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AI-SUPPORT ARCHITECTURE IN DIGITAL MARKETING

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Abstract. In recent years artificial intelligence (AI) has become an indispensable tool in digital marketing that is able to simplify human performance and expand business opportunities. This research considers the current AI (artificial intelligence) architectures in digital marketing, reflects on their impact on the activities of companies, and develops a range of optimization recommendations. The authors identify the most important tasks in evaluating existing solutions and their efficiency, as well as assess the possibilities of switching to AI technologies in business. Specific attention is also devoted to the examples of the neural networks implementation in marketing. As a result, the main components of the AI support architecture are identified, together with the further development prospects, with due consideration of current trends and ethical aspects. This research employs the practical achievements of marketing specialists and suggests a range of step-by-step strategies to optimize the business processes.

Keywords: digital marketing, artificial intelligence, information systems architecture, decision support system, business processes

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АРХИТЕКТУРА AI-ПОДДЕРЖКИ В ЦИФРОВОМ МАРКЕТИНГЕ

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Аннотация. Искусственный интеллект (ИИ) в последние годы стал незаменимым инструментом в цифровом маркетинге, упрощая работу специалистов и расширяя возможности для бизнеса. В данной работе произведен анализ текущих архитектур AI (artificial intelligence) в цифровом маркетинге, отражено их влияние на деятельность компаний, а также разработаны рекомендации по оптимизации. Рассмотрены наиболее важные задачи в оценке существующих решений и их эффективности, проанализированы возможности перехода к AI-технологиям на постоянной основе в работе бизнеса. Рассмотрены примеры использования нейросетей в маркетинге существующих компаний на рынке. В результате выявлены основные компоненты архитектуры AI-поддержки и предложены направления дальнейшего развития, учитывая действующие тренды и этические аспекты. Данная работа подчеркивает практическую ценность полученных результатов для специалистов по маркетингу, предлагая пошаговые стратегии по оптимизации своих бизнес-процессов.

Ключевые слова: цифровой маркетинг, искусственный интеллект, архитектура информационных систем, система поддержки принятия решений, бизнес-процессы

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Introduction

This research considers the AI support architecture in digital marketing. The topic proves to be highly relevant due to a wide range of factors. First of all, the rapid development of technology and the increase in the amount of analyzed data make artificial intelligence (hereinafter, AI) a significant tool that can facilitate human performance and expand business opportunities. Secondly, companies are experiencing an urgent need to adapt to new conditions, hence the need to comprehend how to use new technologies to optimize their business processes.

Despite the growing interest in the use of AI tools in all application areas, especially in marketing, a systematic analysis of AI support architecture is still lacking. Existing research has often examined individual aspects of AI use, such as process automation and data analysis. However, the overall impact of AI on marketing efficiency has not been addressed yet. This emphasizes the importance of exploring the topic in a more detailed way.

This paper aims to investigate the AI support architecture and its impact, as well as generate recommendations on how to construct an optimal architecture. In order to achieve this goal it is necessary to:

– analyze the current architecture of AI support in digital marketing;

– develop proposals for building an optimal architecture;

– evaluate the efficiency of AI implementation in digital marketing based on specific business examples;

– assess the possibility of transition from traditional digital marketing to digital AI market-

ing;

– examine the impact of AI tools produced on the competitiveness of companies.

This work represents specific practical value for marketing specialists. The results of this research can be implemented in development of marketing strategies and effective advertising campaigns. What is more, it provides grounds for optimization of business processes and discovery of new growth opportunities.

Materials and Methods

Open-source literature, including academic articles and specialized studies on digital marketing and AI, were employed in the course of this research. A systematic review of existing research on the application of AI in digital marketing was conducted. The authors refered to Scopus, Web of Science, Google Scholar, MDPI, elibrary, and others scientific databases. In addition, a qualitative analysis was used to explore the current architecture of existing companies. Regression analysis and other statistical methods helped evaluating the relationship between the use of new technologies and marketing performance. Comparative analysis was applied in identification of the most effective technological strategies.

Results and Discussion

The architecture itself consists of components, approaches, and methods required to solve business problems effectively. Table 1 shows what AI consists of and how the information is organized, collected and used.

Table 1. Main components of AI support architecture

№	Component	Features	Implementation prospects
1	Data	Structured data types	Tables, databases
		Unstructured data types	Text, pictures
		Internal data sources	Corporate databases
		External data sources	Open sources, social media
2	Machine learning models	Deep learning	Text and image assessment
		Reinforcement learning	Making relevant decisions in accordance with the context
3	Infrastructure	Cloud platforms	Google Cloud Platform (GCP)
		Local servers	High level of data security
4	Interaction interfaces	API	Integration in other apps
		Chatbots, assistants	Interaction with users

Each component should be observed in a detailed way. The first and most important component is data, information. They shape the basis of all artificial intelligence systems and have a direct impact on performance, efficiency, reliability, etc. Data can be grouped into structured and unstructured types. For instance, when the neural network is provided with analytical tables, product features, and customer purchases, it will draw relevant conclusions. Since texts and images cannot be subjected to structure, they are allocated to a different domain. AI draws information from a variety of sources, whether provided in advance or found on the Internet. Internal sources include corporate databases, for example chatbots with neural networks as user support (Abdullaeva, 2022; Song, 2024). If a prompt is written without setting search constraints, all open sources will be engaged.

Machine learning is based on models – prediction algorithms, and involves deep learning.

In this case, algorithms do not need to set the features or select strategies separately. Instead, they distinct the features themselves, so it becomes possible to analyze text and illustrations as well as sound files. In reinforcement learning, on the other hand, the system learns via the circulating information. This method is mainly used when the network has to produce some solution under given conditions (Evans, 2024).

Since AI systems are supposed to be based on something, i.e. servers or a network of servers. In companies where a high level of data security is required with high entry requirements, local servers are implemented. In this way, companies have full control over the data and apply their protection policy. Cloud platforms, on the other hand, utilize the servers available from the provider over the Internet. In order for AI systems to interact effectively with the user, a suitable interface is also required (Bratucu, 2024; Skatova, 2024; Sobolevsky, 2023).

It can be concluded that the AI architecture is quite realistic and clear to the user. The mechanisms themselves contain basic components, like any field of science that investigates computer programs. Speaking about the high pace of development, the system needs to be flexible and adaptable to new technologies, consumer behaviour, business demands, and an unstable external environment.

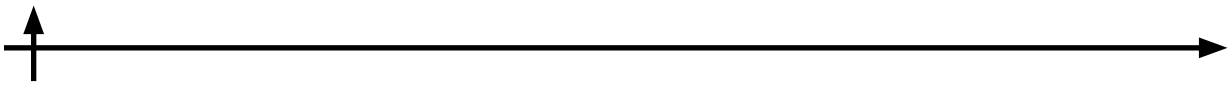
In order to propose an optimal AI support architecture based on the development trends, the following suggestions are presented in Table 2.

Table 2. Suggestions for optimal AI support architecture

№	Scope of application	Components
1	Data interaction	Centralized data storage
		Big data processing
2	Personalization of content	Machine learning algorithms
		Content generation with AI
3	Process automation	Chatbots and assistants
		Optimization of advertising campaigns
4	Predictive analytics	Customer behavior analysis
		Evaluating the effectiveness of advertising campaigns
5	Ethical aspects	Algorithm transparency
		Impact on people

Since data shapes the basis for AI, data unification should be centralized, i.e., a single source should be created to absorb other necessary sources. For example, open-access information: social networks, corporate websites, etc. In the future, it would increase the accuracy of forecasts and the efficiency of decision-making. Big data processing (for example, customer purchases over a certain period of time) is obviously needed in real time, because it allow getting information about customer preferences faster, respond in time, and adjust marketing strategies, as well as predict trends.

Content that is created by neural networks can, and should, be customized. It implies introducing algorithms that not only analyze customer behaviour but also draw recommendations of products for a specific user. In doing so, unique buyer experiences could be created. Content generation is already the responsibility of specialists, but here we can also add automatic content creation, so that the specialist only needs to check solutions (Florido-Benнtez, 2024; Sheikh, 2024). It is especially relevant with social media posts, email newsletters, advertisements, and even the entire marketing campaign. Logically enough, such measures would free



up time for other tasks, reduce the preparation of materials, and increase customer focus and alignment of content with the company's goals.

Automation of business processes through chatbots and neuro-assistants has not been familiar to users for a long time. There is currently an urgent need for widespread introduction of such assistance for the processing of standard questions to go faster. Thus, users will be able to get response regardless of the working hours of employees, meaning that the level of customer service will skyrocket. Automation is possible not only for basic and standard questions but also for managing full-fledged advertising campaigns. If AI participates in analyzing such strategies and campaigns in real time, it will be possible to respond quickly.

What is more, predictive analytics based on historical data can also be utilized more efficienty with the help of AI. For example, analyzing consumer behaviour in real time and based on their past behaviour will help to tweak strategies in advance. The same can be applied to the evaluation of marketing campaigns in general.

Since ethical aspects are an important factor in the development of new models. When AI algorithms are used, data processing should be transparent to the user. In this regard, additional regulations and standards are required to ensure that marketing solutions are not abused. Next comes the influence on people: both potential and existing. There is a need for accountability for emergent processes, development, and empowerment. After all, AI was designed to solve problems, not to replace humans (Goldybaev, 2023; Romanishina, 2024).

Taking into consideration all the above-mentioned areas of architecture suggestions, it is possible to increase the effectiveness of company marketing, improve customer loyalty, and boost profits. Artificial intelligence should become an indispensable tool for marketers and provide companies with a competitive advantage.

The main indicator of return on investment in marketing is ROMI (ROI in advertising). The formula uses marketing (advertising) costs and marketing (advertising) revenues. It is assumed that AI allows reducing advertising costs by using internal resources of the company, rather than resorting to specialists. At the same time, revenues increase by attracting consumers through personalized content, precisely tailored advertising (targeting), and so on.

According to a study conducted by McKinsey, if a company uses artificial intelligence in their marketing strategies and advertising campaigns, they see an average 30-50% increase in ROI.

The next important metric for marketing is the CCA (cost of customer acquisition). With AI, companies can also effectively allocate not only communication channels but also the funds, which reduces costs and improves the quality of incoming leads. In this case, the cost of engagement is reduced by about 20-30.

Targeting can also be analyzed more specifically. For example, AI algorithms can be applied to such ads so that users see only relevant and appropriate ads. As a consequence, this leads to a 20-30% increase in the click-through rate (CTR) of advertising. For example, at VTB, the introduction of AI to personalize marketing campaigns increased click-through rates by 50%, with conversions increasing from 2% to 6%. Artificial intelligence identified the user segment and presented pre-prepared solutions and offers in the ads (Gьndьzyeli, 2024; Liu, 2024).

If AI helps customize ads, it brings leads, and then the conversion rate increases. Out of the total number of visitors to the site, the number of those who took the required action should increase. Similarly, conversions increase by 15-25%.

An optimal AI architecture will enable more and more processes to be automated than just chatbots for technical support. Delegating business processes to AI reduces up to 30% of employee time. Now, with almost complete replacement of micromanagement, professionals can allocate time to long-term tasks. In addition, these chatbots handle up to 80% of the questions

that come from users. It increases customer loyalty because they get a quick and detailed response to their question.

AI-powered predictive analytics also helps achieve greater efficiency. Predictions become 70% more accurate and stable, which helps both to respond quickly to customer behaviour and the dynamic environment and to adjust existing marketing strategies to new realities.

Thus, the help of AI in increasing the efficiency of digital marketing is confirmed by growing performance. It is a matter of absolute necessity to capitalize on these opportunities to have a competitive advantage in the market. (Gupta, 2024; Islam, 2024).

In order to fully assess the possibility of transition from traditional to digital marketing, it is necessary to be well aware of the difference between these concepts. Digital marketing utilizes online and offline promotional methods, all digital communication channels, content, newsletters, social media, etc. In its turn, AI marketing utilizes artificial intelligence technology. With its help, employees can analyze data by predicting consumer behaviour, automate processes by delegating content creation to neural networks, and personalize interaction with users by managing advertising. It can be concluded that the concept of digital marketing is broader and includes AI marketing in its structure.

Development of an AI-marketing industry requires recognizing both the anvantages and challenges (Table 3).

Table 3. Advantages and challenges of adopting AI marketing

Advantages		Potential challenges	
Increased efficiency of advertising campaigns and marketing strategies	Improved customer experience and loyalty	Long-term investments in software and training	Ethical concerns over AI application

If a company has considered all the benefits and risks, and decided to reshape the marketing department in order to move from traditional marketing to digital AI marketing, it is possible to invite some existing strategies, or tips, that will facilitate this transition.

To begin with, a company needs to choose a department of business for AI to be integrated. It is important to bear in mind that a small project should be first subjected to such automation, for example, an advertising campaign for one product only. After the campaign is over, it should be verified on the basis of performance indicators to prove that the implementation has brought visible improvements. If optimization is successful, a full-scale implementation of AI can be considered in both advertising campaigns and other marketing strategies.

Successful automation also depends on the company's internal human resources. In order for the implementation to go smoothly and without interruptions, specialists should be engaged in working with AI, platforms, and software. It will help not only to speed up the process of employee adaptation but also to avoid mistakes at the beginning of interaction.

Here is a range of specific steps to achieving AI marketing adoption:

1. Identify business needs. This step requires analyzing what processes the company currently has in place and which can be improved in order to figure out what exactly needs to be automated, for intance, data analysis, prognosis, control, or process management.

2. Set goals and objectives. If a company is currently striving to increase the advertising efficiency it is necessary to select the appropriate indicators and metrics to track the performance. For example, it can be ROI (ROMI), CCA, CTR, or conversions. In order to boost personalization, it is crucial to see how AI can help with individualized user experience on a

specific example.

3. Selection of methodologies, tools, and technologies. According to the needs, AI technologies and platforms are selected to work with AI. For this purpose, the existing platforms are assessed, together with the implementation prospects and completeness of actions. Another aspect to consider is functionality of programs and their alignment with existing processes. In addition, the platforms and software should correspond to the funds for AI implementation.

4. Employee training. In order to be qualified enough to use the software, employees need to be trained. In addition to successfully using the functionality of the platforms, it is also important to understand how to apply these functions in practice and effectively generate development strategies.

5. Start with small projects. Before launching full scale, a small process should be facilitated as a trial. Having tested the implementation in practice, strategies and approaches should be adjusted to boost functionality.

6. Evaluate effectiveness. Using the selected metrics and indicators, the effectiveness of AI implementation should be evaluated. The metrics should be monitored in real time to ensure a quicker response to external chang.

Undoubtedly, the transition from traditional digital marketing to digital AI marketing is possible. If properly implemented, it can improve the efficiency of business strategies, adapt faster to changing market conditions, and attract more customers. However, the implementation process requires significant investment, respect to ethical concerns, and readiness to introduce radically new strategies.

It is difficult to overestimate the impact of artificial intelligence, including neural networks, on both the effectiveness of marketing and the overall competitiveness of a company. The use of AI in operations allows organizations to adapt faster to changes in consumer behaviour, optimize budgets, and increase revenues.

OZON, a large Russian marketplace, automated the advertising process via targeting. For this purpose, OZON created its own tools for AI advertising campaigns. Targeting became more accurate with higher personalization, resulting in the increased volume of orders to 100 000 per day. In terms of competitiveness, the marketplace has significantly strengthened its position among competitors. In addition, the company has implemented AI in logistics as well. With the help of AI, transportation logistics involves detecting optimal routes in order to reduce the distance. It helps the company save its delivery funds and promotes customer loyalty.

Process automation based on neuroassistants and chatbots is becoming more accessible for many companies. For instance, T-Bank has developed a voice assistant for the call centre, thus saving support service time by handling about 80% of incoming calls. As a consequence, the bank's customers spend less time on hold and become more loyal. As a result, the overall number of customers grows and T-Bank ranks among the leaders in Russia. Another example of a successful implementation of AI-based chatbots is the French brand Sephora. The company analyzes customers and provides individual product recommendations. The conversion rate on the website increased, and as a consequence, the company's revenue grew. Among competitors in the cosmetic industry, Sephora has definitely obtained a much stronger position.

Companies that are automating businesses themselves are also incorporating AI into their operations. For example, HubSpot, a platform that automates the marketing and sales department of customers, has improved customer interactions through AI. As a result, labour productivity has increased by 17%, customer offerings have expanded, and the site saw a new wave of user growth.

Embedding AI capabilities into companies' operations is changing the way they do business. In order to remain competitive, compasnies need to adapt to new realities: change products

and adjust approaches, etc. Methodological agencies that develop courses, including professional training, are currently receiving a large number of orders to adapt existing programa to AI capabilities. For example, programs for designer training already include modules on neural networks. In other words, consumer interest can only be maintained when a company keeps up with the growing demand and constantly changing trends.

Conclusion

Having reviewed the key components of AI support architecture and successful implementation cases, the authors developed an optimal structure for the application of artificial intelligence in various areas of digital marketing.

To sum up, the use of AI tools can improve marketing strategies and increase their performance indicators, thereby reducing advertising costs. What is more, the AI personalizes content and creates a unique user experience which results in higher consumer loyalty.

Digital AI marketing opens up new opportunities for businesses. Numerous examples of international and domestic cases prove that successful application of technologies brings in a wide range of benefits: growth in the number of customers, increased profits, stronger position in the market, and better competitiveness. In order to achieve this full-scale implementation, companies need to invest in technology, software, and training; reconsider smart strategies for building new business; and grow flexibility.

In fact, the more AI technologies are implemented in our lives, the more a qualified human professional is valued. Regardless of the number of challenges that these new realities of the market bring, the mankind has to acknowledge the change in order for the companies to maintain their competitiveness.

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