Practices of Artificial Intelligence Technology in Promoting Innovation of E-commerce Business Models

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Abstract: Amid the surge of the digital economy, e-commerce has gradually shifted from an era of traffic-driven growth to an era of deep value creation. As the core driving force of a new round of technological revolution, artificial intelligence (AI) technology is reshaping the value chain and business models of the e-commerce industry with unprecedented depth and breadth. Drawing on the practical experience of leading enterprises such as Tmall, JD.com, and Pinduoduo, as well as representative industry cases, this paper systematically examines the concrete practices and major outcomes of AI-enabled and AI-driven innovation in e-commerce business models from 11 aspects across three domains: reshaping core e-commerce operational processes, fostering new e-commerce business models, and constructing a new industry landscape. It is hoped that this study can provide reference for further promoting the digital transformation and high-quality development of e-commerce enterprises.

***Keywords*:** artificial intelligence; e-commerce; business model innovation

1. Introduction

With the development of the times, the digital economy has become an important growth engine supporting China's economic development. By the end of 2024, the value added of core digital economy industries accounted for 10% of GDP. As an important component of the digital economy, e-commerce has also entered a new stage of development, accelerating its transformation from "traffic competition" to "value competition." In particular, the rapid development of artificial intelligence (AI) technology has not only provided entirely new tools for e-commerce development, but has also continuously promoted reform and innovation in e-commerce business models. Driven by AI technology, business models such as personalized recommendation, intelligent supply chains, digital human live streaming, and intelligent cross-border commerce have been fully integrated into the entire process of e-commerce development, enabling the industry to achieve new leaps from "people searching for goods" to "goods finding people," from "search-driven" to "scenario-driven," from "experience-driven" to "data-driven," and from "price-based competition" to "value innovation."

Against this broader backdrop, the shortcomings of traditional e-commerce business models have become increasingly evident, with severe homogeneous competition, rising traffic costs, and prominent bottlenecks in operational efficiency. Vigorously developing artificial intelligence has become an inevitable path for e-commerce platforms and enterprises. During the 2025 "Double 11" shopping festival, platforms such as Tmall and JD.com successively launched AI shopping assistants, marking the transition of "Double 11" from a stage dominated by "price wars" and "traffic wars" to a new stage characterized by "technology competition." Based on this context, from the perspectives of technological empowerment, scenario innovation, and ecosystem upgrading, and in combination with representative industry cases, this paper explores the practical pathways and value outcomes of artificial intelligence technology in promoting innovation in e-commerce business models, with the aim of offering exploratory insights for the industry.

2. AI Technology Empowerment to Optimize Core E-commerce Operational Processes

Promoting precise and efficient matching between supply and demand is the core competitive advantage of e-commerce compared with traditional commerce. By collecting massive amounts of data and conducting data mining and analysis, AI technology has reshaped the operational logic of the entire product circulation chain and significantly improved operational efficiency.

2.1 Intelligent Recommendation Systems: Achieving Precise Matching of "Goods Finding People"

Personalized recommendation is a crucial link for achieving sales conversion in e-commerce. Traditional e-commerce business models have mainly adopted a "people searching for goods" approach, which generally requires users to actively

search and leave behavioral traces before backend systems intervene to conduct targeted recommendations, resulting in a certain degree of lag. At the same time, such models are insufficient in capturing changes in user demand, leading to relatively low conversion rates. Intelligent recommendation systems built on AI integrate multidimensional data such as users' browsing history, purchase records, search behavior, and evaluation feedback, and use machine learning and big data models to construct user profiles, deeply analyzing users' current and potential needs. This has substantially improved recommendation effectiveness and significantly increased conversion rates. At present, major domestic e-commerce platforms such as Taobao and JD.com have launched AI-based intelligent recommendation systems to deeply analyze the matching between their products and user needs, resulting in notable improvements in new product promotion rates and repurchase rates.

2.2 AIGC Visual Marketing: Innovating Content Creation and Presentation

Product display is a key factor influencing user decision-making. Under traditional models, e-commerce has mainly relied on combinations of images and text, video displays, and live-stream clips. While these approaches have achieved certain results, they also suffer from high costs and limited creativity. Leveraging AIGC (Artificial Intelligence Generated Content), generative adversarial networks (GANs) and diffusion models can generate unlimited creative content while significantly reducing design and marketing costs. For example, Tmall has applied AIGC to collaborate with more than 20 top-tier celebrities and release multiple popular IPs, enabling users to directly interact with celebrity AIGC content, attracting a large number of fans and increasing attention. AI virtual try-on functions, based on virtual simulation technology, address the pain point of "what you see is not what you get" in online shopping and effectively reduce clothing return rates. Taobao's "Lubban" design platform can generate 8,000 posters per second, meeting the massive demand for marketing materials during major promotional events while significantly lowering production costs.

2.3 Intelligent Customer Service Systems: 24-Hour Intelligent Support and Service

With the continuous expansion of e-commerce transaction scale and the diversification of user demands, traditional manual customer service faces challenges such as insufficient staffing, high costs, slow response times, and limited service coverage, making it difficult to effectively meet shopping guidance needs. With the rise of artificial intelligence technology, the application of natural language processing (NLP), knowledge graphs and knowledge bases, machine learning and deep learning, and multimodal interaction technologies to train AI customer service systems can effectively play an auxiliary role and build a 24-hour, all-day service ecosystem. AI systems trained on large volumes of data can better understand user intent and provide more effective shopping guidance. At present, platforms such as JD.com, Taobao, and Pinduoduo have launched their own AI customer service systems, such as "Quick Butler" and "Jing Xiaozhi," which can handle approximately 70% of common inquiries, significantly reducing customer service pressure and markedly improving response speed. At the same time, these systems provide full time-period coverage, playing an especially important role during late-night hours after 11 p.m. and early morning periods when human customer service is unavailable, with favorable order feedback.

2.4 Intelligent Supply Chains: Reducing Costs, Improving Efficiency, and Enhancing Competitiveness

The supply chain is one of the core competitive strengths of e-commerce. By leveraging artificial intelligence technology to learn from massive datasets and establish algorithmic models for predictive analysis, route optimization, and dynamic scheduling, data-driven supply chain management can comprehensively enhance the intelligence and refinement of supply chain operations. This significantly improves inventory turnover rates and delivery efficiency, promotes cost reduction and efficiency enhancement, and strengthens enterprises' core competitiveness. For example, JD Logistics has focused on supply chain model design, network planning, traffic flow path planning, and intelligent planning systems, deeply integrating AI technologies such as demand forecasting and intelligent product selection to substantially improve supply chain performance. Meituan has developed an AI-driven unmanned delivery system, integrating drones, unmanned vehicles, and robots to form an autonomous delivery network, greatly improving delivery and operational efficiency and enhancing user experience.

3. AI Scenario Innovation: Fostering New E-commerce Business Models

Artificial intelligence technology comprehensively empowers the e-commerce industry by breaking physical and temporal constraints, reshaping user interaction modes, and expanding service boundaries. It has given rise to new application scenarios and business models such as live-streaming commerce, intelligent cross-border e-commerce, and C2M reverse customization, injecting new momentum into industry development.

3.1 Digital Human Live Streaming: Delivering a New All-Day Experience for Audiences

With the development of the times, live-streaming e-commerce has become a major engine driving the growth of the e-commerce industry. Internet influencers such as "Da Xiao Yang Ge" and Li Jiaqi often generate sales exceeding hundreds of millions of yuan in a single live session, greatly promoting the development of the e-commerce sector. However, traditional human live streaming also faces shortcomings such as high labor costs, insufficient creativity, and limited streaming duration. With the advancement of artificial intelligence technology, digital human live streaming has emerged accordingly. Through technologies such as motion capture, graphic rendering, and speech synthesis, digital human anchors are created to simulate human movements and voices for live-stream selling, and can interact and communicate with users. The core advantages of digital human live streaming lie in its ability to operate continuously for 24 hours without time constraints, precisely execute marketing strategies, optimize live-stream scripts and product combinations through data analysis, and avoid the public opinion risks and work–rest limitations associated with human anchors. For example, on December 2, 2025, JD.com announced the free development of digital human live-streaming functions. The number of registered merchants has exceeded 10,000, with nearly 20,000 live sessions launched and a total streaming duration surpassing one million hours, demonstrating significant results from large-scale application.

3.2 Intelligent Cross-border E-commerce: Addressing Challenges in Global Operations

With the full implementation of customs closure in the Hainan Free Trade Port, the costs and logistics efficiency of cross-border e-commerce will be further reduced, creating a favorable policy environment. However, cross-border e-commerce also faces multiple challenges, including language barriers, compliance risks, and logistical complexity. Leveraging artificial intelligence technology enables automatic multilingual translation and intelligent compliance checks, helping to optimize global supply chains and improve efficiency. For example, within existing systems, AliExpress's AI translation tool supports automatic switching among more than 100 languages, enabling real-time localization of product detail pages and communication content, thereby effectively improving operational efficiency and product conversion rates. By relying on various AI-based intelligent compliance inspection tools such as LinkSafe, Ruiguan, and Maifeng Compliance Cloud, sellers can conduct comprehensive product compliance checks simply by entering a single link, significantly reducing product delisting rates. The AI-native application Accio launched by Alibaba International Station provides one-stop services for bulk procurement and customization of Chinese products for cross-border e-commerce.

3.3 C2M Reverse Customization: Building a Demand-driven Production System

C2M, translated as consumer-to-manufacturer, is a flexible production and sales model characterized by "production based on demand." Under traditional business models, production and sales, as well as inventory and demand, cannot be precisely matched, which may lead to disconnection phenomena. Through artificial intelligence technology, by collecting, aggregating, and analyzing data such as user reviews, search keywords, and social media sentiment, user demands can be accurately identified, and potential market needs and directions for product improvement can be recognized. At the same time, external demand data can guide factories to conduct flexible production, reduce inventory costs, and establish a business model of "user demand–platform aggregation–factory production," thereby promoting effective alignment between production and consumption. For example, Pinduoduo aggregates massive volumes of price-sensitive demand and actively promotes the C2M cooperation model with factories, enabling them to smooth manufacturing cycle troughs, clarify expectations, improve efficiency, and transmit clear signals upstream to reduce raw material costs. This is also a key factor enabling Pinduoduo to achieve structural low pricing.

4. AI-driven Ecosystem Upgrading: Building a New Landscape for the E-commerce Industry

Against the backdrop of artificial intelligence, various digital information technologies are transforming e-commerce operating models, profit mechanisms, and competitive structures. AI is reshaping the underlying logic of the e-commerce industry and driving it toward a new stage characterized by greater intelligence, openness, and inclusiveness.

4.1 Transformation of Operating Models: From Manual Operations to Human–AI Collaboration

In traditional e-commerce operations, tasks such as product information management, marketing copywriting, customer communication, and data analysis relied heavily on manual labor. These activities constituted the main operating costs of e-commerce enterprises aside from advertising expenditure. With the widespread application of AI technology, e-commerce operating models have gradually shifted from manual operations to human–AI collaborative models. Supported by AI systems, the demand for human labor has been significantly reduced.Taobao's AI Business Manager provides

small and medium-sized merchants with an agent combination consisting of one AI store manager and six AI employees, which can cover approximately 80 percent of daily operational tasks. This transformation not only effectively reduces enterprise operating costs, but also promotes changes in organizational structures, significantly lowering the entry barrier for e-commerce entrepreneurship and stimulating market vitality. With AI handling repetitive tasks, employees can allocate more time and energy to high-value activities such as product innovation, brand management, and customer development, driving the industry's talent structure toward a more skilled and innovation-oriented direction.

4.2 Innovation in Profit Models: From Traffic Monetization to Value-based Services

Under traditional e-commerce profit models, merchants rely mainly on product price differentials, while platforms generate revenue primarily through advertising fees and transaction commissions. This model depends heavily on traffic expansion, with revenue increasing alongside the number of merchants, traffic volume, and sales scale. However, as competition among e-commerce platforms intensifies, pure traffic monetization has become increasingly unsustainable. The development of AI technology has shifted the core of competition from acquiring traffic entrances to accurately identifying and responding to users' deeper purchasing intentions. For example, semantic understanding systems and multi-round conversational search applications aim to enhance the interpretation of user intent and provide more precise guidance services. Merchants are no longer focused solely on traffic volume, but increasingly emphasize the value they deliver to users. While traffic can generate short-term growth, it cannot secure user loyalty or accumulate brand equity.At the same time, e-commerce platforms have transformed their relationships with merchants from charging traffic and advertising fees to offering value-added services through revenue sharing. These services include participation in the development of popular products, provision of AI-enabled supply chain tools, customized procurement services, and user operation support, thereby forming new business models with aligned interests between platforms and merchants.

4.3 Reshaping the Competitive Landscape: From Price Wars to Efficiency and Experience Competition

In the past, competition in the e-commerce industry centered on price wars and traffic acquisition, pushing the industry into excessive internal competition. The application of AI technology has shifted the competitive focus toward technological investment, efficiency improvement, and user experience enhancement, forming a positive cycle of technology input, efficiency gains, and user retention.Leveraging large-scale user data, comprehensive product libraries, and strong technical infrastructure, some platforms have become ecosystem-oriented players with end-to-end AI integration. Other platforms have focused on efficiency-oriented strategies by emphasizing AI-enabled supply chain optimization. Certain vertical e-commerce enterprises have adopted community-based models to connect high-end users, significantly increasing average order value.Meanwhile, as consumers become less sensitive to price, promotional mechanisms across platforms have shifted toward rule optimization, process simplification, and efficiency improvement. Low price is no longer the core promotional message. Instead, platforms place greater emphasis on product quality, service experience, and brand credibility, promoting high-quality industry development through improved overall user experience.

4.4 Expansion of the Industry Ecosystem: From Online Transactions to Omni-channel Integration

AI technology is breaking down the boundaries between online and offline environments as well as between virtual and physical spaces, driving the e-commerce ecosystem toward omni-channel integration. In terms of scenario integration, applications such as AI virtual try-on and digital home environment reconstruction bring offline experiences into online platforms, enhancing user engagement and exploration.In terms of industrial integration, AI-driven unmanned delivery systems and digital workforce solutions have extended e-commerce services into sectors such as catering, pharmaceuticals, and retail, forming service-oriented retail ecosystems. Regarding cross-border e-commerce and globalization, AI has accelerated localization by supporting local supplier development, overseas warehouse deployment, and adaptation to regional certification standards, thereby increasing international order volumes.This omni-channel ecosystem expansion has enabled traditional e-commerce to evolve from a single online transaction model toward integrated online–offline operations and full industry chain collaboration, ultimately promoting high-quality development of the e-commerce industry.

5. Conclusion

In the new era, artificial intelligence is no longer an optional auxiliary tool for the e-commerce industry, but a key engine driving fundamental innovation in its business models. From technological empowerment of core operational processes to achieve cost reduction and efficiency improvement, to scenario innovation that gives rise to new business models, and further to ecosystem upgrading that reshapes the industry landscape, AI has begun to deeply integrate across the

entire e-commerce industry chain. This integration effectively enhances operational efficiency, improves user experience, and promotes the transformation of the industry from price-based excessive competition toward better satisfaction of user needs and continuous quality innovation.At the same time, it must be recognized that while e-commerce enterprises actively embrace AI, they should also remain vigilant regarding issues such as data privacy and algorithmic ethics brought about by AI applications. Looking ahead, with the development of technologies such as multimodal large-scale models and explainable AI, the integration of AI and e-commerce will evolve toward deeper levels and broader dimensions, driving the e-commerce industry toward greater efficiency, intelligence, and human-centered development.

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