Analysis on Risks and Preventive Measures of Overseas Highway Engineering: Taking Bolivia Project as an Example

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How to cite this paper: Ying Pan, Jun Dong, Likuan Tian. (2023) Analysis on Risks and Preventive Measures of Overseas Highway Engineering: Taking Bolivia Project as an Example. Engineering Advances, 3(3), 274-283. DOI: 10.26855/ea.2023.06.024

Received: May 31, 2023
Accepted: June 29, 2023
Published: July 27, 2023

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Abstract

Under the Belt and Road Initiative, the pace of Chinese enterprises to explore overseas markets obviously quickens, and the international project contracting business has been maintaining rapid growth. At the same time, series of issues have brought the unprecedented impacts on human society, such as the scientific and technological revolution, the industrial revolution, climate change, etc. With more and more risk factors in the international project contracting market, the uncertainties faced by Chinese enterprises "going global" to carry out international business are increasing. Based on the "the Two-San Project" and "the Yukumo Project" being implemented by China Construction Group in Bolivia, the paper focuses on the internal and external risks, involved in the development of highway engineering projects. The various risk factors will be explained in detail so as to provide reference for the smooth implementation of the road projects under construction and the road projects to enter Bolivia in the future.

Keywords

Belt and Road, International project, Construction enterprises, International project contracting, Risk factor

1. Introduction

In response to the "Belt and Road" initiative, Chinese enterprises went out of China and actively carried out international cooperation and competition, and continuously thus expanded their global influence. In 2020, the volume of Chinese foreign direct investment increased to $153.71 billion, ranking first in the world for the first time. However, in the face of different countries and regions, the local humanistic environment and business environment are very different. If you take the liberty to promote project, there are bound to be many potential risks. And so, when Chinese enterprises comply with the "Belt and Road" initiative and go out, it is necessary for us to investigate, analyze and study the background and potential risk factors at different countries and regions, in order to ensure the smooth performance of Chinese enterprises' projects.

Bolivia, short for Plurinational State of Bolivia, is a landlocked country at central part of South America, which borders several countries, including Brazil, Peru, Chile, Argentina, and Paraguay. Since the establishment of diplomatic relations between China and Bolivia in 1985, bilateral friendly relations and mutually beneficial cooperation have made great progress. China has become Bolivia's largest financing provider, largest import source country and largest engineering contractor. At present, the new Bolivian government plans to vigorously develop infrastructure, jointly build the "Belt and Road" and promote the building of a community with a shared future for mankind, and so China-Bolivia economic and trade cooperation has ushered in a new era. There are 48 large and medium-sized Chinese enterprises in...
Bolivia. Being established the Bolivian Chamber of Commerce of Chinese-funded Enterprises, the export of large mechanical and electrical products and the contracting of engineering projects have developed rapidly.

Based on the "San Jose De Chiquitos-Sanigimacio De Velasco Project" (the Two-San Project) and "La Construcción De La carretera Yucumo-San Borja Project" (the Yucumo Project) being implemented by China Construction Group, this paper focuses on the internal and external risks, involved in the process of highway engineering project development. We will analyze and studied the related risk factors and possible preventive measures, and then forms a set of risk identification, assessment and preventive measures, whose research results not only provide references for Chinese overseas enterprises in Bolivia to enhance their risk awareness, deal with various risks and challenges, and ensure the smooth performance of projects, but also have great practical significance for promoting similar projects in countries and regions of South America.

2. Current Situation of Infrastructure in Bolivia

Bolivia is one of the poorest countries in South America. Bolivia's traffic is dominated by road transport, accounting for more than 85% of total traffic, but road coverage is the lowest in South America, and it is only 0.068%. The main highway lines take some important cities as nodes, including La Paz, Oruro, Cochabamba, Sucre and Santa Cruz, forming the main structure of the traffic trunk road and radiating and connecting the national road network. These highway lines are divided into three levels: basic transportation network, provincial transportation network and municipal transportation network. The trans-oceanic highway with a total length of 1,543 kilometers, which links the Atlantic Ocean with the Pacific Ocean, has been finished and put into use, connecting Brazil, Bolivia and Chile, so that goods can be transported directly to Brazilian ports or Chilean ports. The total length of railway is about 3702 kilometers in Bolivia, where there is no high-speed train, and trains are drawn by internal combustion engines. Bolivia, a landlocked country in South America, has no seaport, and water transport consists of river transport and lake transport. There are 43 public airports in Bolivia, of which three major cities, such as La Paz, Cochabamba and Santa Cruz, are armed with the international airport. And all airports have been managing by the Bolivian Airport and Air Transport Ancillary Services Authority. On the basis of the situation, mentioned above, a development plan for 2025 at the 200th anniversary of the foundation of Bolivia was formulated by the new Bolivian government, which had been established since Nov, 2020. People in Bolivia intend to vigorously develop infrastructure and actively implement the strategy of industrialization of oil and gas, energy and mining.

With a relatively low level of digital infrastructure development, Bolivia has the poor quality of communication connections [1]. In the fixed-line market, broadband penetration rate in households is only 25%, it is very difficult to get a phone call in remote rural areas, and there is no guarantee that every household has the Internet even in big cities. Although the network has been installed in overseas corporate camps, the network environment is poor, and Chinese employees need to recruit engineers and experts through newspapers and radio. Compared with the fixed-line market, mobile phone services in Bolivia are well developed, especially in the rural areas. On account of the high cost and difficulty brought by laying fixed-line network, mobile network has obtained unique conditions for development. Most Bolivians use mobile phones to surf the Internet, and web service package are broken down into daily and weekly package. Not everyone has a smart phone, there are still old-version black and white screen mobile phones on the market, and they are selling well, and so very few people would buy and sell the items through the Internet. With Wechat and Alipay seldom used, payment methods are also backward, and there are no ATMs at the local bank, and Chinese enterprises can only go to the counter for business. In recent years, the Bolivian government has issued an ICT policy in the 2020-2025 National Development Guidelines for the purpose of achieving information connectivity and coverage throughout the country.

3. System analysis of risks about highway engineering projects in Bolivia

As a comprehensive form of international economic cooperation, international highway engineering project is often affected by the environment of the country where the project is located and international situation, and risks exist at any place and at any time, running through the various stages of project transaction, project execution and completion. In accordance with the scope and cause of the risk, we will systematically analyze the external risk and internal risk of the project, and thus put forward the risk prevention measures.

3.1 Comprehensively external risks

The common risk international highway engineering project encounters is external risk, which affects the development of highway engineering project and causes a series of problems, such as repetitive operation, delay of construction period, economic loss, cultural collision and conflict. It mainly includes political risk, economic risk, legal risk, social and cultural risk and natural environment risk.
3.1.1 Political risk

With the capital Sucre and the government resident La Paz, Bolivia is a developing country in South America. At the middle and later stages of the COVID-19 epidemic, Bolivia's economy resumed rapid growth, people's employment rate increased, and the domestic political situation became stable. But the ruling party still have to overcome many challenges, including inefficient administration of government officials, fierce fighting between parties, and frequently-occurring riots and conflicts. In 2019 and 2020, Bolivia had two presidential elections respectively, and the national situation was once out of control. Strikes, demonstrations, smashing, burning and looting caused the construction site of Chinese enterprises to be shut down; Laws and regulations that infringe the rights and interests of ordinary people in Bolivia, especially the rights and interests of indigenous Indians, are also the cause of riots and conflicts. Roadblocks prevented the loading of cement, resulting in delay in the transportation of emulsified asphalt; The same situation also appeared in neighboring countries, which Bolivia imported diesel from. Argentina, Chile and Brazil are the main routes for diesel import, and strikes in these neighboring countries affected the transport of diesel, and the project was forced to stop due to lack of diesel.

In the face of the unstable political situation, the project department made contingency plans, comprehensively considering the emergency measures in extreme cases such as beating, smashing and looting, and strengthening safety management. First of all, in order to ensure personal safety, the staff of the project department were not allowed to go out during the riot, and they purchased signal receivers to receive signals, so as to maintain close contact with the embassy in Bolivia, obtain information and seek diplomatic protection, and jointly plan evacuation routes; Because a series of problems caused by the presidential election and the strike had led to construction delay, the project department collected materials and applied for the construction period claim and the cost claim with the supervisor, but Chinese enterprises only obtained the claim for the construction period, and the cost claim was unsuccessful, and they are able to seek the help of the Bolivian Development Planning Department, which is in charge of investment affairs. Pay close attention to the problems about the political governance and social operation in Bolivia's neighboring countries, and the civil disorder in neighboring countries affects the entry of materials and mechanical equipment in transit. At that time, Chinese employees found their ways to redeparture from the location, make a detour to handle customs clearance at other neighboring countries, and then enter into Bolivia and prevent the future loss.

3.1.2 Economic risk

In recent years, Bolivia's economic situation has deteriorated. Coupled with the COVID-19 epidemic, the Russia-Ukraine conflict and the increase in domestic operating costs, energy and mineral products, pillar industry of the Bolivian economy, continue to suffer from low prices in the international market, which lead to a significant decline in import and export volume, foreign exchange reserves and fiscal revenue. According to the Central Bank statistics in Bolivia, the year-on-year inflation rate was 0.67%, as of December 31, 2020 the public debt was as high as $22.528, accounting for more than 50% of GDP, and China has been the country’s largest bilateral debtor. Starting in 2019, Bolivia experienced a decline in GDP real growth rate and even negative growth in 2020, with the main economic indicators shown in table 1 below. GDP can represent the economic level of the country. The Bolivian government and local enterprises do not have the economic strength to complete such large infrastructure construction projects independently. Many local enterprise owners had not finished the project yet, it was because of the debt problem that they had to stop the construction. In 2021, as the COVID-19 epidemic eased and the government made active response, the Bolivian economy showed signs of recovery. Due to the impact of the Russia-Ukraine conflict, global inflation has appeared since 2022. Series of problems has also appeared in Bolivia, such as price increase, slowly economic growth, and imbalances in the balance of payments. When Chinese enterprises go out to contract international highway engineering projects, the construction period is long, and stable economic environment is also needed. Faced with such unforeseeable objective risks and changes in the national conditions, it is very difficult for Chinese enterprises to prevent and control through risk management. They can use legal means to claim compensation as well, but the rate of success is not high.

Table 1. Main economic indicators of Bolivia from 2016 to 2020

<table>
<thead>
<tr>
<th>Year</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
<th>2019</th>
<th>2020</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP (USD 100 million, current price)</td>
<td>339.41</td>
<td>375.09</td>
<td>402.88</td>
<td>408.95</td>
<td>366.89</td>
</tr>
<tr>
<td>GDP real growth rate (%)</td>
<td>4.26</td>
<td>4.20</td>
<td>4.22</td>
<td>2.22</td>
<td>-7.82</td>
</tr>
<tr>
<td>GDP Per capita (USD, current price)</td>
<td>3077</td>
<td>3351</td>
<td>3549</td>
<td>3552</td>
<td>3143</td>
</tr>
<tr>
<td>Annual growth rate of GDP per capita (%)</td>
<td>2.73</td>
<td>2.70</td>
<td>2.75</td>
<td>0.80</td>
<td>-9.09</td>
</tr>
</tbody>
</table>


In accordance with the legal regulations, when foreign investment enterprises participate in the bidding, they need to register domestic company in Bolivia. The two parties sign the contract after winning the bid. The Yukumo Project and
the Two-San Project has set up CHINA STATE CONSTRUCTION ENGINEERING CORP.LTD SUCURSAL BOLIVIA in Santa Cruz, and then become a local company in Bolivia. Chinese enterprise only purchased materials and equipment from China, including machinery and equipment, small construction machinery and tools, and something like that. As of April 2023, the international trade volume of the Yukumo Project was 52,479,400 RMB, the international trade volume of the Two-San Project 46,976,500 RMB. During the process of international trade, series of factors have brought a variety of risks to international trade, including geographical distance, the COVID-19 epidemic, the Russia-Ukraine war and strikes and riots. For example, the price of sea freight soared during the epidemic, with the unit price of per container increasing tenfold, and now the price of sea freight is still higher than one in 2019. The computer board of excavator disappeared during the sea transport in 2020. The result is that the period of claim is very long, and the amount of claim is difficult to coordinate. The project department has withheld part of the sea freight, and now it is still waiting for compensation.

In order to transfer the risk, Chinese enterprises used the registered companies in Bolivia to sign contracts with local suppliers to buy materials, such as asphalt, steel bars and cement, and the suppliers imported these materials from other countries through traditional trade and then transported them to the project department [2]. Since 2022, the price has risen in asphalt, cargo transport disruption and supply chain disruption, caused by the conflict between Russia and Ukraine, increased the cost of Bolivian projects. With asphalt entered the construction site too late, asphalt surface construction could not proceed as planned. In addition, there were occasional riots in neighboring countries, and the asphalt was stuck in customs. Chinese enterprises discussed solutions with domestic asphalt suppliers in time, and they deployed resources in Bolivia to solve the urgent needs at that time. The project department made effort to increase revenue and reduce expenditure, strengthen financial management and cost control, so as to ensure the stability and sustainability of the project.

With 6.86 Boliviano per dollar to be bought and 6.96 Boliviano per dollar to be sold, Bolivia implements a fixed exchange rate system. Since the project department entered the construction site, exchange rate never fluctuated. There was no foreign exchange risk in the past. Since the beginning of 2023, the foreign exchange reserves of the Central Bank in Bolivia have declined sharply, and the original exchange rate is still maintained, but if Chinese construction enterprises want to exchange dollars for international trade, they need to pay an additional 7%-8% fee, and the exchange amount is limited. On the black market, the exchange rate for the US dollar is very high, with 8.00 Bolivianos per dollar to be bought, which will lead to the payment of more Bolivianos, increasing the capital cost of Chinese enterprises. There is exchange rate risk and fund payment risk. In view of this situation, financial instruments such as options and future foreign exchange settlement can be used to hedge risks in international projects to lock in exchange rate and evade the exchange rate risk. Both parties can also add an exchange rate adjustment clause in the contract. When the exchange rate and the corresponding handling fee change, they will be adjusted according to the agreed terms to avoid exchange rate risks, but it needs to negotiate with the owner and reach a consensus.

3.1.3 Legal risk

Bolivia is a civil law country with a relatively sound legal system. In terms of labor employment, it requires Chinese enterprises to pay pension insurance and medical insurance premiums for Bolivarian workers who formally enter the workforce. It is also stipulated that Chinese enterprises should pay employees up-to-17-month pregnancy compensation and childbirth subsidy, Christmas benefits, superannuation allowance and high employee termination indemnity on the basis of the actual payment of wages. The status of insurance and compensation for Chinese employees and Bolivian employees in Bolivia is shown in Table 2. At the same time, labor contracts are required to be filed at the Ministry of Labor, and the fixed-term contracts are divided into three-month contract, six-month contract and one-year contract. The types of contract need to be determined within 15 days after starting the job. When the contract expires, Bolivian workers can only renew for one year. Any further renewal is a project-duration contract.

Bolivians have a strong sense of law, and when encountering big and small things, they will find lawyers, write pleadings, and thus solve problems through legal means. In 2022, a father in his 50s and his children came to the project department to find job, at that time the working clothes were issued to prepare for entry, but they insisted on working in a work area, there was no such position. And so they had no contract with the company and did not handle admission procedures as well. More than one year later, Chinese enterprise had been sued to the local labor agency on charges of age discrimination, and the staff from the local court came to investigate the case, which has not been dealt with now. In accordance with the legal regulations in Bolivia, if the worker leaves by himself after signing a contract with the company, the company will pay the superannuation allowance according to the length of working time. If the company dismisses the employee, the company will pay both superannuation allowance and three-month salary as employee termination indemnity. In view of the employment situation, the project department timely adjusts the corresponding employment plan. Workers who sign a one-year contract can be fired directly and paid within 15-day probationary period. Workers with good performance will be signed directly for another year, and there will be no need to sign an open-ended contract for two years. Workers with bad performance will be sent to positions they do not want to engage
in. If they do not obey the distribution, the company will issue a warning letter. Three warning letters mean violations of discipline, and the company can directly fire them, only paying superannuation allowance, and not paying employee termination indemnity.

<table>
<thead>
<tr>
<th>Item</th>
<th>China</th>
<th>Bolivia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pension insurance</td>
<td>8%</td>
<td>20%</td>
</tr>
<tr>
<td>Medical insurance</td>
<td>2%</td>
<td>8%</td>
</tr>
<tr>
<td>Unemployment insurance</td>
<td>1%</td>
<td>2%</td>
</tr>
<tr>
<td>Industrial injury insurance</td>
<td>1%</td>
<td>1%</td>
</tr>
<tr>
<td>Maternity insurance</td>
<td>1%</td>
<td>1%</td>
</tr>
<tr>
<td>Total of social insurance</td>
<td>12.96%</td>
<td>16.81%</td>
</tr>
<tr>
<td>Personal accident insurance</td>
<td>0.68%</td>
<td>0.68%</td>
</tr>
<tr>
<td>Christmas benefits</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Superannuation allowance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employee termination indemnity</td>
<td>24.99%</td>
<td>24.99%</td>
</tr>
<tr>
<td>Total</td>
<td>11%</td>
<td>32.68%</td>
</tr>
</tbody>
</table>

### 3.1.4 Socio-cultural risks

The official language of Bolivia is Spanish. The communication between Chinese staff and Bolivian supervisors and employees mainly relies on the translator and interpreter. The number of translators and interpreter assigned to the project are limited, people who master Spanish are not proficient in technology, and people who know technology do not grasp Spanish, and the cultural difference still exists, and so the quality of translation cannot be guaranteed, and the communication effect is not good. For example, almost all materials on the construction site are written in Spanish, and some terms of contract do not agree on specific standards for use, but are defined according to the requirements of the supervisor. Thanks to language barriers, sometimes Chinese employees did not know which standard was required and fell into a passive position during the construction. Therefore, the Chinese side is charge of technical guidance and management, while the Bolivian side is responsible for organization and coordination in order to ensure the normal operation of the project. At the same time, Chinese engineers and managers learn Spanish in their free time and interact with Bolivians to continuously learn and accumulate the language. Being simple and enthusiastic, Bolivian people like to chat with Chinese people to deepen mutual understanding. They are very fond of Chinese electronic products and contemporary cultural products. Chinese employees teach them to download and use these apps, such as TikTok and Little Red Book, and discuss strange person and thing with us. They chat, make friends and get information through these apps, and see the real China through these apps to enhance emotional communication and promote spiritual connection [3].

The natural landscape in Bolivia is beautiful and air is fresh. The Bolivian government attaches great importance to environmental protection, and the law enforcement is very strict. In addition to the government's decree, we also need to meet the environmental protection requirements of the community residents and indigenous residents. The environmental protection department in Bolivia does not get involved in the environmental supervision of the project, but the project department employs special environmental supervising engineers to be responsible for environmental management. They have high requirements for environmental protection. For example, before using running water from the local water company, the contractor needs to find an expert from testing company to take water from the camp and conduct water quality testing. If the test results are not qualified, Chinese enterprise need to improve the water for staff at camp, and then make use of barreled water. Now the workers are all drinking barreled water. If the supervisor got to know the fact that the workers were not drinking barreled water, he would issue a warning letter. The three warning letters will be fined 0.01% of the total amount of the project, totally amounting to 43,6557.41 RMB. As the data of measurement, an environmental report made by the construction party every month shall be submitted to the environ-
mental supervision engineer for examination and approval. The project department has disseminated Bolivians environmental policies and regulations to Chinese employees, and they are required to strictly abide by the guidelines of their behavior, and thus carry out their work in an orderly manner.

3.1.5 Natural environmental risk

Bolivia, dominated by plateaus, belongs to the subtropical and tropical climate, and the temperature is often determined by the altitude. Bolivian climate is uncontrollable, which has a great impact on the project, resulting in different degrees of fluctuation between the construction plan and the actual construction situation. With the average altitude of 437 meters and the average temperature of 23.8 degree centigrade throughout the year, the Two-San Project is situated in Santa Cruz province at the eastern plain of Bolivia. The area the Two-San Project belongs to is in the dry season most of the time, with the annual precipitation of 600-1000 mm. During the construction process, they are short of water most of the time. The annual rainfall is not high, but the rainfall intensity is large, with the maximum daily rainfall reaching more than 90mm. There are 52-day heavy rainfall weather in each rainy season, with 1.7 months every year unable to organize construction. The heavy rain will lead to the collapse of the drainage system and traffic disruption, which is bad for the project area. In order to grasp the influence of these uncertain factors on the construction of the project, the annual maximum rainfall records of the meteorological stations in this region within 24 hours were analyzed, we got to know the months of the highest annual precipitation and adopted the corresponding measures. The project department has compiled the Construction Plan for Rainy Season and the Emergency Plan for Rainy Season Construction to deal with some problems brought by rainy season, so as to minimize the losses of the project construction. In the dry season, a large number of water trucks were rented for sprinkling water and lowering dust on the road. As for water points, we make a detailed field investigation before bidding, have a good understanding of the natural environment risk in Bolivia. Fully grasp the weather dynamics in order to reasonably arrange construction design scheme during the rainy season. For example, when the soil moisture content is up to the standard, the workers will carry out soil spreading and rolling. This makes the original four links of "digging (digging the soil), transporting (transporting the soil), leveling (paving the soil) and pressing (rolling the soil)" become five links, and one more link is "drying the soil", which not only extends the construction period, but also increases the cost of people, materials, and machines. Therefore, the contractor should make a detailed field investigation before bidding, have a good understanding of the natural environment risk in Bolivia, and include it in the exemption clause of the contract to reduce the loss of Chinese enterprises in Bolivia. Fully grasp the weather dynamics in order to reasonably arrange construction design scheme during the rainy season. For example, in the continuous light rain days, the workers can not carry out the subgrade filling, but arrange stone construction in order to meet tight deadline. Workers can also prepare for materials in the rainy season, meet the deadline in the dry season and implement multiple shifts to ensure that the project is completed on time. Another method that we are able to make is that workers raise the height of the embankment, reduce the impact of the water level on the road, and install drainage facilities in special sections, such as drainage blind ditch and drainage side ditch.

3.2 Comprehensive internal risk

The internal risks of international highway engineering projects are the risks that are exclusive to specific projects and related to project stakeholders, including project decision risk, contract risk, capital risk, technical risk and management risk, which will bring some problems such as unequal rights and responsibilities, increased difficulty in claims, property losses and so on.

3.2.1 Project decision risk

With the intensification of market competition, international engineering contractors have to bear the risk of project decision in the process of project selection and decision. For example, because the contractors had not fully investigated the overseas market, they were not familiar with the local laws and regulations, without considering the insurance, allowance and compensation, involved in the labor law, which led to the wrong quotation calculation. The drawings, provided by Bolivia are only preliminary design drawings, and the construction drawings need to be continuously improved during the later period, and so the quotation, given according to the preliminary design drawings is not very accurate. Both China and Bolivia use fixed price contract, and the list price is fixed at the time of bidding. However, in the process of subsequent projects implementation, the price of materials, purchased from suppliers rises, and the original
list price remains unchanged, which constitutes the bidding risk. In the contract, the contract scope of the project is unclear, and the contract content is vague, which will inevitably increase the project risk. For example, there is no road maintenance in the list, but the rainy season is long at that place, where the Youkumo project is located, and so the road maintenance fee is included in the comprehensive unit price of the list by default, which increases the cost of the construction party. So far the Youkumo project experienced four rainy seasons, and the mechanical and labor cost, generated by the four rainy seasons, reached more than 10 million RMB.

Therefore, it is suggested that before investing in infrastructure, Chinese enterprises should strengthen overseas research, conducting political environment investigation through the websites of Chinese Embassy in Bolivia and Economic and Commercial Counsellor's Office, carefully studying relevant rules and regulations, analyzing and evaluating related risks; During the project implementation, Chinese employees do a good job in risk avoidance and management, and the project department can hire Bolivian technicians and site management personnel who have a deep understanding of specifications and drawings to join the management team. For some unpredictable engineering risks, under the premise of legal and contract permission, Chinese enterprises adopt contract transferring or subcontracting to transfer risks and protect our own interests; After the event, we will review what we did and constantly summarize our experience in the diverse and changing international market environment.

3.2.2 Contract risk

Contract is an important link in international highway engineering projects. In terms of contract format, the Two-San Project contract uses FIDIC terms 2015 red book, and the rights and obligations between the owner and the contractor are relatively equal. The contract of the Youkumo Project adopts Bolivian local terms, made by the owner himself. The rights and responsibilities between the contractor and the owner are not equal, and the responsibility of the contractor is greater than the rights. There are fewer favorable terms for the contractor. For example, in the Youkumo contract, a penalty of 10% is required for the unfinished part of the construction progress plan on a quarterly basis, and the progress plan submitted at early stage cannot be modified. The project payment has not stipulated the time to be paid in the contract. In terms of contract price, it is stipulated that the price adjustment is not allowed in the contract, and it belongs to fixed price contract. When bidding, the contractors need to consider the possible price changes caused by factors in the future, and then determine the list price. The specific list items are also provided by the owner, and the list price is the bidding price we quoted to the owner. This list price is fixed at the time of bidding. Therefore, contractors will be faced with the risk of materials price rising, and the risk of price changes is borne by the construction group. For example, asphalt is basically imported from Russia. Due to the influence of the Russian-Ukrainian war, the time of entering the construction site was as long as three months, and the asphalt price also rose across the board. The purchase price of modified asphalt purchased from suppliers was as high as $1,450 per ton. However, the list price of modified asphalt, determined at the time of bidding, was $1189.08 per ton. The owner would pay project payment according to the list price, which was equivalent to the loss of $260.92 per ton of modified asphalt. The purchase price of modified asphalt in recent years is shown in Figure 1.

![Price tendency of modified asphalt during project construction.](image)

Figure 1. Price tendency of modified asphalt during project construction.

Contract is the special bond from design blueprint to engineering entity, and it is also the key to implement engineering projects and realize economic benefits. At the stage of contract negotiation, the contractor should enhance the risk awareness, and try to combine the characteristics of highway projects to persuade Bolivian owners to choose the internationally accepted contract model. As a tenderer, Bolivian owner took advantage of their buyer's market to put forward harsh conditions in the contract and shift risks to the contractor, reaching a fixed price contract, which was stipulated in
the form of contact term. However, this agreement is difficult to cope with complex and changeable engineering practice. For example, the purchase price of modified asphalt has been affected by the changes in the performance environment. But it is strictly stipulated in the contract that the price cannot be adjusted. In addition, the imperfect problems are highlighted in the original contract, such as abnormal rainfall, strikes, and riot caused by the presidential election. In this case, the contractor and the owner should negotiate and sign a supplementary agreement, so as to guarantee the interests and gain the profits, but the result of negotiation is still to carry out the original contract. When the course of actual construction, Chinese enterprises are also trying to strengthen the change planning of loss items. On the one hand, the construction party should strive to reduce the engineering quantity of loss-making list items. If the gabion construction is unprofitable, the construction party will try its best to persuade the supervisor not to construct or reduce the construction. On the other hand, efforts should be made to increase the engineering quantity of profit-making list items. If the geogrid is profitable, the employees at the technical department will provide a technical plan to explain which items are needed to increase the engineering quantity and boost income. At the same time, Chinese enterprises can strengthen management, diversifying the income channels and saving the cost and expense.

3.2.3 Capital risk

With the implementation of highway engineering projects in Bolivia, there are the capital risks, such as capital shortage, capital recovery and the risk that cost outweighs expenditure. The Two-San Project belongs to the World Bank loan project, the financial situation is good; The Yukumo project is funded by two parts, 70% from the South American Development Bank and 30% from the Beni provincial government. At present, the funds of the South American Development Bank have been put in place, but the Beni provincial government, which is basically the poorest province in Bolivia, does not have enough funds. The project payment consists of advance payment and progress payment. Advance payment is paid by the owner to the contractor before the project starts, which is used to purchase materials and mechanical equipment, build temporary facilities, organize the construction team to enter the construction site and thus start the project. The advance payment accounts for 20% of the total project amount, and both the Two-San Project and the Yukumo Project have received the advance payment. The progress payment is calculated according to the construction progress, and generally all expenses are calculated by the total number of projects completed on a monthly basis. In the form of advance payment deduction, Bolivia deducts the advance payment from the first progress payment, and the advance payment deducted from each progress payment is 20% of the settlement amount, until the last progress payment is measured. All the advance payments will be deducted and returned back to the owner.

Compared with China, repayment period of the advance payment required by Bolivia is short, which increases the financial pressure of the construction party and requires the construction party to have a stronger ability to advance funds as well. With the progress payment paid monthly, the declaration and confirmation right of the progress payment will take 1-2 months or even longer, for the supervisor procrastinates most often. Especially in recent years, due to the influence of the COVID-19 epidemic and the Russian-Ukrainian war, the government that is not rich has become even more short of funds. At present, the payment of the project progress is seriously lagging behind. Secondly, the owner often makes counterclaims according to the contract. There is still the risk that the progress payment will be deducted. Before construction, the construction party will report the construction progress plan to the supervisor, and it is not allowed to modify at will. 10% of the current progress payment will be deducted without completing the construction progress plan on time. If the construction progress fails to make up for this part in one quarter, this part of the fine will not be refunded. Finally, the machinery leasing businesspeople will charge the construction party for the fee according to the contract. Mechanical equipment is rented firstly, and after the construction in the current month, the payment will be settled at the beginning of next month. As a result, the owner had not paid the project payment to the contractor, and so the contractor neither settled machinery leasing fee nor purchased asphalt, cement and diesel. Due to the project delay, management fees paid by the contractor are increasing, and the project department lost millions of RMB one month.

In view of this situation, the construction party made a plan for the use of project funds to ensure the safety of funds. At the same time, emergency plans were launched to deal with capital risks. With the construction party borrowing from China Construction First Division Group, the company's headquarters has paid more than 60 million RMB for the Yukumo project. The project department sent a letter to the owner, urging the owner to pay the project payment as soon as possible, otherwise, delaying the project payment would increase the interest. When the owner came to visit the project department, the machinery leasing businesspeople blocked the door of the project department and forced the owner to sign a letter of commitment to ensure that the project payment would be paid on time; The owner did not pay the project payment according to the regulations, the project period would become longer and longer. Chinese employees should enhance the awareness of claims, carry out claims for construction period and cost claims, if the cost claims are unsuccessful, the cost claims will be converted into claims for construction period [4].

3.2.4 Technical Risks

Bolivia is mainly based on American Association of State Highway and Transportation Officials and American So-
ciety for Testing Material, for Bolivia’s highway specification system is not perfect. Most local people are accustomed to using American standards and Bolivian standards. The Chinese managers on the construction site lack an adequate understanding of these two specifications, which has affected production performance and technical innovation to some extent. The drawings determined by both sides are only preliminary design drawings, during construction, more detailed drawings need to be drawn. The drawing design software in China is different from that in Bolivia. The local designers in Bolivia use the civil-3D software, which the Chinese enterprise personnel are not very familiar with. By inputting the data into the civil-3D software, the cross section map can be automatically drawn. The staff of the Two-San project encountered the problem of bridge type change. Because the terrain where the project is located is relatively flat, there are only three simply supported T-beam bridges in the whole project. In order to improve work efficiency, engineers changed two bridges with 35m and 45m spans into 40m spans, and curved bridges into straight bridges. The construction drawing of the first bridge can be slightly modified and used for the later two bridges, unifying the bridge type and beam section, saving workload and improving work efficiency.

Chinese enterprises hired professionals to help Chinese personnel with the civil-3D software. At present, the Chinese personnel have mastered the civil-3D software to meet the daily use. In order to better complete the change of technical scheme, Chinese engineers need to find strong evidence in contracts, technical specifications and American standard specifications, conduct qualitative and quantitative analysis and verification repeatedly, and complete the feasibility demonstration of design scheme change. All these things are used to persuade the supervisors to accept design scheme change. At present, the Chinese team of engineers is continuing to carry out a comparative study of Chinese and American construction standard, gradually eliminating the strangeness of American standards. At the same time, through the comparison of specifications and standard systems, the advantages of Chinese specifications are found, which will lay an important foundation for further introduction, publicity and export of China specifications. With the promotion of the “Belt and Road” initiative, both local workers and technical engineers have increasingly recognized the Chinese standard. We should publicize and promote the Chinese standard, enhancing China’s soft power. And thus, international speech right, matching our scientific and technological strength and comprehensive national strength, will be formed.

3.2.5 Management risk

Bolivia is a large country with a small population. The fact is that the less labor force and poor substitutability lead to Bolivian’s working without enthusiasm. Staff mobility is large, education level is low, trade unions are powerful, and the awareness of epidemic prevention and control is not strong because of pursuit of freedom and democracy, which brings great difficulties to the project department management. The drawings given by Bolivian side are only preliminary design drawings, more detailed drawings need to be drawn during construction. The completed drawings can only be constructed after being signed by the supervisor. However, because the supervisor was sometimes not on site or signs late, we would not timely get feedback and modification information, which affected the construction progress. As a result, the supervisor often attributed this to the responsibility of the construction side. The owner and the supervisor do not interfere with each other, and the owner cannot directly talk to the contractor, which makes the improper behavior of the supervisor not to be corrected in time from the management system.

The Two-San Project established the labor union, but the Yucumo Project did not. During the course of management, we carry out democratic management, and the meetings can be hold regularly as a way to collect rationalization proposals and understand cultural difference and the demands of employees [5]. We actively carry out staff caring activities to minimize conflicts. Combined with the local epidemic prevention and control plan, Chinese workers were strictly required not to go to public places, such as bars, but workers in Bolivia could not get strict restrictions, and only could take measures to take turns and put in quarantine. Managers need to strengthen communication. Through interaction with Bolivian employees, we can share the Chinese culture with Bolivian supervisors, engineers and the public, such diligence and courage, solidarity and unity, unremitting self-improvement, honesty and responsibility, advanced management experience and excellent technical achievements. The degree of information management needs to be improved, and the information management system at the project department can be developed to convey drawings and engineering measurement results to the server through the system, and then save them to the database. Supervisors and relevant managers can log in and view them at any time and they handle the business data with electronic signatures, instead of on-site signatures, greatly improving the efficiency of data processing.

4. Conclusion

As an international engineering contractor, we have to enhance the risk awareness, improve the risk identification ability, and systematically and comprehensively analyze the risk factors of international highway engineering projects, so as to lay the foundation for scientific decision-making, risk prevention countermeasure-making and the whole risk management in the process of project development. At the same time, risk management should be regarded as an important part of the operation and management of Chinese enterprises. The internal management should be strengthened, overseas working experience should be accumulated, business level should be improved, risks should be avoided, and
operation should be efficient, which will make Chinese enterprises more competitive in the international market.

Acknowledgements

Project supported by Guangzhou Vocational University of Science and Technology for research base item of Guangdong Academy of Education, “Research on International Trade Risks and Preventive Measures of Chinese Enterprises Engineering Project Along the Belt and Road” (Grant No. 2022JD06); project supported by China Construction First Engineering Division Co., Ltd for key research item, “Research on Sino-American Technical Standards for Highway Construction in South America” (Grant No. J2021031) and “Research on the Differentiation of International Engineering Projects in Countries along the Belt and Road: Bolivia” (Grant No. J2021030”).

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