

Product Promotion in Internet Market

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The influence of Internet marketing has grown so much that producers must now reconfigure their businesses from offline operation to online presence simply to meet user expectations. Thus, the development of an intelligent information system for product promotion online is quite relevant. It may lead to automatized selection of competing products and advertising content, a subsequent increase in the effectiveness of advertisements, and a decrease in costs for Internet ad placements.

Internet marketing

intelligent data processing

information system

data flow

1. Introduction

Today, the most used e-commerce system is the B2C (Business-to-Consumer)—a system characterized by the sale of goods or services at retail directly to the consumer. This includes any retail agreement between legal entities and individuals, e.g., transactions between an online store and a customer, purchase of training courses from registered experts, and software rental ^{[1][2]}.

The development of information and communication technologies (ICT) and the digitization of business processes lead to the transformation of all aspects of enterprise activity: production, finance, management, marketing, and communication. At the same time, the marketing research environment is becoming simpler and more evolved thanks to the rapid spread of the Internet, the consumer is growing closer to the manufacturer and the seller, and effective feedback is easier to achieve in new conditions. Accordingly, marketing tools in today's environment must fully meet the requirements of the times, and technologies and strategies must be ahead of them. Research in the field of varieties, methods of application, combination, and formation of Internet marketing and digital marketing tools gain heightened relevance in today's turbulent environment.

The operation of any system is related to receiving, processing, and organizing large amounts of information. In turn, information and information support cover all aspects of economic activity and are integral elements of the existence and development of economic systems. Information systems ensure dynamic interaction between the company's personnel in the process of corporate planning and accounting, planning of advertising and sales promotion, management of products, sales channels, and direct sales. In addition, the marketing information system becomes one of the main elements of the process of development, adoption, and implementation of innovative marketing solutions and significantly affects its efficiency and quality.

Currently, scientists and marketers define digital marketing as the use of all possible forms of digital channels to promote a product or enterprise. The Internet, television, radio, and social media are all digital marketing tools. Like any other type of marketing, digital marketing helps to achieve the maximum result in an optimal way; that is, it enables saving money and avoiding unnecessary ineffective expenses.

Marketing analysis tools also do not remain stagnant because in the era of the fourth industrial revolution, that is, the era of the development and use of artificial intelligence, it is necessary to test new methods of influencing the consumer and new ways of selling an innovative product with a modified product life cycle model. Taking into account the fact that marketing research always results in a large amount of information and abstracting from discussions about the conflict of a person as a carrier of emotional intelligence and artificial intelligence incapable of the generation and accumulation of feelings and emotions, researchers conclude that any business entity today operates Big Data that are quite diverse in its structure. Its use in marketing analysis provides the management of business entities with objective and up-to-date information necessary for making management decisions and maintaining a favorable positioning on the market. However, due to the large number, lack of structure, and variety of data flows, it is quite difficult to manage such information.

Existing studies ^{[3][4]} on intelligent information systems for product promotion on the Internet have focused solely on the development of the systems themselves without considering the specifics of online advertising. That limitation restricts their practical use. This research aims to fill this gap by exploring the utilization of an intelligent information system for automating the selection of competitive products and advertising content, as well as assessing its impact on the effectiveness of online advertising.

Thus, the development of an Intelligent information system for product promotion online is quite relevant. It may lead to automatized selection of competing products and advertising content, the subsequent increase in the effectiveness of advertisements, and a decrease in costs for Internet ad placements.

2. Artificial Intelligence on Digital Marketing

Intelligent methods in information systems are used at various stages of development, e.g., data collection ^[5], detection of intrusions ^{[6][7][8][9]}, semantic networks and intelligent agents ^{[10][11]}, and decision-making ^[12].

Chen et al. ^[13] examined the effects of social media marketing on the intention to continue, participate, and purchase through social identification, perceived value, and satisfaction. Ivanov ^[14] presented the concept of building a digital marketing system based on the theory and practice of market segmentation, which takes into account many factors: geography, costs, time, and others. The proposed concept and method of assessing consumer demand in the target market is aimed at the prospective management of trading platforms using cloud technologies. Behera et al. ^[1] described a model for providing real-time personalized marketing information on recommended products to online and offline shoppers using a combination of sales strategies: up-selling, cross-selling, best-in-class up-selling, and meeting needs. Authors ^{[1][13][14]} analyzed Internet marketing strategies that

make it possible to increase the profit from sales. However, to process them, researchers need to have high marketing skills, and these processes also take a lot of time.

Dharmaputra et al. [15] investigated the influence of artificial intelligence (AI) on consumers' perception of the effectiveness of digital marketing outcomes. IBM SPSS and Partial Least Squares Structural Equation Modeling (PLS-SEM) methods were used to analyze the data collected through the online questionnaire. Perceived ease of use of AI has been shown to positively influence consumer convenience (CC) and cost minimization (CM) as an e-marketing outcome. In addition, the use of AI enables to improve the effectiveness of advertisements. However, there is no description in [15] of how the above advantages can be used by a marketer who does not have the skills of intelligent data analysis. Lo et al. [16] focused attention on empirical targeting models. Peruta et al. [17] employed content analysis to study the themes and formats of 5932 Facebook posts from leading US colleges and universities. The results show that there are content topics, such as athletics, that significantly increase engagement, while others tend to lower it. In addition, format, like user-generated content, is another factor that promotes engagement. Evert et al. [18] concluded that Facebook is perceived as an effective means of advertising by users of social networks, and it is strongly associated with the benefits of "customer relationship management" and "new product promotion". Kamboj et al. [19] have shown that Facebook advertising had a significant impact on the brand image and its value; both of these factors contribute to the increase in brand sales. Ertugan [20] examined whether customer participation in brand communities on social networks affects brand trust, brand loyalty, and brand creation. The obtained results confirmed that the motivation to participate in SNSs significantly affects customer participation, which, in turn, positively affects brand trust and brand loyalty. Both users and ads are represented using vectors created using natural language processing techniques that harvest ontological entities from textual content.

Determining the emotional state is important when analyzing user reviews. The most accurate models for determining the emotional connotations of a review are based on machine learning [21], deep learning [22][23], and recursive and convolutional neural networks [24][25]. For example, Basiri and Habibi [26] considered a deep model for using features of reviews based on content, semantics, sentiment, and metadata to predict the usefulness of a review. Kauffmann et al. [27] presented a general framework that uses natural language processing (NLP) techniques, including sentiment analysis, textual data analysis, and clustering techniques, to obtain new ratings based on consumer sentiment for various product characteristics. Wehrmann et al. [28] proposed an approach for the sentiment and language classification of tweets, whose framework includes a convolutional neural network with two different outputs, each designed to minimize either classification error or allocation assignment, or language identification. Hartmann et al. [29] developed the SentiCR, a sentiment analysis tool specifically designed for customer comments, based on seven different approaches to text analysis. El Alaoui et al. [30] considered a number of methods for the automatic classification of unstructured text based on a dataset from social networks, covering the main social media platforms, different sample sizes, and languages. Xu et al. [31] proposed a semantics-enhanced and context-enhanced hybrid joint filtering for event recommendations, and it combines semantic content analysis and the influence of a contextual event on the user's neighbourhood selection.

Hou et al. [32] proposed a video representation for advertising video classification, which aims to capture the hidden semantics of an unsupervised advertising video. Experiments on real advertising videos demonstrate that the proposed method can effectively differentiate advertising videos. Smetanin and Komarov [24] proposed an approach based on trust and semantic social recommendation to eliminate the problems of starting advertisements. Shokeen and Rana [33] employed the Latent Dirichlet allocation (LDA) method to determine the feedback for the analysis of Internet shopping sentiments. The LDA approach is designed to solve the issues of Latent semantic analysis (LSA) and Probabilistic Latent Semantic Analysis (PLSA). So, the authors of the works above [21][22][23][24][25][26][27][28][29][30][31][32][33] presented the results of the study of semantic text analysis for Internet advertising. However, none of them highlighted keywords based on the advertising text of the ad.

Nakata [34] proposed the generation of advertising texts based on keywords that take into account product information. Wei et al. [35] considered the automatic creation of an ad text to interest users in achieving a higher click-through rate (CTR). Here, the authors used an approach based on click-through rates to generate advertising text and create ad texts with high-quality user feedback. In general, the results of the research [34][35] have interesting implications. However, they are written in Japanese, which limits their distribution.

Wang et al. [4][36][37][38] focus on the problem of link prediction in heterogeneous social networks, where the types of relationships can be diverse and novel. The authors propose various approaches to address this issue: adaptive meta-learning methods for knowledge transfer across different types of relationships [4], Transferable Domain Adversarial Networks utilizing transferable knowledge to predict new types of relationships [36], and adversarial learning methods for knowledge transfer [37]. Furthermore, in [38], the evolution in networks is examined, highlighting the significance of diverse node evolution mechanisms and their impact on relationship prediction. Collectively, these studies provide a set of methods and approaches that enhance link prediction in complex social networks, considering their diversity and evolutionary aspects.

Cui et al. [39] presented an intelligent framework of an online marketing system to better facilitate online marketing. This system can help advertisers to reduce operating costs, improve operational efficiency, optimize ROI, and increase customer engagement. The disadvantage is that the system does not enable to attract new customers.

Kotsyuba et al. [40] analysed the principles of operation of existing software analogues, considered the methods of choosing a marketing strategy in the field of Internet business, and developed and tested algorithms based on user preferences. However, there is a lack of a systematic approach that facilitates methods of permanent work with customers.

Aguilar and Garcia [41] presented an intelligent system to manage advertising in social networks based on data analysis methods. Its drawbacks are a limited possibility of adding potential customers and a lack of intelligent advertising content.

In general, it can be noted that the works mentioned above mostly analyse the influence of users on Internet advertising. On the other hand, a number of works are considering the developed information systems for Internet

marketing (analogues) that have limited functions, displaying only statistical indicators of Internet advertising and paying insufficient attention to customers' attraction.

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