The Application of Artificial Intelligence in China's Cross border E-commerce Field

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Abstract

With the rapid advancement of technology and profound changes in the economic landscape, artificial intelligence is integrating into the social fabric at an unprecedented speed, greatly promoting a leap in work efficiency and upgrading the quality of life. In particular, the global spread of the COVID-19, instead of curbing the booming trend of China's cross-border e-commerce, has become a catalyst for its accelerated development, pushed it to the forefront of the global foreign trade arena, and become an indispensable bridge to connect the world market. In this process, the deep integration of artificial intelligence technology has equipped China's cross-border e-commerce industry with intelligent services, not only optimizing supply chain management, precision marketing, and personalized services, but also greatly improving the efficiency and security of cross-border transactions. This paper attempts to provide some references for the development of China's cross-border e-commerce market through the impact of COVID-19 on China's cross-border e-commerce industry, the application of existing AI technology in cross-border e-commerce and its shortcomings.

Keywords: Artificial intelligence, Cross-border e-commerce, COVID-19, Anti-Fraud, Data collection

1. INTRODUCTION

In tandem with the advancement of technological capabilities, the process of globalization and digitization has significantly accelerated [1]. Artificial intelligence (AI) and cross-border e-commerce have become important forces that cannot be ignored in today's global economic system.AI is one of the hottest topics in the world today, serving as a leading indicator of future technological

development and lifestyle changes in the 21st century. An essential element of international trade today is cross-border e-commerce [2]. Concurrently, artificial intelligence has brought unprecedented changes to cross-border e-commerce with its powerful data processing, learning optimization capabilities, and excellent automation level.

The term "artificial intelligence" was proposed by computer expert John McCarthy in 1956 and has been around for nearly 70 years [3]. From 1997, Supreme chess champion Kasparov was defeated by IBM's computer "Deep Blue", until 2016, when Google's Alpha Go defeated top human professional Go player Li Shishi 4-1, marking the AI era destined to become the future of the world. Even some industries believe that "whoever masters AI has control over the future."[4].

Chinese transnational e-commerce market started from the late 1990s to around 2008, and its development was relatively slow due to problems such as the Internet penetration rate and imperfect infrastructure at that time. Until around 16 years in 2014, China's cross-border e-commerce industry rapidly developed and expanded. Subsequently, the industry gradually matured and formed its own complete industrial chain and ecosystem, but still faced a series of challenges [5]. Compared to the United State cross-border e-commerce platform Amazon, which once dominated the global e-commerce market, although it has deep accumulation in fields such as cloud computing and big data, it appears relatively conservative in AI technology research and application [6].

In 2020, a sudden outbreak occurred. This has caused various industries around the world to shut down for nearly three years, and the cross-border digital commerce has also encountered many problems among product stockouts, logistics stagnation, and increased inspection and recommendation costs. This also happens to make artificial intelligence shine in the cross-border e-commerce field. The present article delves deep into the intricate intertwining of AI and cross-border e-commerce, exploring not merely the diverse applications of AI within this sector but also the profound and far-reaching implications it has on the entire industry landscape. in order to provide reference for scholars and practitioners in related fields [7].

1.1 Concept of Artificial Intelligence

Simply put, artificial intelligence (AI) is about equipping machines with intelligence capabilities similar to those of humans. If computers, mobile phones, or other machine devices can "understand" images, "understand" language, and even "learn" and "think" on their own [8], it will bring people a more convenient way of life and work. In order to achieve these intelligent capabilities, scientists have utilized various technologies and algorithms, the most important of which is machine learning, Enabling computers to scrutinize data, detect patterns, and formulate predictions or decisions accordingly[1]. Such as network personalized recommendation systems, facial recognition access control, artificial intelligence medical imaging, and so on, which are already ubiquitous in our daily lives. We also need to understand its concept from a deeper perspective. Artificial intelligence is not only a collection of technologies, but also a profound simulation and extension of human intelligence. It is driving innovation and change in society, challenging and expanding our way of thinking and cognitive abilities [9].

The development history in the context of artificial intelligence's role in China can be traced back to the 1950s and 1960s, closely related to the origin and development of artificial intelligence

internationally. Since the 1950s and 1960s, the concept and theory of artificial intelligence have been introduced to China, and some scholars and research institutions have conducted basic research and application growth of AI capabilities [10]. In the following decade, the field of artificial intelligence in China entered a period of reflection and development. It was not until the mid-1980s that the utilization of artificial intelligence was widely promoted, and Chinese researchers began to apply artificial intelligence technology to various fields. In the 21st century, due to swift progress in China's Internet industry and the arrival within the period of big data, AI research has also ushered in new development opportunities. The government and enterprises have increased investment and support for AI, making China's AI technology have made considerable progress. For example, in 2021 [11], the National Examination Institute of the

Ministry of Education used the "Certificate and Photo Home" certificate and photo portrait detection platform provided by Pixel Data Company to achieve the industrialization and application of high-precision facial recognition systems; In 2022, the Beijing Winter Olympics provided "intelligent guidance" services to the audience through AI technology provided by Kuangshi Technology in the Bird's Nest and speed skating competition venue "Ice Ribbon" [12], achieving on-demand guidance; Meanwhile, during the Winter Olympics, CCTV News AI sign language anchors provide real-time sign language translation for hearing-impaired individuals to assist them in better understanding and participating in the Winter Olympics.

1.2 Cross Border E-commerce Concept

Cross-border e-commerce, commonly known as Cross Order Electronic Commerce (CBEC), encompasses international business transactions conducted between entities residing in distinct customs jurisdictions. These transactions are facilitated through e-commerce platforms for payment settlements, and the delivery of goods is achieved via cross-border logistics services, thereby completing the entire trade process[13]. The trade models of cross-border e-commerce mainly include business to business (B2B) and business to consumer (B2C). In the B2C model, enterprises engage directly with foreign consumers, primarily focusing on the sale of personal consumer goods. The development of cross-border e-commerce benefits from the popularity of Internet and mobile technology, as well as the continuous improvement of international logistics and payment infrastructure. It breaks geographical restrictions, allowing merchants to easily sell products to various parts of the world, and consumers can easily purchase products from different countries and regions. This trading method has characteristics such as globalization, convenience, multiple choices, competitiveness, and linguistic and cultural diversity [14]. From a broader perspective, it is not only an innovation in business models, but also a product of global economic integration, highly developed information technology, and increasingly diverse consumer demands.

If the development of China's cross-border e-commerce industry is divided into three stages, it can be summarized as: the embryonic stage (1997-2007), the development stage (2008-2013), and the mature stage (2014 present). In the early stages of China's cross-border e-commerce, the main model was the B2B model, represented by Alibaba, which aimed to help small and medium-sized enterprises showcase their products to global customers and promote international trade as its platform development direction [15]. With the increase in global internet penetration rate and the improvement of cross-border payment, logistics and other service levels, China's cross-border industry has entered a period of development, at which time the retail export industry (B2C and

C2C) has flourished. In the later maturity period, cross-border e-commerce platforms began to pay more attention to user experience and service quality. As of March 2024, Alibaba's global AliExpress mobile app has reached 8.18 million users, a year-on-year increase of 130%. The platform was officially established in 2010 and it stands as the largest cross-border retail e-commerce platform in China. Currently, this e-commerce giant has established websites in 18 languages, spanning over 200 countries and regions worldwide, encompassing a broad range of 30 primary industry categories, including but not limited to 3C electronics, clothing, home furnishings, and accessories, and has become the third largest English online shopping website in the world[16]. The Amazon platform, which ranks first in all, has become one of the preferred platforms for Chinese cross-border e-commerce enterprises and sellers due to its significant advantages in customer base, logistics, technology, customer service, globalization strategy, store opening and labor costs, and AWS services.

2. CROSS BORDER E-COMMERCE INDUSTRY AFFECTED BY THE COVID-19

The COVID-19 epidemic has cast a shadow over the China's cross-border e-commerce sector, severely hampering people's ability to conduct offline transactions and prompting businesses and consumers to turn to digital alternatives, which has greatly impacted the traditional foreign trade business. From a deeper perspective, it has actually reshaped the industry's ecology and pattern, and triggered changes in the global trade model [7].

According to Chinese customs statistics, the import and export data of China's cross-border e-commerce during the COVID-19 are compared as shown in TABLE 1:

Table 1: Overall Situation of China's Cross border E-commerce Import and Export from 2019 to 2023 [17-19].

Year	Amount (100 million yuan)			YOY(%)			Export import ratio
	Total	Export	imports	Total	Export	imports	
2019	12903	7981	4922	22.2	30.5	10.8	1.6
2020	16220	10850	5320	25.7	39.2	9.1	2.0
2021	19237	13918	5319	18.6	28.3	-0.9	2.6
2022	20578	15300	5278	7.0	10.1	-0.8	2.9
2023	23783	18300	5483	15.6	19.6	3.9	3.3

It can be seen from the data in the above Table that the growth of China's cross-border e-commerce business has slowed down significantly due to the impact of the COVID-19, and even there has been a trade deficit. Although the epidemic has brought more market opportunities and incremental users to cross-border e-commerce, it has also brought challenges such as insufficient logistics and distribution capacity, global trade uncertainty, and supply chain problems. It can be seen that the impact of the epidemic on the cross-border e-commerce industry is bidirectional.

2.1 Positive Impact

There is no doubt that the COVID-19 has brought unprecedented development opportunities to the cross-border e-commerce industry. Firstly, the pandemic has forced global consumers to accelerate their shift from offline to online shopping. This change in consumption habits not only increases the frequency of consumer purchases, but also expands the user base, especially elderly users who previously had less involvement in online shopping. The change in consumer behavior habits has provided a broader market space for cross-border e-commerce; Secondly, due to the prolonged impact of the epidemic, the types of online shopping are no longer limited to the purchase of daily consumer goods, but even expand to the demand for high-end and personalized products. This change puts higher demands on cross-border e-commerce enterprises, making market demand more diversified and personalized [20]. Finally, in order to cope with the challenges brought by the epidemic, cross-border e-commerce enterprises have to accelerate the pace of digital transformation, improve operational efficiency and service quality by introducing new technologies and models. Digital transformation not only enhances industry competitiveness, but also brings new growth points to the entire industry

2.2 Negative Impacts

During the epidemic, due to long-term quarantine policies, consumer behavior has changed, gradually shifting from offline consumption to online shopping, driving the temporary prosperity of cross-border e-commerce business. The popularity of working from home and remote work has increased the challenges of data privacy and compliance. To succeed in the global market, cross-border e-commerce enterprises must possess a robust infrastructure, adhere to international regulations, and leverage efficient logistics networks ensure compliance with all relevant privacy regulations when processing large amounts of personal data to avoid legal risks arising from this. The ongoing pandemic has caused disruptions in global logistics and supply chains, especially for cross-border e-commerce companies that rely on manufacturing powers such as China[5]. Due to factory closures and transportation restrictions, many products cannot be produced and shipped on time, seriously affecting the operation of e-commerce. To optimize and improve understand market demand and consumer preferences, enterprises must optimize product design and supply chain management through Internet technology, big data analysis and other means to improve efficiency and quality.

The global spread of COVID-19 has plunged the commodity the transportation logistics of cross-border e-commerce enterprises require careful integration and optimization to ensure smooth and efficient delivery of goods across international borders a state of crisis. Many cross-border logistics companies have had to drastically reduce the variety of inbound goods and postpone the distribution of certain commodities, leaving a significant void in the supply chain. In September 2020, Alibaba International Station issued a notice to temporarily suspend the display of some routes in response to the backlog of goods caused by the epidemic [21]. Multiple nations have had to make urgent adjustments to border freight, airport flights, and port transportation, leading to a significant slowdown in cross-border logistics efficiency [22]. This, in turn, has triggered a wave of overseas order cancellations, leaving both sellers and buyers in a precarious situation. According to a comprehensive survey conducted by Hugo Net, among the 424 cross-border e-commerce sellers polled, a staggering nearly 30% experienced a precipitous drop of over half in their order volume [23]. With costs remaining unchanged, this significant decline in orders has placed a tremendous

financial strain on sellers, leaving many feeling overwhelmed and uncertain about the future of their businesses. This crisis highlights the fragility of global supply chains and the urgent need for innovative solutions to mitigate the impact of such unforeseen events.

To sum up, the COVID-19 has brought many challenges and opportunities to the advancement and maturity of cross-border e-commerce ventures. But overall, the drawbacks outweigh the benefits. In order to address these challenges, cross-border e-commerce enterprises need to strengthen digital transformation, actively change their strategies in various aspects by utilizing policy dividends, artificial intelligence and other new technological means, and improve their competitiveness and ability to prevent major risks.

3. THE APPLICATION OF ARTIFICIAL INTELLIGENCE IN THE CROSS-BORDER E-COMMERCE INDUSTRY

The integration and utilization of Artificial Intelligence in cross-border e-commerce offer significant advantages and innovations has already penetrated every aspect of its core business processes, greatly improving operational efficiency and significantly changing user experience [21]. Artificial intelligence systems can also accurately analyse user needs, predict market trends, optimize delivery routes, analyse and identify potential risks through technologies such as natural language processing and machine learning, becoming the core driving force for industry innovation and development.

3.1 Artificial Intelligence Assistant

An Artificial Intelligence assistant is a sophisticated system that relies on cutting-edge artificial intelligence technology to deliver intelligent assistance, which can continuously improve its own abilities through autonomous learning and analysis, and provide users with various help and problem-solving services. Artificial intelligence assistants can provide uninterrupted online services 24 hours a day, which means that any inquiries from customers can be quickly replied to and responded to at any time and place, effectively solving the time difference and labour cost problems faced by Fast Forward e-commerce. Unlike traditional automatic replies, artificial intelligence assistants can effectively understand and combine contextual information, engage in multiple rounds of dialogue, and provide more coherent personalized services. It can even understand and parse the natural language input of customers, whether it is spoken or written language. This allows customers to communicate with artificial intelligence assistants in their preferred language and methods, making it more convenient for cross-border enterprises to serve global customers [22].

Taking Alibaba's Tmall Genie as an example, it can accurately identify customer intentions, handle common inquiries and complaints, and quickly provide satisfactory answers. Consumers can communicate with these robots through text, voice, and even images. After undergoing thorough authorization procedures and rigorous debugging sessions conducted by merchants, chatbots have the capability to effectively replace a portion of customer service representatives, providing efficient and responsive service, reduce manual customer service workload, increase personalized styles, and greatly improve customer service efficiency [24].

3.2 Recommendation Engine

Faced with a dazzling array of products, customers often have no choice, while facing global customers, businesses are also confused about how to find precise customers with demand. The artificial intelligence recommendation engine plays a crucial role in solving this problem [25]. By analyzing user shopping history, browsing behavior, search records, and other data, it can generate personalized product recommendation lists for each user. Combined with filtering and filtering functions, it can quickly filter out products that meet user needs based on customer preferences and requirements, thereby improving the shopping experience, effectively reducing user search and browsing time, and achieving efficient product conversion. Its real-time update and automatic optimization functions can even recommend different shopping strategies according to specific situations in different holidays and scenarios, such as various discounted products, holiday customized gifts, etc. The most significant transformation that artificial intelligence has imparted on recommendation systems lies in their evolution from mere combinations of standalone recommendation results to an all-encompassing human-computer interaction behavior. This shift incorporates a temporal dimension, thereby fostering dynamic interplay between the system and users.

The recommendation engine on the Amazon platform is rich and powerful, providing users with personalized product recommendation services through in-depth analysis and mining of massive data such as purchase history, search history, and browsing behaviour [26]. For example, if a user frequently purchases technology products, Amazon's recommendation engine will recommend the latest electronic products to them. This content-based recommendation method can effectively solve the problem of "cold start" and help new products quickly gain exposure and sales. Intelligent recommendation engines can even analyze user purchasing behavior, find product combinations that are frequently purchased together, and generate bundled sales recommendations. For example, when a user purchases a camera, the intelligent recommendation robot may recommend compatible storage cards, camera bags, or similar products in other colors, styles, and brands. The application of recommendation engines on cross-border e-commerce platforms has a positive effect on improving user experience, increasing sales, and building user loyalty [27].

3.3 Smart Logistics

Smart logistics embodies a progressive development paradigm that leverages cutting-edge information technology to impart intelligence into its equipment and controls, ultimately facilitating a transition from human-centric to technology-driven operations[28]. Compared to conventional logistics models, intelligent logistics boasts the ability to predict and calculate inventory demands accurately, thereby maintaining optimal inventory levels and ensuring operational efficiency.By utilizing machine learning algorithms, artificial intelligence can optimize the storage and pickup path of goods, predict order trends, plan warehousing and distribution in advance, improve warehouse operation efficiency, and ensure timely delivery of goods [29]. During the transportation of goods, smart logistics can utilize IoT technology to achieve real-time tracking and monitoring, ensuring the safety of goods transportation. By collecting and analyzing a large amount of data, such as order data, logistics data, customer feedback, etc., enterprises can better understand market demand, customer preferences, logistics efficiency and other information to optimize operational strategies [30], predict market trends more accurately, and avoid potential risks.

According to the latest news from Bloomberg (www.thepaper. cn), on the morning of April 24, 2024, Hainan, China achieved its first cross sea flight of unmanned aerial vehicle public cargo logistics between Hainan and Guangdong, opening up a new "air passage" between Hainan and Guangdong to support low altitude economy. The implementation speed of this technology is even 10 hours faster than land transportation at the same location. Unmanned Aerial Vehicle (UAV), also known as a drone, is a type of drone that operates using wireless remote control devices and independent program control devices. Drones equipped with artificial intelligence systems can automatically complete tasks such as route planning, target recognition, and obstacle avoidance. With a high degree of intelligence, they can effectively solve some logistics problems and bring more efficient, safer, and sustainable services [31].

3.4 Payment Security and Anti-Fraud

In the field of cross-border payments, AI technology can detect and prevent fraudulent transactions in a timely manner by monitoring abnormal behavior during the transaction process in real time, protecting the safety of users' property [32]. Artificial intelligence systems are capable of real-time collection and processing of data from multiple channels, including user behavior data, transaction history, geographic location information, device fingerprints, and more. By utilizing advanced algorithms such as deep learning and machine learning, artificial intelligence systems can automatically analyze abnormal patterns and correlations in this data [33]. Once the system identifies suspicious transactions, it will immediately trigger warning mechanisms and automatically take intervention measures. Artificial intelligence can even conduct a comprehensive risk assessment of each transaction by constructing complex risk assessment models. Generate credit scores for users based on their historical transaction records, credit history, and other information. After integration, these data provide a solid foundation for subsequent fraud identification [34].

As of October 2016, Alibaba's Ant Financial has joined forces with the public security in 11 provinces and municipalities directly under the Central Government, including Zhejiang, Henan and Shanghai, to crack down on 16 groups involved in fake base stations, and 34 suspects have been arrested. The cross-border e-commerce platform has successfully reduced the fraud transaction rate and improved the authenticity and security of transactions by introducing an AI anti-fraud system. According to the platform, the introduction of AI systems has reduced fraud losses by about 50% and significantly improved user satisfaction [35]. In addition to Alibaba, the Amazon platform reported that in 2022, it used its machine learning (ML) model to discover and identify over 46 million members and followers of more than 23000 social media groups, facilitating fake reviews, including fake review intermediaries, and filed lawsuits against 94 such "bad actors" [36].

3.5 Image Processing

Using AI for image and text processing to reduce the operating costs of cross-border e-commerce enterprises. On the one hand, utilizing the image processing capabilities of generative artificial intelligence, corresponding images or videos are generated based on users' textual descriptions to assist sellers in designing diversified product main images, product sub images, and introduction videos [37]. Cross border e-commerce platforms utilize AI technology, such as Midjourney, Disco Diffusion, and other image generation tools, to automatically generate high-quality images related

to products based on user input text prompts or keywords. According to industry estimates, using AI image generation tools can save about 50% to 70% of time and reduce costs by about 30% to 50% compared to traditional methods for producing the same number of product images [38].

AI technology also supports customized processing of images, such as resizing, cropping, rotating, etc., to meet the needs of different platforms and channels. This customized processing not only improves the adaptability of the image, but also enhances the user experience. According to research, customized images have higher sharing and liking rates on social media platforms than unprocessed images [39].

3.6 Data Compliance and Ethics

With the widespread application of AI in cross-border e-commerce, issues such as data privacy and security protection, algorithm fairness and transparency are also receiving increasing attention. To this end, organizations such as the China Association for Trade in Services have released the group standard "Application Specification for Generative AI Models and Tools for Cross border E-commerce Platforms", aimed at reducing the entry threshold for AI models and tools in terms of data compliance and usage security, and protecting the privacy rights of enterprise users and individuals (data source: China Association for Trade in Services) [40].

Taking J Company in Nanjing, Jiangsu Province as an example, its online foreign trade e-commerce platform business has passed the national data export security assessment of the Cyberspace Administration of China, becoming the "first data compliance export case in the field of cross-border e-commerce in China". J Company has taken the following measures in terms of data compliance:

1. Develop Privacy Policy: The privacy policy on J Company's website specifies how the personal information processed by the company is transferred globally, including the classification of personal information, processing purposes, legality basis, and separate consent before cross-border transfer.

2. Sign data export legal documents: J Company has signed data export legal documents with overseas recipients, clearly stipulating the location, duration, and security measures for data storage overseas.

3. Conduct personal information protection impact assessment: J Company conducted a personal information protection impact assessment before processing personal information to ensure the legality and compliance of data processing activities.

4. Strengthen employee training and compliance culture promotion: J Company strengthens compliance culture promotion from top to bottom, and sets up dedicated personnel in each business process to regularly collect and organize the latest compliance requirements, and share them within the company [41].

In summary, the application of artificial intelligence in cross-border e-commerce not only improves the operational efficiency and market competitiveness of enterprises, but also brings consumers a more convenient and personalized shopping experience. With the continuous advancement of

technology and the deepening of applications, AI will play a more important role in the field of cross-border e-commerce.

4. SHORTCOMINGS OF ARTIFICIAL INTELLIGENCE APPLICATION IN CROSS BORDER E-COMMERCE INDUSTRY

Due to the involvement of multiple languages and cultural backgrounds in the cross-border e-commerce industry, AI still has certain limitations in handling complex language conversions and cultural differences, resulting in unclear communication of product information. And AI technology may be difficult to accurately determine the true intentions and reputation of both parties in a transaction, thereby increasing the risk of the transaction. When dealing with legal and currency differences between different countries, it may still face difficulties due to the limitations of AI technology applications. Finally, Yu Gong Technology CEO Lu Feng mentioned that due to the unique nature of the industry, it is necessary to fine tune the model based on a specific corpus database. During the training process, data inevitably flows overseas, which will pose certain challenges to the company's data security[42].

5. CONCLUSIONS

Artificial intelligence technology is speeding on the fast lane of development, painting a grand blueprint full of infinite possibilities for China's cross-border e-commerce industry. From the perspective of global e-commerce competition, China's vast consumer market and rich commodity supply chain provide a unique soil for the application of artificial intelligence in cross-border e-commerce. With the deep integration of AI technology, China's cross-border e-commerce can not only consolidate its position in the global market, but also lead a revolution in supply chain collaboration and optimization. Advanced methods such as intelligent prediction and automated management will help Chinese sellers accurately allocate global supply chain resources, significantly improve logistics efficiency and accuracy, thereby reducing operating costs and enhancing market competitiveness. At the same time, with the continuous evolution of the e-commerce industry, traditional business models are gradually being replaced by digitization and intelligence, which has become a new trend in global economic development. In this context, China's cross-border e-commerce enterprises are accelerating the digital transformation and upgrading of their businesses with the strong support of AI technology. This will be an important historical opportunity, as the e-commerce field will be increasingly influenced by artificial intelligence, we believe that artificial intelligence will become a key catalyst for the transformation of cross-border e-commerce.

6. ACKNOWLEDGEMENT

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