

Railway Network Planning for African Continent Under the Background of "the Belt and Road "

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Keywords: The Belt and Road; African Continent; Railway Network Planning; Infrastructure Reconstruction

Abstract: African continent has been colonized and plundered for a long time and its economic development has been restricted. After the independence of African countries, their capital and technical level are far behind the world average, and their infrastructure construction is very backward. Since the "the belt and road " initiative was put forward, China has strengthened infrastructure connectivity among countries along the route to promote economic ties and common development among countries. Chinese-funded enterprises are strongly involved in infrastructure construction on the African continent, especially railway construction. With sufficient funds and mature technologies, the construction costs of African countries have been effectively reduced, and the backward infrastructure in Africa has been gradually improved. The purpose of this article is to explore the research on China's aid to African railways in the new era. China regards infrastructure construction as an important aid content and has established a set of aid modes in Africa that are different from the traditional western aid systems according to its own development experience. This article will use the research method of specific analysis of specific problems to make data comparison and draw a conclusion. The research results of this paper show that Africa is a new market, which is currently in the stage of industrialization and urbanization. Its lagging infrastructure restricts the economic and social development of various countries and the process of regional integration. Studying China's participation in infrastructure construction in Africa is of strategic significance for further promoting China-Africa economic and trade cooperation, strengthening the construction of railway network in the African continent, and promoting the transformation and upgrading of China's domestic economy.

1.Introduction

The distribution of the railway network in the African continent is extremely uneven, mainly relying on the construction of central cities, mining areas and coastal zones. The total population of the African continent is over 1 billion, but the total railway mileage is only about 2.8 million kilometers, which is far from meeting the economic and social needs. The average mileage per capita and per 100 square kilometers is far below the world average. The imperfect infrastructure directly leads to a sharp rise in transportation costs of enterprises and affects the growth momentum. After African countries gained independence, they nationalized the railways one after another and began to build railways through self-financing and the introduction of international capital. At this stage, Africa's economy is developing rapidly, and the needs of the market are driving the construction and development of roads. African countries need a complete and efficient railway network. However, China has abundant capital, advanced high-speed rail technology and rich experience in railway construction. Mutual cooperation between China and Africa is bound to be mutually beneficial and win-win.

The first African project of the "One Belt And One Road" initiative is the Mongolian railway in Kenya built by China road and bridge [1]. The Mongolian railway is the biggest project since the independence of Kenya and the first newly built railway in nearly a hundred years, connecting

Nairobi, the capital of Kenya, with Mombasa, the largest port in East Africa [2-3]. This is the first step in china-africa cooperation in planning the railway network. In the existing studies, foreign achievements in infrastructure development in Africa mainly come from the statistical investigation and analysis of the infrastructure situation in Africa as a whole, in regions and in countries by international organizations such as the world bank, the African union and the African development bank [4-5]. At present, domestic research on "One Belt And One Road" cooperation between China and Africa focuses more on overall and macro perspectives, such as studying the history of relations between China and Africa and studying the community of Shared future in Africa, while relatively few case studies are carried out by country or specific areas of cooperation. It is of great significance to promote the formation of modern railway network in East Africa and regional economic development [6-7]. So far, there are no domestic monographs on China's aid to Africa, but there are many books on China's aid to Africa [8-9]. Experts and scholars at home and abroad, on the whole, the research study of Chinese aid to Africa is less, although specialized articles about China's aid to Africa is not much, but in some china-africa relationship is discussed in the literature about China's aid to Africa is involved [10], and many scholars will be China's assistance to Africa to categorize in china-africa relations of political or economic and trade relations to narrative, not as a separate area for special narrative [11].

At present, Africa has become China's second largest overseas project contracting market. As China-Africa relations become closer and closer, China will continue to push forward the railway network planning in the African continent and put forward the idea of "three major networks" to jointly build infrastructure construction with Africa[12-13]. Under the "the belt and road " initiative, cooperation with Africa in infrastructure construction is conducive to the overall "going out" of China's relevant engineering equipment, technical standards and services. It is of great significance to promote the orderly and free flow of international and domestic factors and the efficient allocation of resources, to foster China's new advantages in international competition and to build a new system of open economy.

2. Methods

2.1 Core Concepts

2.1.1 "The belt and road "

"The belt and road " is short for "Silk Road Economic Belt" and "21st Century Maritime Silk Road". It was proposed by Chinese President Xi Jinping during his visit to Southeast Asian countries in 2013. The 19th National Congress of the Communist Party of China (CPC) proposed to focus on the construction of "the belt and road initiative" and adhere to the principles of peaceful cooperation, openness and inclusiveness, mutual learning and mutual benefit and win-win results. It should follow the principle of joint construction, consultation and sharing, strengthen innovation and open cooperation, and form an open pattern of linkage between mainland and overseas and mutual aid between east and west. "the belt and road initiative" is the logic of thinking that China has completely bid farewell to catching up with the West since modern times and has become a world leader. It is China's great cause to practice the common destiny of mankind. At the same time, the connotation and extension of "the belt and road initiative" are continuously deepening and expanding, which is in line with the fundamental interests of the international community. It is an active exploration of new modes of international cooperation and global governance and adds strength to the peaceful development of the world. "the belt and road initiative" and the concept of human destiny community behind it carry this mission.

2.1.2 Infrastructure development

Infrastructure is the foundation for the development of other industries in a country, and it can promote each other's social development. Infrastructure is an important part of development for African countries to achieve economic development and social progress. There are many problems in infrastructure development in African countries, such as insufficient domestic construction strength and lack of funds, which provide market opportunities and cooperation opportunities for

the outside world. Investment in infrastructure has a long cycle. Due to its large scale and other characteristics, it is easy to form natural monopoly, which determines that the development of infrastructure and international cooperation in Africa cannot be completed solely by market behavior. The role of government is very important. Therefore, this paper regards the government as an important research object of infrastructure cooperation between China and Africa. The driving factors, advantages, constraints and strategy selection of cooperation all involve the government level. However, the lagging development of infrastructure has become one of the major bottlenecks restricting Africa's economic development. Various political, economic and cultural factors constitute major obstacles to development. Specifically, the shortage of energy supply affects the development of production, backward port facilities and low customs clearance efficiency affect trade circulation, backward communication means and high cost directly lead to low business efficiency.

2.2 Research Methods

First, the method of investigation and research. Through interviews, document research and other different channels, the basic information such as geographical location, population, economic development level, railway coverage rate and Chinese enterprise investment projects in various regions of the African continent are investigated. Based on relevant research results and training evaluation theories, the data and interview outlines were collated, and the current engineering situation was investigated to find out the existing problems. To understand and collect data from African research institutes and investment project managers in universities, to further explore the main types currently adopted, and to select the most distinctive exchange and cooperation projects for research. In view of the problems arising from the construction of the railway network on the African continent, appropriate solutions are summarized. Second, the method of induction and summary. This research is based on the investigation of major universities and enterprises of related specialties. It summarizes the results of investment projects. Combined with desk research, it sums up and summarizes, draws lessons from relevant research results and theories, reasonably summarizes the questionnaire, explores various factors that affect railway construction, and summarizes solutions. It summarizes and refines effective targeted suggestions based on small views and local conditions.

3. Experiment

3.1 Experimental Data Source

In this experiment, the railway situation in different regions and countries of the African continent is studied in depth, and there are great differences in the development of highways between sub regions and countries. The roads in southern and northern Africa are relatively developed as a whole, with the largest density in eastern Africa and the best road conditions in northern Africa. The roads in central, Western and eastern Africa are generally poor. The selection of these research objects comes from the official website of the relevant state railway administration, data library, cooperation between domestic and foreign enterprises and economic factors. The comprehensive consideration of these factors is conducive to the representativeness and typicality of experimental data.

3.2 Experiment Implementation

Through consulting information and field research, it is found that the railway network on the African continent is not complete. In the region, the railway facilities are quite different, showing the characteristics of imbalance. In northern Africa, Algeria, Morocco and Tunisia, Egypt and Sudan form three independent networks. The coastal areas of Afghanistan, Morocco and Tunisia are connected, with some routes leading to the southern inland; the railway network of Egypt is relatively complete, radiating; the railway of Sudan runs through the north and south, but it has not been connected with the railway of East Africa so far. In western Africa, it is mainly concentrated on the coast of the Gulf of Guinea, mostly in the port inland direction. Except Mali and Burkina Faso, which are respectively connected with the neighboring Senegal and Ivory Coast railways for

overseas use, others are isolated. Nigeria's railways are relatively developed, forming a "H" pattern of two vertical and one horizontal lines. In other countries, there is basically only one main line, and five countries have no railways. Southern Africa: Africa is the most developed region with the most dense network, accounting for two fifths of the total railway mileage in Africa, of which South Africa accounts for one third. The level of interconnection is relatively high, and the inland countries are all connected with the sea port of the coastal countries and the eastern Africa. Compared with other regions, the objects of railway transportation are diversified, including mineral products, manufactured products, agricultural products, etc. the railway also undertakes the task of passenger transport between cities. There is no railway in Mauritius. East Africa is similar to the west, mainly the sea passage, including Uganda Kenya, Tanzania, Ethiopia Djibouti and other main trunk lines as well as some branch lines. The TAZARA railway connects Eastern and southern Africa. Eritrea has only passenger and tourist railways, and 5 countries have no railways. Central Africa is the least of all African subregions, mainly in the port inland trend. Congo DRC railway is mainly distributed in mining area. Most of the railways in the region have ceased to operate.

4. Discussion

4.1 Data Visualization

In the questionnaire survey, 100 questionnaires were distributed to technicians with African working experience, 90 of which were recovered, 88 of which were valid, the effective recovery rate was 97.8%, and the experimental results were valid. The basic information of the respondents is shown in Table 1.

Table1. Statistics of Railway and Railway Network in Africa

Region	Total Railway Mileage	Population (million)	Area (km ²)	Ratio of Paved Roads	Pavement Mileage Per Thousand People
Central Africa	292896	108.32	5250120	4.14%	0.11
Eastern Africa	418476	250338	3457080	13.33%	0.22
Northern Africa	424301	202.42	8114390	75.95%	1.59
Southern Africa	771462	180.28	6493701	18.78%	0.8
West Africa	572576	313.57	6063110	14.64%	0.27
Total Africa	2479711	1054.98	29378401	24.96%	0.59

4.2 Analysis and Discussion

During the whole process of the construction and operation of the Inner Mongolia Railway, Kenya and China, guided by the principles of mutual consultation, co-construction and sharing, carried out in-depth cooperation in civil construction, technology transfer and personnel training, systematically elaborated the essence of China-Africa cooperation under the framework of the "the belt and road initiative" initiative, completely broke the paradigm of western countries controlling Africa with capital, technology and other means, and opened up a comprehensive situation of Africa's foreign cooperation. For a long time, China and most African countries have maintained good economic and trade cooperation relations, especially since the reform and opening up, the economic and trade interaction between the two sides has become increasingly frequent. Infrastructure is one of the key areas of China-Africa economic and trade cooperation. Its cooperation scale is expanding and the degree of interest integration is deepening. Africa has a huge infrastructure gap and a broad market prospect. Governments, engineering contractors and investors all over the world are optimistic about this market. Chinese enterprises are facing increasing competitive pressure. In Europe and America. European countries are former suzerain countries of Africa, and their history and reality are closely related. The design and construction of most infrastructure projects refer to European standards, which makes European contractors have natural advantages. In recent years, the United States has continuously increased its investment in Africa to create a "new US-Africa partnership". In the past two years, China and Africa's "true, real, pro-and sincere" concept of cooperation and the policy orientation of establishing a correct concept of

justice and benefit in their foreign exchanges have established the principle and policy for the government to plan China and Africa's practical cooperation as a whole. China-Africa friendly relations have not come easily. When planning, coordinating, guiding and serving China-Africa infrastructure cooperation, the government should fully take the above-mentioned four-character concept and the correct concept of justice and benefit as guidelines and implement the commitment of cooperation. We should be honest, attach importance to quality, and solve the problems existing in the cooperation projects with a sincere attitude.

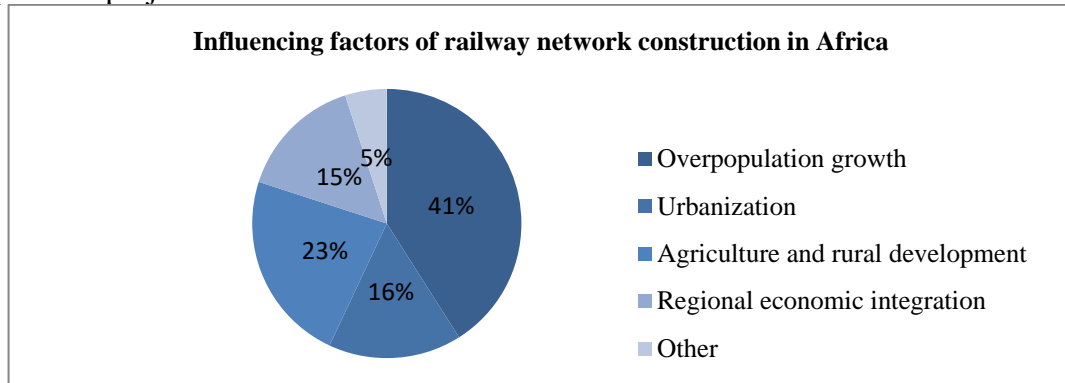


Figure1. Influencing Factors of Railway Network Construction in Africa

5. Conclusion

China has entered the critical stage of realizing the great rejuvenation of the Chinese nation, and its ties with the international community have become closer. In the new era, we must consider and comprehensively use the two markets, the two resources and the two kinds of rules. China's contracted projects and some investment enterprises in Africa have gradually cultivated high-quality management and technical staff, with the ability to coordinate and optimize the allocation of human resources in the system. At present, the main body participating in infrastructure construction in Africa, the central enterprises have mastered the capacity and technology of the whole industrial chain of infrastructure and established a broader market network after several rounds of restructuring in recent years.

Africa is rich in resources, has a huge market, and has broad prospects for development. It is a foreign market and resources that I can use. China and Africa carry out infrastructure construction cooperation and promote Chinese enterprises to explore overseas markets, which not only realizes the export of China's equipment, labor services, technology and standards, but also effectively promotes domestic enterprises to improve their competitiveness through cooperation and competition practice, so as to drive China's economic transformation and upgrading. China's financial institutions provide loans for infrastructure project cooperation, which can transform China's large foreign exchange reserves into practical construction achievements. The package cooperation model can also be exchanged for the oil and mineral resources needed for China's domestic construction. Infrastructure cooperation will connect China and African markets, give full play to their respective resource advantages, and ultimately promote domestic economic development and realize the great goal of the "Chinese dream".

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