuromarketing through consumer neuroscience should move from the current focus (the human brain) to a more reactive field, which would have a dynamic network of activities within the same brain (Braeutigam, Lee & Senior, 2017). More specifically, the activity of the human brain is spontaneous and does not respond to certain stimuli. In future research this can lead us to how people react to stimuli, rather than ordinary noise or other sounds in the middle, with a primary focus on impacts in the purchasing process.

New neuroscience technology in the marketing sphere could provide researchers with a better understanding of consumer emotion in the decision-making process, in terms of developing more effective methods that would more easily free up, follow and interpret consumer's emotions. In this way, confidence and loyalty in relation to the company and the brand would be significantly built, but it would also better measure the intensity of consumer preferences, which in the future, it is believed, should be more explicit (Mileti, Guido, & Prete, 2016).

The neuroscientists' community has come to realise that all the complex integrative functions of the brain depend on the activity of the network formed by the connections between neurons and the parts of the human (consumer) brain (Sporns, 2015). These connections are of utmost importance for the processing of information and are important for detecting all brain activities related to purchasing decision-making activities, as well as product preferences, product selection and generally making other decisions in the purchasing process, such as product selection, comparison of the company's and competitor's product, etc. There is both the hope and the expectation that one day, through neuromarketing techniques; we could more effectively look at the heterogeneity of consumer behaviour. In the field of commercial neuromarketing, both research and equipment are becoming, in time, more financially accessible and statistical analysis techniques are being improved, which contributes to a significant improvement of this scientific method (Smidts et al., 2014).

4. Conclusion Remarks

The studies of consumer trends linked to the behaviour regarding how purchasing decisions are made as well as the use of goods and services have long allured a variety of techniques from the fields of psychology, economy, data science, marketing and neuroscience. Scholars and marketers have been trying to solve numerous dilemmas behind the science of successfully marketing products and services to the consumers. There have been significant innovations allowing us to consider various channels shaping consumer behaviour. Although there have been decades of consumer behaviour research, we are still very far from understanding how and why a consumer behaves in a certain way.

In this review we have tried to identify the current and future issues facing big data and neuromarketing towards better understanding consumer trends. The human mind is a very complex thing – filled with totally unpredictable desires and feelings and therefore many questions still remain unanswered. However, with modern marketing techniques excellent progress has been made in better understanding the crucial workings of the human mind compared with previous decades.

Neurocognitive processes capturing both big data and neuromarketing will be essential for understanding the behavioral map. Every organization is truly interested in predicting and monitoring its target audience, be that B2C or B2B interactions. Perhaps the most important issue here is not only to frame consumer trends but to challenge them with more traditional market research methods as neuroimaging and big data facilities are becoming more widely available. Furthermore, this suggest a growing utility of commercial neuromarketing.

In the modern era today's consumers are faced with a multitude of commercials but seem to better understand what motivates them and what moves into action buying. Thanks to neuromarketing, not just marketing practitioners but also consumers become more aware of why they buy chocolate with a hint of berry godzi or shampoo with the mysterious x factor. It is also a world in which consumers can become aware of their decisions and reliably know whether they actually come to purchase the desired product or service or not. Precisely speaking, memory, attention and perception as basic elements of consumer's emotions are observed by neuromarketing techniques. On the other hand, it is possible to explore hidden patterns in consumer data with big data analytics in order to develop more consumer friendly products or services.

Based on the above-mentioned literature review, it is possible to argue that big data analytics and neuromarketing techniques, as positivist consumer trends research tools, enable

marketing professionals to obtain objective and honest findings about their target audience. In this sense, these tools enable professionals to establish more effective marketing strategies and to develop better product or services. On the other hand, identifying expectations of consumers about a product or service is a vital part of marketing. Big data analytics and neuromarketing potentially make it possible to identify the expectation of consumers even though s/he is not aware of this. In this regard, the potential to improve the experience of consumers with products or services has been created.

On the other hand, approaches to consumer trends research such as big data analytics and neuromarketing can be more technical and they can require higher budgets. In addition, these approaches require an interdisciplinary perspective, and specialists from other professions should be involved in the process.

Further research holds much promise for the investigation of not only consumer behaviour, but also of the advancement of big data and neuroscience in order to possibly intervene in behavioral disturbances and predict future consumer behaviour. Overall, the authors believe in the synergy of different methods within consumer activities that will be predominant for more detailed analytics and a greater perception of consumer trends. This would lead to the shaping of a better understanding not only of consumers, but also of their consumption behaviour and decision making process. Moreover, this would provide significant practical consequences to the marketers.

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