

# ANALYSIS OF KEY INFLUENTIAL FACTORS OF CHINESE E-COMMERCE IN AFRICA BASED ON SWOT-PEST ANALYSIS MODEL EMPIRICAL EVIDENCE

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**Abstract:** In the realm of international trade, cross-border e-commerce has infused fresh vitality into the traditional foreign trade. Through the deepening of international cooperation in "Silk Road E-commerce," Chinese cross-border e-commerce is actively forging into emerging overseas markets. In contrast to regions such as Europe and the United States, Africa presents a less saturated cross-border e-commerce market, offering a vast "blue ocean" of opportunities. Within the context of the cordial relationship between China and Africa, this paper reflects on the past decade of China's cross-border e-commerce development in Africa and employs PEST analysis to investigate the political, economic, social, and technological factors influencing China's cross-border e-commerce in Africa. Speculatively, this analysis suggests that China's cross-border e-commerce to Africa will continue its growth trajectory. This paper will elucidate the internal strengths and weaknesses of China's cross-border e-commerce through SWOT analysis, forecast the opportunities and threats present within the external African environment, and proceed with TOWS cross analysis and regression validation analysis to generate corresponding strategic recommendations. These recommendations aim to provide specific and concise operational measures for the relevant government departments and cross-border e-commerce industry to navigate the African market successfully.

**Keywords:** Cross-border e-commerce; China-Africa; PEST analysis

## 1 INTRODUCTION

On March 5, 2023, at the inaugural session of the 14th National People's Congress, Premier Li Keqiang emphasized China's commitment to expanding its international presence and fostering new trade models by establishing 152 new cross-border e-commerce pilot zones and supporting the establishment of overseas warehouses [1]. China's cross-border e-commerce sector has emerged as a significant catalyst for the growth of the domestic and international economies, particularly in the context of the dual-cycle development strategy [2]. While the term "cross-border e-commerce" may encompass various interpretations, in a broader sense, it denotes the import and export trade activities achieved through e-commerce channels, encompassing both physical and virtual retailing. More specifically, this study focuses on the burgeoning industry of cross-border e-commerce transactions carried out by online retail entities via online platforms. Thus, the scope of this study encompasses both physical and virtual cross-border e-commerce. China's cross-border e-commerce to the sea relies on traditional commerce or modern network channels to sell Chinese products or overseas localized products to overseas customers in the form of traffic promotion and realization, and has gradually formed a systematic business model [3].

The earliest trade relations between China and Africa can be traced back to the 1950s, and with the strengthening of political relations, China-Africa economic cooperation has gradually accelerated [4], in which China-Africa cross-border e-commerce has received focused attention. A series of policy activities such as China-Africa Trade Expo, "Silk Road E-commerce", China-Africa Economic and Trade Deep Cooperation Pioneer Zone, China-Africa Cooperation Forum (E-commerce Promotion Season), African Continental Free Trade Area Agreement (Af CFTA), and Partnership for Africa's Export Growth (PEECA) have brought a large number of development opportunities for China's cross-border e-commerce to go to sea in Africa.

Currently, in addition to Southeast Asia, Latin America, and other regions, e-commerce in Africa, as an emerging economy, is also rapidly developing [5]. In the 21st century, Africa has also embraced the "fast track of the digital economy," driving the achievement of sustainable, diversified, and integrated development on the continent, while also digitally empowering a significant number of Africans to integrate into the modern economy and society [6]. The widespread adoption of mobile Internet, e-commerce, financial technology, online education, digital security, telemedicine, and other facets of the digital economy are gradually gaining acceptance from local governments and the public [7]. Compared to the mature e-commerce markets in Europe and the United States, the e-commerce industry in Africa is relatively small. However, it holds immense potential due to its large user base and a market environment similar to that of China's low-end commodities. This situation has gradually transformed Africa into a "blue ocean" for future exploration of cross-border e-commerce.

From the perspective of China's foreign trade, the country boasts a robust trading power, possessing a substantial export market base that ranks first globally. In 2021, China accounted for 15% of global exports, providing ample space for the development of online e-commerce. China's advantage in cross-border e-commerce lies in its well-established domestic supply chain system, which supports business operations and facilitates the gradual improvement of logistics for

overseas trade. Consequently, Chinese cross-border e-commerce enterprises possess the capabilities and experience to expand their business into Africa. The burgeoning cross-border e-commerce between China and Africa has emerged as a new growth driver for trade exchanges between the two regions.

Based on the previous decade of amicable cooperation between China and Africa, and given the current surge in cross-border e-commerce activities, this study conducts an in-depth analysis of the key factors that impact China's cross-border e-commerce exports to Africa. Additionally, the study anticipates future trends in China's cross-border e-commerce import and export activities, providing the latest strategies and recommendations for all relevant sectors.

## 2 TEN YEARS OF DEVELOPMENT OF CROSS-BORDER E-COMMERCE IN CHINA REVIEW

China-Africa long-term friendly cooperation has been a catalyst for the sustained growth of China-Africa trade. Given the vast opportunities within the African cross-border e-commerce market and the robust presence of Chinese e-commerce enterprises, China's cross-border e-commerce industry holds immense potential for future expansion. This study examines the decade-long data of China's cross-border e-commerce in Africa, analyzes the crucial factors that impact China's cross-border e-commerce in Africa using the PEST analytical framework, and offers insights into the future trajectory of China's cross-border e-commerce based on its development trend from 2012 to 2021.

### 2.1 Political Environment: China's Cross-Border E-commerce Grows Fast Thanks to China-Africa Policies

**Table 1** Major Relevant Policy Launches on Cross-border E-commerce between China and Africa

Year	Nation	Formulation	Catalytic Effect
2013	China	Circular on Tax Policy for Cross-border E-commerce Retail Exports	Introduction of tax incentives
2014	China	Announcement on Matters Relating to the Supervision of Goods and Articles Entering and Exiting the Territory for Cross-border Trade in E-commerce; Announcement on the Addition of Customs Supervision Mode Codes	Improvement of customs control methods and provision of convenient customs clearance services
2015	Kenya	Special Economic Zones Act; Foreign Investment Protection Act; Agenda 2063	Appropriate tax relief in the Special Administrative Region; attracting foreign investment; maintaining the environment for e-commerce development
2017	China, South Africa	BRICS E-Commerce Cooperation Initiative	Improve the e-commerce cooperation mechanism between China and South Africa; strengthen the interaction and exchange between the political and e-commerce sectors; and carry out joint research on e-commerce.
2019	China, African countries	Forum on China-Africa Cooperation - Beijing Action Plan (2019-2021)	Using digital technology to enhance trade facilitation between the two sides
2020	China	Announcement of the General Administration of Customs of the People's Republic of China No. 75 of 2020	Lowering the threshold for SMEs to enter the cross-border e-commerce industry

Source: Compiled in this study

Since 2012, China has implemented official policies regarding cross-border e-commerce. In 2013, the Circular on Tax Policy for Cross-border E-commerce Retail Exports was issued by the Ministry of Finance and the State Administration of Taxation. The Chinese Customs also introduced the Announcement on Supervisory Issues Concerning Cross-border E-commerce of Inbound and Outbound Goods and Items, along with the Announcement on the Addition of Customs Supervisory Mode Code "9610" in the same year. Subsequently, in 2014, China Customs issued the Notice on Supervision Matters Relating to the Entry and Exit of Goods and Articles for Cross-border Trade and the Notice on the Addition of Customs Supervisory Mode Code "9610". These measures were implemented to promote the growth of cross-border e-commerce retail business on an international scale, standardize customs trade statistics, and enhance customs clearance services for cross-border e-commerce enterprises. In 2016, China established the first comprehensive cross-border e-commerce pilot zone in Hangzhou, indicating positive prospects for the development of China's cross-border e-commerce market.

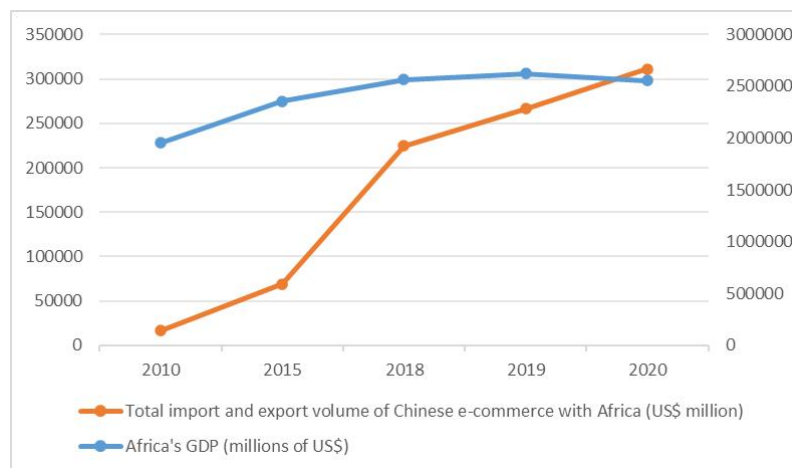
Similarly, African nations are also dedicated to fostering the advancement of the e-commerce sector. For instance, in 2015, Kenya implemented the Special Economic Zones Act, which affirms that enterprises operating within these zones are entitled to certain preferential policies, including a 20-year exemption from value-added tax and a reduction in corporate income tax. Moreover, Kenya has made amendments to the Foreign Investment Protection Act to safeguard the rights and interests of investment enterprises hailing from different countries operating within its borders. Concurrently, in the same year, the African Union endorsed "Agenda 2063," with member states actively pursuing avenues for economic growth to forge a thriving Africa underpinned by inclusive growth and sustainable development [8]. E-commerce, as a catalyst, plays a crucial role in propelling Africa's economic development in the digital age.

In 2017, the BRICS Business Forum, comprising countries such as China and South Africa, among others, adopted the BRICS E-Commerce Cooperation Initiative through thorough consultations and discussions. This initiative sets forth comprehensive guidelines for the advancement of the e-commerce sector, including the enhancement of the BRICS e-commerce collaboration framework, strengthening the political sector's engagement and interaction with the

e-commerce industry, and conducting joint research on e-commerce. The initiative aims to enhance connectivity among BRICS countries, facilitate the reciprocal sharing of resources and commodities, and foster a conducive environment for China-Africa e-commerce collaboration. In 2019, the Belt and Road International Cooperation Summit Forum and the Forum on China-Africa Cooperation - Beijing Action Plan (2019 -2021) emphasized the significance of the Digital Silk Road in advancing both China and Africa's digital economy. These forums encouraged the promotion of cross-border e-commerce, including measures such as enhancing export management capabilities, establishing an Internet visa system, and implementing e-certificates to streamline trade facilitation [9].

In 2020, the General Administration of Customs (GAC) of China introduced regulatory codes "9710" and "9810," namely the "B2B Direct Import/Export" mode and the "Export Overseas Warehouse" mode. The latter mode has reduced the entry barrier for Chinese SMEs in overseas trade, offering them the opportunity to digitally transform their businesses by exploring cross-border e-commerce channels. Africa, with its vast untapped market in the cross-border e-commerce sector, has emerged as a prime region for enterprises to explore. Chinese companies are not only attentive to local e-commerce policies abroad but also concentrate on China-Africa officials' cooperative stance. In 2021, the South African Institute of International Affairs (SAIIA) released a groundbreaking report asserting that China-Africa relations align with the principles of the "Belt and Road" initiative, representing their first venture into cross-border e-commerce. This report by SAIIA underscores the advancements achieved in China-Africa relations in response to the "Belt and Road" initiative, offering a mutually beneficial policy environment that is poised to catalyze cross-border e-commerce development as a "new wind port."

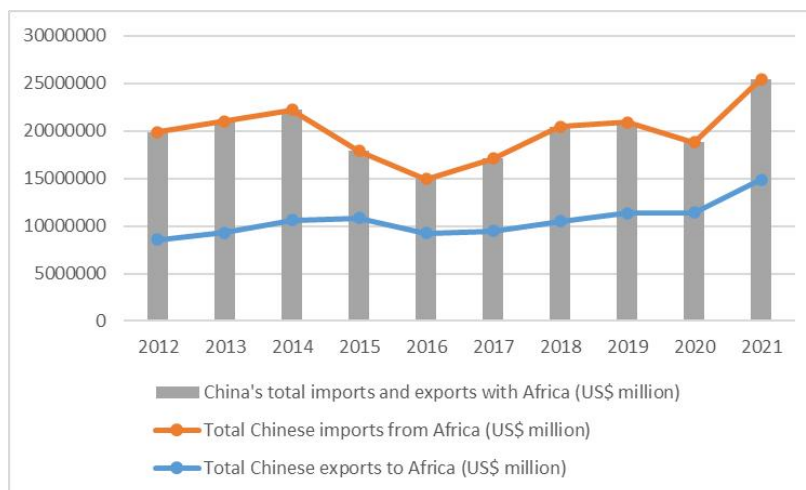
## 2.2 Economic Environment: China-Africa Economic Development Promotes China's Cross-Border E-commerce Boom in Africa



**Figure 1** Africa's GDP & China's Cross-border E-commerce Trend out of Africa

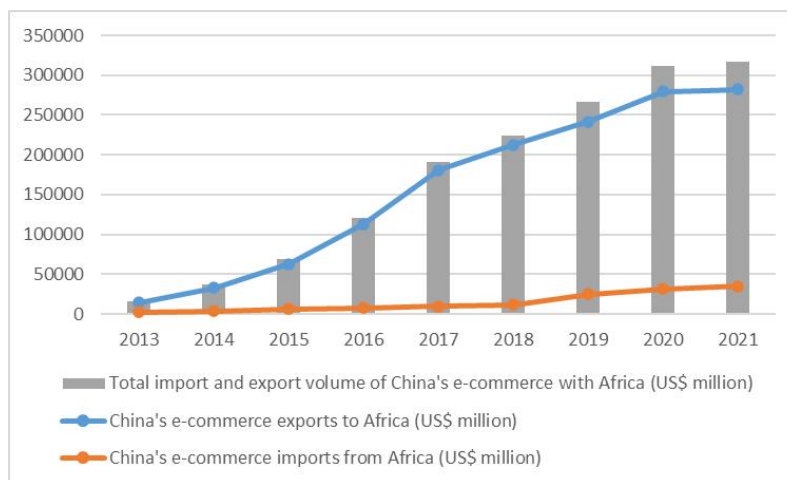
Source: Collated from United Nations Statistics Division data

According to the data provided by the United Nations Statistics Division, Africa's gross domestic product (GDP) has exhibited substantial growth between 2010 and 2020, with a consistent year-on-year growth rate ranging between 2% and 4% [10]. This positive trend in economic development can be attributed to various factors. Firstly, the demographic advantage of Africa's population continues to expand. Additionally, influenced by European and American culture, African consumer behavior emphasizes over-consumption rather than future-oriented saving, thereby contributing to sustained growth in consumer demand and driving the overall development of the African economy. Drawing upon Keynesian theory, which states that "income is the prerequisite for consumption," the World Bank's data reveal that Africa's per capita expenditure to income ratio slightly exceeds that of Europe, Americas, and Asia. Consequently, Africa possesses a vast potential for internal consumption. Furthermore, China's cross-border e-commerce has provided the African population with a diverse array of commodities, thereby further stimulating Africa's economic growth. However, historical colonial rule has hindered Africa's development of urban industrialization and weakened the economic foundation. Consequently, Africa's GDP still trails behind other global regions, resulting in China importing fewer goods from Africa.



**Figure 2** Trends in China's Exports and Imports with Africa  
Source: National Bureau of Statistics of China

As illustrated in Figure 2, China's trade activities with Africa have experienced a fluctuating upward trajectory in the past decade. Although China's imports to Africa witnessed a decline of 24.1 percent in 2020, and Africa's Gross Domestic Product (GDP) contracted by approximately 2.7 percent, this can be attributed to Africa's unavoidable exposure to both low domestic oil prices and the global COVID-19 epidemic. The resulting economic volatility prompted numerous African countries to mitigate the impact by expanding fiscal spending to stimulate consumption. However, the stagnation of international capital flows has intensified fiscal deficits and inflation in certain African nations. Moreover, countries heavily reliant on tourism for economic growth, such as Mauritius and Seychelles, suffered even more due to the structural unity of their economies. Consequently, these international and domestic challenges have exerted downward pressure on the African economy as a whole, leading to a decline in the overall volume of China-Africa trade in 2020. Nonetheless, when considering the broader perspective of China-Africa trade, the total trade base between China and Africa remains substantial, and China maintains its status as Africa's largest trading partner. This grants China a competitive advantage in its cross-border e-commerce operations in Africa and its exports in this domain have evidenced a year-on-year growth trend (Figure 3). Enveloped by an improving economic environment, this sector is poised for accelerated expansion.



**Figure 3** Trend of China's Cross-border E-commerce Imports and Exports with Africa

Source: Compiled from a number of annual trade data reports, including the Annual Report on China's Foreign Trade Statistics, issued by the General Administration of Customs of China.

In terms of China's domestic situation, it can be observed that in 2021, there has been an increase in overcapacity within the manufacturing sector, leading to intensified competition and homogenization. As a result, numerous small and medium-sized enterprises have embarked on the path of digital transformation. Specifically, traditional enterprises have started to rely on cross-border e-commerce platforms to boost their exportation efforts, consequently making the overseas market an appealing option. Nevertheless, the European and American markets have become saturated, with numerous competitors vying for entry. Consequently, Chinese small and medium-sized enterprises have been compelled to explore alternative avenues. The emerging African market, within the realms of cross-border e-commerce and the traditional manufacturing industry, presents both opportunities and challenges. It is noteworthy that the China-Africa trade volume in 2021 reached a staggering 254.3 billion U.S. dollars, reflecting a remarkable year-on-year increase of 35.3% [11]. This clearly demonstrates the longstanding friendly and cooperative ties between China and Africa, which have significantly contributed to the sustained growth of China's cross-border e-commerce ventures.

### **2.3 Social Environment: Consumer Market and Cultural Exchange Become Double Factors to Promote China's Cross-border E-commerce Growth**

In terms of the consumer market perspective, the African region as a whole has witnessed a rapid development since the start of the 21st century. By 2010, The analysis by McKinsey & Company suggests that there were approximately 85 million middle-class households in Sub-Saharan Africa (SSA). Assuming an average household size of five individuals, this figure equates to a substantial population of 425 million people [12]. This surge in the middle-class populace has injected new vitality into the African consumer market. The proliferation of this group has gradually lifted African citizens out of poverty, thereby cultivating a yearning for an enhanced quality of life. Consequently, consumption capacity has soared. The advent of e-commerce as an emerging business model has facilitated a convenient consumer market.

Furthermore, Africa continues to benefit from its demographic dividend. By 2019, the continent's total population had reached 1.33 billion, with a remarkably youthful demographic structure. In fact, the youth population, ranging from 15 to 24 years old, comprises 24% of Africa's overall population [13]. This age group, generally equipped with a higher education level and an extensive knowledge base, demonstrates a keen receptiveness towards novel technologies and innovations. Remarkably adept in utilizing the Internet for online shopping, they represent the primary demographic engaging in e-commerce activities. The number of online shoppers in Africa has displayed an annual growth rate of 18% since 2014, surpassing the global average of 12% (UNCTAD, 2018). Additionally, African women constitute a significant consumer group within the realm of online shopping, exhibiting a propensity to continue their preference for e-commerce even after the COVID-19 pandemic, according to the IFC's Women and E-Commerce in Africa report. Therefore, e-commerce companies should prioritize their focus on two key consumer groups: young consumers and women consumers.

Since the founding of the People's Republic of China, China and Africa have actively engaged in diverse cultural exchanges, empowering the establishment of Confucius Institutes in Africa. This commendable initiative not only facilitates the diffusion of Chinese culture within African societies but also fosters a profound understanding and affinity among African inhabitants towards Chinese traditions. Consequently, when African consumers encounter Chinese goods, an automatic association is formed between these commodities and the distinctive Chinese national image and culture. The imprint of "Made in China" carries a certain familiarity, eliciting emotional responses such as empathy, fondness, and attachment based on their previously acquired knowledge of Chinese manufacturing techniques [14].

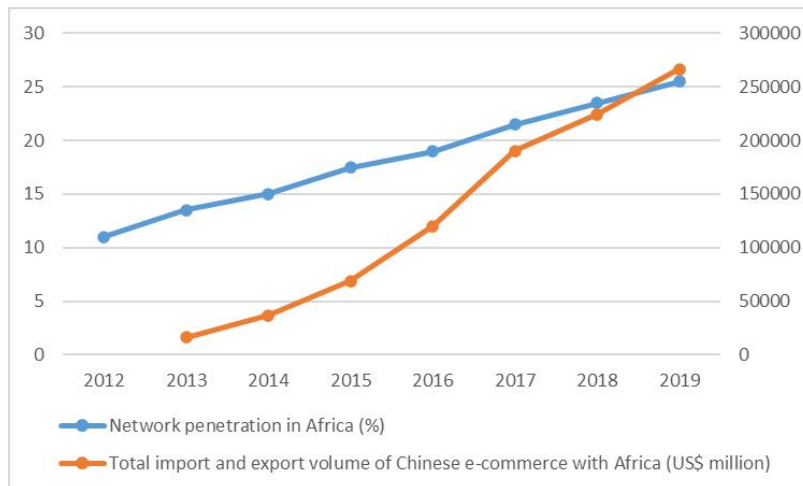
Furthermore, the cultural concept of placing utmost importance on family is shared between African countries and China, generating a sense of cultural solidarity. Consequently, African markets readily embrace Chinese products, thereby facilitating the expansion of product offerings for Chinese cross-border e-commerce enterprises. These enterprises are thus able to sell not only locally adapted products but also promote goods originating from China. Additionally, the adoption of the Chinese language as a crucial component of national education systems in 13 African countries, as revealed in the Report on the Development of the Chinese Language and Literature Program (2018), testifies to the increasing demand for linguistically adept individuals in China's cross-border e-commerce industry. Therefore, African youths educated in Chinese can potentially serve as valuable talents for future cross-border e-commerce ventures in the region.

### **2.4 Technological Environment: Technological Innovations in China and Africa Benefit China's Cross-Border E-commerce Development in Africa**

Prior to the COVID-19 outbreak, the surge in smartphone utilization and the booming local e-commerce market in Africa in 2015 exemplified the growth potential of the e-commerce industry. Despite existing challenges in network security, e-payment, cross-border logistics, and other fundamental prerequisites in Africa, China's amicable cooperation has facilitated the establishment of cross-border e-commerce pilot zones, enhancing bilateral trade and economic development [15]. Furthermore, e-commerce represents a specific manifestation of the digital economy, which has been a focal point for African countries in light of the impending "fourth industrial revolution." These nations have dedicated substantial efforts over the years to fortify network infrastructure. Egypt Telecom, for instance, has prioritized the deployment of national broadband, resulting in a surge in fixed-line broadband speed, escalating it from a mere 0.5M bandwidth per line to an impressive 16M bandwidth per line. Morocco, on the other hand, accomplished the construction of five international submarine cables and three satellite earth stations in 2019, bolstering network propagation rates significantly. In 2020, Nigeria had a network penetration rate of 38.5%. President Buhari has recently announced plans to accelerate the development of a 4G/5G network, aiming to increase network penetration to 70% within the next five years. On the other hand, South Africa has made significant progress in telecommunication infrastructure, primarily using data microwave and fiber optic cable as the medium for network transmission. This has enabled the country to establish a robust telecommunication network. The proactive measures taken by many African countries indicate their prioritization of digital economy development, creating favorable conditions for the growth of e-commerce.

After the outbreak of the COVID-19 pandemic, several e-commerce platforms in Africa experienced a considerable surge in business, with a triple-digit growth rate. The significant increase in online shopping, driven by the reduction of in-person interactions, has presented lucrative business growth prospects for e-commerce companies. Moreover, ensuring that these e-commerce platform users remain loyal during this period will further stabilize the transaction volumes. Figure 4 illustrates the rapid growth of Africa's Internet penetration rate over the past decade. This widespread adoption of the Internet has facilitated China's cross-border e-commerce and Africa's import and export trade. According to data from the International Telecommunication Union and Statista statistics, the proportion of the African population using the Internet has surged from a mere 2.1% in 2005 to an impressive 26.3% in 2019 [16]. Consequently,

the e-commerce industry in Africa has entered a new phase of development, providing a vast market for Chinese cross-border e-commerce expansion overseas.

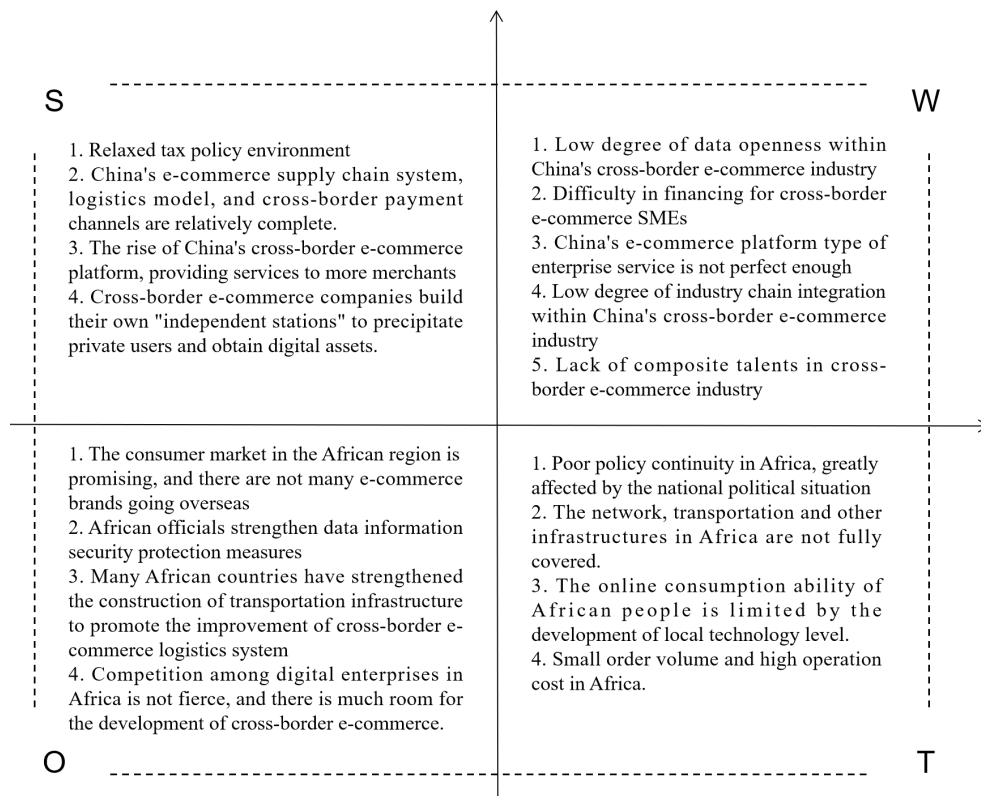


**Figure 4** Internet Penetration in Africa & China's Cross-Border E-Commerce Import and Export Trends in Africa  
Source: Based on International Telecommunication Union data, Statista, Huatai Research Data

From the perspective of China's capabilities in cross-border e-commerce enterprises, there are two notable aspects. Firstly, the country possesses robust hard science and technology prowess. Chinese technology giants like Alibaba, Huawei, and Baidu have engaged in collaborations with various African countries in the fields of telecommunications and network services. This partnership has greatly contributed to the advancement of local 5G network technology. Not only have they exported network technology to Africa, but they have also gradually established a comprehensive operation system and technical standards encompassing express packaging, logistics and warehousing, after-sales service, and physical stores. Secondly, the supporting soft technology services are well-developed. In Kenya, Chinese technicians were deployed to collaborate with Africa in the development of a "mobile wallet" application. This innovative tool integrates payment, cash collection, and money transfer functions, and has become widely embraced by the local population. As of March 2022, data released by Kenya's telecommunication operator revealed that the "mobile wallet" boasts an impressive 30 million monthly active users in the country [17]. Therefore, by enhancing and upgrading the overall solution capability that combines hard and soft technologies, China's cross-border e-commerce will be able to navigate the African market in a more convenient and efficient manner.

### 3 CHINA'S CROSS-BORDER E-COMMERCE SEAFARING AFRICA'S FUTURE DIRECTION

China's cross-border e-commerce has gained significant expertise and prowess through a decade of intricate development and transformation. The current policy and technological landscape offer a favorable environment for China's cross-border e-commerce expansion into Africa. To maintain and enhance the upward trajectory of this maritime journey, this study employs SWOT analysis to elucidate the internal strengths and weaknesses of Chinese cross-border e-commerce, as well as forecast the opportunities for growth and potential threats in the African region (Figure 5).



**Figure 5** SWOT Analysis of China's Cross-border E-commerce to Africa  
Source: Compiled in this study

### 3.1 China's Cross-Border E-commerce Presents Multiple Advantages of Going to Sea

Exploit the competitive advantages of China's cross-border e-commerce from four key perspectives: policy environment, industry segments, platform system, and user reach.

Firstly, China boasts a relatively lenient tax policy environment, both domestically and internationally. Since 2013, China has consistently introduced official supportive policies for cross-border e-commerce. Notably, comprehensive cross-border e-commerce pilot zones have been established nationwide, offering tax exemptions, streamlined customs clearance, and other forms of support for cross-border e-commerce enterprises. This has leveled the playing field between low-end Chinese products and local African sellers in terms of tax costs within the African e-commerce market.

Secondly, China's cross-border e-commerce boasts a mature supply chain system, sophisticated logistics model, and efficient online payment system. The supply chain system in China's cross-border e-commerce has been fully developed in the upstream manufacturing industry, resulting in reduced production costs, improved production efficiency, and enhanced agility, thereby establishing a significant competitive advantage. Leveraging the combined advantage of the African traffic supply market and the operational capability of Chinese enterprises, China's cross-border e-commerce companies have the potential to localize their supply chains in Africa and bolster future supply volume. Moreover, China's cross-border e-commerce logistics model has been continually refined, with diverse logistical channels facilitating its expansion into Africa. Presently, the primary cross-border e-commerce logistics models encompass postal parcels, commercial express delivery, cross-border special lines, and overseas warehouses, all of which illustrate the robust logistical support that underpins China's cross-border e-commerce. Additionally, China's cross-border payment industry ecosystem has taken shape through comprehensive digital empowerment across the entire industry chain. This ecosystem provides technological advancements and services for China's cross-border e-commerce, comprising cross-border mobile payment, a multitude of collection options, and various value-added projects. These initiatives collectively contribute to the smooth operation of China's cross-border e-commerce domestically and abroad.

Thirdly, in recent years, Chinese cross-border e-commerce platforms have witnessed a significant growth in their overall development trend. Prominent platforms like Alibaba and Jindong Global Marketplace have emerged as reliable third-party facilitators, offering import and export services to Africa. By doing so, they effectively reduce fixed costs associated with China-Africa trade. Furthermore, these platforms play a crucial role in ensuring the quality of trade and facilitating smooth transactions. Research studies have demonstrated that such intermediaries have a substantial positive impact on enhancing the quality of exports from non-direct importing enterprises. As a result, they contribute significantly to fostering inclusive trade growth [18].

Fourthly, concerning the establishment of connections with African users, the network broadens the pool of traffic for each self-centered domain. Chinese cross-border e-commerce companies have initiated the construction of their own "independent platforms" in order to fortify communication between the supply and demand sides. Moreover, the expansion of new traffic sources aids Chinese cross-border e-commerce companies in satisfying the consumption demands of African users [19] and in further expanding into the African market by attracting new users through media platform diversions. This strategic approach represents a significant advantage for Chinese cross-border e-commerce companies expanding abroad.

### 3.2 Inadequate Internal Development of Cross-Border E-commerce in China

China's cross-border e-commerce industry faces several challenges that hinder its rapid expansion. These challenges include data and information barriers within Internet enterprises, difficulties in financing for small and medium-sized enterprises, an imperfect service system for platform-type enterprises, weak links in the e-commerce industry chain, a lack of skilled professionals, and other constraints. Therefore, it is crucial for Chinese cross-border e-commerce companies to confront these issues head-on and conduct a comprehensive review and reflection, particularly in the context of expanding into the African market.

Firstly, cross-border e-commerce relies on the sharing of data elements to achieve trade facilitation, and in the context of the digital economy, data is given value, and the sharing and interoperability of information is maintained in order to expand China's cross-border e-commerce's core strengths, but the low openness of data makes it difficult to accelerate the speed of China's cross-border e-commerce development [20]. Among them, the discrepancy between local and customs statistics easily leads to the mismatch and misdistribution of government subsidies, coupled with the increasing demand for data openness and sharing in the comprehensive cross-border e-commerce pilot zones set up in many places, this drawback needs to be solved urgently.

Secondly, there are a large number of small and medium-sized enterprises in the cross-border e-commerce industry, and the problems of difficult financing and large amount of financing are likely to appear in the cross-border e-commerce enterprises with light assets and little investment, which are difficult to prepare for the funding of "overseas warehouses" and "independent stations" due to the lack of the bank's recognition of their creditworthiness.

Fourthly, for cross-border e-commerce platform enterprises, their internal information technology services are not perfect enough, there are problems such as service object homogenization, service process formalization, etc., the service content is difficult to meet the user's personalized needs and there is the phenomenon of homogenization, and the inefficient competition is not conducive to the development of the overall cross-border e-commerce industry [21].

Fifthly, in the links of marketing, transaction, logistics and payment within cross-border e-commerce, the integration between related industry chains needs to be strengthened. Cross-border logistics infrastructure is not modernized enough, and there are problems in cold chain transportation, traffic transit, and operating costs [22]; although the security of the payment system construction has been strengthened, the risk of the system being invaded and supplied in the open network environment still exists.

Sixthly, the cross-border e-commerce industry lacks composite talents. The industry needs practitioners who understand foreign languages, international trade knowledge, digital technology, transaction law and supply chain management, and the lack of talents will affect the rapid expansion of cross-border e-commerce business.

### 3.3 China's Cross-Border E-commerce Has Opportunities for Development in Africa

Specifically analyzing the market environment in the African region, Africa attracts Chinese cross-border e-commerce companies to carry out trade activities in terms of policy and technical conditions, and the specific development opportunities include four aspects:

Firstly, from the point of view of geography, the African continent is vast, some areas are less populated, and the people have few channels to choose consumption. E-commerce as an emerging online shopping method, China's cross-border e-commerce can provide a digital platform with Chinese products, Africa's new market for e-commerce companies is undoubtedly a major attraction.

Secondly, African governments have begun to pay attention to the development of e-commerce, and in order to create a relatively favorable development environment, they have taken actions in related policies and laws and regulations. In order to maintain market network order and protect consumer privacy, South Africa has introduced the Electronic Communications and Transactions Act and the Cybercrime and Cybersecurity Bill to increase the public's trust in e-consumption, and Kenya has approved the Data Protection Bill 2019 to increase the protection of personal data and regulate the use of cybersecurity, and vigorously combat data leakage, illegal use and other criminal matters. and to crack down on data leakage, illegal use and other crimes.

Thirdly, the establishment and improvement of infrastructure is the key to the development of e-commerce. The national level has increased its investment in infrastructure, and in terms of transportation, countries in East Africa have strengthened the construction of cross-border railroads and ports, which provide the necessary conditions for the improvement of cross-border e-commerce logistics systems. At the same time, the African Development Fund has invested 1.5 million dollars in the AU to improve the overall environment for the development of e-commerce in Africa.

Fourthly, the current competitive landscape of the African cross-border e-commerce industry is favorable. The digital industry in the African region is dominated by small and medium-sized enterprises, and there are no large digital enterprises with exclusive monopoly status in the economic market, except for a few large enterprises in telecommunication operations, which provides a good opportunity for Chinese cross-border e-commerce companies newly entering the African market to go to sea.

### 3.4 Threats to China's Cross-Border E-commerce in Non-Trading Environments

Africa is a complex environment, and cross-border e-commerce development may also encounter some inevitable difficulties, reasonable prediction of potential threat factors, can put forward an effective response to minimize the risk factor.

Firstly, the policy environment in some parts of Africa is unfavorable. Although African countries have begun to pay attention to the protection of the network environment, due to the unstable political situation in the country, whenever there is a change of regime, there may be changes in the existing policy, and the poor continuity of the policy has led to



an increase in the cost of adaptation for enterprises, which has cut down the enthusiasm of cross-border e-commerce companies to go to sea in Africa.

Secondly, infrastructure such as information communication and transportation in Africa has not achieved full coverage. Although Africa's consumer market has great potential, remote rural areas lack Internet, broadband, electricity and other equipment [23], and people in better urbanized areas have also given up spending on e-commerce channels because of the high cost of online shopping, which is fundamentally due to the inconvenience of transportation facilities that increase the cost of transporting goods.

Thirdly, the technological environment in Africa is relatively backward. Although the use of smartphones by African people has increased, the limited memory of inexpensive cell phones and the number of running programs limit users' choice of online shopping [24], which is a major obstacle for cross-border e-commerce to open up the African market. In addition, the issue of online payment for e-commerce is also a key consideration, and the main means of payment used by local e-commerce businesses in Africa is cash on delivery. According to the statistics of Nigeria Mobile Report 2018, Nigerian e-commerce users can choose three payment methods: cash on delivery, bank card payment and mobile payment, accounting for 67%, 23% and 10% respectively. Online payment spending habits also change with technological advances, and Africa's payment system needs to continue to improve.

Fourthly, in the specific transaction situation in Africa, there are problems such as small and scattered users and small number of parcels, how to realize efficient distribution of goods needs to be solved urgently, and reasonable control of operating costs is a big challenge for e-commerce enterprises.

#### 4 COUNTERMEASURE SUGGESTIONS FOR CHINA'S CROSS-BORDER E-COMMERCE GOING TO AFRICA

After sorting out China's cross-border e-commerce's own strengths and weaknesses as well as the development opportunities and potential threats existing in Africa, this study will conduct TOWS cross-analysis by combining these four aspects to give full play to China's cross-border e-commerce's strengths, effectively overcome its internal weaknesses, seize the opportunities in the African environment in time, and try to avoid the threats in the African environment. Ultimately, it will formulate a development strategy for Chinese politics as well as Chinese cross-border e-commerce industry and entrepreneurs to match the internal conditions with the external environment (Table 2).

**Table 2** TOWS Analysis of Chinese Cross-border E-commerce Going to Sea in Africa

	<b>Weaknesses</b>	<b>Strengths</b>
<b>Threats</b>	<p><b>WT</b></p> <ol style="list-style-type: none"> <li>1. Introduce relevant laws to reduce business and political risks in Africa.</li> <li>2. Deepen China-Africa infrastructure cooperation and production capacity cooperation to cope with the status quo of weak technical environment in Africa.</li> <li>3. Cultivate cross-border e-commerce composite talents to solve the internal problems of the industry</li> </ol>	<p><b>ST</b></p> <ol style="list-style-type: none"> <li>1. China's cross-border e-commerce industry reduces the negative impact of Africa's transportation inconvenience by improving logistics management.</li> <li>2. In order to improve the situation that African people are less likely to buy cross-border goods, China's cross-border e-commerce industry adopts the business strategy of "globalization of products and localization of operations".</li> </ol>
<b>Opportunities</b>	<p><b>WO</b></p> <ol style="list-style-type: none"> <li>1. With regard to the problem of low cross-border sales of Chinese goods, China's cross-border e-commerce companies have adopted an integrated online and offline marketing strategy to capitalize on the opportunity of "branding overseas".</li> </ol>	<p><b>SO</b></p> <ol style="list-style-type: none"> <li>1. Strengthen the digital business concept of Chinese cross-border e-commerce in the context of enhanced information security protection by African officials.</li> <li>2. Establishing a cross-border online payment system between China and Africa by virtue of Africa's ever-improving network infrastructure.</li> </ol>

Source: Compiled in this study

##### 4.1 The Chinese Government Should Adopt a Defensive Strategy (WT)

At the macro level, the government should help China's cross-border e-commerce companies to reduce their exposure to potential threats in Africa and overcome the risky issues that have arisen in the industry, and thus the government can adopt a defensive strategy.

Firstly, introduce relevant laws to reduce business and political risks in Africa. China should continue to improve the laws and regulations in the field of cross-border e-commerce, pay more attention to privacy protection, taxation, etc., and effectively urge the relevant enterprises to follow the local laws in Africa while also using legal means to safeguard their rights and interests in Africa. The Chinese government can help establish a public service platform for cross-border e-commerce in Africa in areas with high business and political risks, and update in real time the rules and regulations, preferential policies, and financing methods of e-commerce introduced by African countries, as well as provide timely and reliable information services for Chinese cross-border e-commerce companies in terms of the relevant consulting news and the risk of political turmoil.

Secondly, deepen China-Africa infrastructure and production capacity cooperation to address the weak technological environment in Africa. As Africa's transportation and network infrastructure constrains the rapid development of e-commerce, China should help Africa solve technical problems in the construction of railroads, highways and air

routes, and promote the continuous improvement of e-commerce logistics systems. China and Africa should strengthen cooperation in network infrastructure construction, improve network coverage in Africa, so that people in remote areas can also enjoy the convenience of life brought by the network, including online shopping, communication, access to information and other activities. African e-commerce industry construction can be scaled down through China-Africa production capacity cooperation to reduce input costs, the Chinese side should specifically examine the feasibility of cooperation projects and broaden investment channels in Africa by cooperating with relevant financial institutions, and the continuous improvement of the industrial infrastructure will improve a better business environment for Chinese cross-border e-commerce in Africa.

Thirdly, cultivate cross-border e-commerce composite talents to solve the problem of lack of talents within the industry. Although China-Africa educational cooperation has cultivated a number of economic and trade talents, there are not many professionals in the field of e-commerce. Both China and Africa need to explore the mode of school-enterprise cooperation, incorporate e-commerce related knowledge into the curriculum of the school education system [25], and continuously deliver composite talents who know foreign language, international trade, digital technology, trading law, supply chain management and other knowledge for the e-commerce industry.

#### **4.2 China's Cross-Border E-commerce Industry Should Adopt a Buffer-Type Strategy (ST)**

At the meso level, China's cross-border e-commerce industry has developed over the years and formed the ability to continuously optimize its internal system to keep pace with the times, so that in the face of potential threats in Africa, it is able to make use of its own experience and strengths to solve the new problems that keep emerging. At this stage, the e-commerce environment in Africa is not mature enough, and Chinese cross-border e-commerce companies need to put forward reasonable solutions based on this special situation.

Firstly, in terms of strengthening logistics management, cross-border e-commerce companies have to solve the problems related to local express delivery in Africa, in order to reduce the negative impact of inconvenient transportation in Africa. Logistics enterprises in China's cross-border e-commerce industry are mainly involved in headway logistics, and tail logistics is completed in cooperation with third-party logistics platforms, in which the end fulfillment process is not standardized enough, which restricts the enhancement of cross-border e-commerce services. In Africa, China's cross-border e-commerce products still mainly rely on the postal service and the four major international courier companies, and poor timeliness and high transportation costs are the problems that need to be improved in the tail logistics. As the cross-border e-commerce industry gradually matures, Jindong, Amazon and other companies with self-owned logistics systems will gain a greater competitive advantage. In order to improve the efficiency of logistics, Chinese cross-border e-commerce can be realized by building its own logistics system or building overseas warehouses to provide commodity warehousing services. Setting up "overseas warehouses" is a feasible key measure for cross-border e-commerce companies, which means centralizing the goods in designated warehouses and cooperating with professional logistics companies to complete the distribution work in order to reduce logistics costs. This not only enhances customer experience, strengthens customer stickiness and expands the competitiveness of China's cross-border e-commerce, but also helps cross-border e-commerce sellers to manage their inventory and reduce warehousing and transportation costs.

Secondly, in order to improve the situation in Africa, where people are less likely to buy cross-border goods, Chinese cross-border e-commerce companies have adopted the business strategy of "globalization of products and localization of operations". Chinese-made products have been exported and sold in many countries around the world, and cross-border e-commerce platforms should not only actively promote and export Chinese products, but also sell global products of multiple categories and brands to meet the demand for diversified products in the African market. Operational localization requires Chinese cross-border e-commerce companies to take into account the localized needs of Africa when selecting products in the supply chain, and to accurately push preferred products to users according to the cross-border e-commerce platform, to further improve the operational efficiency of China's exports to Africa. In terms of product supply, Chinese cross-border e-commerce companies can rely on Africa's localized supply chain system to put themselves on the same starting line as local e-commerce companies and reduce cross-border transportation time.

#### **4.3 Chinese Cross-Border E-commerce Firms Should Adopt a Proactive Strategy (So) or an Improvement Strategy (WO)**

China's cross-border e-commerce is divided into online virtual enterprises and offline physical enterprises. Online virtual enterprises usually adopt digital business systems and mainly have problems in technology optimization, while offline physical enterprises have practical problems. Differentiated response strategies should be adopted according to the nature of work of different enterprises.

##### **4.3.1 Online virtual enterprises of cross-border e-commerce in China**

Chinese cross-border e-commerce companies that work primarily online should adopt a proactive strategy to seize opportunities for growth in Africa and fully utilize their internal strengths. Chinese cross-border e-commerce platforms should continue to improve their digital management systems, not only for the platforms' own cross-border e-commerce businesses, but also for more cross-border e-commerce sellers to provide transaction services.

Firstly, under the favorable conditions that African officials attach importance to the protection of information security, enterprises should strengthen the concept of digital management and set up a cross-border e-commerce data center in the African region. On the one hand, according to the platform's backstage data, analyze consumer behavior data, actively analyze consumer psychology, predict the reasonable inventory type and quantity of overseas warehouse, etc., and provide platform merchants with reasonable stocking suggestions. On the other hand, using the data center as the basis to try to carry out warehousing and logistics visualization services can maximize the protection of consumer interests, but also to make platform merchants feel at ease.

Secondly, with Africa's ever-improving network infrastructure, enterprises can raise their awareness of secure payments and improve their online payment systems. On the one hand, SMEs can strengthen their R&D capabilities to carry out technological innovation, develop their own platform payment systems, and ensure the stability of databases, front-end applications and back-end operating systems with mature technologies. This will enable African people to enjoy convenient and safe online payment services and increase the willingness of target users to use China's cross-border e-commerce platform. On the other hand, China's large digital enterprises have strengthened and improved third-party payment channels to provide mobile payment channels for small and medium-sized enterprises (SMEs). In recent years, Chinese enterprises such as Tencent, Ant Gold Service and UnionPay have carried out mobile payment cooperation programs with African regions, helping Chinese cross-border e-commerce enterprises to obtain services such as collection and payment, credit and repayment through technological innovation, as well as enabling African consumers to enjoy the financial services of China-Africa cooperation.

#### 4.3.2 Chinese cross-border e-commerce offline entities

Chinese cross-border e-commerce offline entities should adopt an improvement-oriented strategy, formulate reasonable solutions to specific offline problems, and grasp the favorable situation of operating in the non-country. For the problem of low cross-border sales of Chinese goods, enterprises can adopt an integrated online and offline marketing strategy. Since the African people have not yet formed the habit of using e-commerce channels to buy goods, cross-border e-commerce enterprises can strengthen the right to make rules by competing for traffic online, and attract new users in Africa through extensive offline publicity, so as to give full play to the advantages of local entities in expanding the African market. Enterprises can also follow the trend of "branding overseas" and seize the opportunity to build global brands in new channels, markets and categories, so as to open up the consumer markets of African youth, women, middle class and other groups.

## 5 CHINA'S CROSS-BORDER E-COMMERCE OVERSEAS AFRICA TOTAL ECONOMIC DATA (PEST) REGRESSION VALIDATION

In this study, ten-year data affecting China's cross-border e-commerce exports to Africa from 2012 to 2021 were collected from four aspects: political, economic, social, and technological, and the data were preprocessed to meet the required conditions for regression analysis. The processed data were imported into SPSSAU, and the degree of influence of each factor on China's cross-border e-commerce exports to Africa was verified by stepwise regression and ridge regression.

### 5.1 Data Sources and Data Processing

**Table 3** Ten Years of Original Data on Chinese Cross-Border E-commerce Going to Africa

Year	Chinese e-commerce exports to Africa (US\$ million)	Political factors (P)	Economic factors (E)	Social factors (S)	Technical factors (T)				
	The dependent variable y	x1	x2	x3	x4	x5	x6	x7	x8
2012	5761.8 (estimated)	1	31	2208	1399.96	8.24	39.85	9.3	471725434
2013	14404.5	2	37	2213	1470.10	8.56	40.29	11	544447403
2014	33028.5	5	42	2270	1544.10	8.90	40.75	14	618078177
2015	62419.5	9	46	2007	1379.54	9.04	41.22	16	680980483
2016	112762.5	14	48	1835	1260.57	9.18	41.68	19	751999700
2017	180856.5	16	54	1862	1313.19	9.21	42.14	21	752397695
2018	212575.5	24	59	1916	1319.43	9.33	42.6	24	765206244
2019	241966.5	30	61	1939	1313.90	9.44	43.07	28	771437112
2020	279505.5	37	61	1799	1228.81	9.45	43.54	32	881779709
2021	281979	46	63	1959	1306.19	9.82	44.02	35	945527602
<b>independent variable</b>	x1 Cumulative number of policy enactments (number); x2 Number of Confucius Institutes (number); x3 Africa's GDP per capita (US\$); x4 Africa's GNI per capita (US\$); x5 Enrollment in tertiary education (%); x6 Urban population as a percentage of the total population (%); x7 Proportion of individuals using the Internet in Africa (%); x8 Mobile cellular subscriptions (persons)								

Source: Compiled by the State Council of China, the Ministry of Commerce, the General Administration of Customs, UNCTAD, The World Bank and ITU.

China's cross-border e-commerce exports to Africa are mainly represented through the volume of China's cross-border e-commerce exports to Africa, as shown in Table 3, with political economy, society, and technology each comprising two independent variable factors.

First of all, among the political factors, the cumulative number of policies enacted and the number of Confucius Institutes present the friendly cooperation and support of the Chinese state to African countries in the past ten years. In 2012, China's Ministry of Commerce enacted Several Opinions on the Utilization of E-Commerce Platforms to Conduct Foreign Trade, and cross-border e-commerce export trade was in the beginning stage, and then the trade volume has increased year by year, and the encouraging policies of the Chinese government on cross-border e-commerce have promoted the China-Africa cross-border e-commerce trade. Chinese officials actively set up Confucius Institutes

overseas to promote traditional Chinese culture and enhance China's image among people in other countries, which not only facilitates friendly cooperation between China and Africa, but also improves the acceptance of African people to Chinese cross-border e-commerce products, which indirectly influences the volume of trade and sales of Chinese e-commerce exports to Africa.

Secondly, with regard to economic factors, the economic development of African countries can be analyzed in terms of gross domestic product (GDP) per capita and gross national income (GNI) per capita. The data on GDP per capita in Africa over the past decade reflect the high volatility and slow growth of the economies of the countries in this region, and GNI per capita is also affected by this, showing the instability of national income levels.

Once again, among the social factors, education and urban population have a significant impact on the way people accept and use e-commerce for consumption. African populations with higher education are more likely to choose electronic products, while urban populations have access to express delivery services and means of harvesting e-commerce products due to the availability of good infrastructure.

Finally, in terms of technological factors, the proportion of individuals using the Internet and mobile cellular subscriptions in Africa reflect the extent to which Africa's digital infrastructure is developing. The proportion of personal use of the Internet in Africa has been growing year by year, and with the increase in Internet penetration African people are more likely to use cross-border e-commerce platforms for consumption, and the number of mobile cellular subscriptions in Africa in 2021 is as much as twice as that of 2012, and the use of mobile networks enhances the convenience of online shopping, which is conducive to the online publicity of China's cross-border e-commerce products in Africa. Therefore, ten years of data influencing Chinese cross-border e-commerce exports to Africa are collected from eight sources, and the importance of the impact of each factor is further verified.

**Table 4** Ten-year Data Processing Results of China's Cross-Border E-commerce to Africa

Year	Ln_Chinese e-commerce exports to Africa (US\$ million)	Political factors (P)		Economic factors (E)		Social factors (S)		Technical factors (T)	
	The dependent variable y	x1	x2	x3	x4	x5	x6	x7	x8
2012	8.66	0.00	3.43	7.70	7.24	8.24	39.85	9.3	19.97
2013	9.58	0.69	3.61	7.70	7.29	8.56	40.29	11	20.12
2014	10.41	1.61	3.74	7.73	7.34	8.90	40.75	14	20.24
2015	11.04	2.20	3.83	7.60	7.23	9.04	41.22	16	20.34
2016	11.63	2.64	3.87	7.51	7.14	9.18	41.68	19	20.44
2017	12.11	2.77	3.99	7.53	7.18	9.21	42.14	21	20.44
2018	12.27	3.18	4.08	7.56	7.18	9.33	42.6	24	20.46
2019	12.40	3.40	4.11	7.57	7.18	9.44	43.07	28	20.46
2020	12.54	3.61	4.11	7.49	7.11	9.45	43.54	32	20.60
2021	12.55	3.83	4.14	7.58	7.17	9.82	44.02	35	20.67
<b>independent variable</b>	x1 Ln_Cumulative number of policy enactments (number); x2 Ln_Number of Confucius Institutes (number); x3 Ln_Africa's GDP per capita (\$); x4 Ln_Africa's GNI per capita (\$); x5 Tertiary-level enrolment (%); x6 Urban population as a percentage of total population (%); x7 Proportion of individuals in Africa who use the Internet (%); x8 Ln_Mobile cellular subscriptions (people)								

Source: Compiled by the State Council of China, the Ministry of Commerce, the General Administration of Customs, UNCTAD, The World Bank and ITU.

The natural logarithms of y, x1, x2, x3, x4 and x8 were taken as the analyzed data because the difference in the range of absolute values of y, x1, x2, x3, x4 and x8 was too large to import the original data directly into SPSSAU for regression analysis. Table 4 presents the ten-year data processing results of Chinese cross-border e-commerce exports to Africa. For the first time, the original unprocessed data of ten years of China's cross-border e-commerce exports to Africa were imported into SPSSAU and analyzed by linear regression, and the results showed that the VIF values of the respective variables were all greater than 5, and thus there was a problem of covariance in this linear regression model. In order to solve the research algorithm for the existence of covariance in the independent variables, this study conducted ridge regression analysis and stepwise regression analysis to verify the explanatory power of each factor on the dependent variable and the most significant influencing factor among all factors, respectively.

## 5.2 Validation Results from Ridge Regression Analysis

In this study, we verify the regression analysis results of the respective variable factors on the dependent variable of Ln\_China's e-commerce exports to Africa from the political, economic, social, and technological aspects, respectively, and output the ridge regression analysis results of the four aspects of PEST by using ridge regression analysis to solve the problem of the existence of covariance in the independent variables. The ridge regression analysis firstly combines the ridge trace plot to confirm the K value, x1 and x2, x3 and x4, x5 and x6, x7 and x8 are divided into four times to import into the ridge regression analysis model, and Ln\_Chinese e-commerce export value to Africa as the dependent variable to carry out the ridge regression analysis, and combined with the two criteria of  $VIF \leq 10$  and the smaller K value is better for judging, and the K value of the four times of the ridge regression is selected as 0.02 .

### 5.2.1 Validation of ridge regression analysis of political factors

**Table 5** Results of Ridge Regression Analysis of Political Factors

	Non-standardized coefficient		Standardized coefficient	t	p	VIF value
	B	Standard Error	Beta			
a constant (math.)	-0.184	2.132	-	-0.086	0.934	-
X1: Ln_Policy Enactment Cumulative Number (nos.)	0.564	0.115	0.527	4.899	0.002**	5.771
X2: Ln_Number of Confucius Institutes (number)	2.609	0.612	0.459	4.265	0.004**	5.771
R <sup>2</sup>			0.986			
Adjustment R <sup>2</sup>			0.982			
F			F(2,7) = 245.977, p = 0.000			

Dependent variable y: Ln\_Chinese e-commerce exports to Africa (\$ million)

\* p<0.05 \*\* p<0.01

Ln\_Policy Enactment Cumulative Number and Ln\_Number of Confucius Institutes as independent variables and Ln\_China E-commerce Exports to Africa as dependent variable for ridge regression analysis, and the K value is taken as 0.02. As shown in Table 5, the model R-square value is 0.986, which indicates that Ln\_Policy Enactment Cumulative Number and Ln\_Number of Confucius Institutes can explain 98.60% of the change in Ln\_China E-commerce Exports to Africa the reason. p-value is less than 0.05, this model is meaningful and passes the F-test (F=245.977, p=0.000<0.05), which indicates that at least one of Ln\_Policy Enactment Cumulative Number, Ln\_Confucius Institutes Number will have an impact relationship on Ln\_China E-Commerce Export Value to Africa. The model equation is:  $y = -0.184 + 0.564 * x_1 + 2.609 * x_2$ . The regression coefficients of x1 and x2 have the values of 0.564 and 2.609 (t=4.899, p=0.002<0.01), so all of the Ln\_Policy Enactment Cumulative Number, and all of the Ln\_Confucius Institutes will have a significant positive influence relationship.

**5.2.2 Validation of ridge regression analysis of economic factors**

**Table 6** Results of Ridge Regression Analysis of Economic Factors

	Non-standardized coefficient		Standardized coefficient	t	p	VIF value
	B	Standard Error	Beta			
a constant (math.)	103.814	26.076	-	3.981	0.005**	-
X3: Ln_Africa GDP per capita (US\$)	-19.465	7.006	-1.191	-2.778	0.027*	5.189
X4: Ln_Africa GNI per capita (US\$)	7.686	8.405	0.392	0.914	0.391	5.189
R <sup>2</sup>			0.752			
Adjustment R <sup>2</sup>			0.681			
F			F(2,7) = 10.612, p = 0.008			

Dependent variable y: Ln\_Chinese e-commerce exports to Africa (\$ million)

\* p<0.05 \*\* p<0.01

GDP per capita in Ln\_Africa and GNI per capita in Ln\_Africa are used as independent variables and Ln\_China's e-commerce export value to Africa is used as dependent variable for ridge regression analysis, and the K value is taken to be 0.02. As shown in Table 6, the model R-square value is 0.752, which implies that GDP per capita in Ln\_Africa, and GNI per capita in Ln\_Africa can explain Ln\_China's e-commerce export value to Africa's 75.20% change reason. p-value is less than 0.05, which proves that this model is meaningful. And it passed the F-test (F=10.612, p=0.008<0.05), which indicates that at least one of Ln\_Africa GDP per capita and Ln\_Africa GNI per capita will have an impact relationship on Ln\_China e-commerce export value to Africa. the regression coefficient value of x3 is -19.465 (t=-2.778, p=0.027<0.05), which indicates that Ln\_Africa GDP per capita will have a significant negative impact relationship on Ln\_Chinese e-commerce exports to Africa, while the regression coefficient value of x4 is 7.686 (t=0.914, p=0.391>0.05), indicating that Ln\_Africa GNI per capita will not have an impact relationship on Ln\_Chinese e-commerce exports to Africa. As the African economy has been in an unstable state due to the epidemic and other factors, resulting in the up and down fluctuation of the values of GDP per capita in Africa and GNI per capita in Africa, which is not conducive to the cross-border e-commerce trade between China and Africa.

**5.2.3 Validation of ridge regression analysis of social factors**

**Table 7** Results of Ridge Regression Analysis of Social Factors

	Non-standardized coefficient		Standardized coefficient	<i>t</i>	<i>p</i>	VIF value
	<i>B</i>	Standard Error	<i>Beta</i>			
a constant (math.)	-18.262	4.771	-	-3.827	0.006**	-
X5: Enrollment rate at tertiary level (%)	2.076	0.727	0.698	2.853	0.025*	5.77
X6: Urban population as a percentage of total population (%)	0.254	0.238	0.261	1.067	0.321	5.77
<i>R</i> <sup>2</sup>			0.927			
Adjustment <i>R</i> <sup>2</sup>			0.907			
<i>F</i>			<i>F</i> (2,7) = 44.685, <i>p</i> = 0.000			

Dependent variable *y*: Ln\_Chinese e-commerce exports to Africa (\$ million)

\* *p*<0.05 \*\* *p*<0.01

Ridge regression analysis was conducted with enrollment in tertiary education level and percentage of urban population to total population as independent variables and Ln\_Chinese e-commerce exports to Africa as the dependent variable, with the *K* value taken as 0.02. As shown in Table 7, the R-squared value of this model is 0.927, which implies that enrollment in tertiary education level and percentage of urban population to total population can explain Ln\_Chinese e-commerce exports to Africa's 92.74% change reason. The model was tested and passed the F-test (*F*=44.685, *p*=0.000<0.05), which means that at least one of the enrollments in tertiary education and urban population as a percentage of the total population will have an impact on the relationship of Ln\_Chinese e-commerce exports to Africa. The value of regression coefficient of enrollment in tertiary education is 2.076 (*t*=2.853, *p*=0.025<0.05), which indicates that enrollment in tertiary education will have a significant positive impact on the value of Ln\_Chinese e-commerce exports to Africa. Whereas, the regression coefficient value of urban population as a percentage of total population is 0.254 (*t*=1.067, *p*=0.321>0.05), indicating that the percentage of urban population as a percentage of total population will not have an influential relationship on the value of Ln\_Chinese e-commerce exports to Africa. Therefore, higher education has a greater impact on the African masses' use of cross-border e-commerce for consumption, and people with higher education are more willing to accept new things and foreign products.

#### 5.2.4 Validation of ridge regression analysis of technical factors

**Table 8** Results of Ridge Regression Analysis of Technical Factors

	Non-standardized coefficient		Standardized coefficient	<i>t</i>	<i>p</i>	VIF value
	<i>B</i>	Standard Error	<i>Beta</i>			
a constant (math.)	-106.793	27.067	-	-3.945	0.006**	-
X7: Proportion of African individuals using the Internet (%)	0.008	0.033	0.054	0.254	0.807	4.853
X8: Ln_mobile cellular subscriptions (persons)	5.789	1.359	0.9	4.26	0.004**	4.853
<i>R</i> <sup>2</sup>			0.936			
Adjustment <i>R</i> <sup>2</sup>			0.917			
<i>F</i>			<i>F</i> (2,7) = 50.895, <i>p</i> = 0.000			

Dependent variable *y*: Ln\_Chinese e-commerce exports to Africa (\$ million)

\* *p*<0.05 \*\* *p*<0.01

Ridge regression analysis was conducted with the proportion of African individuals using the Internet and Ln\_mobile cellular subscriptions as independent variables and Ln\_Chinese e-commerce exports to Africa as the dependent variable, with the *K* value taken to be 0.02. As shown in Table 8, the model R-squared value is 0.936, which indicates that the proportion of African individuals using the Internet and Ln\_mobile cellular subscriptions can explain the 93.57% change reason. The F-test of the model was conducted and found that the model passed the F-test (*F*=50.895, *p*=0.000<0.05), which proves that at least one of the proportions of African individuals using the Internet, Ln\_mobile cellular subscriptions will have an impact on the relationship of Ln\_China's e-commerce exports to Africa. The regression coefficient value of the proportion of African individuals using the Internet is 0.008 (*t*=0.254, *p*=0.807>0.05), which proves that the proportion of African individuals using the Internet does not have an impact relationship on the export value of Ln\_Chinese e-commerce to Africa. the regression coefficient value of the Ln\_mobile cellular subscriptions is 5.789 (*t*=4.260, *p*=0.004<0.01), indicating that Ln\_mobile cellular subscriptions will have a significant positive impact relationship on Ln\_Chinese e-commerce exports to Africa. Therefore, mobile cellular

subscriptions have a greater impact on Chinese cross-border e-commerce operations in Africa, and the people must purchase Chinese e-commerce products through the Internet, and mobile cellular provides the conditions for people to shop online anytime and anywhere.

### 5.3 Stepwise Regression Analysis to Validate the Results

The ten-year total merchant data of China's cross-border e-commerce exports to Africa were imported into SPSSAU and analyzed by stepwise regression, as shown in Table 9, and the stepwise regression model automatically identified Ln\_Policy Enactment Cumulative Number, a significant independent variable  $x_1$ , by the stepwise method, and the other independent variables that were not significant were automatically moved out of the model. The R-squared value of 0.983 means that Ln\_Policy Enactment Cumulative Number explains 98.3% of the reasons for the change in Ln\_China's e-commerce exports to Africa and the model passes the F-test ( $F=465.943$ ,  $p=0.000<0.05$ ), which indicates that this model is valid. Therefore, the model formula is:  $y = 8.776 + 1.062*x_1$ , which has a regression coefficient value of 1.062 ( $t=21.586$ ,  $p=0.000<0.01$ ), indicating that the Ln\_Policy Enactment Cumulative Number will have a significant positive impact relationship on the Ln\_Chinese e-commerce export value to Africa. As the cumulative number of e-commerce policy promulgation increases, the more Chinese e-commerce companies tend to export trade, and the openness and transparency of China-Africa trade policies and regulations will provide clear and convenient services for China-Africa cross-border e-commerce companies and boost the growth of China's cross-border e-commerce export trade volume to Africa.

**Table 9** Results of Stepwise Regression Analysis (n=10)

	Non-standardized coefficient		Standardized coefficient	<i>t</i>	<i>p</i>	covariance diagnosis	
	<i>B</i>	Standard Error	<i>Beta</i>			VIF	Tolerance
a constant (math.)	8.776	0.132	-	66.501	0.000**	-	-
X1: Ln_Policy Enactment Cumulative Number (nos.)	1.062	0.049	0.992	21.586	0.000**	1	1
$R^2$			0.983				
Adjustment $R^2$			0.981				
<i>F</i>			$F(1,8)=465.943$ , $p=0.000$				
D-W value			1.117				

Dependent variable y: Ln\_Chinese e-commerce exports to Africa (\$ million)

\*  $p<0.05$  \*\*  $p<0.01$

## 6 CONCLUSIONS AND SHORTCOMINGS

Based on the PEST/TOWS analysis and PEST regression validation of the development status of China's cross-border e-commerce to Africa, this study proposes the following suggestions for all sectors:

Firstly, on the governance of our government. Policy factors are the most significant factors affecting China's e-commerce to go to sea in Africa, Africa's e-commerce development uncertainties are many, and manufacturers decide to go to sea or not and go to sea to the extent of how much investment, often depends on the general environment situation, which is also this study from the PEST general economic factors to start with the point of view. For Chinese manufacturers, especially cross-border e-commerce, small and medium-sized enterprises (SMEs) occupy the majority of the market, and therefore attach more importance to the substantive relationship between the region and China in terms of political and economic cooperation and the degree of friendly policy exchanges. Compared with the uncertainty of the local micro-environment, Chinese entrepreneurs tend to believe more in the example of the national government and the local government has a good interactive situation. Therefore, in addition to continuing to improve China's cross-border e-commerce related laws and policies, China should strengthen the signing of cross-border e-commerce favorable substantive economic and trade friendly agreements with countries in the African region, including in the environmental protection of the business environment, the two sides of the tax rent and tax relief agreements, and to enhance the transparency of the implementation of the two sides of the laws and regulations of the economic and trade laws and regulations. At the same time, the open adoption of cross-border e-commerce industry associations practical difficulties and advice, in order to effectively promote the implementation of the China-African trade and friendly relations agreement in place, for China's cross-border e-commerce exports to Africa to create a favorable trade environment. In addition, it is also very important to cultivate complex talents in this industry and strengthen the cooperation in China-Africa infrastructure construction.

Secondly, to China's physical cross-border e-commerce industry. In order to withstand the impact of unstable economic growth in Africa, enterprises should strengthen logistics management, adopt appropriate business strategies, and determine business expansion areas based on the education of local populations, with a higher rate of return for shopping services provided to highly educated populations.

Thirdly, for Chinese virtual cross-border e-commerce enterprises. According to the year-on-year increase in mobile cellular subscriptions in Africa, enterprises should strengthen their digital operations and improve their online payment systems in a proactive strategy, and it is important for Chinese cross-border e-commerce entities to realize an improved strategy of integrated online and offline marketing.

This study is limited by practical constraints and has the following shortcomings:

First of all, Africa is a vast region, the recommendations given in this study are not geographically specific, Chinese cross-border e-commerce companies in different countries and regions need to adapt to the local conditions, and make modifications according to the specific market conditions in Africa before practical application; secondly, this study adopts the data and materials published by Chinese and African officials, and does not use field surveys to carry out first-hand information and data for field validation research, and we hope that more researchers will participate in this topic to carry out empirical research in future. It is hoped that more research will be conducted on this topic in the future.

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