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POSSIBILITIES OF APPLYING ARTIFICIAL INTELLIGENCE IN NEUROMARKETING RESEARCH TO IMPROVE THE EFFICIENCY OF PROMOTING BANKING PRODUCTS

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Abstract: *This article aims to identify and analyze the possibilities of applying artificial intelligence in neuromarketing research, remarkably increasing the effectiveness of promoting banking products and services. Nowadays, artificial intelligence is used in many industries, including neuromarketing. This is facilitated by the unique capabilities of artificial intelligence, such as analyzing large amounts of data, searching for patterns, drawing conclusions, and making predictions. The market for banking products and services is characterized by great competition, innovation, and, as a rule, large marketing budgets. Marketing of banking services has its peculiarities, which are related to the characteristics of banking services and the fears of consumers related to money. Neuromarketing helps financial institutions understand their consumers better and learn their behavior and preferences to prepare an effective marketing strategy to promote banking products and services and attract new customers. The combination of neuromarketing and artificial intelligence makes it possible to deeply understand the consumer and predict their behavior depending on certain factors. This unique information allows banks to create personalized content and make advertising more effective. Websites are one of the most important channels of communication with consumers. On banks' websites, consumers get helpful information, learn about offers, and find solutions to meet their needs. A competently designed website allows banks to promote their products and services, generate consumer confidence, and motivate them to request further cooperation. To demonstrate the possibility of using AI-driven neuromarketing technology, I have analyzed the websites of four commercial banks of the Republic of Moldova. This study confirmed the feasibility of using artificial intelligence in combination with neuromarketing to more effectively promote banking products and services.*

Key words: *artificial intelligence, neuromarketing, neuromarketing research, ai driven techniques, promotion, banking products*

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1. Introduction

The banking services market is highly competitive, which motivates financial companies to seek new innovative approaches to meet customers' needs better and improve the efficiency of promoting their products and services to attract customers. In this case, neuromarketing opens up opportunities for a deeper understanding of customers and using the obtained information to achieve established goals.

Martin Lindstrom notes that without the use of neuroscience research, all marketing, advertising, and branding strategies are like playing the lottery, and all successful moves are nothing more than ordinary luck because 90% of the time the customer makes a choice unconsciously (M. Lindstrom, 2010)

In the digital age, the emergence of artificial intelligence, which can analyze large amounts of data, identify patterns, and make predictions, has provided new opportunities for the practical application of neuromarketing.

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Combining neuromarketing and artificial intelligence opens up new opportunities to increase promotion effectiveness in many areas, including the banking sector. Banking products and services have peculiarities related to their characteristics and consumer perception, so AI-driven neuromarketing techniques help better understand the target audience and develop profitable advertising campaigns based on a smart approach and personalized content.

2. The essence of neuromarketing

Neuromarketing is an interdisciplinary field that combines neuroscience research and marketing to understand how the human brain responds to marketing stimuli and the biological basis of consumer behavior. It uses neurobiological and psychological methods to analyze the brain's response to advertising, products, or other elements of marketing (N. Lee, L. Chamberlain, , A. J. Broderick, 2007; H. Plassmann, 2012). This new field solves the same problems as most marketing research, namely how a company should improve its product and increase the effectiveness of promotion and sales (Stephen J. Genco, 2013).

Neuromarketing research provides professionals with unique data to study customer responses to marketing stimuli at sensorimotor, cognitive, and emotional levels. The researchers use methods that are based on the study of body and brain responses.

1) Physiological tools

Physiologic instruments show changes in the autonomous nervous system over which the person has no direct or conscious control (blood circulation, blood pressure, heart rate, sweating, respiratory rate).

2) Neurophysiologic instruments

Neurophysiologic instruments directly measure the brain activity of consumers. They can be divided into two categories: those that measure the electrical activity and those that measure the metabolic activity of the brain.

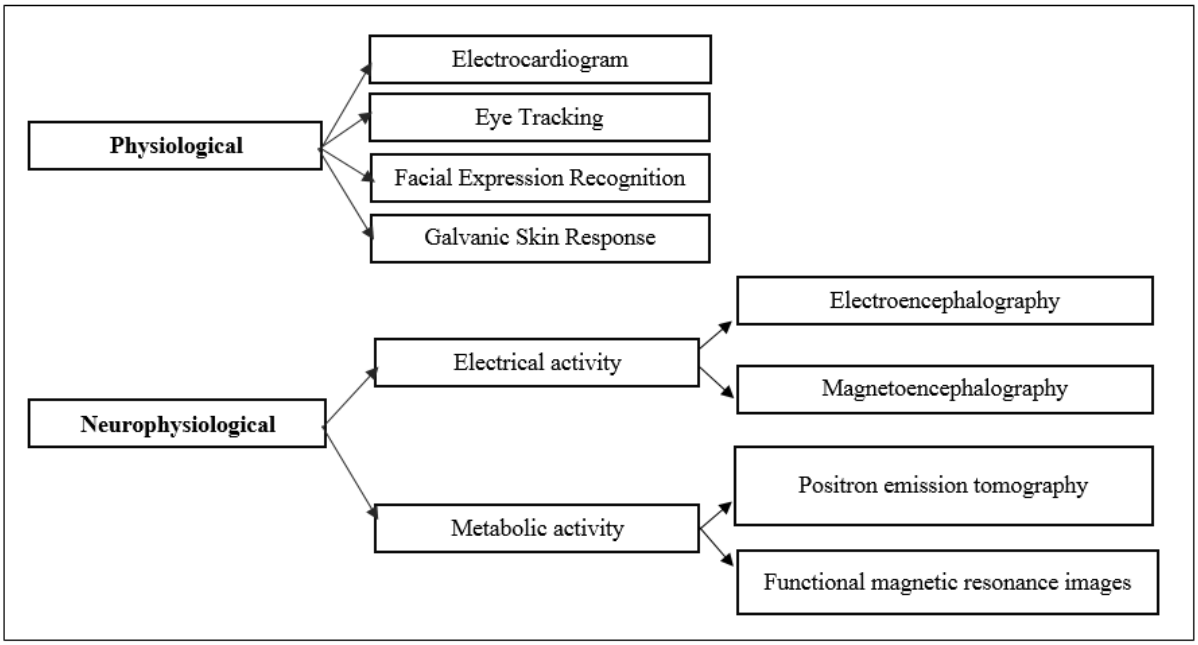

Figure 1. Methods used to conduct neuromarketing research

3. Features of marketing of banking services and the use of neuromarketing for their promotion

Banking products and services encompass a wide range of financial tools and offerings banks provide to meet the diverse needs of individuals, businesses, and organizations.

According to experts, banking services marketing is characterized by a highly competitive environment, challenging, expensive, and dynamic (Dr. Vivek Agrawal, 2023). Therefore, leading banks always look for innovative ways to attract and retain customers.

To develop a successful marketing strategy and build communication with customers, it is necessary to consider the characteristics of banking services and their perceptions by the consumer.

Features of banking services

- Intangibility. Banking services have no physical form; they cannot be seen, shown, or tasted before purchase.

- Perishability. Banking services are perishable; they cannot be stored or inventoried to sell when demand is high.

- Variability. The quality of banking services can vary significantly depending on who provides the service and when it is provided.

- Inseparability. Banking services are first sold and then produced and consumed simultaneously.

- Fiduciary responsibility. The responsibility that banks have to the customers who have used their services. Banking services can be difficult to understand for many consumers who don't have specialized skills. Therefore, when they go to the bank, they trust it as a professional to help them fulfill their needs.

It is also important to note that finance and money are sensitive subjects for everybody. According to the research, losing money activates the same part of the brain that is activated by physical pain (Wellcome Trust, 2007).

From this, financial decisions are not entirely rational, as people are pretty emotional about money.

Often, people don't say what they think, so neuromarketing research provides reliable information about a consumer's decision-making process.

Neuromarketing opens up attractive opportunities for effectively promoting banking products and services and attracting new customers.

1. Understanding consumer behavior through in-depth analysis using neuromarketing techniques.
2. Personalization of marketing efforts based on more objective information about consumer behavior.
3. Increasing memorability and engagement in advertising campaigns.
4. Testing and improving marketing strategies based on qualitative data
5. Optimizing content for short and long attention spans.
6. Improving the user experience when visiting a website or app
7. Creating a visible competitive advantage over other banks

4. Artificial intelligence and its application in neuromarketing

Artificial Intelligence (abbreviated as AI) is a field of computer science that involves the development of computer systems capable of performing tasks that typically require human intelligence. It includes machine learning, natural language processing, pattern recognition,

and decision-making (Kai-Fu Lee, 2018; S. Russell, P. Norvig, 2021)
With the ability to process large amounts of data, recognize patterns in brain activity and emotional responses, and make predictions, artificial intelligence is giving new opportunities for the development of neuromarketing.
The combination of neuromarketing and artificial intelligence represents a powerful tool for profoundly understanding consumer behavior and needs, improving product development, optimizing marketing strategies, making advertising more efficient, and creating personalized content.

The benefits of using artificial intelligence in neuromarketing:
- Deeper Consumer Insights. Understanding consumer behavior, decision-making, preferences, and emotions allows you to develop effective marketing strategies.
- Enhanced Personalization. Artificial intelligence's ability to analyze neuromarketing data enables the creation of more personalized marketing content that drives deeper consumer engagement and improves the effectiveness of advertising campaigns.
- Predictive Analytics. Predicting consumer reactions and behavior allows companies to anticipate changes in the market and adapt their strategies to meet new consumer preferences.
- Improved Product Development. Marketers can refine product design, features, and packaging using AI-enabled neuromarketing research data.
- Efficient Advertising. With personalized content and a better understanding of the target audience, companies can choose more effective marketing channels for promotion and create more impactful marketing campaigns.
- Improved Customer Retention: Personalized marketing campaigns increase customer loyalty and strengthen customer relationship
Artificial intelligence is already actively used in neuromarketing research methods such as facial recognition and emotion analysis, eye-tracking, electroencephalography, functional magnetic resonance imaging, and galvanic skin response.

5. Analyzing bank websites using ai driven neuromarketing technology
To show in practice the unique opportunities offered by the combination of neuromarketing and artificial intelligence, the websites of 4 banks from the Republic of Moldova were analyzed using EyeQuant's patented technology. The technology generates a visual simulation of how users perceive a commercial bank's website within 3-5 seconds of their visit.

Table 1. List of commercial banks and their websites that were analyzed during the study

Name of the commercial bank	**Website**
Banca Comerciala „MOLDOVA - AGROINDBANK" S.A.	www.maib.md
Banca Comerciala „Moldindconbank" S.A	www.moldindconbank.com
Banca Comerciala „EuroCreditBank" S.A	www.ecb.md
OTP Bank S.A	www.otpbank.md

Source: https://www.bnm.md/

The website is one of the important channels of communication with consumers. The effective website design ensures higher engagement and draws attention to specific products and phrases depending on the marketing objectives. Therefore, the task of the study was using artificial intelligence to predict which areas of the site attract the consumer's attention. This will allow us to determine the aspects of the website design that could be changed to improve the potential customer's perception of the information.

The analysis focused on the following indicators - cluttering the site design and distribution of attention. During the study, I analyzed the desktop versions of the sites.

1. Cluttering the site design

The clarity map comparative analysis showed how easily the considered banks' websites were perceived. The indicator was a scale from 0 to 100 (where 0 meant a very congested site, 100 was the best clarity, and 50 represented the average of the pages on the web). The results showed that Eurocreditbank's site is the most overloaded (its scores are below the average of the sites' online pages). Moldindconbank and OTP Bank websites are the clearest.

Figure 2. Cluttering the site design

Source: https://www.eyequant.com/

2. Distribution of attention & order of fixation frequency

- Distribution of attention. Perception Map shows what users will see on your website within the first few seconds of opening the page.
- The order of fixation frequency. With this analysis you can see the order of fixation frequency on your design. The size of each hotspot corresponds to the probability of fixation in this particular area. The larger the circles, the longer the time spent looking at it.

Figure 3. Distribution of attention

Source: *https://www.eyequant.com/*

Based on the obtained data, it is possible to summarize the banks' websites.

Moldova Agroinbank: the areas that the visitor will pay attention to in the first 3 seconds are the logo on the top hat, as well as the area including people (a woman with a child), the call to action, the name of the product and the first digits in the countdown counter, which showed how long the offer

would still be valid. The most visible areas are the top logo, people, and call to action. The visitors' attention is completely drawn to the left side of the site.

Moldinconbank: the areas to which the visitor will pay attention are the logo and part of the smaller one in the top hat of the site, partly the name of the advertised product on the banner, as well as the names of other products of the bank with links to the pages. The areas with the logo, menu, and product name P2P transfer will attract the most attention. The analysis shows that advertising the product displayed on the banner is ineffective, as its attention is drawn to other products shown on the banner below.

Eurocreditbank: the case study shows that the upper part of the banner is overloaded with information elements. The visitors' attention is scattered between the left and right parts of the site.

OTP Bank: The most attention visitors are attracted by the area, which has a symbol of money and a commission amount. Also, the product names "Deservire curentă", "Credite" and "Oferte recomandate" attract a lot of attention.

6. Conclusions

Artificial intelligence and neuromarketing significantly increase the effectiveness of promoting banking products and services. More profound research will enable us to understand the target audience better and learn its behavior, fears, and preferences, which allows financial companies to focus their marketing efforts on a personalized approach and to create their advertising campaigns in such a way as to get the desired reactions from consumers.

Understanding the consumer's sensory perception of advertising enables companies to develop effective designs of marketing materials and websites that will attract attention, be memorable, and create a desire to use the banking service.

Also, thanks to the possibility of analyzing big data and hidden consumer behavior patterns, financial companies have powerful tools for effective targeting, personalizing content in advertising, and working with hidden objections.

Predictive analytics and innovations in advertising strategies improve the quality of communication with the consumer and reduce marketing costs.

Thus, using artificial intelligence combined with neuromarketing helps increase financial companies' competitiveness in the market and improves the efficiency of promoting banking products and services.

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