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## CONTRIBUTIONS OF THE MINING INDUSTRY TO SOCIO- DEMOGRAPHIC GROWTH IN DEVELOPING COUNTRIES – A LOOK AT THE MOATIZE CARBON BASIN IN MOZAMBIQUE

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**Abstract:** The establishment of companies linked to the extractive industry in the Moatize Coal Basin (BCM), in Mozambique, had a positive impact on the economy and the living conditions of the population in this region, despite the less favorable impacts associated with the mining process. The coal region in question, which covers the districts of Moatize, Marara and the City of Tete, where the companies Vale – Mozambique/Brazil, Jindal – South Africa, ICVL – India are operating, as well as others dedicated to services for the exploitation of coal, have become preferred destinations for many people from different continents (Europe, Asia and America), as well as from African countries such as South Africa, Zimbabwe or Malawi and also from several provinces of Mozambique. This migratory movement was conditioned by the search and search for business and employment opportunities in the companies existing in this coal zone. Since they started operating, the aforementioned companies have already created 9,585 direct jobs and, it is admitted, many others will have been created by the companies subcontracted by the megaprojects. This fact contributed to the growth of the country's Gross Domestic Product (GDP) and to the improvement of the living conditions of the local population, due to the increase in purchasing power and the possibility of acquiring improved goods and services, given that workers and their households now have medical and medication assistance, social assistance, in addition to having a guaranteed salary at the end of the month, thus making it possible to contribute to the payment of taxes to the state, availability to search for quality services for their dependents for education, health, transport and other essential goods for their daily lives, facts that contribute to improving life expectancy and productivity, thus raising

1 One billion is used here according to European nomenclature, which will be equivalent to one billion according to Brazilian nomenclature.

the country's economy.

**Keywords:** Impacts, Mining, Coal, Environment, Sustainability.

## INTRODUCTION

Mining is considered one of the oldest economic activities in the world and, in Mozambique, it is a practice that in 1985, in a work developed by the Portuguese geologist Freire de Andrade, showed that studies on the existence of coal had long been presented, which allowed the start of mining in the year 1950. After the colonial period, the exploration of this ore was made possible through the Mining Law n° 20/2014, of 18 August, allowing the entry of foreign investment into the area of exploration of resources minerals, based on the amendment to the Constitution of the Republic in 1990 (CASTEL-BRANCO & OSSEMANE, 2010).

Data from the World Coal Association (WCA, 2012) reveal that coal currently accounts for 30% of primary energy demand and approximately 41% of total electricity worldwide. Therefore, these elements made it possible to place it at the center of disputes over the control of reserves or its hasty extraction, similar to other ores, such as oil, natural gas, copper, silver, gold, palladium, platinum, which are examples of some minerals that have aroused the appetite of transnational companies and their countries (MOYO, 2013).

In the subcontinental context, that is, in Sub-Saharan Africa, Mozambique occupies a relatively comfortable position in terms of coal reserves. In a group of twelve countries, the country takes the third position, with 2.5 billion<sup>1</sup> tons of coal, behind only South Africa and Zimbabwe, first and second, respectively. In this case, in order to decipher what is behind these numbers, it is necessary to go through time and space to understand the role played by coal since its first call, at the end of the 18th

century in some countries that are currently world-wide economic powers. (BATA, 2018).

José and Sampaio (2012), cited by Macie (2015:18), state that the central province of Tete is one of the top provinces in terms of the exploitation of mineral resources in Mozambique, in particular in the BCM which, by itself, has one of the largest coal deposits, which is expected to be exploited in a period of 35 to 40 years.

One of the triumphs used by the Mozambican government to attract Foreign Direct Investment (FDI) was the offer of tax incentives and facilities to expatriate profits, as well as guarantees that, in the event of a dispute, transnational companies would have the right to resort to the International Arbitration Center for International Rights (CIADI), as established by Law n° 3/93, legislation that regulates investment in Mozambique. This leached strategy (diluted within the scope of sovereignty) was adopted by Mozambique with a view to attracting investments for the exploitation of existing mineral resources in the country, which could, on the one hand, place the country in economic prosperity and, on the other hand, enable the existence of work and employability of the Mozambican population, mostly made up of young people (45%), according to the 2017 Census (INE, 2017).

The exploitation of coal which, in the coal mining area of Couto Mineiro do Pejão, in Portugal, which lasted more than 100 years, despite having had negative impacts on the area where it was located (Castelo de Paiva municipality), boosted demographic and economic growth of that region and the country, due to the fact that in the period between the years 1886 to 1994, mining companies (the last one was Empresa Carbonífera do Douro) created direct employment opportunities for many hundreds of workers, as well as indirect employment in other companies. mining

dependent. This activity also evidenced the emergence of many coal-fired industries and companies providing public utilities that made a significant contribution in attracting taxes and foreign exchange to the country in general (CUSTÓDIO, 2004).

Another example shows that, in the 1970s, thousands of people in the coal region of southern Santa Catarina in Brazil depended directly or indirectly on coal mining. Around the mining activity there were thousands of workers, mainly rural, who migrated stimulated by the new job opportunities (SILVA and FERREIRA, 2015).

Be that as it may, there is no doubt that the implementation of the coal extractive industry served as the main vector for the migratory influx of the population to Moatize and the city of Tete, destinations seen as lands of hope, especially for the youngest who look to these parts of the country as a kind of new El dorado. This fact resulted in the direct employment of more than 9,585 people, of which 85% are Mozambican nationals, in addition to indirect jobs from subcontracted companies that provide services to the megaprojects (BATA, 2018).

In view of the facts of the research mentioned above, despite the concerns that are advanced in several studies about the aggression to the environment due to the activity of coal mining being legitimate, it is necessary to take into account the need to exploit this abundant resource so that Mozambique can enter on the path of economic and social development, as was the case in many other countries worldwide, and for this, the adoption of strategies and technological measures to mitigate the possible negative impacts to be generated must be imperative.

The present study aimed to: (i) describe the history of coal mining in the Moatize Coal Basin; (ii) analyze the demographic evolution in the Moatize coal basin region with the

emergence of the coal mining industry; and (iii) present the migratory movement due to the installation of the mining industry in Moatize.

The methodology used was the bibliographic research of the history of the coal mining industry in Mozambique, as well as the characterization of the migratory phenomenon to the study region through the analysis and interpretation of available documents (1997 Census, 2007 Census, 2017 Census and projection of demographic data in Mozambique), use of cartography applications to illustrate the field studied, which fundamentally brings approaches to the relevance of the exploitation of mineral resources in developing countries.

## **MATERIAL AND METHODS**

### **GEOGRAPHICAL FRAMEWORK**

The coal exploration companies are located in the province of Tete, in the central region of Mozambique, whose capital is the City of Tete, located about 1,570 km north of the city of Maputo, the country's capital. This province has a total area of 100,724 km<sup>2</sup>, with a population of 2,764,169 inhabitants, in which 51.2% of the population is female and 48.8% is male, according to the 2017 Census. a population density of 27.4 inhab/km<sup>2</sup>. The 2017 Census represents an increase of 980,202 inhabitants, that is, 54.9%, compared to the 1,783,967 residents registered in the previous 2007 census.

This province is divided into 15 districts and has, since 2013, four municipalities: City of Tete, City of Moatize, Vila de Nhamayábué and Vila de Ulongué. The province is located at the top of the central region of Mozambique, being the only one in border contact with three neighboring countries: Malawi to the northeast, Zambia to the northwest, and

Zimbabwe to the southwest. To the south it borders the provinces of Manica, Sofala and Zambézia.

The study area is located in the aforementioned province, integrating the districts of Tete, Moatize and Marara. It is located between the parallels 14°00'00" and 17°40'00" of South Latitude and between the meriyears 30°50'00" and 34°30'00" of East Longitude. The District of Moatize, in its entirety, is located in the Lower Zambezi region, having as geographic limits, to the north, the districts of Chiúta and Tsangyear (Tete province), to the south, the districts of Tambara, Guro (Manica province) and Mutarara (Tete Province), to the east the Republic of Malawi and to the west, Changara District and Tete City (Tete Province). The total area of Moatize District is approximately 8,428 km<sup>2</sup>.

The District of Marara, in turn, has its headquarters at the Administrative Post of Marara Cachembe, having been created as a district in 2013, according to Law No. part of Changara district. It is bordered to the east by the Districts of Chiúta, Moatize and the city of Tete, to the south by the District of Changara and to the west by the District of Cahora-Bassa. According to the 2017 census, this District has a population of 75,824 inhabitants, being subdivided into two Administrative Posts: Marara Sede and Mufa-Boroma.

### **GEOLOGICAL FRAMEWORK**

The first geological sketch of Mozambique, at a scale of 1:8,000,000, was authored by A. A. Freire de Andrade <sup>2</sup>, published in the 1908 Mozambique yearbook. At this time, most of the territory was considered to be occupied by Precambrian formations, with patches of Paleozoic terrain corresponding to the present Karoo and a patch of melaphyrs and porphyrites around the province of

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<sup>2</sup> Alfredo Augusto Freire de Andrade (1859-1929) was an engineering general in the Portuguese Army. He performed several missions in the Portuguese colonies in Africa, namely in Mozambique, where he was governor-general.

Tete, corresponds to the current gabbro-yearrrthosite complex of Tete. Currently, it can be considered that the geological formations of the Zambezi River valley can be divided into three major stratigraphic units: i) Pre-Karoo formations, of Pre-Cambrian age; ii) Karoo Supergroup formations ranging in age from the Upper Carboniferous to the Jurassic; and iii) Post-Karoo formations, with ages ranging from the Jurassic to the Quaternary.

The existing coal basins in Tete belong to the Karoo Super Group. The Chipanga layer is the thickest of all and the only one that has been explored. The Moatize Coal Basin belongs to a larger basin, which extends from Tete to Minjova, on the border with Malawi, which in turn extends into this country in the Lengwe Basin. The NE and SW boundaries of the graben that delimits the basin are defined by boundary faults with NW-SE direction. The graben of this basin has an approximate length of 35 km and an average width of approximately 2 km. The most important orographic feature is Mount M'pandi, with an altitude of 320.8 m, located on the SW margin of the graben, representing a brachyantocline of the basement rocks in the geological sketch (David & Sampaio, 2003).

The formations in this area are respectively equivalent to the Upper Dwyka / Lower Ecça and the Middle / Upper Ecça of the Basin. The sequence of coal layers of the same is inserted in the Karoo, thus justifying the importance of this geological unit. In this region, superior to the productive series, another sedimentary series begins with coarse to medium grain, archic stoneware and small lenticular layers of rolled pebble and cross bedding (Real, 1966).

The coal deposits in the study area are made up of rocks of sedimentary origin, such as siltstones and sandstones, these being the lithologies corresponding to barren rock. The ore is composed of three main horizontal layers of coal with the following nomenclature: the

Bananeiras, the Chipanga and the Souza Pinto layer, presented from the uppermost layer to the deepest. The production series is of great interest as it encompasses the important coal seam. This series is characterized by having shales, carbonaceous sandstones, black claystones, sometimes pyritic. The age of this series is Lower Permian, which probably corresponds to Ecça (Real, 1978).

According to MEDIAFAX (22/07/2010), Mozambique will be considered in the near future as one of the countries with the largest reserves of coal in the world, given that the research carried out so far shows that there are several coal basins identified in different areas of the world. country, in the provinces of Tete, Niassa, Cabo Delgado and Manica. The same Source emphasizes that the largest mineral coal reserve in Mozambique is located in the district of Moatize, in the province of Tete, in the center of the country, with more than three international companies with Brazilian capital having already been installed in the last ten years, australiyears and indiyyears, thus allowing the country to become the second largest Africyear coal producer, after South Africa.

## METHODOLOGY

In this research, mining companies (Vale-Mozambique, ICVL, Jindal-Africa) located in the Moatize coal basin were taken as a sample, with an analysis of communities in the District of Moatize, the City of Tete and the District of Marara, in aspects related to the demographic evolution in the first two and, in the three, in the aspects of the history of the implantation of the extractive industry.

The methodology used was the bibliographic analysis, the documentary survey (Laws, Decrees and data from the Census of housing and Mozambican population from the years 1950, 1960, 1970, 1980, 1997, 2007 and 2017), the statistical method for data processing,

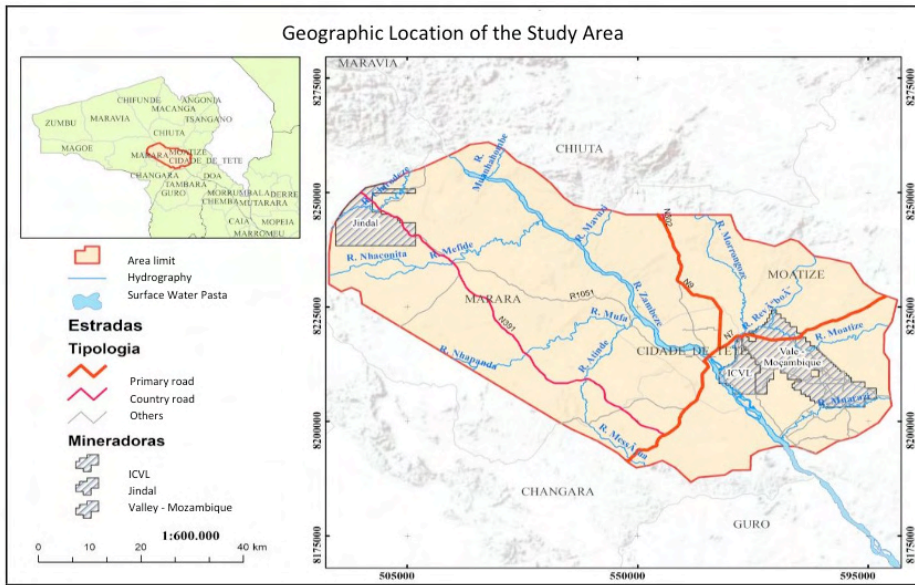


Figure 1: Geographical framework of the study area (Author, 2022).

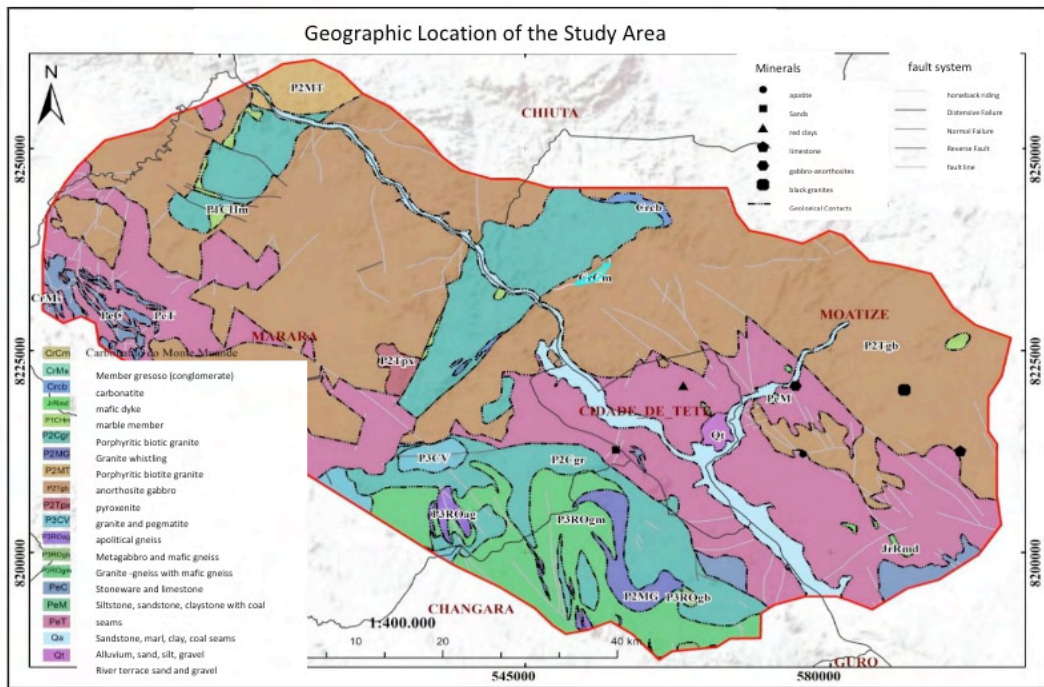


Figure 1: Geological Map of the Study Area (Author, 2022).

the cartographic method for producing maps (in scale 1:50,000 and 1:250,000; 1:1,000,000 and 1:250,000) of geographic, geological and physical characterization.

## **RESULTS AND DISCUSSION**

The mineral exploration activity, like any other human activity, causes environmental impacts, both positive and negative. Among the positive impacts resulting from the mining of coal, among others, its contribution to demographic growth due to the migratory movement in search of employment, better opportunities for formal or informal trade, the search for better living conditions.

The history of the Moatize coal exploration process followed several stages that will be presented below.

### **HISTORY OF COAL EXPLORATION AT BCM IN MOZAMBIQUE**

The first geological studies in Mozambique were carried out in 1920 by students and university professors of Belgian nationality, having studied the sedimentary basin, with particular emphasis on the Moatize coal beds, having concluded that the Moatize coal basin had different coal beds that available at different depths. The Mozambican government, through the Ministry of Mineral Resources, granted, until the year 2012, a total of 105 concessions for coal exploration and prospecting. Meanwhile, the Moatize, Benga and Chirodzi Mines, in Tete province, were developed respectively by the Brazilian company Vale, the Australian mining company Riversdale and the Indian mining company Jindal, which are in operation (JOSE & SAMPAIO, 2012).

The results already obtained indicate the existence of coal throughout the province of Tete, in central Mozambique. Companies involved in the research and prospection of coal deposits in Moatize, namely JFPL, Essar

and ETA Star, since 2008, announced the discovery of new coal deposits in the districts of Changara, Cahora Bassa, Mágoè, Mutarara, Marávia and Zumbu. The Moatize basin is where the largest reserves in the country are found, and exploitable quantities of coal have been identified in the region of Samoa, where the company Carvoeira de Samoa is already working (New coal deposits discovered in Mozambique: available at the address electronic and accessed on 12/21/2021: <<http://www.africatoday.co.ao/pt/empresas/4918>>).

Coal exploration research, led by Portuguese specialists, began in 1895 with the Companhia Hulheira do Zambeze which, over time, was replaced by a Belgian company in 1923, the Société Minière et Géologique du Zambèze, a group financed by the Union Minière Haut. Katanga. The Belgian company was replaced in 1948 by Companhia Carbonífera de Moçambique – CCM.

The post-independence era was marked by the decline of CCM, due to two serious accidents that occurred in 1976 and 1977 and which killed many workers. On 16 September 1976, at the Chipanga VI mine, around 200 miners died and on 2 August 1977, an explosion occurred at the Chipanga III mine, which killed 63 Mozambican workers and 1 Portuguese nationality. This fact provoked a general strike against the employers and against the management of the company, made up of Portuguese and Belgians. These events led to the stoppage of coal exploration at the Chipanga III mine.

Faced with this situation, the Government of the People's Republic of Mozambique was forced to nationalize the CCM, having published Decree No. – National Coal Company of Mozambique. From 1982 onwards, due to the outbreak of the armed conflict between RENAMO and the FRELIMO government, there was a strong decline in the Mozambican economy due to the destruction

of economically strategic companies and social infrastructure. The lifetime of CARBOMOC E.E. It was not very long due to the economic situation heavily affected by the civil war, which had paralyzed the main national road and rail transport networks, as was the case, in 1983, with the stoppage of the activities of the Sena railway line that defines the Beira-Moatize. Thus, CARBOMOC E.E. lost its main production flow route, drastically reducing its work operations which, consequently, led the company to insolvency with accumulated financial liabilities. CARBOMOC was extinguished in 2006, after being paralyzed for a long time (CASTEL-BRANCO & OSSEMANE, 2010).

Table 1, below, shows some data on the coal mining process in BCM, from the colonial period and after the independence of Mozambique.

It can be assumed that, in the colonial and post-independence period, that is, from 1923 to 1980, according to table 1 above, there was always a company in the district of Moatize that operated in a certain period, which was replaced by another if it came to collapse. This fact shows that this activity, for a long time, is considered to have a great social and economic impact, being very relevant for the country and for the improvement of the living conditions of a part of the population, who had their employment guaranteed in the mines of coal. In this period, mining was underground and, whenever a new company took over the mining space to replace the previous one, it had the obligation to inherit all the company's assets and infrastructures, including the transfer of human resources that, invariably, was fixed. In about 1,200 workers who, in addition to Mozambicans, also included Portuguese, German, Belgian, French and South African nationals. These last five nationalities were responsible for the technology and administration sectors

of the company, which belonged to the Portuguese colonial government which, after independence, was managed by the Mozambican government, which at the time held 10% of shares. Some workers, instead of continuing as collaborators of the new employer due to the bankruptcy or abandonment of the previous one, preferred compensation that, most of the times, led them to social misfortunes for being a small value to personal projects or for lack of capacity to manage the salaries received. (PANTIE, 2006).

Records indicate the year 1982 as the year of restart for the interest in exploring coal from BCM, when the Companhia de Pesquisa e Recursos Minerais (CPRM) of Brazil led the geological surveys and photointerpretation of the Mucanha-Vuzi section, a deposit located 240 km from Moatize, where the mining operations (now open pit) of coal from Vale-Mozambique, a subsidiary of Vale S.A., are concentrated. implanted in the Province of Tete. It can be said that the District of Moatize is considered to be home to one of the largest coal reserves in the world, with around 2.5 million tons, of which 850 million are in Vale's concession area. The Moatize coal basin contains not only the largest reserve identified in Mozambique, but also high-calorific coal – bituminous coal, whose carbon concentration varies between 75% and 85% (PARALBA, 1990).

The new phase began with the concession of the company Vale-Mozambique, which began operations in August 2011. Other transnational companies, such as Riversdale and, later, Rio Tinto, ICVL, Nkondezi Coal, Jindal-Africa, subsidiary of the Indian multinational Jindal Steel and Power Limited, began the construction of major works and the installation of equipment that allowed the extraction of coal at BCM (see table 2).

The concession areas, called the Moatize Coal Mine, the Benga Coal Project, the



Company	Activity period	Number of workers (average)	Occupied area (ha)
Societe Miniere et Geologique du Zambeze	1923 - 1948	1.200	3.076 ha
Companhia Carbonífera de Moçambique-CCM	1948 – 1978		
CARBOMOC E.E.	1978 – 1980		

Table 1: Data on extractive industry companies in the BCM (1923 -1980).

Source: Autor (2022).

Concessioned Area	Concessionary Company <sup>1</sup>	Start of Production	Total investment	T.A. <sup>2</sup>	Production capacity
coal mine of Moatize	Vale – Moçambique	2011	USD 1,9 million	8.000	22 Mt/year
Projet of coal from Benga	International Coal Ventures Private Limited (ICVL)	2012	USD 1,2 million	385	2 Mt/year
Projecto Chirodzi-Marara	Jindal Moçambique	2013	USD 180 million	1.200	2 Mt/year
Project Minas of Moatize	Beacon Hill Resources (BHR)	2011	(USD 42 million)		(2,35 Mt/year)
Project of Mina of Nkondezi	Nkondezi Coal	2012	(USD 376 million)		(38,7 Mt/year)
<b>Total</b>	<b>5</b>	<b>---</b>	<b>USD 3,280 million</b>	<b>9.585</b>	<b>26Mt/year<sup>3</sup></b>

Table 2: Data on extractive industry companies at BCM (2007-2017).

Source: Autor, modificado de Standard Bank, 2014.

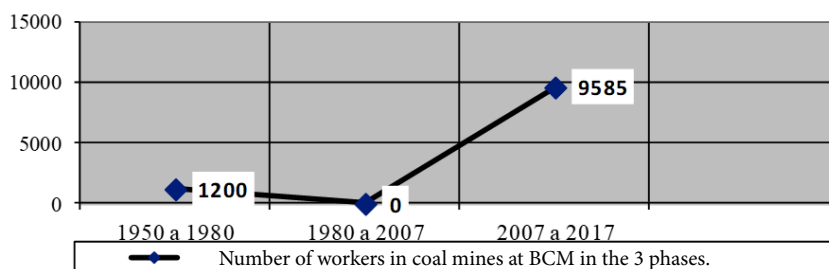


Figure 2: Graph showing the variation in the number of workers at coal mining companies from 1950 to 2017.

Source: Autor (2022).

1 The last two companies did not start the work planned for the years 2011 and 2012.

2 T.A. – absorbed workers.

3 Mt/year – Millions of tons per year.

Marara Project, the Minas de Moatize Project, and the Nkondezi Mine Project, are occupied and exploited by Vale – Mozambique, ICVL, Jindal Africa, Beacon Hill Resources (BHR) and Nkondezi Coal, respectively, all located in the Moatize Coal Basin, in the districts of Moatize and Marara.

As Tables 1 and 2 show, as well as the graph in Figure 2, it is understood that the first phase (old phase) of coal exploration lasted from 1923 to 1980, while in the following period, 1980 to 2007, the activity was paralyzed. due to the aforementioned factors. The third phase, the current one, which started in 2007 and lasts until now, the companies started their operations from 2011, which corresponds to the new exploration phase, marked by the presence of several companies, operating in the same period and in different spaces within BCM. It is this phase that provides a strong stimulus for the accelerated advance of several development indicators.

With the trend illustrated in the graph in Figure 2, the increase in the workforce from 1,200 to 9,585 permanent workers, from the old to the new phase, positively impacted economic and social growth in the BCM region and in Mozambique in general. The first three companies in table 2 created a total of 9,585 direct jobs, in addition to many others that were created to fill vacancies in subcontracted companies, a fact that contributes as one of the reasons for the migratory movement.

### **IMPACTS RESULTING FROM MINING ON BCM – TETE, MOÇAMBIQUE**

Among the impacts recorded by the presence of extractive industry companies in BCM, the following stand out: i) the availability of new business and employment opportunities, a factor that conditioned the variation in demography due to the migratory movement to this region in search

of self-support ; ii) increase or expansion in business volume, which improved the living conditions and economic support of families. On the other hand, it is important to mention that there are also undesirable impacts in the mining activity, such as the denaturing of the surrounding environment through water, atmospheric and noise pollution, limitation of the use of fauna and forest resources.

### **DEMOGRAPHIC EVOLUTION AND EMPLOYABILITY**

The activity undertaken by the mining companies, located in the BCM, constituted these areas as points of attraction for the population, given that many people who lived in rural regions and even people from other Mozambican districts/provinces, including those from foreign countries on the five continents, they moved to the cities of Tete and Marara in Tete province, these being the destination points in search of employment or to develop formal and/or informal businesses.

If we analyze the case of the city of Tete, we can see that, according to the 1997 Census, it had 101,984 inhabitants, representing 9% of the population of the province. In 2007, it had 158,000 inhabitants and, in 2017, according to the 2017 Census, the population of Tete City increased to a total of 305,722 inhabitants, of which 148,354 are men and 157,368 are women, representing 11% of the population in the Province.

In 1997 there were a total of 109,103 inhabitants in the district of Moatize, representing 10% of the total population of Tete Province. In 2007, that number increased to 217,609 inhabitants and, after another ten years, that is, in 2017, the number increased to 343,546 inhabitants, of which 166,803 were men and 176,743 were women, representing 12% of the total in the province. Based on the data analyzed, it appears that the population of Moatize has almost tripled in the last

twenty years (1997 to 2017), according to the National Institute of Statistics (INE, 2017).

In Saraiva's analysis (2008), in relation to the ethnic-linguistic matrix, it appears that the population of BCM predominantly communicates in Nyungwe, Sena, Cheua and a small percentage in Portuguese, considered to be a legacy of Portuguese colonialism. Of this population, 17% practice the Zion/Zion religion, 16.7% are Catholic and 39% do not profess any religion. But the latter are encapsulated in a certain belief and cosmovision, by which they guide their daily lives, that is, they culturally adore their ancestors through rituals preserved by their historical and religious genesis. The graph presented in Figure 3 illustrates the demographic evolution of the district of Moatize and the city of Tete, which was a strong beneficiary of the investments of the mining megaprojects.

The data in Figure 3 confirm that both in Tete City and in the district of Moatize, there was a significant increase in population between 1997 and 2017, which was not observed in previous decades for this same region. This is not a data that appears by chance, but a data that proves to be in agreement with the attractive factor in this region of the country, which is the job offer and a favorable environment to develop business.

The indicators of job offer and population growth had a positive impact on this region because they led to an increase in the number of economically active inhabitants for production, as well as an increase in gross domestic product through the collection of revenue through various taxes, resulting in the effective circulation of currency and the increase in the purchasing power of citizens.

The same phenomenon of population explosion in the districts in question obviously increased the number of inhabitants in Tete province in general, due to the migratory

movement from the surrounding provinces, motivated by the availability of jobs in the mines, creation of new business opportunities, ways to support their families and increase their income. This population variation was noticed mainly in the first years of the implantation and exploration of the so-called black gold, according to the accounting of the population by time (years) of residence in each province. The data that support these claims are shown in table 4, originating from the 2017 Census (Table 64a, page 205).

In the analysis by Bata (2018), the demographic growth in Moatize and in the city of Tete shows that, in general terms, from 2008 to 2017, there was a population increase to an average of more than 15,000 inhabitants per year, with a rapid population increase to gain more impetus in the period from 2008 to 2014, a period in which mining companies and their subcontractors recruited the human resources necessary for the implementation and operation phase for their staff.

Table 4 illustrates the migratory movement of the population from the provinces of the central region of Mozambique and, the various moments configured in the table, confirm the province of Tete as a preferred destination for part of the populations coming from the provinces of Manica, Sofala and Zambézia in search for a job opportunity and/or activities related to mining companies, in the years 2009 to 2014, a period that corresponds to the beginning of operations for the preparation and recruitment of workers in companies such as Vale, Jindal, ICVL and other service providers to these, including in the area of formal and informal commerce in the communities surrounding BCM. The years 2015 to 2017 correspond to a period in which companies were already consolidated in their activities and in which the massive admission of new employees was less intense.

This situation of internal migration is

Area	Population		Evolution from 1997 to 2007	Population	Evolution from 2007 to 2017
	Census 1997	Census 2007	(%)	Census 2017	(%)
<b>Tete city</b>	101.984	158.000	55,0	305.722	93,0%
<b>Moatize District</b>	109.103	217.609	99,0	343.546	58,0%

Table 3: Demographic Evolution in BCM Communities in 1997, 2007 and 2017.

Source: Author (2022), Adapted from INE

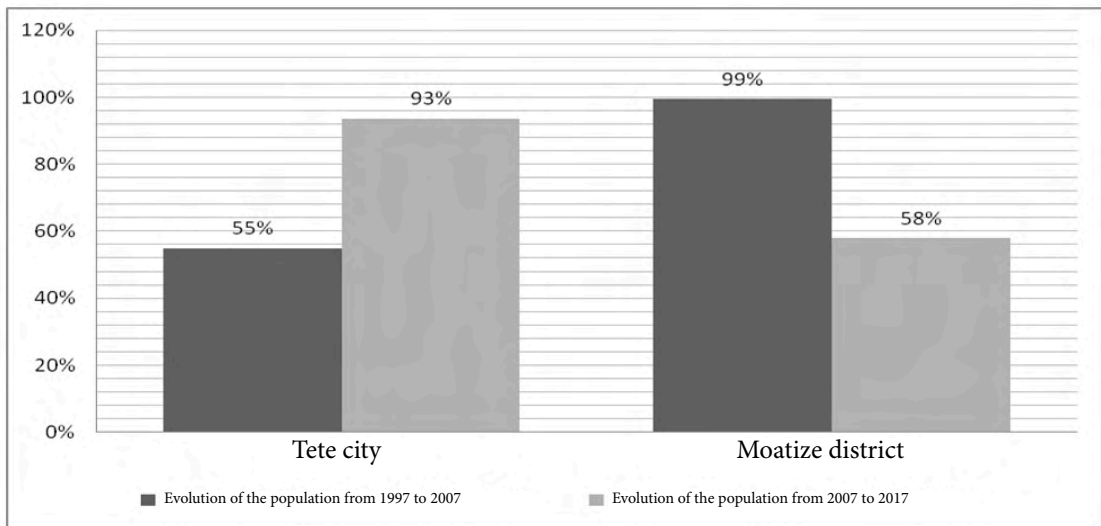


Figure 3: Demographic growth in BCM-Tete in Mozambique, for the periods 1997 to 2007 and for 2007 to 2017.

Source: Author (2022).

Province	Number of Population by Length of Residence before the 2017 Census										
(Center of the country)	Total population	2008 (9 years)	2009 (8 years)	2010 (7 years)	2011 (6 years)	2012 (5 years)	2013 (4 years)	2014 (3 years)	2015 (2 years)	2016 (1 year)	2017 (-1 year)
<b>Zambézia</b>	5 002 457	16 151	17 186	23 824	22 148	32 468	29 625	39 339	45 732	61 994	29 088
<b>Tete</b>	2 551 826	9 523	10 491	15 462	14 152	19 706	18 258	21 906	23 713	27 332	11 116
<b>Manica</b>	1 851 931	9 543	9 570	14 258	13 012	18 300	15 815	20 244	24 512	31 642	13 629
<b>Sofala</b>	2 196 845	13 216	13 722	20 419	19 162	27 563	24 071	32 737	35 759	45 229	20 250

Table 4: Migratory movement from provinces surrounding the BCM, from 2008 to 2017.

Source: Author (2022), adapted from INE-Moçambique.

proof of the social importance of companies that exploit mineral resources, since in less developed regions, people are in constant search of a means of sustenance for their survival and self-fulfillment. This fact directly interferes with the population growth rate at the local and even national level, as shown in table 5.

The evolution of demography is notable, both at the provincial and national levels. According to table 5, population growth in Tete province has been registered since the 1997 general census, being higher than the other Mozambican provinces. Only the province of Maputo (4.25%), province of the capital and where employment opportunities are always higher than in the rest of the country, and the province of Niassa (4.10%), show a similar growth. of magnitude in Tete (4.45%) but, even so, lower than that recorded in Tete. The growth seen in Tete is also clearly higher than the average recorded globally in the country (3.05%).

According to Bata (2018), this sudden movement and population growth, despite the existence of other factors, such as political and social ones, such as, for example, the end of the civil war in 1992 and the beginning of the national reconstruction process in the year which favored the return of Mozambican refugees in neighboring territories, is also due to the growth of mining activity.

For several authors, the demographic dynamics of this region can be related to three basic factors: the first is related to the high vegetative growth in a rural region where birth and fertility rates are still high; the second is due to the return of migrants after the end of the civil war in 1992, which cruelly affected the entire province; and, finally, the third, which corresponds to the announcement of large enterprises generating employment opportunities in the 2000s (MONIÉ and CARVALHO, 2019). It is clear that these

trends are based on aspects of an economic nature, since the arrival of megaprojects, linked to the coal extractive industry and its subsidiaries, generated expectations of lasting work, creating in the population the hope of being part of the workforce. work of newly established companies. This dynamic had a positive impact on the resurgence and growth of the private business sector, creating numerous jobs, complemented with a free healthcare system, as well as other socio-economic packages that boosted GDP growth in Mozambique.

### **PERSPECTIVES FOR MINERAL EXPLORATION AT BCM – TETE, MOÇAMBIQUE**

The guarantee of the socio-economic and environmental sustainability of the extractive industry must be ensured in addition to the existence of a Monitoring and Post-Evaluation Plan, resulting from the implementation of the Execution Project in operation. Actions such as:

- (i) Anticipation of the process of selection, training and training of skilled and unskilled labor, in order to make effective the possibility of absorbing the local population in jobs with greater scope, a condition to make development equitable the community where the mining companies are located;
- (ii) Promotion and support of local initiatives in the search for employability solutions, through the creation of micro-enterprises to provide services to the mega coal exploration projects implemented in the region, given that not all of them can be absorbed as direct workers;
- (iii) Clear implementation of a discount policy for the tax system of the National Institute of Social Security (INSS), in order to guarantee the survival of

Area	Growth 1997-2007 (%)	Growth 2007-2017 (%)	Average 1997-2017 (%)
Maputo Province	4,2	4,3	4,25
Maputo City	1,2	1,4	1,30
Gaza Provinc	1,5	1,7	1,60
Inhambane Province	1,5	1,7	1,60
Cado Delgado Province	5,5	1,8	3,65
Niassa Province	4,7	3,5	4,10
Nampula Province	3,2	2,5	2,85
Manica Province	3,9	3,7	3,80
Sofala Province	2,7	2,5	2,60
Zambezia Province	3,0	2,6	2,80
<b>Tete Province</b>	<b>4,6</b>	<b>4,3</b>	<b>4,45</b>
Moçambique (total)	3,3	2,8	3,05

Table 5: Demographic evolution of Tete Province in the years 1997/2007 and 2007/2017.

Source: INE of Mozambique

workers in the phase of their retirement or disability, as a result of any accident attributable to the your work activity;

(iv) Promotion of a cycle of investments in research, supervised by the central government in coordination with mining companies. This means that the sector must promote and finance scholarships for specific research, with the aim of bringing, disseminating technologies and strategies to foresee, avoid or minimize issues permanently observed in the sector, so that the exploitation of mineral resources provides a sustainable socio-economic and environmental development in Mozambique.

## FINAL CONSIDERATIONS

Historically, the Mozambican economy has always been dependent on the exploitation of natural resources, from the colonial period to the present time. The focus on the “market economy” policy has predisposed the entry of foreign investment that has been contributing to the improvement of the living standards of a significant part of the population by employing, currently and directly, almost ten thousand people in the coal mining industry in BCM, in addition to so many other indirect jobs in subcontracted companies and in formal and informal commerce. Mineral exploration, coal in particular, is the one that most significantly contributes to Mozambique’s economic growth.

The data reveal that the coal mining industry, in undeveloped countries, is very important to boost the socio-economic growth factors of their populations, not only in the areas where the activity is developed, but also in other parts of the country, adding here the small, medium and large companies that find employment and business opportunities in this sector.

The mega-projects implemented at BCM are one of the factors of attraction for the migratory movement that boosted the population growth of Tete province by 4.45% between 1997 and 2017, differentiating itself from other provinces in the country. In the areas where extractive industries are located (Moatize district and Tete city) there was also a demographic evolution of more than 100% in the two decades studied (1997-2017), different from other districts of the same province, a fact which confirms the importance of the private

sector, in particular the extractive industry, which provides numerous employment and business opportunities.

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