

Artisanal gold mining's impact on local livelihoods and the mining industry in Ivory Coast

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Abstract

Purpose – In rural regions, mining is an activity that employs many people due to the fact that the barriers to entry are sometimes trivial, with very low technology, capital fund, and no specialized skills required. Many people including children are engaged in artisanal mining in Ivory Coast because they can earn higher incomes in mining than through other traditional activities such as agriculture, which is the main activity in the country. Artisanal mining contributes to reduce abject poverty prevalent in the country and it offers many others opportunities. However, this activity has many negative social impacts. Local people including miners are risking their lives everyday as they are exposed to unsanitary conditions, prostitution, chemical contaminants, and alcoholism, and also due to the large degradation of lands. The paper aims to discuss these issues.

Design/methodology/approach – All the data collected during this study were analyzed before some of it was corrected. For data analysis and interpretation, the authors used Word and Excel and other software, and other statistical tools for maps, graphs, and tables.

Findings – The main objective of this paper is to understand how artisanal gold mining in the Ivory Coast affects local livelihoods and the environment.

Research limitations/implications – This study was carried out during the author's study in China. The data collection between the two countries was too difficult due to the long distance. Many times the network was not reliable for any call and discuss with miners when we are not in the country. The hesitation of miners to give real information to the authors was also a main problem because most of them are illegal miners. Some of the guided questionnaires stayed without feedback for almost three months. The production was sold on a day-to-day basis by the miners in the illegal mining sites, so the authors could not obtain with precision the monthly and annual production to calculate income of the miners.

Originality/value – Some key recommendations for addressing artisanal mining activities in order to have a good option for sustainable management of mineral resources in the country are proposed.

Keywords Environments, Artisanal mining, Ivory Coast, Mining industry

Paper type Research paper

1. Introduction

1.1 Definition

Many potential mining deposits have been discovered in the country such as in Bonikro, Hire, and Abgovia. These cities are in the central part of Ivory Coast, around 300 kms from the economic capital (Abidjan). More than three licenses had been obtained by Newcrest the third largest world mining company for exploration and exploitation of the mineral resources in this area. The main intention of this mining company is committing a campaign of exploration in the country in order to discover major mineral resources especially gold.

“Artisanal mining” is an activity that consists of an adequate use of tools to extract mineral resources, generally with a good market. (Hentschel *et al.*, 2002; Banchirigah and Hilson, 2010) Artisanal mining is a real and ongoing situation in Ivory Coast but at the same



time it is also substantial for many people today. Foreigners and indigenous population are all attracted to this profitable activity because of the high price of gold (Bolay, 2014; Reuters, 2015; Dillon *et al.*, 2012).

Most of the rural population including women and children are generally affected by this hazardous work. The deforestation and land degradation are some of the key problems of artisanal mining. Local people are being exposed to infectious diseases. Artisanal miners generally try not to connive with the mining laws and the environment issue set by the government (Manuel, 2011).

Nowadays, artisanal mining is seen as a livelihood sustaining activity for rural population. This activity leads to low productivity, social security issues, environmental problems (pollution, degradation), and illegal jobs due to the very reduced degree of mechanization or organization (Drechsler, 2001; Kouame *et al.*, 2015). The inhalation of mercury and welding fumes is a great danger to these miners because it could lead to death because of the content of molten metal in the fume, which will be vaporized.

The artisanal and small-scale mining is analogous to an unofficial mining extraction due to the fact that the miners do not use sophisticated machinery and high technology, combined with the lack of (or very minimal use of) machinery, which is dominant across the country (Ivory Coast) and some others countries over the world such as the countries in the southern part of America, Africa and Oceania countries with an estimated more than 100 million people involved in this activity. (Hentschel *et al.*, 2002; Hilson and McQuilken, 2014). As the World Bank Group said in 2013, the largest poverty-driven activity is small-scale mining. The majority of people involved in this activity are itinerants with unstable employment options, and they normally operate the activity in isolated small towns in all parts of the country without any good administrative regulations (World Bank Group, 2013).

It is impossible to detect the people involved in gold mining activities and also the number of illegal mining sites operating in the Ivory Coast. Nevertheless, the working estimation according to the state's mining company (SODEMI) is that more than 5,400 people (indigenous, foreigners, old, women, men, children) are actively working in or around any of the 300 illegal mining sites, located in 21 of the 36 regions of the country (AFP, 2014; AIP, 2013; ASSIE, 2009; Randgold Resources Ltd, 2012).

This study aims to identify the key problems of Ivory Coast's mining industry. The sustainable management of the natural resources in general, especially the mineral resources, is seen in this paper as key recommendations.

1.2 The objectives

This study intends to apply the research outcome in China to the mining industry of Ivory Coast. Although this kind of research has already been done in other parts of the world, the question is, what is the advantage of Chinese research outcome compared to researches in other parts of the world, and how Chinese research outcome is more beneficial in the mining industry of Ivory Coast. That is why we try to enumerate the similarity problems in the mining industry of China with the mining industry of Ivory Coast.

We have tried to understand the fast expansion of artisanal mining in almost all the parts of Ivory Coast since the political unrest in 1999. Our research discusses an interesting issue about the evasion of major population especially children in mining activities, the hesitation of foreign investors, and the new advanced technology. The difference between the Ivory Coast and modern countries is that the Ivory Coast is not a well-developed country and does not have a good industry; therefore, the mining products need to be sold for raw materials, but in modern countries they are sold as produced products. Mining industry supports others industries. Some recommendations suggest modernizing Ivory Coast, in order to improve the artisanal gold mines, to attract foreign investors and avoid selling mining products for raw materials.

In fact due to the high levels of risk in the mining industry, the workers need to be supported. This issue has been done well in China. The Government of China carries out a series of policy and laws to encourage and balance the development of mining industry that is why we try to find out what the Chinese government policy is and how it can support the mining industry in Ivory Coast in the coming years.

2. Materials and methodology

We had proceeded by producing a “research questionnaire.” Boore was our privileged place. We tried to obtain the maximum information about gender, age, origin of miners, and the reasons for their presence on the mining sites instead of being in their plantations. At the same time attempt has been made to find out the different problems they meet everyday and their relationship with the state’s government and the national mining company (SODEMI).

2.1 Presentation of Boore mining sites

The Boore gold mine which is one of the main interests in this paper was detected due to the actively effort of the government of Ivory Coast supported by some organizations such as the University Center for Research and Application in Remote Sensing (CURAT) and CMA (Africa Mining Company).

This remains insignificant; more indepth researches are required to discover the real mining potential in this area. Boore is located in the central part of Ivory Coast, close to the political capital Yamoussoukro (Figure 1). Boore is part of the “Reigion des Lacs” in the district of Nzi-comoe is the sub-prefecture of Dimbokro. The vegetation of Boore is composed of savannah and forest. Due to the fact that most of the local populations of Boore are farmers, the forest of Boore has been highly deteriorated.

The cultivation of cocoa, coffee, yams, and bananas is extreme in this region. The region of Boore comprises two major features. The river Bandama is one of the natural gifts in this area that led to mining transportation facilities.

With more than 68,000 people, Dimbokro is the second largest city after Yamoussoukro, the political capital of the country in the Lacs Region. It is located at latitude 6.65, longitude – 4.71 and situated at an elevation of 94 meters.

2.2 The data collection

Different methods that led to collect the data for this study are the following:

- Several existing reported documents from SODEMI, CMA, CURAT, and many concerned bodies, websites, and institutions. Consistant literature review of articles, books, and laws and relugulations about mining code, mining operation, and mining activities was one of our basic information sources.
- Recurrent visit to some mining and illegal mining sites both in China and Ivory Coast was also done to understand the mining industry in the two countries.

More than 100 people involved in the mining activity were interviewed about their livelihood, advantages, consequences, and environment problems. The information obtained from the miners, local people, landlords, children present in the illegal mining sites, and other people after the interviews allowed us to collect data on their income, to understand the main reason of expansion of illegal mining over the country. The guided questionnaire also helped us to evaluate different problems facing the mining industry in the Ivory Coast:

- some technology tools were used for photograph maps and other issues;
- a number of focus-group discussions have taken place; and
- we had done some consultations with stakeholders and SODEMI.

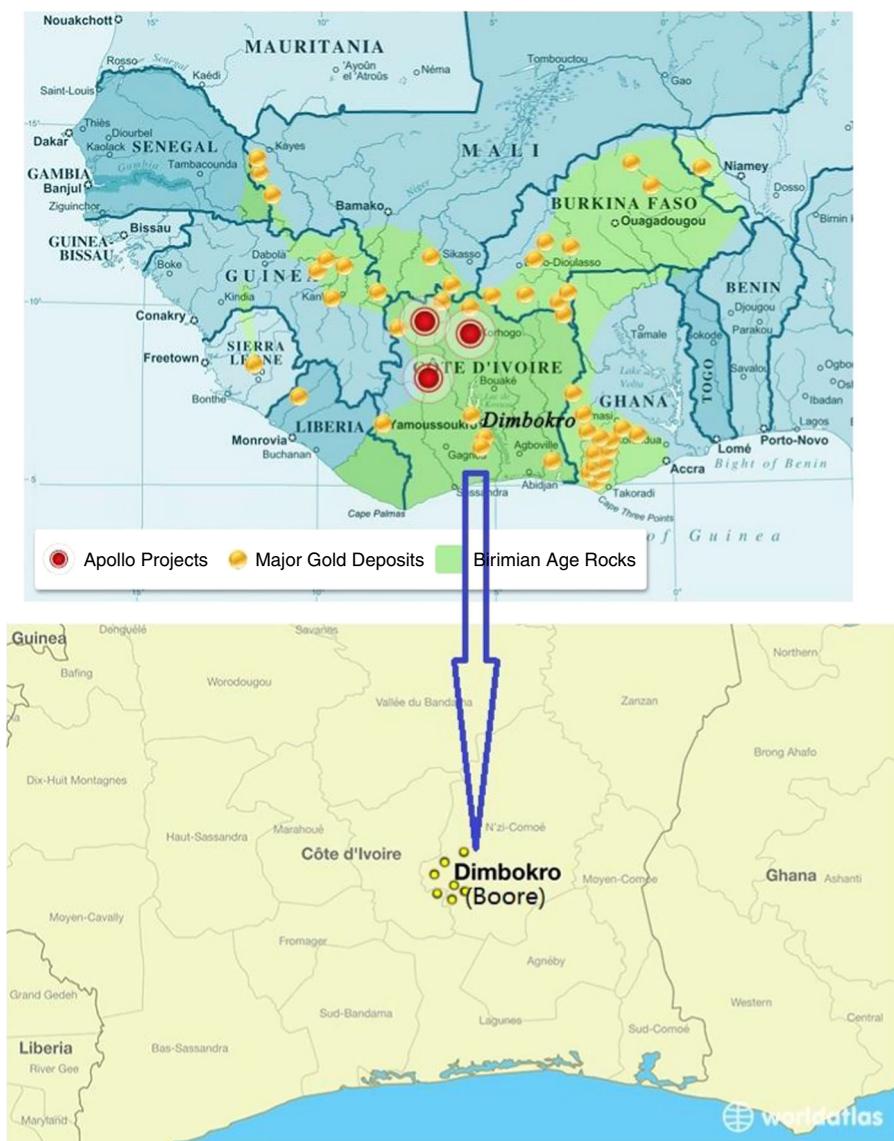


Figure 1.
The location of Boore (Dimbokro)

2.3 Data analysis

All the data collected during this study were well analyzed before some of it was corrected. For data analysis and interpretation, we used Word and Excel and other software, and also other statistical tools for maps, graphs, and tables.

2.4 The study's limitations

This study was carried out during my study in China. Data collection between the two countries was too difficult due to the long distance. Many times the network was not reliable for any call and discussion with miners when we are not in the same country. The hesitation

of miners to give us real information was also a main problem because most of them are illegal miners. Some of our guided questionnaires stayed without feedback for almost three months, so we were unable to obtain with precision the monthly and annual production to calculate the income of the miners.

3. Results

Even though artisanal mining is dangerous to the people of the Ivory Coast, at the same time it also saves their lives. Artisanal gold mining in the Ivory Coast unquestionably affects the livelihoods of the local people. It provides employment, in turn reducing the high levels of poverty. Because of artisanal gold mines some parents can earn a significant amount of money (alongside the current solitary and universal source of income – agriculture) to pay their children school’s fees.

Schools and hospitals are being built in the mining areas. Those actions and donations by miners greatly improve the local people livelihood.

3.1 The probe’s biological data

3.1.1 Age of artisanal miners. As mentioned more than two million children are involved in child labor. Most of these kids spend their time trying to earn money for a better future, than actually wanting to go to school for a better education.

According to our investment results, only 20 percent of miners are above the age of 40 years (12 percent in the age group from 40 to 55 years and 8 percent from 55 to 60 years of age). Most of the miners are in the age group from 14 to 40 years, as artisanal mining activity is a labor requiring strong young people. We found that 24 percent of miners are aged between 14 and 18 years. Few of those children worked temporarily on holidays as part-time jobs and some had dropped out of school due to the fact that their parent’s financial situation was not good (Table I). Of the miners, 56 percent are aged between 18 and 40 years.

3.1.2 The gender of miners. The number of women in mining sites is not high. Only few women are involved in mining activities in the Ivory Coast but sometimes not directly because mining requires a lot of physical strength. Women cannot do the digging by themselves. Most of these women are the wives of miners so they just support them in their duties (Figure 2).

3.1.3 The origin of miners. People who work in gold mines in the Ivory Coast are indigenous and foreigners from the neighboring countries. From 120 miners we found 45 Ivorian nationality miners (37.5 percent), 30 miners from Burkina Faso (25 percent), 22 miners from Mali (18.34 percent), 13 miners from Guinea (10.83 percent), and 10 miners from other African countries (8.33 percent). Most of those foreigners had entered the Ivory Coast illegally during the political unrest and. More than 76 percent of children in the mining sites are mostly foreigners (Table II). Child trafficking is recurrent in the northern part of Ivory Coast (McAdam and Willman, 2013; Dillon *et al.*, 2012).

3.1.4 Leadership. The person who discovers the mining deposit is called the leader. He will request for some professionals such as the people who are working in some existing illegal mines for exploration and exploitation. An organogram will be established including family, relatives, and workers.

3.1.5 Labor and remuneration. People work by groups or sometimes alone with the assistance of their relatives and friends so they do not need to hire. Miners do not permanently work at the same place. They move from one site to another site. The workers

Table I.
Age of miners

Age ranked (years of age)	14-18	18-40	40-55	55-60
%	24	56	12	8

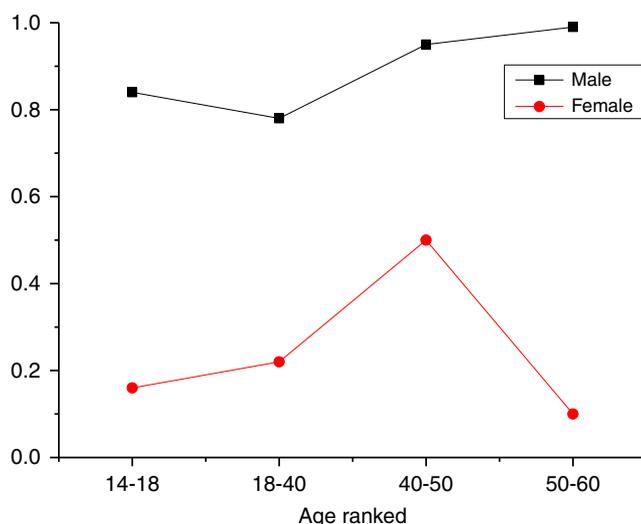


Figure 2. Gender of miners

Country	Number	%
Burkina Faso	30	25
Guinea	13	10.33
Ivory Coast	45	37.5
Mali	22	18.34
Others	10	8.33
Total	120	100
Foreign children	76	76
Ivorian children	24	24
Total	100	100

Table II. Origin of miners

have duties like digging and washing. They are paid daily, weekly, or even monthly according to the productions. It is about US\$40 (CFA 2,500) per day.

3.1.6 *Artisanal mining evolution and change in Ivory Coast.* Different techniques are used in mining in the Ivory Coast. The material used for digging and washing are the same the old ones used since the independence, only few materials have changed. Many countries like China and others foreign countries are helping by providing materials and increasing the production of the products. These countries are very important to Ivory Coast, because without them the mining industry would be a disaster. The materials cost depends on their performance and utility (Table III).

4. Discussion and analysis

4.1 Discussion

In the Ivory Coast, as proved by previous researchers, it is clear that the artisanal gold mining has an environmental impact and even cultural and socioeconomic impact.

This activity of gold extraction that started after the political unrest is more considering the rural people due to their fastness to earn much fortune. Agriculture ranks today the second level because it is periodical. Actually, it does not rain much as before in the Boore, so the agriculture production has decreased. The local people are hoping that the current

Table III.Costs of materials
in Ivory

Material	Minimum cost (CFA)	Maximum cost (CFA)
Spade	12,000 (US\$22)	15,000 (US\$28.50)
Crowbar	20,000 (US\$37)	30,000 (US\$57)
Wooden sluice box	30,000 (US\$57)	40,000 (US\$73)
Bate	8,000 (US\$14.55)	10,000 (US\$20)
Pickaxe	8,000 (US\$14.55)	10,000 (US\$20)
Machete	8,000 (US\$14.55)	10,000 (US\$20)
Boots	8,000 (US\$14.55)	10,000 (US\$20)
Motorized pump (with all accessories)	160,000 (US\$291)	200,000 (US\$364)
Total	254,000 (US\$462)	325,000 (US\$591)

government legalizes artisanal gold extraction. However, informal activity is really acute because the negative side remains big. The products used by miners are toxic and are dangerous to the health of people. The environment and the water bodies are exposed to high pollution. Infectious diseases are spreading. The plantations are destroyed everyday and the lands are sold to foreigners.

Many clandestine mining sites had been closed by the government in order to regulate this activity, but it still it is not effective as the miners prefer working in the illegal way due to the fact that they do not want to face outlays like tax, license, and others administrative documents fee.

Landholders are selling their lands and conniving with miners because they see that normal. It is not acceptable that the government is interfering into their own properties.

Local people believe that the gold in their plantations is godsend. It is like a gift. Nobody can convince them to not exploit it by themselves or dismiss it as heritage to whomever they want.

The current government should try to develop the mining sector because mining itself can do many great things such as construction of schools and hospitals in the localities with the capital. The mining areas can be rehabilitated and miners will use some appropriate tools and products. Then the negative impacts will be reduced greatly.

4.2 Analysis

The fast expansion of artisanal mining all over the Ivory Coast and the large prevalence of artisanal mining activities with the unauthorized selling of land to the miners remains a problem (problem of artisanal mining). That is why it is necessary to do an ongoing study on the subject. Clandestine gold miners threaten the significant potential mineral resources (Plate 1).

4.2.1 Effect of the political unrest from 1999 to 2011. The insecurity due to the political unrest since 1999 has helped foreigners who are from the neighboring countries to enter the Ivory Coast in the most illegal way. Once in the country, they are involved in gold extraction (United Nations Security Council, 2011). The restoration of the security in the system and to deal with other pertinent issues such as the tribal conflicts, xenophobia, and improving the standard of living of the people in these parts of Ivory Coast are complex issues.

4.2.2 Poverty and unemployment. It assesses the rapid expansion of artisanal mining sites in the country. More than two million individuals involved in artisanal gold mining and extraction depend on benefiting from gold mines and its revenues due to the high-abject poverty. Artisanal mining is so important and will always be important to the people of Ivory Coast as long as abject poverty exists in the country. Seeing how the world is evolving, we are still a long way from getting rid of abject poverty.

4.2.3 Bad organization. Actually, the disregard is evident. Several huge mineral deposits have been discovered in the Ivory Coast (gold, nickel, manganese, cobalt,



Plate 1.
Miners at work

tungsten, diamonds, bauxite, copper, monazite, iron ore, etc.), but agriculture still remains the main activity.

A bad organization in the sector always leads to several consequences. Even in the neighboring Ghana, the Oboassi mine, which is the largest in the country, is currently closed because of excess of illegal activities.

The large presence of artisanal miners who are mining in some regions frequently affect the operations of gold mining by foreign investors.

Agriculture not too profitable. Boore is full of people everyday. The abject poverty is the main reason. Many cocoa plantations become old and the production cannot solve any problems, even food. The price of cocoa is not as high as that of gold. Gold is more lucrative than cocoa because of the faster production time.

What one can elucidate from these examples is that artisanal gold mining in the Ivory Coast lacks the necessary implementation of an adequate mining code in large part due to the lack of political support perhaps owing to the “attractive” incentives in the mining sector. It is also apparent that there is an infrequent revision of mining code for a policy of sustainable development in the mining sector. This combined with a non-extension of existing legislative texts relating to the environment, such as simple documents or emissions (mass media) to accelerate their adoption, implementation, and to raise awareness on a national basis. Moreover, the low capacity of enforcement in the sector, growing insecurity in mining areas, hesitation of foreign investors due to the political insecurity in the country add to the problem.

4.2.4 Insignificant Infrastructures for children. Some children in the Ivory Coast prefer going to extract gold instead of going to school (Plate 2).

Many problems including the recurrent strikes and violence in the school areas do not encourage parents schooling their kids and mostly children from the neighboring countries are following this (Human Rights Watch, 2012). This is one of the major issues leading to the presence of children being involved in illegal gold mines. These children are tricked into doing illegal work that moreover requires a lot of strength. Such jobs are not suitable for children of such ages.

Plate 2.
Children working at
the mine site



5. Conclusion

In this paper, we suggest that the investment in mining industry and others sectors will help the agriculture to boost the Ivory Coast national economy. It also recommends solving the security problem and establishing good regulations and law for the mining sector.

As a result, the gold product in Ivory Coast will attract more foreign buyers. The buyers will not hesitate to invest many funds in the country's gold production. Ivory Coast can be the largest gold producer in West Africa and will rank a great position among the whole of Africa. The economy of Ivory Coast will be greatly boosted. The government will use the funds from the mining sector to solve some main problems such as insecurity, poor health conditions, poor education, etc. The local people will have better standards of living because most of the workers who will work in the mining sector will be indigenous as notified in the new mining code. The mining sector will actively be interested in the investors from developed countries. There will be an invasion of foreign investors into the Ivory Coast mining industry. The economy of Ivory Coast will grow rapidly like China. Furthermore, children will not be dragged into this sector and they can continue school and have a better education.

5.1 Key recommendations

This paper also gives further suggestions that the government of Ivory Coast pays more attention and invest in the new economic sectors with particular reference to the mining sector to strengthen the national GDP by Law, regulation, and environment.

5.1.1 Tax holidays. The government of Ivory Coast may offer at least two to four years' tax holidays to mining investors in order to encourage and attract them. This should be an exceptional case and effort from the current government to help investors.

5.1.2 New trends and future perspectives by adopting the new mining code in Ivory Coast's mining industry. It means, immediately adopting the new mining code.

The decentralization of the activity sector as new trends and future perspectives due to the advantages granting to the rural people by the new mining code will play a great contribution to the development of the mining sector.

Foreigners and local people will both be stakeholders, involved in the mining activities with efficient due process. The recurrent conflict between the local people and the miners will be ameliorated because we will assist efforts to improve the relationship between the government and the local people.

Ivory Coast will learn from the Chinese markets and grow the national GDP of Ivory Coast to increase and better the lives of the population: subsidence and environmental control-mining equipment and technology.

5.2 *Creation of mining group company*

The creation of the mining group company will be introduced into four modes:

- (1) The sale of mineral deposits.

The country will appeal to the foreign mining company to invest in Ivory Coast.

- (2) Local mining companies with foreign mining companies.

The local mining companies in Ivory Coast have to connive with foreign mining companies especially Chinese mining companies to build some new mining group companies which will lead to other business such as trade and education, tourism to set money and technology.

- (3) Sustainable development – good equipment and devices from China.

Local companies will ask for foreign expertise from China and some good mining equipment that will help to develop all fields in the mining industry of the Ivory Coast.

- (4) Technology.

Introducing the mining information technology that can help the mining sector in the country like strengthening of geological infrastructure, research, and data acquisition – using GIS in Ivory Coast gold mines.

GIS Software serves as an effective solution for solving artisanal gold mine challenges, while seeking to promote a safer mining industry in Ivory Coast.

As such, the development of GIS-based graphic safety technology with an integrated visual information management system, aimed at enhancing the level of mine safety management in Ivory Coast is essential and will certainly prove beneficial.

5.3 *Further perspective: implications of the new advanced mining technology in the mining industry in China and its application in Ivory Coast*

In this part of our research, we discuss on a new and interesting issue about the new advance technology. As a matter of fact and high level of risk in mining industry, the workers need to be supported. This issue has been done well in China.

This is when China can play a big part in helping Ivory Coast by providing new and improved materials to make mining easy for miners in Ivory Coast. China is known for being creative and innovative; they could help save lives and reduce the percentage of damages in mining sites simply by offering the machinery.

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