Path Analysis of Data Empowerment Driving the Upgrading of China Consumer Market

Qingyang Hong[a]
Krieger School of Arts & Sciences, Johns Hopkins University, 555 Pennsylvania Avenue, U.S.A.

Keywords: Consumption Upgrading, Digital Economy, AI-Driven, Personalization, Regional Disparities.

Abstract: China's consumer market has exhibited a dual-track phenomenon since the post-pandemic era, characterized by consumption downgrade and upgrade simultaneously. Cost-effective products dominate among middle and low-income populations due to economic uncertainty and rising price sensitivity. In contrast, high-income demographics continue to drive premium consumption in sectors like health, technology, and education. Regional disparities also further fragment the market: Eastern China adopts selective downgrade strategies by leveraging mature digital infrastructure for data-driven precision marketing, whereas central and western regions face comprehensive expenditure declines due to weaker technological capabilities. This study investigates how Tmall and Douyin exemplify their algorithmic innovation to withstand these complexities, to drive consumption upgrades, and to sustain growth. Tmall commands 62.2% of China's e-commerce market with the support of its real-time behavioral analytics, dynamic ranking, and gamified engagement. It employs AI-driven recommendation systems to optimize personalized product matching during mega-events like Singles' Day. Douyin integrates user profiling and interest-tagging algorithms to revolutionize live-stream e-commerce and transform interactions into purchase intent, achieving $200 billion GMV by 2022. Findings underscore the pivotal role of AI in reconciling China's dual-track consumption trends, offering insights into the synergies between technological innovation and evolving consumer behavior in a stratified market.

SCITEPRESS
SCIENCE AND TECHNOLOGY PUBLICATIONS

1 INTRODUCTION

China's consumer market has undergone profound transformations and expansion over the last decade, driven by rapid digitalization, economic stratification, and evolving consumer preferences. As one of the leading forces, e-commerce penetration surpassed 40% in 2023, and platforms like Tmall and Douyin are emerging as the game changers in reshaping consumption patterns (Bain and Company, 2024). This growth is underpinned by integrating advanced data technologies, such as AI-driven recommendation systems and real-time behavioral analytics, into retail ecosystems, enabling unprecedented precision in understanding and influencing consumer behavior. However, the market exhibits a dual-track phenomenon: while premium consumption persists in sectors like health and technology, economic uncertainty and regional disparities have intensified cost-consciousness, particularly among middle- and low-income groups (Han, 2024; Chen and Li, 2020). Eastern regions prioritize high-quality and personalized consumption due to their mature digital infrastructure. Meanwhile, central and western areas face broader expenditure declines, exacerbating market fragmentation (Deloitte, 2023). To turn around this backdrop, algorithmic innovation has become a critical weapon for bridging these divides, optimizing resource allocation, and sustaining growth in this increasingly complex landscape.

Existing scholarship has extensively explored China's consumption downgrade-upgrade duality and regional imbalances (Han, 2024; Chen and Li, 2020), yet few studies systematically examine how digital platforms harness algorithmic tools to navigate these dynamics. Prior research emphasizes macroeconomic drivers of stratification, such as income inequality and savings rates, but overlooks the micro-level role of data-driven technologies in mediating consumer

[a] https://orcid.org/0009-0008-3889-1490

Hong, Q.
Path Analysis of Data Empowerment Driving the Upgrading of China Consumer Market.
DOI: 10.5220/0013849900004719
Paper published under CC license (CC BY-NC-ND 4.0)
In *Proceedings of the 2nd International Conference on E-commerce and Modern Logistics (ICEML 2025)*, pages 576-581
ISBN: 978-989-758-775-7
Proceedings Copyright © 2025 by SCITEPRESS – Science and Technology Publications, Lda.

choices (Bain and Company, 2024). Similarly, while regional disparities are well-documented, the intersection of digital infrastructure gaps and algorithmic efficacy remains underexplored (Deloitte, 2023). This study addresses these gaps by analyzing how leading platforms leverage AI-powered systems to reconcile market fragmentation, stimulate demand, and drive consumption upgrades.

The significance of this research lies in its timely examination of technology's role in sustaining China's digital economy amid shifting consumer priorities. Platforms compete to balance efficiency with hyper-personalization. At the same time, building in volatile markets, their algorithmic strategies offer insights into resilience. For instance, Tmall's AI recommendation engines, deployed during the 2024 Singles' Day Festival, boosted sales for brands like Midea by 22% through real-time personalization and dynamic resource optimization, while Douyin's interest-tagging algorithms achieved $200 billion GMV by aligning livestream content with user preferences. These cases illustrate how algorithmic precision transforms transient interactions into sustained purchasing intent, moving beyond transactional relationships to foster brand loyalty and recurring engagement.

Methodologically, this paper employs a mixed-methods approach, combining case studies of Tmall and Douyin with quantitative analysis of sales data, user engagement metrics, and regional consumption trends. By dissecting Tmall's AI-driven mega-event strategies and Douyin's short-video e-commerce model, the study highlights the operational mechanics of algorithmic systems, their impact on consumer behavior, and their implications for market cohesion. The findings indicate the need for scalable, adaptive technologies to address heterogeneity and advocate for enhanced data infrastructure in underserved regions to mitigate regional, economic, or behavioral disparities. Ultimately, this research contributes to the broader discourse on algorithmic innovation's capacity to harmonize efficiency, personalization, and inclusivity in China's evolving digital economy.

2 ANALYSIS ON THE CURRENT SITUATION OF CHINA CONSUMER MARKET WITH DATA EMPOWERMENT

In recent years, Chinese consumers have increasingly prioritized cost-effective products, reflecting a pronounced trend of consumption downgrade. This shift is linked to economic uncertainty, rising household savings rates, and heightened price sensitivity among consumers (Han, 2024). Despite the prominence of consumption downgrade, consumption upgrade persists in certain sectors. For instance, expenditures on health, education, and technology continue to grow, underscoring consumers' pursuit of high-quality lifestyles (Chen and Li, 2020). This "dual-track phenomenon" highlights the complexity of China's consumer market. Market stratification will become more evident. On one hand, high-income groups will continue driving premium consumption; on the other, middle- and low-income demographics will prioritize value-for-money, potentially prolonging the consumption downgrade trend (Sing, 2024).

Against the backdrop of consumption downgrade, regional consumer markets exhibit distinct coping strategies. In eastern China, consumers lean toward selective downgrade-reducing spending in certain categories while maintaining or increasing consumption in others. In contrast, central and western regions demonstrate comprehensive downgrade, marked by an overall decline in consumer expenditure (Bain and Company, 2024). This divergence further accentuates regional market fragmentation. Eastern coastal areas (e.g., the Yangtze River Delta and Pearl River Delta) boast higher economic development and household income levels compared to central and western regions. These markets are more mature, with consumers prioritizing high-quality, personalized goods and services (Deloitto, 2023).

The efficacy of data empowerment also varies regionally. Eastern regions, supported by robust digital infrastructure, have achieved notable success in data-driven precision marketing and supply chain optimization. Conversely, central and western regions lag due to insufficient data collection and application capabilities, leaving the full potential of data empowerment untapped. Strengthening data infrastructure in these areas could help bridge regional disparities (Zhang and Zhan, 2023)

Mintel's 2024 China Consumer Report likely highlights evolving consumer preferences and adaptive marketing strategies, noting that companies leveraging big data to analyze purchase histories and browsing patterns can deliver targeted advertisements for products/services matching consumer interests, thereby enhancing marketing efficacy.

Despite the prevalence of consumption downgrade, consumption upgrade trends persist in specific sectors. Data analytics allow businesses to identify these dynamic shifts and formulate agile

market strategies. For example, by tracking rising consumer interest in health and sustainability, companies can introduce high value-added products aligned with these emerging demands (Zipser et al., 2024). Data empowerment further fosters cross-industry data sharing and collaborative innovation. In service-oriented manufacturing, for instance, data sharing enhances supply chain management and reduces operational costs. Such synergies are particularly vital amid consumption downgrade, as collaborative resource integration strengthens overall competitiveness.

3 CASE STUDY

Personalized Recommendation Systems are intelligent algorithms grounded in user historical behavior, preferences, and interests, designed to provide tailored product or service recommendations. These systems analyze behavioral data (e.g., browsing duration, click patterns, purchase history) using machine learning and big data technologies to predict user preferences, thereby enhancing user experience and commercial conversion rates. Since 2020, personalized recommendation systems have been implemented through four key steps: data collection, feature extraction, model training, and real-time prediction, enabling efficient and precise recommendations. Both Tmall and Douyin use personalized recommendation systems to accurately depict users, thus improving consumers' purchasing power.

3.1 Tmall

3.1.1 Tmall's Dominance in China's E-Commerce Market

As the undisputed leader in China's e-commerce landscape, Tmall holds an unshakable position characterized by its overwhelming market share, strategic brand collaborations, and cutting-edge technological prowess. Dominating the B2C sector with a 50.8% transaction share and commanding 62.2% of China's total e-commerce market, Tmall's supremacy reflects not only consumer trust but also its integrated strengths in supply chain efficiency, logistics innovation, and technological infrastructure (Verot, 2024). The platform has emerged as a critical partner for brands, incubating over 4,000 brands in 2023 alone-many achieving annual sales exceeding RMB 1 billion-while solidifying its reputation as the gateway for both international and domestic brands to penetrate China's premium and luxury markets. Leveraging Alibaba's ecosystem, Tmall pioneers AI-driven innovations, such as personalized recommendation systems during mega-sales events like Singles' Day, which enhance user engagement and conversion rates. Its category dominance, particularly in fashion (30% market share) and beauty (25% market share), further cements its appeal to consumers and brands alike, making it the go-to platform for product launches and trendsetting (Wang, 2024). By synergizing scale, technology, and consumer insights, Tmall continues to redefine industry standards and maintain its leadership in an intensely competitive market.

3.1.2 AI-Driven Consumer Trends and Data Analytics in Tmall's 2024 Singles' Day Festival

During Tmall's 2024 Singles' Day Festival (October 14–November 11), AI recommendation systems were pivotal in shaping consumer trends and enabling data-driven decision-making. Concurrently, the festival revealed evolving consumer priorities, with heightened interest in green technologies and sustainable consumption, as evidenced by Tmall's first full-scale adoption of cloud computing to minimize environmental impact. Emerging brands also thrived, with a 70% surge in new brand registrations in Q3 2024 and selected newcomers achieving a 239% sales boost during the festival, signaling growing consumer openness to innovative products (Zhang, 2024). Tmall's AI recommendation systems were instrumental in decoding these dynamics. The platform delivered hyper-personalized homepages to users by analyzing vast behavioral datasets, streamlining product discovery, and boosting conversion rates. Beyond sales, these systems empowered brands to refine inventory management, pricing, and promotions while elevating user experience. As a barometer of China's consumption resilience, Singles' Day data revealed nuanced behavioral shifts, such as the rise of eco-conscious purchasing and preference fragmentation.
Tmall's AI recommendation system combines retrieval, ranking, and mechanism modules. Enabling precise, adaptive product matching during Singles' Day, driving user satisfaction and revenue growth (Chen, 2019). As AI technology evolves, its integration into e-commerce will unlock new frontiers in hyper-personalization and real-time market responsiveness. Tmall's AI recommendation systems are critical in enhancing user experience and driving sales during the Singles' Day mega-sale.

However, the large scale of real-time data and extreme system loads pose significant challenges to these systems, particularly in balancing real-time responsiveness with operational stability. For example, avoiding errors from lost, duplicated, or disordered data is vital because users' trust is built by maintaining data consistency and integrity across high-frequency streams. With millions of user actions and purchases per second, the real-time processing system of vast data streams demands instantaneous analysis for personalized recommendations. Solid architecture, load balancing, and fault tolerance are required to ensure system stability under peak loads. Resource allocation must dynamically match fluctuating demand without overprovisioning and prevent performance degradation from overwhelming user requests. These challenges demand solutions to ensure seamless performance and user satisfaction during the event.

Tmall's AI recommendation system-combining retrieval, ranking, and mechanism modules-enabled precise, adaptive product matching during Singles' Day, driving both user satisfaction and revenue growth (Chen, 2019). As AI technology evolves, its integration into e-commerce will deepen, unlocking new frontiers in hyper-personalization and real-time market responsiveness. Tmall's AI recommendation systems play a critical role in enhancing user experience and driving sales during the Singles' Day mega-sale. However, the sheer scale of real-time data and extreme system loads pose significant challenges to these systems, particularly in balancing real-time responsiveness with operational stability. Below is an analysis of the primary challenges.

3.2 Douyin

Douyin has rapidly ascended since its launch in 2016 and has become China's leading short-video platform. It has profoundly reshaped the landscape of social media and e-commerce. Douyin's evolution and market influence have not only transformed users' content consumption habits but have also created innovative marketing and sales channels for brands and businesses. Since 2019, Douyin has emerged as a formidable marketing platform through AI-driven ad targeting and precise user profiling. Its short-video e-commerce model showcased its significant potential in the sector by achieving over $200 billion in Gross Merchandise Volume (GMV) by 2022. The global expansion strategy of Douyin has also yielded remarkable success. Its international counterpart, TikTok, amasses hundreds of millions of users worldwide and replicates the same strategy globally. By analyzing user behavior and interest tags, Douyin delivers hyper-personalized content recommendations, which enhance user engagement while equipping brands with efficient marketing tools. For instance, live-stream hosts leverage interest-based tagging to recommend relevant products during broadcasts, significantly boosting sales conversions. Douyin's live-streaming feature has revolutionized traditional e-commerce by breaking the fourth wall between the host and viewers. As a consequence, enabling real-time interaction allows the host to showcase the product features and stimulate purchase intent vividly. The platform's short-video and live-stream formats offer brands novel marketing avenues, enabling targeted outreach through creative content, particularly resonating with younger demographics. Its multi-channel network (MCN) model has garnered significant industry attention, fostering collaborations between content creators and brands. Douyin's rapid growth has not only solidified its dominance in the short-video market but has also spurred industry-wide innovation, with competitors emulating its successful model, thereby accelerating market maturity and diversification (Xu et al., 2019). User profiling and interest tag matching on Douyin play pivotal roles in e-commerce marketing. By leveraging precise user profiles and interest-based tagging, livestream hosts can effectively attract target consumers and drive sales growth (Koç, 2023). Below is an analysis of how interest tags function in e-commerce marketing and their practical applications.

Douyin constructs detailed user profiles by analyzing behavioral data such as viewing history, interactions (likes, comments, shares), and purchase records. These profiles capture demographic attributes (age, gender, geographic location), spending habits, and nuanced preferences through interest tags (e.g., "beauty & cosmetics," "fitness," "culinary"). Interest tags are algorithmically generated by analyzing user behavior-for instance, frequent engagement with specific video categories or participation in related topic discussions prompts the system to automatically assign corresponding tags.

The primary function of interest tags lies in enabling precision marketing. By aligning content and product recommendations with user tags, livestream hosts can deliver hyper-targeted promotions. For example, users tagged with "beauty & cosmetics" are prioritized for livestreams or ads featuring makeup tutorials or skincare products. This targeted approach not only enhances user engagement and purchase intent but also reduces ad waste by minimizing irrelevant exposure (X. Wang & Cao,

2024). Furthermore, Livestream hosts on Douyin tailor their content to align with users' interest tags, creating highly resonant experiences. For instance, users tagged with "culinary interests" may encounter livestreams showcasing gourmet snacks or kitchen gadgets, accompanied by live cooking demonstrations. By analyzing these tags, hosts craft interactive segments-such as Q&A sessions or prize giveaways-to amplify engagement and purchasing intent. This precision-driven approach directly influences consumer behavio, content aligned with user interests accelerates purchase decisions by reducing cognitive friction. Moreover, accurate tag matching fosters platform trust and loyalty, encouraging repeat participation in livestreams and sustained purchasing activity. Ultimately, interest tags serve as a dual catalyst-empowering hosts to refine marketing tactics while deepening user-platform relationships through relevance and reliability (Liu and Liang, 2025).

4 CONCLUSION

Through research, this paper concludes that China's consumer market is marked by a dual-track dynamic, where consumption downgrade and upgrade trends coexist. Economic pressures drive cost-conscious behavior among middle- and low-income groups, yet demand for premium products in health, education, and technology persists, reflecting deepening market stratification and regional disparities. Eastern regions emphasize selective, high-quality consumption supported by robust digital infrastructure, while central and western areas grapple with broader expenditure declines. Amid this complexity, algorithmic innovation has become a linchpin in bridging gaps and reshaping consumption patterns.

Platforms like Tmall and Douyin exemplify this transformation. Tmall's AI-driven recommendation systems, showcased during Singles' Day, optimize real-time personalization, dynamic exposure, and gamified engagement to boost sales and user satisfaction. Douyin leverages interest-tagging and livestream marketing to convert user interactions into purchase intent, achieving remarkable GMV growth. Both platforms illustrate how algorithmic precision addresses consumer heterogeneity, balancing efficiency with hyper-personalization.

Looking ahead, advancements in AI, edge computing, and federated learning will further enhance real-time processing and adaptive capabilities, enabling platforms to manage extreme data volumes during mega-events while maintaining stability. Strengthening data infrastructure in underdeveloped regions could mitigate regional disparities, fostering inclusive growth. Sustainability will likely gain prominence, with AI optimizing green supply chains and cloud computing minimizing environmental impacts, aligning with rising eco-conscious consumer preferences. Douyin's global expansion and integration of immersive technologies (e.g., AR/VR) may redefine cross-border e-commerce, while Tmall's ecosystem could pioneer AI-hardware co-design for seamless omnichannel experiences.

However, challenges persist, including data privacy concerns, algorithmic transparency, and the need for agile resource allocation amid fluctuating demands. As competitors emulate these models, continuous innovation will be critical to sustaining leadership. Ultimately, the synergy between algorithmic agility, consumer insights, and infrastructure resilience will shape China's digital economy, reinforcing its capacity to navigate evolving market dynamics while driving global e-commerce innovation.

REFERENCES

Bain & Company & Kantar Worldpanel, 2024. Changing with the times: New consumption trends of FMCG industry in China: *2024 China shoppers report, Series 2*.https://www.bain.cn/pdfs/202412121036451898.pdf.

Chen, J., Li, H., 2020. Development prospect of China's new consumer economy in the new situation—Concurrently discussing the impact of COVID-19. *Open Journal of Business and Management* 8(3), 1201–1205.

Chen, Q., 2019. How does the recommendation system work on TMall? *Alibaba Cloud Community.* https://www.alibabacloud.com/blog/595335.

Deloitte, 2023. 2023 *White paper on consumer insight and market outlook in China.* https://www2.deloitte.com/content/dam/Deloitte/cn/Documents/consumer-business/deloitte-cn-cb-consumer-insight-zh-230118.pdf.

Han, S., 2024. Analysis of MUJI's development strategy in China under the background of consumption downgrade. *Deleted Journal* 12(1), 36–39.

Koç, B., 2023. The role of user interactions in social media on recommendation algorithms: Evaluation of TikTok's personalization practices from user's perspective. *Istanbul University*.

Liu, H., Liang, J., 2025. A study on the factors influencing Chinese costume consumers utilizing live streaming platforms to purchase products: A case study of Douyin. *Journal of Theoretical and Applied Electronic Commerce Research* 20(1), 38.

Mintel, 2024. Consumers in China in 2024: Towards diversification.

Sing, C.K., 2024. China consumer is epitome of delayed gratification. *Reuters.* https://www.reuters.com/breakingviews/china-consumer-is-epitome-delayed-gratification-2024-11-04/.

Verot, O., 2024. What is Tmall? China's #1 e-commerce platform. *Marketing China*. https://marketingtochina.com/tmall-the-ultimate-guide/.

Wang, G., 2024. The global growth of e-commerce and China's leading position-Chinese digital marketing. *Jademond*. https://www.jademond.com/magazine/global-e-commerce-made-in-chinas/.

Wang, X., Cao, S., 2024. Harnessing the stream: Algorithmic imaginary and coping strategies for live streaming e-commerce entrepreneurs on Douyin. *The Journal of Chinese Sociology* 11, 9.

Xu, S. et al., 2019. Research on business model innovation of short video enterprises from the perspective of community economy—Taking "Douyin" as an example. *Atlantis Press*.

Zhang, S., 2024. LIVE BLOG: Alibaba's 2024 11.11 global shopping festival. *Alizila.* https://www.alizila.com/alibaba-2024-11-11-live-blog/.

Zhang, Y., Zhan, R., 2023. Does online retailing narrow the regional economic gap? -Empirical analysis based on the data of prefecture-level cities in China. https://fddi.fudan.edu.cn/cd/38/c19046a642360/page.htm.

Zipser, D., McKinsey & Company, 2024. China brief: The truth about Chinese consumption. https://www.mckinsey.com/cn/~/media/mckinsey/locations/asia/greater%20china/our%20insights/the%20truth%20about%20chinese%20consumption/mckinsey%20china%20brief%20the%20truth%20about%20chinese%20consumption%20en.pdf.

SCITEPRESS
SCIENCE AND TECHNOLOGY PUBLICATIONS