Original article

The Socioeconomic Impacts of Traditional Gold Mining Activities in Sudan

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ARTICLE INFO

Article history:
Received 2021 April 12th
Reviewed 2021 June 15th
Accepted 2021 August 1st

Keywords:
Traditional mining, job creation, tax revenues, socioeconomic impacts

Abstract

This study focuses on the influences of the artisanal mining on the growth of economy and job creation, with considerations to the socioeconomics, health and environmental hazards. The study was conducted on the top-three gold-producing states (River Nile, South Kordofan, and South Darfur) in Sudan. The share of gold in total Sudanese exports has increased from 2.54% in 2011 to 33.7% in 2016. The total annual gold export earnings have increased from USD139.6 million in 2010 to USD145 million in 2011. In 2017, gold exports contributed almost by USD4 billion to the Sudanese treasury.

Nearly 3 million persons are involved directly in the artisanal mining sector, which holds around 23% of the total Sudanese active labour force in 2017, millions of direct, indirect, and induced jobs were created. Almost 735,694 direct jobs were created in the traditional mining sector during the last 10 years. The study also exposed the unpleasant working environments for the traditional miners especially children and women, and gave solutions for the mostly-faced hurdles among the artisanal mining sector.

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Introduction

Sudan is the third largest country in Africa with a surface area of approximately 1.886 million km². It is located in the north-eastern part of Africa; at the crossroads of African Sub-Saharan and the Middle East. Despite its size, the population is only around 39.580 million (World Bank-2016). Since independence, Sudan economy has been largely agriculture-based *(Table 1)*. The period 1899–1956 (under the British colonial administration) witnessed the foundation placing of the modern economy of Sudan *(Figure 1)*. The Gezira irrigated cotton scheme and building of Sennar Dam were the big achievements that boosted the Sudanese economy at that time. Around 85000 km^2 of the Sudanese land are cultivable areas. Nevertheless; 18% of Sudanese lands are unexploited.

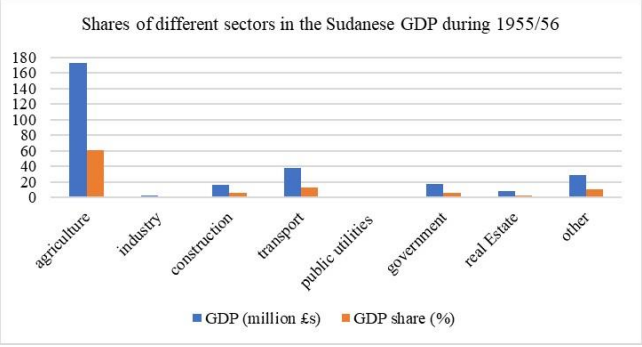

Figure 1: 1955/56 GDP composition (current prices), reflects that Sudanese economy was mainly agriculture-based type

The rise of extractive industries in Sudan *(Figure 2)* has led to a wide range in job opportunities that offer high quality and better paid salaries. Particularly, the rise in mining sector has been associated with almost steady contribution of agriculture sector in the Sudan gross domestic product (GDP) during the last 10 years *(Figure 2)*. Unfortunately, the agriculture shares in Sudan GDP dropped down by nearly half of its value, just shortly after the independency in 1956 *(Tables 1 and 4)*. Agricultural sector contribution was 60.7 % in 1955/1956 and declined to 27.4% in average during the last 10 years. Most of Sudanese people are farmers, but there were also nomads owning huge numbers of livestock scattered in large grazing areas, especially in central and western side of Sudan (Darfur and Kordofan region). After Sudan gained independency from Great Britain in 1956, agriculture and livestock production continued to be the mainstay of the economy, however; their contribution to the GDP retrograded in the last decade, largely due to new economic activities generated from the exploitation of oil fields in the southern part of country (now South Sudan).

Table 1: Sudan: 1955/56 GDP composition (current prices), Source: Brown (1992).

Sector	GDP (million £s)	GDP share (%)
agriculture	172.6	60.7
industry	3	1.1
construction	16.2	5.7
transport	37.6	13.2
public utilities	1	0.4
government	17.2	6
real Estate	8.2	2.9
other	28.4	10
total	284.2	100

In 2011, the secession of South Sudan from the mother country (Sudan), caused a drop-in exports and loss of oil revenues (over half of Sudan's government revenue at that time). Consequently, the government sought another opportunity, which gold at that time was the prime target due to the new discoveries that had been widespread across most of the Sudanese land.

According to official estimates, around 3 million jobs (personal communication, Ministry of Labour) directly linked to the artisanal mining sector have been created during the last 10 years.

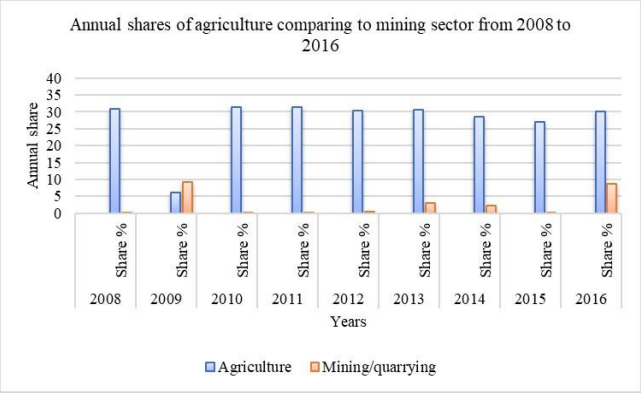

Figure 2: Steady contribution of agricultural industry compared to rising share of the mining sector in Sudan GDP, 2008-2016, source Central Bank of Sudan, annual report 2017.

Over the same period, the formal gold mining sector created approximately 25,000 jobs, of which 6.5% were female. In both artisanal and formal mining, the participation of women in the sector is very low compared to other sectors of Sudan economy (e.g., agriculture, manufacturing, engineering, and service industries), which mainly connected to the local cultures. There are also indirect jobs related to mining activities that have been created. Such jobs include those related to hotels, restaurants, water/fuel supply, tax collection, medical services, transportation, and security, etc. While, the exploration and production of minerals may provide good opportunities to create jobs and improve the life quality of millions including women. However; it could have some negative social and environmental impacts. For example, in many instances the creation of extractive industries has led to prostitution, homo-sexuality, and rise of criminal gangs, soil degradation, wild-life extinction, environmental damages, and occupation of grazing and agricultural lands.

Historical background of mining in Sudan

Historical records show that the people of old Sudan (area covers south Egypt, Sudan, West Ethiopia) have mined gold and other commodities e.g., iron for centuries. For example, the ancient civilization of Nuba (Nubia), which means gold, dominated the area of northern Sudan and southern Egypt as far back as 2000 B. C. In the 4th century, pharaohs who were mainly nomads settled in the area following the collapse of the Kingdom of Kush. The Kush Kingdom had two capitals, Meroë city for the south section and Nabata was for the north part. Meroë became the base of a successful kingdom whose wealth was based on a strong bronze-iron industry as well as international trade that extended to India and China. Metal-working is thought to have gone on in Meroë, possibly through bloomers and blast furnaces. At that time, iron was one of the most important metals worldwide (used in weapons), and Meroitic metal workers were among the best in the world. The focus on gold mining yielded interesting resolutions to the Sudan government. Gold exports became the main source of foreign exchange for the Sudan in 2016 – gold accounted for 31.2% of total exports in 2016 and revenues amounted to USD1.2 billion (Ministry of Finance 2017 annual report). Both exports and revenues are anticipated to increase in 2019 as the Ministry of Minerals embarks on plans to expand mineral production by attracting new investments in a bid to introduce modern technology into mining sector, and to monitor some companies' license those are exceeded all allowed extension periods and yet not in production stage. Sudan is now the third ranked gold producer in Africa behind South Africa and Ghana, and the ninth biggest producer worldwide.

Mining sector in Sudan

The mining sector in Sudan is officially structured as follows:

Traditional mining (artisanal miners): Mining is characterized by use of equipment or tools for drilling and extraction for specific depths. This type of mining represents the largest proportion of mining in Sudan in terms of the number of miners and gold production.

Small scale mining: Refers to mining activities within an area that doesn't exceed 5 km^2. There are 201 companies work in small scale mining in Sudan.

Large scale mining: Refers to mining activities within an area that doesn't exceed 1000 km^2. There are 139 companies work in large-scale mining in Sudan.

Reprocessed residues (Karta): There are 74 companies working in the re-processing of mining residues and these companies depend on traditional mining tailings (Karta).

The mining sector in Sudan is currently dominated by traditional mining (small scale gold prospectors or artisanal miners), who are regulated by central government policy for purchasing and exporting the country's gold production. Under guidelines introduced in March/2017 to reduce smuggling, private prospectors must sell at least 50% of their extracted gold back to the Central Bank of Sudan.

Traditional mining is viewed as a first step in exploration for minerals. It frequently provides basic geological information to formal mining. This type of mining consists of panning for minerals (e.g., gold) in streams, but in some places, miners dig deeper tunnels to extract thicker and more richer quartz veins with adjacent alteration zones, which is panned at nearby water sources. It is very difficult to estimate the number of traditional miners due to the lack of a common definition, use of seasonal and occasional workers (during the rainy season i.e., the mining season, large numbers of miners are active but only a few operating during the dry season), and lack of an official statistics, poor human resources based for statistical work, inadequate staff and lack of relevant training particularly in areas of international standards and methodologies.

Study aims

This study examines the extractive industry in Sudan, looks at challenges, opportunities, and provides a descriptive analysis of the breakout in total jobs created in Sudan during the last years. The study also provides policy recommendations that could strengthen and sustain job creation in Sudan's extractive

industries.

The data used in this study was collected through primary and secondary sources. Primary data collection was accomplished by regular field trips, geological and environmental investigations, direct communications with artisanal miners and small-scale companies, technical and fiscal reports of some of the gold operating companies. Secondary data was provided by the Ministry of Minerals, Geological Research Authority of Sudan, Central Bureau of Statistics, and the Ministry of Labour.

Methodology

The approach adopted in this study for measuring jobs, was based on surveys conducted through face-to-face interviews with miners on their sites. This bottom-up approach for information processing was implemented to measure job numbers, taking into consideration special situations of each studied district and municipality. Taking into consideration that every single area of artisanal mining has distinguish community nature and diversity, ethnic groups and cultures, climate nature, and essentially gold different styles and types of mineralization. These factors among others have great influences in the job numbers of artisanal miners as well as the chances to the formal firms to be involved. In addition, it reflects the difficulties to measure numbers of traditional miners and the associated socio-economic activities.

This study used personally observed and collected field data from three states; **(i)** River Nile, which considered as one of the most copious artisanal gold provinces in Sudan in 2017 (around 11.3 tons per annum), *Figure 3*), **(ii)** South Kordofan (10.4 ton of gold produced in 2016), and **(iii)** South Darfur State (6.7 tons), which is ranked in the middle list of productive gold states in Sudan. Furthermore, to standardise the outcomes of the three studied states to the other states due to homogeneity of the dataset. It is noteworthy that the artisanal miner different groups working in these selected three states represent almost 90% of the total Sudanese tribes and other ethnic groups (sometimes foreigners).

Moreover, the artisanal gold miners are continuously migrating up and down through all Sudanese states and occasionally, through neighboring countries as well. The jobs in formal mining sector are measured by the direct count method. Information related to jobs was provided by the human resources department of the operating companies.

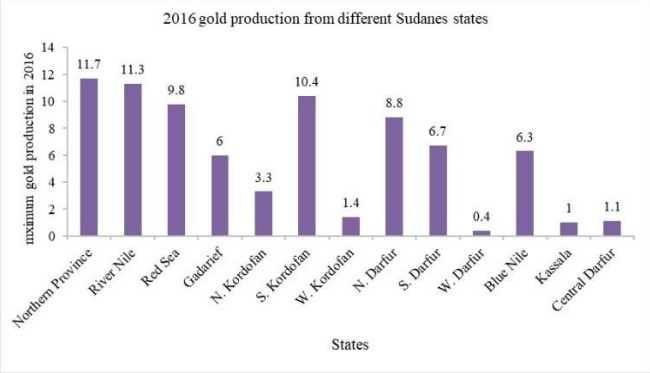

Figure 3: Gold annual production from artisanal mining sector in different Sudanese states in 2017, per million tons. Source Ministry of Minerals

In addition, data were given by different governmental bodies, as well as Sudan Mineral Resources Co. Ltd. (SMRC), which is responsible of inspecting and monitoring all mining activities including exploiting, transporting, processing of the ore materials, and also recording the jobs created by the extractive industries. SMRC also analyse and interpret the information obtained from the mining corporates and enforce them to recruit a decent proportion of Sudanese individuals (especially from local communities) in the total workforce as agreed in the signed contract

In this study, the methodology used to measure jobs creation is to calculate the total number of people employed directly in the mining sector from the official surveys and population census years (2009, 2011), and the reports of recurrent missions conducted by the Ministry of Minerals. Based on that, author computes annual change in job categories, mining activities, and gender equality. The second method counts directly the number of jobs and activities during many field trips to River Nile, South Kordofan, and South Darfur states, in which personal communications and field observations were the main source of information. The figures obtained were applied in

other productive states based on many factors including annual production, tonnage and approved reserve, grade values, etc.

Results and Discussion

Gold industry impacts on Sudan economy

Gold mining (artisanal + official) has contributed significantly to the Sudanese economy over the last years *(Figure 4)*, production and revenues were steadily grown over this period apart from 2008 when gold prices tumbled as the world was experiencing financial debt crises, and also, the oil fields loss due to the referendum of the South Sudan decreased the gold production in 2011. The rise of gold's contribution to the economy (between 2012 and 2017, *Table 2*) is largely attributed to diversifying from oil after the secession, resolution of internal conflict and improved macroeconomic stability. Gold production in Sudan has increased from around 59.6 ton in 2008 to 93 ton in 2016 *(Table 3)*.

The formal gold mining has slow impacts on the Sudanese economy as compared to the traditional/artisanal mining. This is due to the long lead times before production begins in formal mining -prospecting and exploration, which takes between 3 to 5 years.

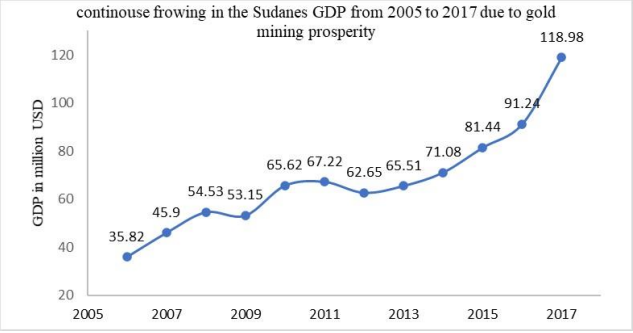

Figure 4: GDP of Sudan (in billion USD) reflects growth due to additions of extractive industries, source: IMF, 2017

However, the formal/official sector has a longer life span, which would sustain and secure jobs for several years.

Gold mining has also made a significant contribution to Sudan's export revenue *(Table 3)*. In 2012, gold has 8% share of the total Sudanese exports. Other mining activities such as clinker and chromite production contributed by 20% and 5% respectively to total Sudan non-petroleum exports. The share of gold in total exports has increased from 2.54% in 2011 to 33.7% in 2016, a hike of over a 1000%. The total annual gold export earnings have increased from USD139.6 million in 2010 to USD145 million in 2011. In 2017, gold exports contributed almost by USD4 billion to the Sudanese treasury. This amount is estimated to be more than the earnings of oil exports from 2000 to 2005. Accordingly, thousands of jobs have been created due to growth in gold mining sector.

Gold contribution in the GDP is very low, however it is very important to the Sudanese export sector *(Figure 5)* that due to the high prices of gold world-wide. In 2012, the share of the mining and quarrying sector in GDP was 0.4%, despite its continuous growth since 2010 reach up to 8.6% total share in 2016 *(Table 4)*. During the last 10 years, gold revenues including taxes made a significant contribution to the creation of direct and indirect jobs as well as induced jobs. For example, gold revenue is partially responsible for the growth and creation of jobs in other related sectors such as public service, transportation, building and construction, trading, and tourism hotels.

Table 2: Gold annual production in Sudan per ton from 2012 to 2017 Q3. Source: The Ministry of Minerals

Year	Formal	Artisanal	Total (ton)
2012	-	-	50
2013	5.8	41.2	47
2014	9.72	63.7	73.4
2015	11	50.5	61.5
2016	15.2	78.2	93.4
2017Q3	11.4	63.2	74.6

Types of job associated with extractive industry.

The mining companies In Sudan are classified based on their work plans, concession areas, specific specialization and

profiles, and their proposed budget. They are subdivided into large- scale, small-scale or waste treatment companies.

There are different types of job offered in formal mining and companies recruit based on:

- The academic qualifications (basic education, higher education, tertiary education, diplomas, masters, doctorates). The salary level depends on the academic qualifications.
- Previous experience- most of the mining companies request 5 to 10 years previous experience in the top-paid jobs (exploration/production managers, senior geologists, etc.
- Type of working-plans of the corporates and stages of progressing.
- The jobs in formal mining are secured and stable, and salaries are attractive. Employees have rights, medical and social insurance, post-service benefits, and many other encouraging offers.

Since the legalization of artisanal mining in 2008, tens of thousands of jobs have been created annually. However, jobs associated with artisanal mining are usually not of long duration. Many miners leave the work, due to poor gold grades, shortage of capital, risks, injuries, illness, or death.

Table 3: The share of the gold in Sudan's Gross domestic product (GDP). From 2003-2016. Notice that gold prices have hiked up during the global financial crises in 2008 and later years. Source: Ministry of Finance annual report 2016.

year	Non-petroleum export	Gross domestic product (billion USD)	Gold production (ton)	Gold revenue (million USD)	Share of gold in the total Sudanese exports (%)
2003	494.47	21.400	58.59	58.6	12
2004	677.29	27.500	50.42	50.4	7
2005	636.92	37.300	63.65	63.7	10
2006	569.36	35.82	64.28	64.3	11
2007	460.72	45.9	63.20	63.3	13.7
2008	576.4	54.53	59.60	51.6	1.88
2009	702.5	53.15	60.60	85.5	6.66
2010	1709.2	65.62	74.70	139.6	13.63
2011	2312.4	67.22	70.20	144.2	2.54
2012	1924.2	62.65	50.000	215.8	8
2013	19852.2	65.51	47.000	205.6	14
2014	2441.2	71.08	73.357	102.7	18
2015	2541.8	81.44	61.500	725.7	22
2016	2757.9	91.24	93.400	104.38	33.7

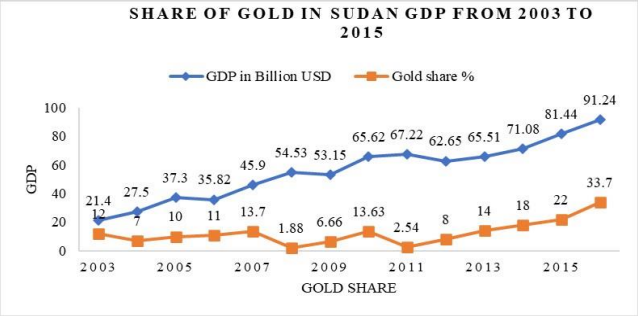

Figure 5: Shows the share of gold mining on the Sudanese GDP, source: Ministry of Finance, annual report 2017. The drop in 2008 is related to global monetary crises, drop again in 2011 is due to the loss of oil after delivery of South Sudan

Other miners use the profits from mining sector and invest their money in other fields (construction, agriculture, trading, travel and tourism, etc.). Based on this reality, the total number of jobs created and job types vary from time to another. The direct jobs created in artisanal mining include digging, crushing, milling, panning, processing, and extraction while indirect jobs linked to both formal and artisanal mining include, inter alia, traders, jewellers, transport, mercury sellers, machinery sellers, food supplier and mechanics.

Analysis of the quantity of jobs in mining sector.

The total labour force in Sudan is 12 million of which 24% are female and 70% are male (IMF, 2017). In 1990, the share of female in total Sudanese work-force was 23%, reflecting an increase of 1% during 27 years. This very slow and marginal increase reflects the obvious rejection of women-labour based on culture and traditions of some rustic societies. in some cases, social/religion restrictions and community traditions prohibit women to work.

With respect to males, their participation in mining has fallen from 73% of the total work force in 1990 to 70% in 2017 due to illegal immigration of youth to developed countries to seek better living conditions.

Table 4: Shows of different economic sectors in the Sudanese GDP, from 2008 to 2016. Merging some sectors together. Source: Central Bank of Sudan, annual report 2017 and statistical book 2017 - Central Bureau of Statistics (Sudan). GR=Growth rate (%), S=Share (%)

Sector	2008		2009		2010		2011		2012		2013		2014		2015		2016	
	GR	S	GR	S	GR	S	GR	S	GR	S	GR	S	GR	S	GR	S	GR	S
Agriculture	27.7	31	6.7	6.2	6.7	31.3	3.3	31.5	6.4	30.4	3.5	30.6	4.1	28.5	2.8	27	5.5	30.1
Mining/quarrying	8.9	0.2	10.3	9.3	9.3	0.3	0.0	0.3	15.3	0.4	38.2	2.9	7.7	2.3	10	0.2	5.5	8.6
Industrial +other sectors (combined together)	19.9	20.2	21.6	22.1	22.3	20.8	51	19.6	51.8	20.9	24.6	26.7	26.8	41.3	22.7	41	14.3	30.1
General services + other sectors (combined together)	64.1	51.8	51.2	51.2	53.3	51.00	33.3	53.3	13.2	57.6	18.6	100.7	37.0	98.5	64.5	101.3	55.6	80.7

Formal mining

In case of formal mining sector, the direct employment calculation procedure is applied by the Ministry of Minerals, Chamber of Mines, mining corporates in estimating the number of jobs created. However, this method cannot be used in artisanal mining sector because the job design changes on daily basis. So, there are no rules to count jobs in artisanal mining. Thus, jobs are estimated through frequent monitoring by the government. The official organs of government collect the information regarding the artisanal miners' by sending frequent missions or by hiring specialized sub-contractors, who provide the government officials with real or at some cases estimated data, especially in the remote and insecure areas.

Based on available information and calculations on annual growth rates of employment related to the growth in corporate mining operations, the total number of male and female jobs in the formal sector including all types of companies (large-scale, small-scale, waste treatment) was estimated at 22,518 persons

and 1577 persons respectively in 2017 *(Table 5)*. In total 24,095 jobs were created in the formal mining sector. The sudden change in quantity of jobs and ratios in the formal mining sector is very marginal, due to an outstanding working environment, high wages, job sustainability, and the fiscal stability for the employees.

The number of females working in formal mining represent approximately 6.5% of the total work force in the formal mining sector and 0.005% of the total feminine work-force in Sudan. This is very low amount compared to neighbouring countries, and may be linked to the social/religion restrictions and community traditions that prohibit women to work. Unfortunately, there is no accurate statistics for the females involved in artisanal activities. Nevertheless; women and child labour have been documented by unofficial reports, especially in the western and southern states. Almost 60% of the total labour in these states are children and women. Some studies referred this number of participants to the nature and culture of the tribes dominating these areas.

In 2017, there were 414 formal companies working in Sudan at different stages of mining *(Table 6)*, involving thousands of workers. Regardless of all the information given by official bodies or by the HR departments in different corporates, yet no accurate or complete sufficient available data regarding the exact numbers of the employees in these mining companies.

Table 5: A breakdown of jobs in the formal sector and the different types of companies surveyed

	Large scale companies	Small scale companies	Waste treatment company	Total
Number of companies surveyed	139	104	74	317
Male Jobs	13344	7176	1998	22518
Female Jobs	1251	104	222	1577

Artisanal mining

Artisanal mining sector supports nearly 3 million direct and indirect jobs (approximately 23% of the total employment in Sudan in 2017. In addition, 10 million (family members, dependents, etc.) are profiting from the artisanal mining sector.

Table 6: Number of companies work in formal mining sector in Sudan in 2017. Source: Ministry of Minerals, annual progressive report 2016/17.

Items	**Number**
Large-scale Companies (prospecting and exploration)	124
Large-scale Companies (active)	15
Waste treatment companies (active)	74
Small-scale mining companies (prospecting and exploration)	97
Small-scale companies (active)	98
Companies work in alteration zones	6
Total	414

In 2014, Artisanal mining sector holds around 14% of the total Sudanese active labour force, this contribution has been elevated to 23% in 2017. Based on this ration, using multiplier effect, the increase in this ratio is 9% in 3 years, which means 3% increase every year. If can assume that the employment is growing annually with constant rate (3%), then the annual increase of labour involved in artisanal mining sector will be 85,580.43 persons, and the total number of artisanal miners will reach up to 3,280,583.15 in 2022.

However, unofficial studies suggest that the number of the artisanal miners is much higher than the officially published figures. Some estimates are as much as 20 million persons involved directly and indirectly in the traditional mining activities in Sudan. However, this estimate is not verified and may include a large number of foreigners (Chadian, Ethiopian, Somalis, and South Sudanese).

An official survey conducted by the Ministry of Minerals in 2017, suggests 85,651 direct jobs were created by artisanal mining, 7710 indirect jobs, and around 1032 induced jobs.

The Ministry of Minerals is regularly sent missions to screen the number of miners in artisanal mining locations across the country, but their estimated figures and numbers are far less than the actual number of artisanal miners observed during field survey and the reports of non-government organizations (NGOs). If using the same statistical procedure that they used in counting the mining activities (panning, washing, milling, etc.), and also assumed that only one individual works by each

activity, which is not reflecting the reality. Then it comes to the fact that the estimated number of individuals working in artisanal mining are only 55,362 persons, which is 40% less than the total artisanal miners' number (85,651) that was estimated by the Ministry of Minerals in their 2017 annual report.

If using field observed actual numbers of artisanal miners involved in all mining activities (washing/mills/basins, etc. *Table 7),* applying the noticed real individual numbers in each mining activity, it ends up with a total of 735,694 direct jobs, which significantly differ from the Ministry declared estimation in 2017 annual report *(Figure 6).*

In this study, the use of the arithmetic means and normal distribution pattern methods to generalize the data on the other producing states based on their resource reserves, security issues, etc.

The information is collected through direct communication with artisanal miners, unions, chiefs, in addition to the field observations. Based on these data sets, assuming that the average number of individuals working at one shift in each mine (pit) is 15 persons, and 9 individuals per each water basin, and 4 persons per each mill. Multiply these worker numbers in the total numbers of each activity in all gold-producing Sudanese states *(Table 7, Figure 6)*, estimated around 2,852.681 almost 3 million) artisanal miners were working in Sudan during 2017, *(Table 7)*. Nevertheless; in artisanal mining areas, people usually work for more than one shift, sometimes reached to three shifts per day. So, if undertake that the same people are doing the three shifts per day (which is unlikely), the jobs created by these direct procedures are 855,804.3. Therefore, the total estimated jobs created by the artisanal mining is almost 9 million jobs.

The study applies the same above-mentioned method to calculate the total jobs created in the last years, by using assumed numbers of individuals working in the different mining activities, also taking into consideration the continuous annual expansion in mining sector. For example, in 2008, the total number of artisanal miners was retrospectively estimated as 691,870, in 2009 was 699,870, in 2010 was 708,870, in 2011 was 738,960, in 2012 was 738,990, in 2013 was 854,340, in 2014 was 864,420, in 2015 was 887,350 in 2016 was 987,940. This process reflects hiking up in the numbers of artisanal miners involved annually in this sector. Furthermore, if using the same number of activities estimated by the Ministry of Minerals and add the observations on the amount of work-force by each activity, the calculated jobs would be around 735,694 direct jobs in 2017, which is more than the declared figures by the Ministry itself.

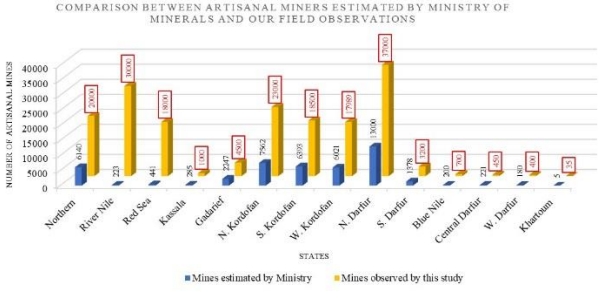

Figure 6: Reflects the distribution of artisanal mines in the Sudanese states, and the difference between estimated numbers of mines by the Ministry and observed numbers of mine by this study

An evaluation of government policies and corporate programs

The government has declared many economic reform programs that aim to maintaining economic stability and providing guidance on macro policies to increase production and productivity. These policies aim to enhance economic growth and subsequently, create and secure jobs. The objectives are to:

- Encourage the private sector to play its role in the implementation of the five-year national program objectives. This will reduce the number of government employment and open doors for private sector to recruit more people, especially in the annually growing mining sector.

- Stimulate working together with other coalitions to achieve the largest surpluses in the balance of payments and reducing the trade balance and current account deficit.
- Reduce the budget deficit to secure limits consistent with the overall objectives of the government and continue to sustain development. These objectives focusing on the social protection, job creation, and poverty alleviation.

Table 7. The numbers and distribution of artisanal mining activities in Sudan per each mining activity, both estimated by the Ministry of Minerals and this study.

	Ministry of Minerals			Present study		
State	Mines	Mills	Panning basins	Mines	Mills	Panning basins
Northern	6140	392	480	20000	4000	5000
River Nile	223	2543	776	30000	6000	4000
Red Sea	441	619	329	18000	3000	2500
Kassala	285	10	180	1000	300	250
Gadarief	2247	653	669	4500	900	1000
N. Kordofan	7562	259	282	23000	500	470
S. Kordofan	6393	298	510	18500	790	854
W. Kordofan	6021	685	1070	17989	1500	1225
N. Darfur	13000	60	1000	37000	480	2000
S. Darfur	1378	51	32	3200	160	70
Blue Nile	200	65	52	700	100	170
Central Darfur	221	11	9	450	50	54
W. Darfur	180	7	0	400	33	18
Khartoum	5	15	9	35	150	80
Total	44296	5668	5398	174774	17963	17691
Total labor	95,000 (far away lesser from reality)			2,852,681		

Many Presidential Decrees and Acts have also been issued in the last twenty years, with detailed responsibilities of the Ministry of Minerals and its position as the sole authority responsible for mining in Sudan. These rules include, inter alia, regulating and environmental impacts, artisanal mining, mitigating disagreements between the different levels of the ministerial cabinet, approving licenses, granting concessions, tax exemptions, compensation of landlords, careful use of radioactive minerals, roles of states and municipalities, investment regulations, promotion and marketing.

Governmental efforts in developing the artisanal mining sector.

Since 1998, the ruling government in Sudan started to bear more attention to the mining sector. The government issued many rules regarding the employment legislation, which in part, create encouraging environment for investments (especially foreigners), and support the labour rights, through implementing strong labour regulations to endorse artisanal mining and create sustainable jobs. The lawmaker in the constitutions of 1998 and 2005 stated clearly that the ownership of all mineral resources and underground resources is vested on the State, and the relevant federal ministries are responsible to regulate and control the optimum revenues out of exploiting these resources. In 2015, government issued amendments in the Minerals Wealth Development and Mining Act, which include clause (14E) that defines traditional mining (artisanal scale mining) as an activity practiced utilizing local traditional means within a specified area. The government requests the companies (especially medium and large scale) to employ Sudanese individuals and train them (in some cases up to 25% of the work force).

The Sudanese Labour Law (Act 1997) contains important articles regarding the rights of the mining employees. Article 74 allows consultancy and sharing ideas between employers and workforces on work-related issues in order to achieve maximum interests for both factions. Article 66 governs work contract validity in case of landlord or ownership transferred to another entity. Article 20/3 provides women-gender rights to

work and have respect at the work sites. Article 73 guarantees and preserves the rights of the labour while they are involved in that certain job. Article 69/1 explains the employment terms and conditions for artisanal mining.

The Ministry of Minerals carries out several capacity building and training programs for its employees as well as for the artisanal miners. It also organizes, intensive training courses nationally and supports participation in international courses.

Sudan has been nominated by the African Union to be the host of the permanent headquarters of the proposed centre for training and developing minerals in Africa. In this regard, the Sudanese government aims to boost skills available in the country and the potential to provide services to the extractive industry. Upgrade artisanal mining to small-scale system, which will create and secure more jobs.

Artisanal scale mining in Sudan is currently focused on gold, there is very limited activity in chromite, marbles, and other commodities (due to low prices). The Ministry of Minerals endorse investing in other ore-minerals like chromite, gypsum, iron, nickel, manganese, cement materials, white and black sand, copper, etc. The main goal behind that is to open chances for new jobs, reduce reliance on only gold mining, and increase mobility in the Sudanese markets.

Legal framework

sector, which requires the following: wages re-structuring, salaries increase, limited working hours per day/week that supposed to be in harmony with the international labour organization and the United Nation guidelines, job stability and sustainability, social protection, healthcare, and safety. Other relevant laws were implemented such as Labour Act (1997), Child Act (2010), Environmental Protection Act (2001), and Environmental Health Act (2009).

To improve legislation on mining, a legislature workshop was organized in 2016 by the Ministry of Minerals to introduce the law of mineral wealth. It was attended by 194 judges, lawyers, prosecutors, police officers, and media professionals. The workshop concluded with a number of recommendations, the most important of which is the establishment of a specialized prosecution to address and solve mining problems. All of these articles and recommendations have good influences on organizing and developing mining, particularly traditional sector. These rules defend the miners' rights and established new channels of communications between government and artisanal miners.

Environmental concerns and health safety

In 2012, The Ministry of Minerals established a department to oversee environment safety in mining activities, all the active companies are enforced by the law to take serious actions to protect the environment at their mining areas, with written proof that verify these actions. Join-missions between Ministry of Minerals and the Sudanese Higher Council for Environment are regularly inspecting the corporates and artisanal mining sites. All active companies in large-scale must permanently employ at least one environmental adviser.

Mercury has been used in gold extraction for decades and is well known for its impact on health and environment. Although it is globally forbidden, mercury amalgam process is widely used in artisanal mining in many developing countries (e.g., Mali, Mauritania, and Niger) and was also seen in USA and Asia for long time during last century. In Sudan, the government has declared that the use of mercury in mining will be fully banned by year 2020, unfortunately, people are using it up to date. Alternatively, green technology will be applied for gold dressing. As part of governmental efforts to regulate and limit the use of mercury in gold extraction, the Ministry of Minerals has embarked on a plan to reduce the health and environmental impacts caused by mercury. The plan includes; i) providing artisanal miners with safety gloves and masks. ii) Construction of new artisanal gold-related markets to serve the miners (food, service supply) and relocate the gold processing units far away (25-30 km) from the River Nile, water sources, and from the indigenous residents.

Other environmental concerns tackled by the ministry include fostering the use of water-mills instead of air-mills to reduce silica dust immersion; the ministry has encouraged companies to work in artisanal heaps (waste) or tailings, which contain leftovers of mercury. The aims out of this are to extract more fine-grained gold and increase the recovery, and also to prevent leaking of mercury into water resources.

Another challenge facing the government endower to safe environment is the huge number of holes that are excavated for mining purposes but are still hazardous. These holes are sometimes left unattended and often cause injuries or even death to miners as well as to the livestock. The miners dig both vertically and horizontally underground, creating tunnels to follow the gold veins. These tunnels often connect several vertical holes, and are high risky because sometimes they collapse, resulting in miners being injured or killed. Miners have been literally buried by walls caving in or whole tunnel systems collapsing, sometimes death caused by lack of oxygen and bad ventilation systems.

Furthermore, sanitation conditions are poor and consequently pose health risks in the mining sites, which are often far away from any settlement and health centres. People drink the water from the streams in which they both pan for gold and bathe, consequently miners are exposed to water-borne diseases.

Job creation, securing, and sustainability

The gold rush during the last years in Sudan established an open employment market, with unlimited opportunities for workers and employers in both artisanal mining sub-sector and formal mining. The opportunities are in different labour categories and they consist direct (digging, crushing, milling, processing, extraction) and indirect jobs, (marketing, trading, etc.). As the industry grows, employers pursue more workers and more people are encouraged to be involved in the sector because of attractive wages and revenues, coupled with the abundance of gold in the artisanal mining areas, and high prices (locally and world-wide).

The open gold markets have helped to reduce the negative impacts of unemployment such as violent acts committed by youth, radicalized movements or illegal activities such as human trafficking, smuggling, drugs, etc. It has contributed to the youth (mainly males) having a better quality of life.

The good news for job seekers is that the Ministry of Minerals has decided to prospect and explore for other ore-minerals in addition to gold *(Table 8)*. This will positively increase chances for jobs creation in the mining sector. The Ministry has suggested adding value to ore-minerals through manufacturing and refining thus reducing raw material exports. It is also looking at revising the official tax policy to attract investment into value added activities. Enhancing the investment rules to accommodate more international corporates, especially after the partial lifting of the economic sanctions, is expected to attract international companies and the use of new mining technologies.

The forecast shows that job growth rates will rise in the coming few years due to new gold sites discoveries, application of new and fast mining techniques, revision of the official investment policies to attract local and foreign investors and signing up new bilateral international agreements. In addition, government plans to upgrade artisanal mining to small-scale system, which will create and secure more jobs. The attraction of university experts, mining professionals, policy think-tanks, and interaction of specialized institutes will contribute to the implementation of better plans for job security and sustainability

The Ministry participates and run annual conferences, which attract multi-national corporates to invest in Sudan. It is likely that such events will open up investment opportunities and subsequently create more jobs. In November/2017, Sudan hosted the International Conference in Great Lakes Region (ICGLR) workshop of traditional mining in the Great Lakes Region, in which 12 States attended and discussed how to regulate the artisanal mining for more benefits to nations and

governments. The regional workshop of ICGLR focal points were focused on formalization of the artisanal mining sector and gender to validate a regional guide for formalization of the artisanal and small-scale mining sector. The main aim of this formalization guide is to offer ICGLR member states a regionally harmonized framework to formalize the artisanal mining sector with a view of enhancing de-linkage of the financing of illegal armed groups from exploitation and trade in minerals. Formalization of the artisanal mining sector aims ultimately to contribute to restoration of peace, stability and promotion of development in the Great Lakes Region.

In the last two years, the government has signed many bilateral agreements; one of them is the Sudanese- Belarusian agreement, which outlines cooperation between the two countries regarding the development of the mining sector in Sudan. The agreement includes coordination in academic research, laboratories support, planning and policy-making, geological mapping, investments, water harvesting, mineral resources, and safety, environment preservation, and pollution combating. In December/2017, several agreements were signed between Turkish businesses and the government to support development of the mining sector. All these bilateral agreements will contribute to create more jobs and sustain developments in the mining communities.

A golden opportunity for the mining sector to create jobs would come from the Atlantis deep II project currently in its feasibility stage. A Canadian company is studying ways of extracting metals from Atlantis deep II hydro-thermal basins in water depths of up to 2,000 meters in the Red Sea. If this project proves viable, it will boost Saudi Arabia and Sudan's access to metals and create high-paying jobs. The estimated and expected revenue of the two countries from the Atlantis II mining project in the Red Sea is roughly USD 20 billion. According to the Geological Research Authority of Sudan the estimates of minerals in common areas between Sudan and Saudi Arabia are in the region of 47 tons of gold, 2 million tons of zinc, 500,000 tons of copper, 3,000 tons of silver as well as large quantities of other valuable minerals.

The Ministry of Minerals said that 80% of the registered mining companies are located in the Red Sea State and its border with the River Nile State pointing that 30 billion SDG of the revenues of mineral have returned to the State's treasury during 2016. So, the state's share of the social responsibility is 32 million SDG.

Sudanese Ministry of Minerals revealed that recommendations of the Sudanese national dialogue include allocation of a percentage from the nationally-wide projects to the provinces, declaring that there are recommendations to allocate part of mining revenues to the producing states, pointing that the application of these recommendations, indicating that his ministry encouraging the traditional mining through helping to open new markets to encounter the speedy growth of mining activities, and providing miners with good services, awareness, training, capacity building, and job security.

Table 8: Production of some ore-minerals in 2017Q3, two struggled companies working in feldspar and kaolin. For iron and manganese companies stop working for the low prices. For copper only one company in exploration stage. Source: Ministry of Minerals, annual report 2017.

Ore	Production in 2017 (ton)
Gypsum	250,205
Salt	193,000
Chromite	30,294
Feldspar	19,734
Kaolin	4,946

Challenges

Despite the efforts that have been implemented by Sudanese government through its official arms to support creation and sustainability of jobs related to the extractive mining industries, there are still many glitches remain unsolved, which need more

attention from the government. The big issues facing job creation and securing is the instability in exchange rate that disturbs and decreases local currency prices against the hard currencies. Inflation rate has been increased rapidly in the last years, which is crucial to jobs gain and loss. In addition, the lack of a certain or permanent economic policy. These complications in Sudanese economy are not in favour to apply any kind of strategic long-term analysis (e.g., elasticity, job forecasting, etc.). Exchange rate upsurge guide to increase in imports prices, disturbing domestic markets supply and demand flexibility, which hike up the market prices very fast and furious. Some other specific and controversial obstacles are listed below:

- Some mining sites need quick attention, including environmental protection, security, underground mining, ambiguity in production records, transparency, job description, information for each category and minimizing interference between different official bodies. Confusion between the limits of powers of governors (municipalities, local governments, revenue rates, and collection methods, etc.), and miners' powers, rights, and permissions should be addressed.
- Absence of national employment policy in the artisanal mining sector, the lack of long-term planning to create and sustain jobs, coupled with uncertainty in employment strategy for active companies represent a big threat for job security and stability. Organizing and sorting of prospectors are the current challenge facing the government, due to the vast and remote mining areas, and scattering of the working-force.
- The collection of data concerning artisanal mining sector is very poor, many areas in Sudan are not reached by officials. That is mainly due to the security instability, particularly in Darfur, South Kordofan, and the Blue Nile States.
- Inadequate legal framework, institutional weakness of organizations affecting their capacity for requests, Poor infrastructural support for data sharing/data flow, lack of cooperation by suppliers plus their inability to respond to data requests, difficulty in acquisition of infrastructure due to sanctions placed on the country, lack of capacity by the media in handling and interpreting Bank's Statistics.
- The traditional methods and techniques for collecting information are not the top ranked procedures. Yet no tracking systems in place for artisanal gold miners, which is very essential to study any possible prospectors' migration and relocation and the reasons behind that. There is no chain of custody technologies being proposed for this category of gold production, nor by the on-ground engagement neither by large overseas gold buyers.
- The large State-controlled enterprises, which dominate mining industry in most of African countries including Sudan, have generally declined in performance. They are subject to government interventions and changes in official policy. In this case, performance and operations tend to be less productive than those of the private companies. However; privatization always causes drop in job numbers.
- The most important challenges facing the government is continuation of the US-led economic blockade and banking ban. Declining in domestic production of oil (due to South Sudan referendum) and depression in global oil prices.
- Rehabilitation of areas affected by the insurgence in the liberated areas and the cost of peace and establishment of security. Impacts of foreign and cross- border trades, leading to an increase in the rate of smuggling of goods and minerals (mainly gold). Lack of political stability and security in some neighbouring countries increased movement of refugees, foreign labour, negative repercussions on employment, pressure on the limited resources and the services provided, particularly after the recurrent escalations of the war in Southern Sudan. Slow flow of foreign investments to Sudan. Drop in international price of gold due to upsurge in US dollar market values, and its negative effects on the country's revenues of foreign currency.
- Formalization of artisanal mining sector represents a big deal facing the Sudanese government. Privatization will lead to

employment reduction. Many official steps have been established to upgrade the artisanal mining. The major concern of artisanal mining is the labour shortages for agriculture which reduces productivity in crops, fruits, Gum Arabic, and livestock.

- Most of the artisanal miners are young, with only basic education and they come from remote areas with wide-spread poverty like Darfur. They were motivated by the drive to improve their incomes and the conditions of their families. They transfer over 60% of their monthly income to their families. They were therefor; subject to the exploitation of those who have the capital.
- Family breaks due to informal mining are not a common phenomenon and miners keep strong ties with their families despite the long distance's factor. Nevertheless; occasionally conflicts are observed in the artisanal mining areas, basically due to mixing of bio-diverse ethnic groups and resulted problems of landlord property.
- Gold smuggling continues to limit the benefits from gold production and Sudan would not benefit fully from gold mining as a source of hard currency, if smuggling continues. The discrepancies between the production figures of gold and the export figures are clearly indicate massive smuggling. This shortage was clearly admitted by the Ministry of Minerals and confirmed by the reports of the Taxes Administration.
- The most considerable impact of mining project is the effects on water quality and availability of water resources within mining sites close to River Nile, due to: (i) *Acid mine drainage:* being the most serious threats to water resources and if left uncontrolled the acid mine drainage overflow into streams or rivers, or recharge the groundwater through artisanal mining open pits. (ii) *Erosion of soils and mine wastes into surface waters:* the potential of soil and sediments eroding into and degrading surface water quality is a serious problem. Because of the large area of land disturbed by mining operations and the large quantities of earthen materials exposed at sites, erosion represents a major concern. (iii) *Silica dust and surface water pollution:* There are large numbers of dry mills in mining areas, which are considered the main source of fatal dust, where dust carried by wind into nearby River Nile. Particulate matters increase water turbidity, sediments load, total dissolved solids, and may changes water pH according to type of minerals that dissolved and hence affect fisheries.
- Mining operations degrade the quality of soil in mining sites: erosion of top soil and increase the desertification rate in mining sites. Tailing accumulation contains residues of toxic substances including, mercury, lead, cadmium, chromium, nickel, and cyanide.
- Security and crime cases among the miner's communities are generally low, vary from vice-encounters to serious offenses. Theft, cheating, and drug abuse make > 90% of cases. Criminals and fugitives from justice are commonly using the artisanal mining remote areas as a good environment to hide. Insecurity is a serious threat to the artisanal mining sector. In some areas (parts of Darfur and Nuba Mountains) artisanal mining seems to be controlled by rebel groups, who don't hesitate to use violence to protect their interests. Just like what happened in South Sudan during the civil war, where SPLM for long time using gold cross-border trading.
- There is a particular secretiveness that surrounds gold mining in Sudan, contributing to rumours and allegations of all kinds, which are often impossible to verify but could create a climate of suspicion and opposition. It is especially noticeable that communities mistrust companies, government, and any foreigners who show an interest in an area's mineral resources.
- Majority of artisanal miners work with inappropriate or rudimentary tools, which don't enable any increase in productivity. Accidents occur because of a lack of appropriate technologies. Moreover, they have only limited knowledge of how to discover deposits and track them. There are health risks in the mining sites, which are often far away from any settlement and medical centres. There are no available reports about sexual abuse or sexual transmitted disease in the mining sites.

- Unfortunately, no NGOs, civil societies, or international organisations initiatives providing any kinds of support to the artisanal miners at their target areas.
- The big risks that companies frightened by "political" risks. The governments could suddenly change the "rules of the game" especially in mining rights, investment policies, taxation arrangement, and access to their hard currency bank accounts.

Conclusion

Sudan economy has been an agricultural-based since its independence in 1956, with immense contribution to the GDP. Progressively, the role of other sectors (mining, services, etc.) rises up during the last few years, and the economy has been moving towards liberalization. This had progressively helped Sudan to improve exports/imports balance and aid to increase the domestic growth rate. Industrial minerals are playing an essential role in supporting the economy and sustain development in Sudan. Recently, the Ministry of Minerals has given special attention to mining, particularly gold, copper, iron, and chromite. These minerals are of great importance to various kinds of industries and represent golden tools to boost the socio-economic sectors in Sudan. A specialized committee consisting of experts in geology and economics and representatives of the Geological Research Authority of Sudan, Central Bank of Sudan, dedicated institutes, and the Ministry of Finance had prepared scientific studies on this regard, examining the volume of reserves located in Sudan, identified its proven and probable reserves, and discuss its potentiality.

The government seeks to increase the production of non-oil exports (mainly gold, livestock, and crops specially sesame), which are expected to contribute on average by 83% of total exports over the period between 2019 and 2020. This coupled with other anticipated government policy reviewing, will boost investments and support the balance of payments between 2019 and 2020. Accordingly, these policies would assist to open more job opportunities and enhance current jobs situation.

Huge numbers of indirect jobs are also attached and related to mining activities, such as hotels, restaurants, water/fuel supply, tax collectors, doctors, transport, economists, security agencies, and much more. The revenues return out of gold exports assist the government to pay or marginally increase the wages of public service employees. That could be taken as job creation and securing. Other sources for jobs are visa issuing/renewing centres, foreign investors and labours registration cards and extension process, education centres, and capacity building seminars.

Economic instability and exchange rate fluctuations along with day to day changing in national fiscal policies guide to uncertainty and mistrust among the extractive industries and related investments, forming a kind of economy shrinking, inflation rush, and prices hike up. Accordingly, it is so difficult to fulfil long-term planning strategies for jobs creation and securing.

Taking into consideration the current problems associated with the mining industry, it is increasingly important to assess the economic and social impacts of mining at the community level in the next generations. This study demonstrates clearly that there are substantial social and economic benefits to local communities in Sudan, but they do not come automatically, and their sustainability is a key issue. The most positive cases are related to the growth of local small and micro-enterprise activity, providing supplies and related services to mining companies; and to local economy development. On the other hand, there is a clear need also to redistribute more tax revenues to local governments and to build capacity at community-level. However, the position of mining remains controversial and true sustainable development is not just a matter of financial flows. While mining is a major contributor towards economic development, it has also been associated with triggering several economic, environmental and social problems, which has led many to question the sustainability of the economic outcome of mining and propounded the resource curse theory. The industry is therefore challenged to (i) mitigate its negative impacts - in

terms of environment, socio-cultural, health and human development, governance, macro-economic management and corruption, as well as economic barriers to restructuring and real impacts on poverty reduction; and (ii) further improve and promote concepts and actions aiming at industry-community co-participation in the mine building process. The industry needs to ensure that its benefits are harnessed at both the local and national level in a sustainable way.

Sudan being one of the largest economies of Africa and bestowed with ample natural resources, which should very objective in political stability, which guide to growth in the gross domestic product. The country has the potential resources, but allocation and management have to be done properly.

The contribution of mining to sustainable job creation needs to be considered in terms of economic and technical viability, ecological sustainability, and social equity. In order to achieve this, governments, mining companies and local communities must work together on these issues through the different stages of a mining project and over a considerable time span, covering the period from exploration to mine operation, and to post mine closure.

Recommendations:

- Assistance and logistics support are extremely required from different agencies of the United Nation and other world aid organizations. In addition, it is possible to make use of proven reserves of minerals in the ground as a guarantee to obtain funding for other kinds of projects in agriculture, animal products, food industries, etc., which will aid to create more jobs.
- It is recommended that steps must be taken by government to offer support to artisanal miners to, inter-alia, explore for suitable deposits; to introduce appropriate tools; to train artisanal miners in health, safety, and environmental issues; to provide financial services; and to provide training, and support concerning cooperatives mining and marketing.
- In order to preserve its important contributions to livelihoods, economic adjustment programs and State Acts should continue to evolve macro-economic sector. Effects of mining must be fully taken into consideration; exchange rate policies should be market-based and should be aimed at jobs stability and security.
- Governments (all states) should clearly spell out their mining development strategies, the private sector should take the lead. Private investors should own and operate mines. The government must promote private investment policies and regulation, supervise implementation of established policies and monitor the private companies.
- Existing State-owned mining companies should be privatized at the earliest opportunity to improve productivity, and to give a clear signal to investors with respect to the government's intention to follow a private-sector-based strategy.
- The incentives for mining investors should be clearly determined by investment legislation.
- Taxation of mining companies should be consistent with the taxation of other sectors in the Sudanese economy, the specific nature of mining as a resource-based industry must be considered. Mining taxes should be earning-related rather than output-or input-related to avoid distortion in investment and operational decisions. Mining taxation needs to take account of tax levels in other surrounded mining-active countries to maintain or establish competitiveness of the national industry and to fight smuggling.
- Old numerating methods must be modernized with new statistical technologies, such as GIS and remote sensing tools. Even small improvements in data collection technology would cause important gains in the quality and cost-effectiveness of the whole operation. Therefore; counting of human resources, numbers, genders, age, job description, job titles, and so many other features must be achieved by attributed and appropriate

statistical methods, such as direct questioning and interviewing with artisanal miners, regular field mission, biometrics, implementing the intelligent character recognition (ICR), mapping of population that requiring an extensive fieldwork, and generating maps for enumeration, etc. in addition, the government might issue a specific identification cards for the artisanal miners for more precision.

- Operation requires an efficient communication with millions of persons, as well as procurement and storage of a large variety of items (shops, mines, etc.), most of which are distributed at all corners of the country. Improved computer software and wide availability of personal computers (PCs) have made managing the flow of information much easier. Bar-code technology would be a key element in this regard. Using bar codes instead of printed numbers has advantages world-wide in avoiding transcription errors and speeding up processing. The officials must concern about how to choose appropriate technologies, how to maintain the integrity of existing statistical systems, how to deal with outsourcing certain tasks, and how to maintain confidentiality of data. Quality assurance, including the use of scientifically sound sampling methods, should be an integrating part of all enumeration operations
- Engaging leaders of artisanal miners (union, league) in policy-making process and sharing ideas is not at the ideal level, which will initiate matter of conflict of interests and kinds of interference. The decision-makers must find ways to win artisanal miners' cooperation in further mineral tracking efforts and secure sustained support for legal sales efforts and sensitization more broadly.
- It is very essential for artisanal producers enumerating is to involve all the important stakeholders in the process: government, civil society, and industry are all represented on the data collection teams, which travel together in a group to artisanal exploitation areas in order to seek out and register miners. The fact that civil society and industry representatives are present on the teams helps to build the trust that necessary to give miners confidence in the process and decision makers.
- The successful mining sector must be under joint-venture accords between the private sector and government. These joint-ventures are managed by the private partner who generally operates under an investment agreement, which provides the private investor with explicit guarantees against unreasonable government interferences.
- The government must establish marketing program in the future, to attract the foreign investors, and to encourage companies to increase gold production, using modern technologies as well as improve production conditions in artisanal mining sector.

Acknowledgements

Would like to express my sincere thanks and appreciations to the Geological Research Authority of Sudan (GRAS), Ministry of Minerals for sharing some information, and Prof. Hassan Basheer who assist to enhance this study.

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