



Review Paper

Neuromarketing Research – A Classification and Literature Review

Zarã I.A. and Tuță M.

Faculty of Marketing, Academy of Economic Studies, Bucharest, ROMANIA

Available online at: www.isca.in

Received 25th March 2013, revised 8th May 2013, accepted 11th July 2013

Abstract

In the more complex process of satisfying the consumers new marketing tools are needed to understand their constraints or preferences. Neuromarketing research may shed light on many unanswered questions regarding consumers. Much of the neuromarketing research suffers from a lack of standard reference in measurement and unity in research procedure. The current research paper will present a literature review and a classification scheme on the neuromarketing researches. This demonstrates the complementary role of neuromarketing techniques played in elucidating aspects on consumer behavior.

Keywords: Neuromarketing, consumer behavior, marketing research.

Introduction

The complex business world and stronger competitors require new techniques for understanding consumer behavior. The increasing number of customers, products, competitors and a shorter time to react means that understanding the consumer is more difficult now¹. Today the companies have to switch from managing a market, to managing specific consumers groups and specific customers². Marketing research is supposed to help by thinking and solving different questions of the marketing specialists. These activities can be classified in two categories: qualitative research which generates detailed stories, and quantitative research which supplies with measurements and possible predictions. In the category of qualitative research the new science of neuromarketing shapes what we know about consumers and the buying process and consumption. Consumption is part of our everyday life. Almost all behaviors in human being are directly or indirectly connected to consumption³. Advertising, reading books, watching television, eating or traveling by train are all examples of how people consume. Investigating consumer has deep roots in human activity. The first stage was the *pre-scientific stage* in which people discussed about consumer behavior from philosophical and sociological point of view. This is followed by the *modernist approach*, which lasts until the 1970s, when the Freud's psychoanalytic theory aims to explain consumer's action, including here the new concepts of ego, id and super-ego. On this stage the term of *qualitative research* had been used for the first time. The third stage is the *information-processing approach* (1970s), dealing with experiments in which information supplied to consumers was varied. The *affective approach* of 1980s can be considered the fourth stage, when scientists focused on feelings which had been neglected in the previous stage of information-processing approach. The next stage, the fifth, may be named the *experiential approach* (1990s), having expressive value and narratives on foreground⁴. The rational choices models have been heavily criticized for

taking into account cognition only⁵ here as consumers are influenced by subconscious mind. During the last decade, the development of the neuroscience techniques and the lack of answers regarding consumer behavior using traditional research methods determined scientists to step further creating a new field of marketing –*neuromarketing*.

Qualitative and quantitative methods can complement each other in the design of one study, as well as the traditional research methods can mix with the new neuromarketing techniques. Sheena Iyengar⁶ presents many neuromarketing studies, from the blind between Coke and Pepsi to how immediate rewards activate additional areas of the brain, in which various neurological techniques and information are used to find marketing related answers. Usually these neuromarketing studies are done as experiments in special environments. Experimentation involves changes of one or more variables and explains how this impacts the other variables and the final results⁷.

Many studies have demonstrated the importance of neuromarketing techniques in shaping marketing strategies and how to meet consumer expectations. According to *Science Daily* neuromarketing is now used to make promotional campaigns more effective or to provide detailed knowledge about the consumer preferences. These studies have yielded important insights into consumer behavior and have identified a significant area of research. However, traditional market researches as the focus groups, the brainstorming, the depth interviews or the surveys cannot clarify entirely why consumers buy what they buy or how they act on specific marketing stimuli. Questions like how a high potential product can fail when launching it on the market or why some commercials increase the market share of other competitive products can be just a few examples of neuromarketing need of action.

Material and Methods

The goals of this paper are to illustrate the neuromarketing techniques analysis and to describe in details features of the neuromarketing researches during the past years. The first neuromarketing elements were developed in 1990s. The Richard Dawkins “meme”, unit information stored in the brain, and the Zaltman Metaphor Elicitation Technique (ZMET) are the first neuroscience concepts used for understanding the consumer’s mind. In 2002, the word “neuromarketing” was coined by Ale Smidts, professor of marketing research and chair of the Department of Marketing Management, Rotterdam School of Management, Erasmus University⁸.

Neuromarketing is considered a cutting-edge science, a mix of more research fields: i. *Neuroscience* which focuses on nervous system, and predominantly on the human brain; Brain Science is a division of Neuroscience studying the connections between the brain and its structure or function⁹ *Cognitive psychology* which makes connection between human mind and behavior. It refers to mental activities such as memory, learning, imagery, problem solving, reasoning or decision making. Cognition occupies a major place in the human psychology¹⁰. Almost everything a consumer does when searching for a product or making a decision involves activities like perceiving, remembering, learning, language process, thinking or memory. ii. *Marketing* that is responsible for developing products and brands in order to satisfy the customers, being profitable for the company¹¹.

In addition there are other sciences that participate to the development of this new research field of neuromarketing: sociology, endocrinology, chemistry, or computer science.

In observing the consumer’s brain activity researchers look for which areas of the brain activate in conjunction with certain marketing stimuli like sounds, visual effects, smells or emotions. But studying the consumer’s mind is not so simple. In neuroscience there is no need to separate brain from mind. By understanding the individual and concerted action of neurons we will understand the origin of our mental abilities¹². Until now it was possible to observe and to ask consumers about their actions, feelings or motivations. Some people still think that the messages should be able to make us think rationally so we can make difference between what is good and what is bad¹³. But there is difference between what consumers tell rationally what they do/think and what they really do/think. The subconscious mind is a key player in our decision making process. Only searching on the subconscious mind and emotional functions of the brain researchers can have more accurate details about why consumer buy certain products or prefer different brands and how they make decisions.

In achieving that, neuromarketing brings with it new marketing research methods: i. *Neurological methods* such as fMRI (functional Magnetic Resonance Imaging), EEG

(Electroencephalogram), MEG (Magnetoencephalography), PET (Positron Emission Tomography), SST (Steady State Topography), or TMS (Transcranial Magnetic Stimulation); ii. Most commonly used methods in neuromarketing studies are the fMRI, the EEG and the MEG. The fMRI (functional Magnetic Resonance Imaging) measures the brain’s activity by detecting the change in blood flow. The first MRI studies in human were done in 1977, and the first papers in the field of fMRI were published in 1992⁹. Since then, this new neurological technique has evolved so that today we can use it also in studying consumer behavior. The EEG (Electroencephalogram) measures the electrical activity of the brain and the MEG (Magnetoencephalography) provides an image of the brain by using a magnetic field. These magnetic fields are generated by the electrical signals in the brain. It has high temporal and spatial resolution. iii. *Biometrics and other non-neurological methods* like heart rate and respiratory rate, galvanic skin response, eye-tracking, facial, body and voice tracking which have evolved, being used also in neuromarketing studies.

Using these techniques researchers can measure not only the rational activity of Neocortex, but also the unconscious mind. Recent research on the consumer’s conscious and unconscious minds revealed that our purchase decisions are not as rational as we consider to be¹⁴. We are more emotional and more similar to our ancestors than we think. Business people who make their strategies based on complex assumptions often miss that we are driven by simple and emotional impulses¹⁵.

According to Renvoise and Morin we have one brain formed by three distinctive “brains”: i. The *Neocortex*, only in humans, it’s the rational or the thinking brain. This last developed brain region it’s about 4 to 5 percent of the volume of the rest of the brain¹⁶. ii. The *Limbic System* or the middle brain is in charge with feelings or emotions. It is the intuitive brain. iii. The *Reptilian Brain* or the Old Brain which controls our survival functions and takes decisions. Even if it is the most primitive brain, the Reptilian Brain is the decider in our decision-making process. It makes purchase decision based on information from the emotional and rational brains¹⁷.

With an increasing role in the activity of top companies, such as Coca-Cola, Pepsi, Google, IBM, PayPal, VISA or CBS, neuromarketers have to develop unique metrics. Researchers from well-known universities, Nobel Prize awarded scientists, or simple marketing professionals come up with new solutions for the complex field of neuromarketing. The brain itself it’s the most sophisticated organ of our body – by the enormous number, variety, and interaction of its nerve cells¹⁸.

Due to the great revolutions of molecular biology and neuroscience in the twentieth century, it is possible for neuromarketers to think as a whole when discussing about the mind and the brain of the consumers. To simplify the studies and make them efficient certain parameters are observed:

Memory and Learning: For people to use memory, they have to encode information, store and retrieve it. According to some hypothesis, consumers will remember better information if the environment in which they try to recall resembles the one in which they learned it. Without memory consumers would not be able to learn about products and services³ and building brands would be very difficult. The concept of “working memory” makes connection between different regions of the brain and consumer’s reactions when visual, verbal and other temporary buffers are involved. Elements like numbers, words, rating steps, seen faces or musical tones may be called working memories¹⁹.

Attention and Perception: Perception and attention are two convergent areas in understanding consumer behavior and choice. In the modern life people are constantly exposed to a high number of marketing stimuli. Selective attention is a powerful cognitive ability that permits us to react only upon relevant information. Attention is at the core of mental functioning²⁰. Consumers may pay attention to a cup of coffee because of the low-level features like color, texture, and location or because of the high-level of features like: this cup of hot coffee can be useful. *Attentional* selection can affect neurons at almost any level¹⁹. Perception helps consumers to focus their attention only in those products they have some sort of interest³. A good customer perception may increase the brand image and the loyalty⁵. One of the most important functions of the unconscious mind is to process data coming from the eyes. About a third of our brain is involved in processing visual data. After data is processed and interpreted unconsciously the information is delivered to the conscious mind²¹. Attention is usually tracked with eye-tracking devices and represents one of the main parameters in neuromarketing studies.

Emotional engagement: Emotions cannot necessarily be accurately described, said Gemma Calvert in *Businessweek*²². The Limbic System, our emotional brain, has a major role in our decisions. When deciding to buy a product, first the consumer is influenced by emotions and after that all this process become rational. The repurchase intention is based on satisfaction²³, which is depending on the customer’s emotions.

A long period of time the marketing researchers considered that the consumer makes purchases based on rational reasoning. Emotions influence consumer’s behavior in ways they cannot consciously track. We saw many marketing studies in which subjects are asked to suppress their emotions when making different tasks or answering questions – this kind of studies cannot have conclusive results. Emotions are generated in the Limbic System, which does not support consciousness itself. Much of the time we are unaware of having emotions. Due to the connections between our Limbic System and the Cortex, especially the Frontal Lobes, we can be aware only of intense emotions²⁴.

Emotional engagement is tightly connected to the social aspects. An important activity of the consumer’s life is the social

involvement and the connections with other people of the community. Recommendations or simple discussions about a product or brand influence us in selection and decision-making processes. The human brain is designed for *social life*. A result and a cause of this fact is the expansion of the cortex which corresponds to increasingly larger groups. Without interaction the neuron dies. The individual neuron or a single human brain does not exist in the nature²⁵. Our neurons are far more social than people – estimates for human being social networks are about 100 – 150 connections, compared to the 10 000 for neurons²⁶.

Recently endocrine-specific elements are also included in the neuromarketing studies. A new field of research that focuses on why do consumers prefer a product and predict consumers’ behavior is *neuroendocrinology*. The Hormonal Quotient (HQ) may be used to identify, understand and predict human traits, motivations and behavior²⁷. Neuroendocrinology, which studies connection between hormones and our brain, suggests the neurological organization whereby mammals and some birds focus on their own well-being was modified to motivate new values like to focus also on the well-being of certain others²⁸. During the neuromarketing studies was highlighted the importance of some hormones, such as *oxytocin*, or neurotransmitters like *dopamine*, with many implication in the consumer’s behavior and decision making process. Our dopamine system is constantly adapting to everything we already know and gives us reward when something new or different occurs²⁶. The oxytocin is found in all vertebrates, but the evolution of the human being’s brain adapted it to new tasks like caring for others or our social involvement. Oxytocin has been associated with trust and tolerance of others. When consumers trust a product or company and they feel safe the level of their oxytocin is higher than when fear and insecure situations occur²⁸.

Additional to the above parameters, neuromarketing researchers and consulting companies developed other parameters they consider are essential for these studies such as Purchase Intent/Persuasion, Novelty, Awareness/ Understanding/ Comprehension or Effectiveness²⁹ or Cognition, Recognition, Vision and Motor used by Sands Research.

Case Study: The neuromarketing field is at its early stage. These studies are very complex and involve high financial resources. Despite this, interesting and innovative studies have been published. They open new pathways in analyzing and understanding the consumer’s behavior. The results of these studies “make the difference” in many marketing campaigns and generate sustainable competitive advantages.

Three methods were used to search papers related to neuromarketing studies published since 2007 to the present: i. major academic databases, as Springer, Science Direct, ProQuest and specific journals including Journal of Consumer Psychology, Journal of the Academy of Marketing, Journal of Neuroscience, International Journal of Marketing Studies,

Journal of National Institutes of Health were searched using the keyword: *neuromarketing*; ii. neuromarketing books and magazines such as the Neuromarketing. Theory and Practice - NMSBA; iii. onlinecommunity papers were evaluated: neuromarketingconsulting companies websites, and universities websites.

Table-1
Neuromarketing research papers review

Method	Authors	Research objectives	Details
fMRI	PetrMilacek& Jiri Herian	Exploratory research on how viewers perceive TV programs	The results of their study showed that different TV programs activate different part of the brain. Quiz shows and reality shows involve different areas of the brain, giving a clear image on how our mind functions when watching TV ³⁰ .
	Limbio Business	The effects on brain of the Gosser beer commercial.	The Grosser TV commercial tells an emotional and attractive story with high level of interaction. Different areas of the brain activates, showing how this spot involve both conscious and subconscious mind ³⁰ .
	Gemma Calvert	The effect of the health warnings on cigarettes packs	The warnings labels on the cigarettes packs have no negative impact on the smokers. Even more they stimulate in fact and area of the brain named nucleus accumbens, known as “the craving spot” that light up the body desires ¹⁴ .
	Daimler-Chrysler	The reaction of potential customers to sixty-six different cars	The study revealed that the cars are much more than just some recognizable products wrapped in the eye-catching designs. The sport cars stimulated the area of the brain in charge with reward and reinforcement ¹⁴ .
	Brian Hnutson, Stanford University	Prediction patterns on individual purchasing - behavior	The search team was able to predict if the subjects would decide to purchase each presented items ³¹ .
	Falk, Berkman& Lieberman	The effectiveness of TV marketing campaigns designed to help smokers quit	The results showed that Campaign B was the most effective, followed by Campaign A and Campaign C. Each of the marketing campaigns could lead to other implications as it was the increased call volume to the Quitline service ³² .
	Van der Laan, de Ridder, Viergever&Smeets	Study on the consumer’s food choice function of packaging design	Packaging has an important role in manipulation regarding the level of healthiness and fat of the product. The attractiveness of healthy products was high. The most preferred colors were blue, green and white. After this study was possible to observe patterns that predicts choice ³³ .
	Lehmann &Reimann	Correlation of <i>time</i> versus <i>money</i> in our purchase decision	These investigations provide evidence on the insula activity in time-versus-money effect. When consumers are primed with time, their favorability ratings for product increases ³⁴ .
	Levy, Lazzaro, Rutledge &Glimcher	Prediction on consumer preference obtained during passive viewing: choice from non-choice	Activation in the striatum and MPFC in the absence of choice predicts subsequent choices. That means that the brain areas in charge with value and preference activate in both cases of choice or not choice ³⁵ .
	Krienen, Tu& Buckner	How the Medial Prefrontal Cortex responds to making friends and keep in touch with others	The regions of the brain along the fontal midline have high contribution to social recognition and similarity. The four experiments offer details about our thinking in social groups ³⁶ .
Clithero, Smith, Carter&Huettel	Study on brain regions in charge with monetary	The results showed that there are different patterns representing participants-specific functional organization	

		rewards and social rewards	and the aspects of brain organization that generalize across individuals ³⁷ .
EEG & Biometrics	Labiometrics – <i>BioNavigator system</i>	The effectiveness of Nespresso commercial with George Clooney	The results show that the commercial is emotional engaging and have a positive impact for women, as well as leverage purchase oriented behavior. But it has two imperfections: one is the slogan and the other one in regard with the object of the commercial and the target audience. This second issue is where the problem arises because audience doesn't understand what for is the commercial: for coffee, for capsules or for coffee machine. To fix the problem one needs to divert the attention of consumers from the nice George Clooney and to target this ad for men, who are the decision-makers for household appliances ³⁰ .
	A. K. Pradeep	Finding better solutions to increase a business online of baby care products	After the study there were more recommendations to be followed. The results were: <ul style="list-style-type: none"> - website traffic spiked 26% in the first month after the study; - time spent on website increase by 14%; - number of pages visited increased by 37%; - sales increased by 24%²⁹
	NeuroFocus, a Nielsen Company – <i>MYND system</i>	Identification of the problem: why the new package of a snack food product doesn't work	The tests revealed that the new package did not engage emotionally the customers and didn't have any effect on memory. There was a continuous distraction of packaging elements, higher than norms. The core product and the brand messages did not stimulate the consumer mind ³⁸
EEG	Vecchiato, Toppi, Astolfi, Fallani, Cincotti, Mattia, Bez&Babiloni	Analysis of frontal activity when consumers watch TV commercial	There were an asymmetrical increase of theta and alpha waves in left/right hemispheres related to the activity of pleasant/unpleasant ads. The increase of Power spectral density at left frontal areas was negatively correlated with the degree of pleasantness perceived. The left frontal and pre-frontal areas are mostly activated when subjects perceived pleasant feeling when watching TV commercials ³⁹ .
	SBS & Neuro-Insight	Study on what cars attract women	The results show that women are attracted by different types of cars. Even more, the drivers are re-considered and re-evaluated depending on what kind of car they drive ⁴⁰
MEG	Vieceli, Georgiou, Zubcevic, Ciorciari & Mason	Investigation on the emotional and cognitive responses of AFL fanatical members and non-fanatical members	The results identify and propose that fanatics are different to regular fans. The academic contribution is to bring new insights on emotional and cognitive processing aspects of loyalty and to light up how this information can be used by organizations ⁴¹
Eye tracking	Millward Brown	The effectiveness of A4 size print ads in South Africa	The researchers found that there was a preferential scan path sequence that started in the middle and ended in the bottom right-hand corner of the page ⁴²
The divided visual field paradigm	Vance & Virtue	How familiar slogans affect right and left hemispheres	The research findings provided new insights into how consumers process advertisement content. The results suggest that the brand familiarity influences more the right hemisphere and affects ratings for purchase intent in left hemisphere ⁴³ .

Sixty three scientific papers, five books, two magazines and fifteen case studies of several neuromarketing companies were reviewed.

Results and Discussion

Due to the complexity of the neuromarketing researches many of the scientific papers present only theoretic aspects or just assumptions of some neural patterns. The fMRI and the EEG are, by far, the most used methods in neuromarketing researches. Usually the neuromarketing companies have their own instruments and methodologies. NeuroFocus, a Nielsen company, has developed a special EEG device for neuromarketing studies named MYND, a dry wireless headset. Additionally they use eye-tracking and galvanic skin response devices. Another company that developed a set of neuromarketing instruments is Labiometrics. Their device is named *BioNavigator*, and it records brain waves and galvanic skin response. Buyology Inc. has different services for each

field: *MindLink* for strategy, *Mind Measure* for product, *AdMindMeasure* for advertising, *PacMindmeasure* for packaging, and *Media Mind Measure* for media⁴⁴. Widely these techniques are used to test and predict advertising effectiveness and the impact on consumer.

Still many things need to be improved. There is not a unity in measuring the brain activity for neuromarketing studies. Using various methodologies may result in different outputs. Due to the special technologies needed and high costs involved only a few companies and universities are able to run such complex researches. Additionally, to interpret data requires high skilled professionals and researchers from different fields such as neurologists, psychologists, economists and software engineers.

More areas of research were identified and classified according to the topics and patterns of neuromarketing studies.

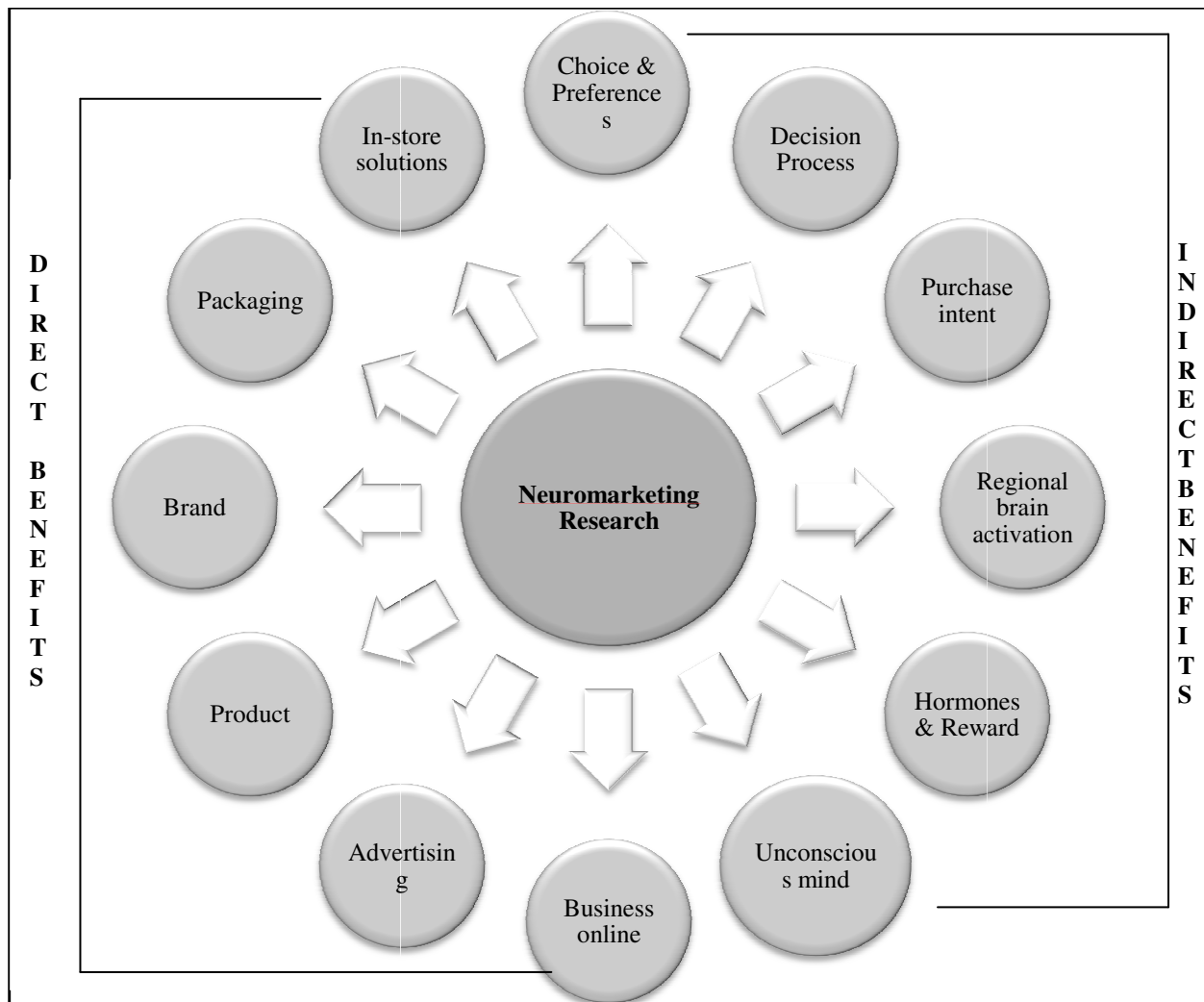


Figure-1
 Classification scheme: neuromarketing researches

Based on these areas of research companies might have direct and indirect benefits from the neuromarketing studies. The direct benefits refer to key aspects of the business field such as products and services, brand, advertising, packaging, in-store solutions or business online. In this case the neuromarketing studies outputs can be immediately implemented and the results can be measured. Regarding the researches with indirect benefits they can be categorized in more groups: choice and preferences, decision process, purchase intent, regional brain activation to marketing stimuli, hormones and reward and unconscious mind of the consumer underlying the emotions role in consumer behavior. This category of research leads to general outputs and every company has to implement the findings according to their specific.

Conclusion

Neuromarketing studies are in their infancy and most of them are experimental. Generally, the lack of unity from the methodology point of view may lead to unclear outputs. However, as Dr. Eric Kandel asserted understanding the human mind in biological terms has emerged as the central challenge of science in the twenty-first century²⁹. Neuromarketing researchers need to do much more work into theory development and testing in order to move forward. From the methodology perspective the qualitative method is used more often than the quantitative one because of the complexity and high costs of this type of research. Sometimes only qualitative methods are not enough to bring with it accurate results and strong arguments. Future interested researchers should pay attention to both the qualitative and quantitative studies and explore data from a higher number of subjects. This study gave an integrative literature on neuromarketing studies from 2007 to the present. Twelve areas of studies were identified and classified according to the topics and patterns of papers. According to findings there are two classes of studies: with direct benefits and immediate implementation and with indirect benefits which require adjustment to the specific features of each company. Neuromarketing research helps companies in their marketing campaigns and for deeper consumer insights. It represents a new frontier in understanding consumer behavior, gaining rapid credibility and adoption among marketing professionals and entrepreneurs.

Acknowledgement

This work was co-financed from the European Social Fund through Sectorial Operational Programme Human Resources Development 2007-2013, project number POSDRU/107/1.5/S/77213, Ph.D. for a career in interdisciplinary economic research at the European standards" (DOCCENT)

References

1. Satish B. and Sunil P., Study and Evaluation of user's behavior in e-commerce Using Data Mining, *Research Journal of Recent Science*, **1(ISC-2011)**, 375-387 (2012)
2. Biswamohan B. and Bidhubhusan M., E-CRM Practices and Customer Satisfaction in Insurance Sector, *Research Journal of Management Science*, **1(1)**, 2-6 (2012)
3. Jansson-Boyd C., Consumer Psychology, McGraw Hill Education, Berkshire, England, 1-70 (2010)
4. Flick U., An Introduction to the Qualitative Research, SAGE Publications Ltd, London, UK, 16-25 (2009)
5. Serban C., Iconaru C., Macovei O.I. and Perju A, Modeling Romanian Consumers' Behaviour Case study: Cause-related Marketing Campaigns, *Research Journal of Recent Science*, **1(10)**, 27-32 (2012)
6. Iyengar S., The art of choosing, Twelve, Hachette Book Group, New York, US, 270-297 (2010)
7. Hawkins I.D., Coney A.K., Consumer behavior: Building Marketing Strategy, The McGraw Hill Companies, Inc., New York, US, 743 (2004)
8. Erasmus Research Institute of Management, information about Ale Smits available at: <http://www.erim.eur.nl/people/ale-smidts> (2013)
9. Pillay M.D., Srinivasan, S., Your Brain and Business. The Neuroscience of Great Leaders, Persons Education Inc., New Jersey, US, 1-87 (2011)
10. Matlin M.W., Cognition, Seventh edition, John Wiley & Sons, New Jersey, US, 1-3 (2008)
11. Martinez Pepe, The Consumer Mind: Brand perception and Implications for Marketers, Kogan Page Limited, Philadelphia, US, 3 (2012)
12. Bear F.M., Connors W.B. and Paradise A.M, Neuroscience, Exploring the Brain, Third Edition, Lippincot Williams & Willkins, Philadelphia, US, 24 (2006)
13. Abhijit B., Science Communication through Mass Media, *Research Journal of Recent Science*, **1(1)**, 10-15 (2012)
14. Lindstrom M., buyology, Crown Publishing Group, a division of Random House Inc., New York, US, ix, 12 - 15, 32-33, 66 (2010)
15. Hill D., Emotionomics, second edition, Kogan Page Ltd, Philadelphia, US, 3-120 (2010)
16. Rock D., Brain at work - strategies for overcoming distractions, regaining focus, and working smarter all day long - HarperCollins Publishers, New York, US, 5 (2009)
17. Renvoisé P., Christophe M., Neuro Marketing - le nerf de la vente, De Boeck, Bruxelles, Belgium, pg. 18-23 (2005)

18. Kandel E.R., In search of memory. The emergence of a new science of mind., W.W. Norton & Company, New York, US, 9 (2006)
19. Baars J.B. and Gage M.N., Fundamental of Cognitive Neuroscience. A Beginner's Guide, Waltham, US, 2–11 (2012)
20. Falk B.E., Berkman T.E. and Lieberman M.D., From Neural Responses to Population Behavior: Neural Focus Groups Predicts Population – Level Media Effects, *Psychological Science*, **23(5)**, 439-45(2012)
21. Mladinow L., Subliminal: How your unconscious mind rules your behavior, Random House, Inc., New York, US, 35 (2012)
22. BusinessWeek magazine available at: <http://www.businessweek.com/stories/2007-10-08/this-is-your-brain-on-advertisingbusinessweek-business-news-stock-market-and-financial-advice> (2013)
23. Mehdi J.S., Mojgan K. and Masoud J. Investigation of the Effective Factors on Brand Loyalty and Repurchase Intention (Case study: Iranian Consumers), *Research Journal of Recent Science* , **2(2)**,10-17 (2013)
24. Carter R., The Human Brain Book, DK, New York, 124 – 127 (2009)
25. Cozolino L., The Neuroscience of Human Relationship. Attachment and the developing human brain., W. W. Norton & Company, Inc, New York, US, 11 – 12 (2006)
26. O'Reilly R.C., Munakata Y., Frank M.J, Hazy T. E. and Contributors, Computational Cognitive Neuroscience, Wiki Book, 1st Edition, cnbook.colorado.edu, pg. 4 – 17 (2012)
27. Derval D., The Right Sensory Mix. Targeting Consumer Product Development Specifically., Springer, New York, US, 17 – 22, 65 – 75, 139 (2010)
28. Churchland S.P., Braintrust. What Neuroscience Tells us about Morality., Princeton University Press, New Jersey, US, 10 – 96 (2011)
29. Pradeep A. K., The Buying Brain. Secrets for Selling to the Subconscious Mind., John Wiley & Sons, New Jersey, US, 81, 103 – 112 (2010)
30. Neuromarketing Science & Business Association, Neuromarketing. Theory & Practice Magazine, Issue no. 2, July, 4 – 7, 10 – 11 (2012)
31. Lynch Z., The Neuro Revolution. How Brain Science Is Changing Our World, St. Martin's Press, New York, 61 (2010)
32. Falk E.B., Berkman E.T., Lieberman M.D., From Neural Responses to Population Behavior: Neural Focus Group Predicts Population-Level Media Effects, *Psychological Science*, **XX(X)**, 1 –7 (2012)
33. Van der Laan N.L., De Ridder T.D. and Viergever M.A., Smeets A. M. P, Appearance Matters: Neural Correlates of Food Choice and Packaging Aesthetics, *PLoS ONE*, **7(7)**, 1-11(2012)
34. Lehmann S., Reimann M., Neural correlates of time versus money in product evaluation, *Frontiers in Psychology*, **372(3)**, 1-20 (2012)
35. Levy I., Lazzaro S.C., Rutledge B.R. and Glimcher P.W., Choice from Non-Choice: Predicting Consumer Preferences from Blood Oxygenation Level Dependent Signals Obtained during Passive Viewing, *The Journal of Neuroscience*, **31(1)**, 118 –125 (2011)
36. Krienen F.M., Tu P.C. and Buckner R.L., Clan Mentality: Evidence That the Medial Prefrontal Cortex Responds to Close Others, *The Journal of Neuroscience*, **30(41)**, 13906 –13915 (2010)
37. Clithero J. A., Smith D. V., Carter R. M., Huettel S. A., Within- and Cross-Participant Classifiers Reveal Different NeuralCoding of Information, National Institute of Health, Neuroimage, 2011 May 15, **56(2)**, 699–708 (2011)
38. Company, Neurofocus, Nielsen Corporation, Neuromarketing article available at: http://www.neurofocus.com/pdfs/NeuroFocusExecutiveBrief_SnackFoodPackaging.pdf (2013)
39. Vecchiato G., Toppi J., Astolfi L., Fallani V. F., Cincotti F., Mattia D., Bez, F., Babiloni F., Spectral EEG frontal asymmetries correlate with the experienced pleasantness of TV commercial advertisement, *International Federation for Medical and Biological Engineering*, **49(5)**, 579–583 (2011)
40. Company, Neuro-Insights, Neuromarketing article available at: <http://www.neuro-insight.com/case-studies/> (2013)
41. Vieceli J., Georgiou C., Zubcevic N., Ciorciari J., Mason C., Fan Loyalty: Investigating the Emotional and Cognitive Responses of AFL Fans and Fanatics, Proceedings of the Australian and New Zealand Marketing Academy Conference (ANZMAC 2012), Adelaide, South Australia, Australia (2012)
42. Neuromarketing Science & Business Association, Neuromarketing, Theory & Practice Magazine, **3**, 10–11, 16 – 17 (2012)
43. Vance K. and Virtue S., Running Head: Hemispheric Processing of SlogansBrand Familiarity in Advertisement Slogans: The Role of the Left and Right Cerebral Hemispheres, *International Journal of Marketing Studies*, **3(3)**, 42-55 (2011)
44. Company, Buyology Inc, Neuromarketing metrics available at:<http://www.buyologyinc.com/fw.html> (2013)