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Big Data-Driven E-commerce Advertising Push: Its Impact on Consumer Market Efficiency, Potential Risks and Regulatory Insights

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Abstract. With the development of digital technology and e-commerce industry, China's e-commerce platform advertising push under big data plays an increasingly important role in resource allocation and efficiency improvement in the consumer market. In the past, people's understanding of it was limited to "commodity promotion methods" and did not pay attention to its deep logic of affecting the consumer market. This article uses the case analysis method (analyzing the platform model) to conduct research. Specifically, it seeks to clarify the positive value of big data-driven advertising in optimizing supply-demand matching and enhancing market operation efficiency, while identifying potential issues such as information cocoons, algorithmic bias-induced unfair competition, and consumer privacy risks. Ultimately, the research intends to provide insights for regulating advertising push behaviors, thereby promoting the efficient, sustainable, and healthy development of the consumer market amid digital transformation.

Keywords: E-commerce industry, Advertising push, Big data, Market operation efficiency

1. Introduction

With the rapid development of digital technology, big data technology has been deeply integrated into the operation system of e-commerce platforms. Cohen [1] emphasized the extensive impact of big data on service operations, pointing out that the large amount of data collected by enterprises is completely changing the way services are provided and personalized. Among them, advertising push is the core means for the platform to connect merchants and consumers, and its operating model is undergoing significant changes. With the help of in-depth mining of user browsing trajectories, purchase preferences, length of stay and other behavioral data and dynamic analysis of machine learning algorithms, e-commerce platforms can achieve precise advertising. This change not only subverts the traditional "casting a wide net" consumer information dissemination model, but also has a profound impact on consumers' decision-making behavior and market resource allocation. Integrating big data into personalized advertising has attracted widespread attention in the academic community, Slavakis et al. [2] emphasized that in the era of data flood, the intelligent processing of massive data has opened up numerous opportunities for research and practical applications in the

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field of big data analysis, including personalized advertising. This basic perspective emphasizes the importance of using big data to effectively and efficiently create customized advertising content.

The present study aims to conduct an in-depth investigation into the multifaceted impacts of e-commerce platform advertising push on consumer market efficiency. By unpacking the mechanisms through which big data-driven push strategies influence supply-demand matching and market operation efficiency, the research seeks to validate their positive value in the digital transformation. Simultaneously, it will systematically identify some risks, including information cocoons, algorithmic unfairness, and privacy violations. Ultimately, this study provides theoretical insights and practical recommendations for regulating advertising push behaviors, with the goal of fostering a consumer market that is both efficient and equitable.

2. Literature review

2.1 Online advertising effectiveness: precision, authenticity, and consumer psychology

In order to play a role in the fiercely competitive digital market, online advertising first needs precise strategic positioning. Only clear objectives and advertising strategies that match users' needs can make advertising messages reach potential consumers accurately, improving conversion efficiency. Kangean et al. [3] adopted frameworks such as SOSTAC to analyze marketing communication strategies in a highly competitive e-commerce environment in Indonesia. Their research highlights the importance of strategic communication for achieving online brand differentiation and improving advertising effectiveness in a highly competitive market . Kalaivani et al. [4] help to understand consumer behavior forecasting by developing multi-process models based on Internet usage patterns. Their work shows that online shopping behavior can be predicted by analyzing users' interactions with online ads, thus informing e-commerce platforms to push targeted advertising strategies. Liu et al. [5] further introduced a multi-level visual analytics approach to better understand user behavior in online shopping advertising. Their innovative visualization tools enable detailed analysis of user behavior. These studies provide practical support for advertising strategic precision from different perspectives.

On the basis of precision strategy, content authenticity is the core of maintaining consumer trust and ensuring the long-term effectiveness of advertising. Kariyawasam et al. [6] discusses how deceptive online advertising distorts consumers' perceptions and can undermine trust. They highlight the changing legal environment aimed at regulating false advertising online and the need for effective consumer protection mechanisms in digital markets. In contrast, authentic advertising content significantly increases consumer engagement and trust Close [7], it shows that perceived authenticity can significantly affect consumers' participation and trust in advertising on e-commerce platforms. That is, credible and authentic advertising content can promote positive consumer reactions in the digital environment.

Advertising on different platforms has different mechanisms to influence consumers' psychology, but the core is to fit consumers' intrinsic needs and motivations. Fernandes et al. [8] examined the psychological mechanisms behind advertising on e-commerce platforms, revealing that advertising on Instagram influences purchase intention through utilitarian and hedonic shopping motives. Their causal studies suggest that emotional and functional appeals in social media advertising can be effective in driving consumer behavior. This is corroborated by the study of YouTube advertising effectiveness by Zhou et al. [9], who confirmed the strong association between YouTube advertising and sales growth. This effect is essentially the precise response of advertising to the psychological needs of consumers.

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Taken together, strategic precision points the way for online advertising, content authenticity builds trust, and a deep understanding of consumer psychology gives it the power to move people.

2.2 The advantages of big data in advertising strategies in different scenarios

The integration of big data and e-commerce platforms has greatly changed advertising strategies and spawned more targeted and efficient marketing methods. Chen et al. [10] argue that the rapid growth of e-commerce in the era of big data requires strategic development plans that leverage data-driven insights to drive platform growth. This highlights the importance of big data in shaping advertising approaches that are more in line with consumer behaviour and preferences. Ren [11] also highlighted that big data technologies have played a key role in advancing e-commerce. The quantity, speed, and variety of big data enable e-commerce platforms to analyze consumer data more effectively, which in turn promotes personalized advertising.

From the perspective of specific applications, the advantages of big data in advertising strategy are reflected in multiple scenarios. Yu et. al. [12] explored how big data can promote behavior-based price discrimination. This is a form of personalized advertising that customizes prices based on consumer behavior, an approach that exemplifies big data's potential to improve conversion rates and customer satisfaction by customizing advertising for individual consumers, and research has shown that this personalized pricing strategy is a natural extension of big data in e-commerce advertising. In addition, Yang et al. [13] analyze the role of information sharing in online platforms. Their findings suggest that driven by big data, demand information sharing benefits both platforms and suppliers, implying that advertising strategies can be optimized through strategic data sharing and analysis.

Big Data also brings significant advantages for advertising strategies in different e-commerce scenarios. In the context of cross-border e-commerce, Song [14] shows that big data analytics enhances various operational aspects. By analyzing consumer data and market trends, e-commerce platforms can design targeted advertising campaigns to reach international consumers more efficiently. This application reflects the role of big data in expanding advertising coverage and improving the accuracy of cross-border advertising. Xu et al. [15] also focused on platform recommendation advertising in cross-border e-commerce, analyzing how advertising characteristics affect consumers' purchase decisions with the support of big data.

While in the field of e-commerce in rural tourism, Zhao et al. [16] highlighted by SWOT analysis, that big data provides an opportunity for customized advertising strategies to cater to specific regional markets. With the help of big data, the platform can identify unique consumer needs and produce advertising content that resonates with local audiences, promote self-development and competitiveness. In addition, Chen [17] mentioned the design of e-government platform based on cloud computing in the era of big data, which can be used to develop complex advertising algorithms that enable personalized marketing while ensuring data security.

2.3 Case studies

Douyin e-commerce reconstructs the transaction logic of e-commerce by accurately matching demand and optimizing trust experience, and finally achieves strong growth, which effectively solves the core pain points of information asymmetry and weak trust perception in traditional e-commerce.

In the transaction of e-commerce platforms, the separation of information and entity objects, and the separation of goods and sales websites hinder the direct trust perception of product quality and

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interpersonal relationship Pavlou et al. [18]. The real-time interaction between anchors and consumers in live streaming e-commerce will promote consumers' understanding of products, reduce information asymmetry, and enhance consumers' purchase intention Xu et al. [19]

Douyin, as an emerging e-commerce platform, performed very strongly during the June 18 promotion in 2025. Douyin's e-commerce sales ranked third, second only to Tmall and JD.com.

The growth of Douyin e-commerce is not accidental, and there is a clear driving logic behind it. The core of douyin is“Interest e-commerce”, that is, accurately matching users' interests through content and actively stimulating users' potential consumption interests through algorithms. Different from the traditional e-commerce“ People looking for goods” search model, douyin implements the“Goods looking for people” recommendation model. The second is the data and push mechanism. Douyin accurately identifies which content users are interested in through user behavior data such as duration of stay, likes, comments, sharing, and following. Consumers are precisely touched and stimulated by the“Brushing video” scene without clear purchase intention, which greatly reduces the“Market discovery cost” of new brands and new products. Finally, the deep integration of live broadcasting and content ecology. Live streaming is the core engine of growth. Douyin accounted for nearly half of the 23.1 percent of sales from live streaming e-commerce, up from 14.0 per cent in 2021.

Chen et al 's research shows that high-quality customer experience can significantly enhance users' trust and attachment to influencers, and then positively promote purchase intention. At the same time, a comparative analysis of Douyin and Taobao platforms also shows that [20].

2.4 Risks and challenges of targeted advertising strategy in the big data age

With the support of big data technology, accurate advertising pushes rely on artificial intelligence and machine learning to achieve strategy upgrading, especially in the fields of User Behavior Prediction and personalized recommendation. For example, Li explores the application of various artificial intelligence algorithms such as supervised learning, deep learning, unsupervised learning, and reinforcement learning in Douyin's e-commerce strategy. These technological innovations aim to optimize marketing effects by accurately matching user needs, thereby improving user participation and advertising conversion rates, and laying a technical foundation for precise advertising push [21]. However, in the process of pursuing personalization and high transformation, targeted advertising is first faced with the core risks of data security and privacy protection. Zarova et al. [22] studied the legal situation in Russia and pointed out that with the increasing application of big data technology in the field of advertising, the existing legal system has been difficult to fully cover the needs of citizens' data rights and interests protection. This situation directly aggravates the tension between“Using data to achieve personalization” and“Protecting users' privacy”, and has become the core contradiction to be solved in the promotion of targeted advertising strategy.

Furthermore, consumers' privacy concerns are not only a potential risk, but also a key challenge that directly affects the effectiveness of advertising, which restricts the actual value of targeted push. Lina's [23] research clearly shows that privacy concerns significantly reduce consumers' perceived value of advertising, which in turn changes their purchasing decisions and other behaviors; especially in scenarios such as social media platforms, where data interaction is frequent, the negative impact of privacy anxiety on advertising effectiveness is more prominent. The findings support the idea that addressing privacy concerns is a prerequisite for maximizing the effectiveness of personalized advertising, and suggest that even with targeted technology, users' privacy concerns may not be mitigated.

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From the perspective of industry practice and technology exploration, as the core carrier of precise advertising push, the response and mitigation of privacy risk of recommendation system has always been the focus of the industry, related Research and technological innovation also continue to advance in this direction. In reviewing privacy-preserving recommendation technologies, Friedman et al. [24] provide an in-depth analysis of the actual impact of existing solutions on user privacy, emphasizing the need for targeted advertising to find a delicate balance between "Personalization advantages" and "Privacy risks", and advocate for the construction of recommendation models with greater privacy awareness [24]; Balebako et al. [25] and others focus on the application ecosystem level and provide ideas for addressing risks at the industry level.

At the same time, understanding and resolving user privacy concerns in data-driven innovation (DDI) has become a key challenge in building user trust and promoting sustainable development in the field of targeted advertising. Saura et al. [26] by combining a systematic literature review, interviews, and topic modeling for a comprehensive assessment, it is clear that in digital marketplaces, only proactively addressing user privacy concerns can effectively foster trust in targeted advertising and provide space for technological innovation and strategy optimization-if privacy concerns are ignored, it will not only lead to user resistance but also more likely restrict the entire field of precision advertising innovation and development.

It is worth noting that technological innovation is providing new possibilities for alleviating privacy risks and has become an important breakthrough direction to deal with the challenges of targeted advertising. Among them, the application of federated learning technology is a typical example, and the FEDGNN (joint graph neural network framework) proposed by Wu et al. [27] is a practical outcome in this direction: by supporting the decentralized training mode. The model training is completed without directly obtaining the user's original data, which effectively realizes the coordination of "Accurate recommendation" and "Data protection".

3. Conclusion

The traditional "wide net" advertising is not only expensive, but also easy to cause user aversion, resulting in resource misallocation and loss of market efficiency. The actual effect of targeted advertising needs rigorous academic inspection to guide the healthy development of the industry.

Precision advertising greatly reduces the information search cost of consumers and the trial-and-error cost of merchants, improves the accuracy and speed of transaction matching, and thus improves consumer surplus and merchant profit margins.

However, algorithmic bias and information cocoons still exist. Over-accurate push may imprison the consumer's vision, lead to"Information Diet" simplification, inhibit the accidental discovery of unplanned consumption. Second, there are privacy concerns. The improvement of efficiency is highly dependent on the in-depth collection and analysis of user data, which is in fundamental conflict with the growing privacy demands of users. Once data leakage or abuse occurs, it will seriously erode consumer trust.

The conclusion of this study is that e-commerce advertising push based on big data is undoubtedly a powerful way to improve the efficiency of market consumption at the technical and economic levels, and it realizes the optimal allocation of resources through precise matching. However, its effectiveness has a "critical point". Beyond this point, the marginal returns decrease, while the social costs (e. g. , the cost of privacy, the loss of social welfare) increase. Therefore, its effectiveness is highly dependent on a sound regulatory framework and ethical constraints.

Therefore, some suggestions are put forward to address these issues. For platform enterprises, data governance should be strengthened and "Data available but not visible" technologies such as

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privacy computing and federated learning should be adopted to realize the value of data under the premise of protecting user privacy. At the level of laws and regulations, we should deeply implement the personal information protection law and the network security law.

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