The Application of Big Data in the Marketing of Live E-Commerce Platform

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Abstract: With the rapid development of electronic commerce (e-commerce) and live streaming technology, Live Streaming Commerce (LSC) platform has be-come an important channel of modern retail industry. In this context, big da-ta technology provides strong support for the marketing of live streaming e-commerce. This paper discusses the application of big data in the marketing of LSC platforms, in-cluding user portraits, accurate recommendations, real-time data analysis and market trend prediction. By analyzing user behavior data, the platform can build a refined consumer portrait to realize personalized product recommendation and precision marketing. Real-time data analysis helps platforms optimize live content and engagement strategies to in-crease user engagement and conversion rates. At the same time, the predictive power of big data provides merchants with insights into market trends and optimizes supply chain and inventory management. This paper takes a well-known live streaming e-commerce platform as an example to explain how big data technology can help it improve marketing effect and realize business value. The research shows that the big data-driven marketing model is of great significance in improving the competitiveness of the platform and pro-moting the upgrading of consumption.

1 INTRODUCTION

The rapid development of information technology has brought Live Streaming Commerce (LSC), which is the product of the combination of information technolo-gy development and business model innovation (Wang et al., 2022). As a new business mod-el, LSC is rapidly emerging as an important part of the e-commerce field with its advantages of enhancing customer engagement, product promotion, transaction facilitation, and improving online shopping experiences (Luo et al., 2023). However, in the increasingly competitive LSC market, how to improve user experience, optimize marketing strategies and achieve accurate access has become the core issue that platforms and merchants need to solve. In this context, the wide application of big data technology has inject-ed new vitality into LSC.

Big Data is a term of massive data that have large volume and difficulties for fur-ther storing and processes (Sagiroglu et al., 2013). Big data, with its powerful data analysis and processing capabilities, can comprehensively improve the marketing efficiency of LSC plat-forms. In LSC, data are the key to provide customers with personalized service, which are collected when consumers are browsing shopping soft-ware (Akter & Samuel, 2016). From the collection and analysis of user behavior data to the application of intelligent recom-mendation algorithms, big data helps LSC to achieve accurate matching between users and products. Through the in-depth mining of user browsing, liking, sharing, purchasing and other behavioral data, the platform can precisely target user groups, insight into consumer preferences, and push personalized products and content, so as to meet customer needs, reduce marketing costs, and increase profits (Akter & Samuel, 2016).

In addition, big data also plays an important role in real-time monitoring and deci-sion optimization of LSC. By analyzing key metrics such as number of viewers, length of stay, transaction rate, etc., the platform can timely adjust marketing strate-gies and interactive content to increase user engagement and purchase intention. More importantly, the predictive power of big data can help businesses grasp market trends, layout in advance, and avoid risks (Zhanet al., 2018). At the same time, big data technology can also be used for traffic distribution and traffic monitoring in the broadcast room to maximize the marketing effect by dynamically adjusting the recommendation logic and optimizing the allocation of resources. For

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example, by monitoring the number of viewers, length of stay, transaction rate and other key indicators in the broadcast room, you can quickly find problems in the marketing link, optimize re-source allocation and interaction, and maximize the balance between revenue and user satisfaction.

Therefore, discussing the specific application of big data in the marketing of live e-commerce platforms not only helps to understand the operational logic of this emerg-ing business model, but also provides innovative ideas for the development of the industry. By reviewing and summarizing the literature, user positioning, content opti-mization and marketing effect evaluation of LSC platforms. Through the analysis of the deep integration of big data technology and live e-commerce marketing, it aims to provide a new perspective and reference for the development of the industry.

2 APPLICATION ANALYSIS OF BIG DATA TECHNOLOGY IN LIVE E-COMMERCE MARKETING

2.1 Collect and Analyze User Data

In practical applications, big data technology runs through the full link of live e-commerce marketing, helping enterprises to enhance their competitiveness in multiple links. First of all, In terms of data collection and analysis, users' behaviors and habits of watching live broadcast can be collected. For example, data can be collected and analyzed regarding the highest number of people watching live broadcasts, the time of day when a single consumer's viewing peaks, the duration of audience watching, and the types of live broadcasts that attract more viewers and keep them engaged for longer periods (Mendhe al., 2020). Secondly, in terms of product selection and inventory manage-ment, data analysis helps merchants understand the character-istics and market de-mand of hot products, so as to optimize product selection decisions and reduce the risk of lagging sales. Thirdly, real-time data monitoring can help anchors adjust their speech skills, interaction methods and live broad-cast rhythm in time, and improve user retention and purchase rate. In addition, for high-value user groups, LSC can develop differentiated operational strategies through big data analysis, such as providing exclusive offers or customized ser-vices, to improve user loyalty and re-purchase rate.

2.2 Precision Marketing Strategy

Through big data technology, artificial intelligence and user behavior analysis, LSC can achieve full-link optimization from user positioning to purchase trans-formation. The premise of precision marketing is a deep understanding of the target users (Li, 2022). First of all, the user portrait is constructed through multidimensional data analysis, including the data of live streaming platform, shopping plat-form and social media (such as viewing record, browsing behavior, shopping cart and search record), age, gender, region, interest preference, consumption power and other basic information. In terms of precision marketing, merchants can use user portrait data to push personalized ads and live broadcasts through social media or platforms to attract target users to participate in live broadcasts. At the same time, behavioral data such as purchase frequency and product preference are added. Group according to user profiles to develop differentiated marketing strategies. Secondly, by using the recommendation algorithm, it shows users personalized goods and content, which improves the conversion rate of purchase. For example, according to the user's interests to recommend suitable broadcast room, combined with collaborative filtering algorithm or deep learning technology, the user may be interested in the goods priority display, improve the click rate, through real-time analysis of live interactive data (such as bullet screen, likes, comments) to adjust the list of recommended goods, enhance the user experience. Finally, precise advertising will reach the target user group efficiently. LSC platforms could use social media, search engines, short video platforms and other channels to reach target users, and choose the best delivery time by analyzing the active period and buying habits of users.

2.3 Data-Driven Innovation in Live Content

Through data-driven, the live streaming industry is shifting from "experience oriented" to "data oriented", which not only improves the efficiency of content creation, but also helps platforms and creators achieve more accurate user reach and maximize commercial value. First, platforms should optimize the contents and innovation planning. It can help predict users' attention to certain types of contents based on data trends and plan live broadcast topics that will worsen market demand in advance to predict hot spots (Trabucchi & Tommaso, 2019). The platform can adjust the direction of content or the

form of engagement with real-time data feedback (e.g., user likes, comments slowing down). While the use of generative AI can help creators quickly generate scripts, footage, or scene designs. Secondly, the plat-form should improve the efficiency of promoting live content. The use of the intelligent recommendation algorithm, combined with user portrait and live con-tent label can help achieve accurate content recommendation. Which can improve the click rates and customer retention rate. By analyzing the conversion effect of promotion materials, it can help optimize the promotion content and channels. According to the user behavior of different platforms, the distribution policy is customized to achieve multi-platform linkage. For instance, short video clips are directed to live broadcasts. Finally, the platforms should optimize the income management system. The platforms by adjusting the advertising type and duration accordingly to the user's viewing behavior, this can help achieve the optimal advertising revenue. Predict user behavior, manage user lifecycle, and provide customized services to potentially high-value users.

2.4 Real-Time Feedback and Adjustment Mechanism

LSC uses big data real-time feedback and adjustment mechanism to optimize live streaming process, product display and user experience through data collection, analysis and rapid response to improve conversion rate and sales. The following is the specific practice and core links of this mechanism. LSC platforms collect real-time data in a variety of ways, including user behavior data such as viewing duration, interaction frequency, commodity click rate, and length of stay. Sales data such as real-time order volume, successful payment rate and merchandise inventory changes. Interactive data such as user questions, votes, or engagement in red envelopes. The above real-time feedback provides a variety of real-time adjustment strategies for LSC, including content adjustment, commodity adjustment and optimizing user interaction (Lu et al., 2002). First of all, by monitoring the audience's attention to a certain type of product in real time, the anchor can increase the introduction time of related products or adjust the focus of explanation, emphasizing the hot content. When the data feedback viewing time or interaction volume decreases, the LSC platform should adjust the rhythm of live broadcast (such as an increase in interactive links, lottery or new products). By giving quick responses to problems and timely adjust the interpretation or presentation, can help reduce user loss. Secondly, by having real-time monitoring of commodity click-through rate and conversion rate can prioritize the display of hot goods and avoids unpopular goods that may reduce user interests. When the data feed-back viewing time or interaction volume decreases, the LSC platform should ad-just the rhythm of live broadcast (such as increasing interactive links, lottery or new products). The use of real-time inventory monitoring to avoid user loss due to stock shortages, while improving conversion by replenishing or recommending replacement items. Finally, according to the real-time data of users, the anchor can thank high-value users by name or respond specifically to improve user stickiness. If an interactive session (like a raffle or a red envelope) does not work as expected, adjust the rules or make the reward more attractive.

3 THE INNOVATIVE WAY OF DIGITAL TRANSFORMATION OF LIVE BROADCASTING PLATFORM

3.1 The Need for Digital Transformation

Digital transformation is crucial for insurers in the current market environment. Through digitalization, customer experience can be enhanced, operational efficiency improved, risk management capabilities enhanced and market share expanded. For example, the use of big data and artificial intelligence technologies can enable accurate risk assessment and personalized product recommendations, thereby increasing customer satisfaction and loyalty (Matt et al., 2015). At the same time, com-petition in the live streaming industry is fierce, driving platforms to build differentiation advantages through technological innovation and service optimization (such as personalized recommendation). In addition, the entry of short video platforms, e-commerce platforms, and social platforms into the field of live broadcasting has intensified cross-industry competition, and also promoted live broadcasting platforms to improve their technical capabilities and content diversity.

3.2 Innovation Mode Analysis

LSC is a new retail model that combines live streaming and e-commerce, and its innovation is mainly reflected in technological innovation, mode

innovation and supply chain and logistics innovation (Filippetti, 2011). First of all, live streaming e-commerce not only uses artificial intelligence to generate personalized live content, virtual anchors or intelligent customer service, but also uses big data analysis to accurately recommend products for consumers. Secondly, celebrities are invited to live with ordinary people, and the personal influence of celebrities is used to attract traffic and facilitate transactions. Finally, LSC partners with local logistics or instant delivery services to achieve fast delivery after placing orders and improve user experience.

3.3 Ecosystem Expansion

The ecosystem of LSC is a complex network that integrates multiple resources, technologies and services to support the healthy development and continuous innovation of the LSC industry. By leveraging external resources, the ecosystem can be expanded in terms of marketing and promotion, related personnel training, and investment (Koenig, 2013). First, by extending live content to social media and short video platforms, implant brands in advertisements, and short video promotion can boost traffic. The use of community operations, such as the establishment of Wechat, QQ groups and other private traffic pools, to maintain user stickiness. Secondly, LSC can provide professional training courses for anchors, including expression skills, product recommendation ability, etc. By providing business operations support, data analysis and live streaming skills training can enhance consumers' acceptance and trust in live shopping. Finally, it supports the growth of start-ups and individual anchors, and the platform provides financial services to small and medium-sized merchants, such as loans and billing.

4 CASE ANALYSIS

4.1 Analysis of Typical Live E-Commerce Cases at Home and Abroad

As an important part of modern e-commerce, live streaming e-commerce plat-form shows diversified development models at home and abroad. This section will analyze the main characteristics, business models and development trends of typical live streaming e-commerce platforms at home and abroad.

Domestic live streaming e-commerce platforms, such as Taobao Live (Alibaba), are characterized by an early start, relying on Alibaba's strong e-commerce ecosystem, covering all categories of goods, and significant traffic advantages (Li & Dimitrios, 2006). Merchants and anchors cooperate closely and establish a mature supply chain system. The business model is used to promote the sale of goods through live broadcasting and earn transaction commission. Also, by providing advertising services to merchants can help better generate revenue. With its large user base, ecological closed loop, and strong data analysis capabilities, it has increased cooperation with content creators to improve the diversity of live content. Foreign live streaming e-commerce platforms, such as Amazon Live. It is characterized by a professional anchor team, focusing on commodity demonstration and evaluation. Relying on Amazon's global logistics and warehousing system. It has a business model of selling goods, earning commission and providing advertising services to brand owners with the help of broadcast room. With a strong global logistics network, a rich variety of goods and a mature consumer base, it will strengthen cooperation with brands and promote more high-quality goods.

4.2 Successful Case Marketing Supported by Big Data

The successful live e-commerce cases supported by big data provide a strong reference for the industry (Wright et al, 2019). In the study of foreign successful cases of Amazon live holiday shopping season promotion, every year during the holiday shopping season, Amazon launches live streaming events featuring professional streamers demonstrating electronics and lifestyle items. Big data is used to recommend the most popular promotional items through Amazon's purchase history and review data.

5 CONCLUSION

The application of big data has significantly transformed the marketing strategies of live-streaming e-commerce platforms, creating substantial value for platforms, merchants, and consumers alike. By analyzing user behavior data, platforms can generate precise consumer profiles, enabling personalized product recommendations and targeted marketing strategies. This data-driven approach enhances user experience while boosting product conversion rates and improving the operational efficiency of live-streaming sessions. Moreover, the

real-time analytics capability of big data empowers platforms to dynamically adjust their live-streaming strategies based on audience engagement metrics and sales performance, thereby fostering stronger user loyalty and maximizing traffic monetization. In addition to enhancing marketing outcomes, big data plays a critical role in supply chain optimization, inventory management, and market trend forecasting, providing merchants with data-driven insights to inform strategic decisions.

However, the integration of big data into live-streaming e-commerce is not without challenges. Issues such as data privacy concerns, algorithmic biases, and the high cost of technology implementation remain significant obstacles. Addressing these challenges requires ongoing efforts from platforms and businesses to ensure ethical, secure, and cost-effective use of data technologies. Looking ahead, the convergence of big data with emerging technologies such as artificial intelligence and blockchain will further advance the intelligence and precision of live-streaming e-commerce marketing. These innovations will not only enhance the efficiency of marketing operations but also accelerate the digital transformation of the retail industry and drive the evolution of consumer behavior.

The continuous development of big data technologies promises to empower live-streaming e-commerce with new possibilities, offering broader market potential and more profound impacts across the industry. In conclusion, big data serves as a powerful catalyst for the innovation and growth of live-streaming e-commerce. It not only improves marketing effectiveness but also reshapes the way businesses interact with consumers in a highly competitive digital economy. By leveraging the full potential of big data, live-streaming platforms can stay ahead in an ever-changing market, delivering superior value to all stakeholders involved.

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