

Human Capital for the Oil, Gas and Minerals Industries

Is Africa Getting the Most out of its Extractive Industries Boom?

After agriculture, the extractive sector is the most important in most countries in Sub-Saharan Africa.

- At US\$3.4 billion, Africa's estimated budget for mining exploration (excluding iron ore) is the second-largest in the world after Latin America (US Geological Survey Annual Review, 2012).
- Exports of mineral products and fuels account for up to 38 percent of total exports in Sub-Saharan Africa (UNSTAT 2010; World Bank 2010).
- The continent is resource-rich, hosting 30 percent of the world's total hydrocarbons and mineral reserves; 12 percent of its crude oil reserves; well over a third of its bauxite, gold, uranium and chromite; 88 percent of its diamonds; and 95 percent of its vanadium.

With a strong focus on skills enhancement, African countries have a clear window of opportunity to convert their natural capital into sustainable economic activities that can generate longer-term social and economic benefits.

Specialized Human Capital: A Key Factor in Maximizing Gains from the Boom

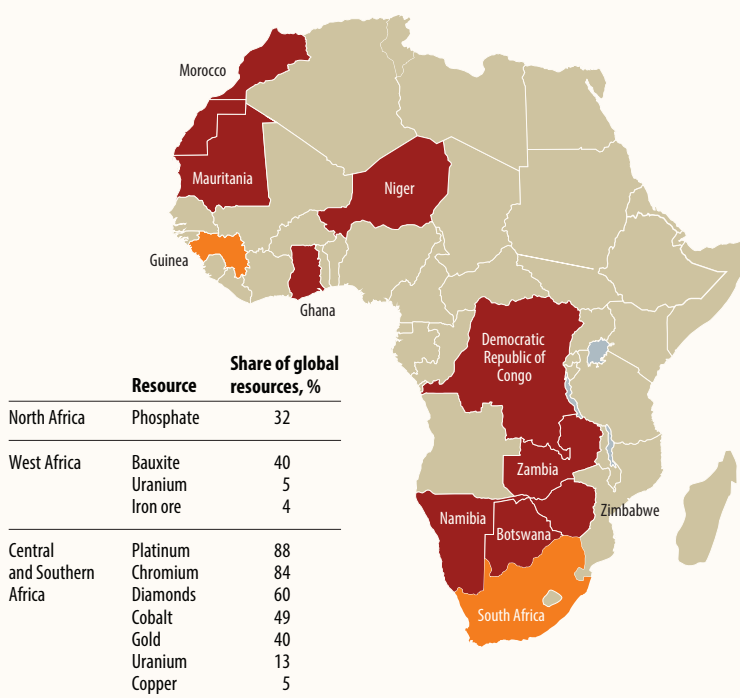
Skills development is clearly linked to greater and more long-running gains from the extractive industries. Evidence from eight African countries—Angola, Botswana, Gabon, Ghana, Nigeria,

KEY MESSAGES

- Africa has a window of opportunity to enlarge the economic benefits from its booming oil, gas and minerals industries.
- The lack of specialized expertise is a major bottleneck obstructing the potential for more well-paid jobs and home-grown supplier companies.
- Significant skills shortages exist both in terms of numbers and quality, particularly within the science, technology, engineering and mathematics (STEM fields).
- Establishing Public Private Partnerships and regional centers of excellence is key to building these specializations.
- The World Bank is supporting 10 African countries as they train workers for the extractive industries.

Figure 1. Africa's share of global mineral resources

- >1 resource holding in top 10 globally
- 1 resource holding in top 10 globally



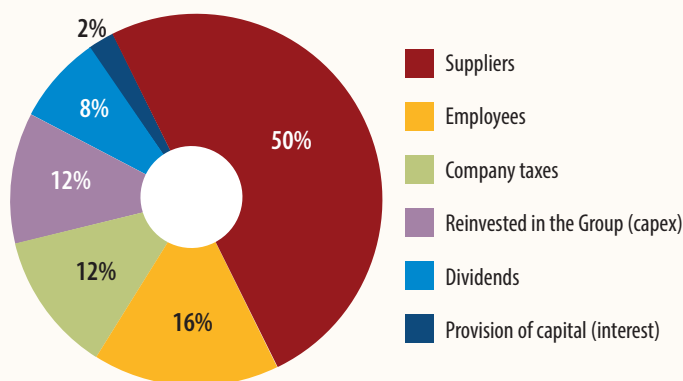
Source: Deutsche Bank, US Geological Survey (USGS), World Nuclear Association

South Africa, Tanzania, and Zambia—and six sectors (copper, diamonds, gold, oil and gas, mining services and timber) shows that skills, and the institutions that affect firm- and sector-level capabilities, constitute the most important determinant of economic benefits. Building specialized human capital adds value for local suppliers, creates a large number of direct and indirect jobs, and builds governance capacity.

Local skills training helps enterprises of all sizes become suppliers to the oil and gas industry. According to the *Anglo American 2012 Sustainable Development Report*, economic value retained through employment and local suppliers accounts for 66 percent of the total value created through minerals extraction (see Figure 2). Unlike taxes, royalties, fees, and other revenues paid to government (such as through support to improved fiscal regimes), skills development enables more value created from minerals extraction to be retained locally. Greater skills capacity enables higher levels of local employment and local procurement, in turn promoting inclusive growth and community empowerment. Take the example of Botswana: De Beers moved many of its downstream diamond activities from the United Kingdom to Botswana. Making more diamonds available locally has shifted more than US\$6 billion worth of annual rough diamond sales from London to Gaborone. An additional 3,200 manufacturing jobs have been created in Botswana since 2007 and 16 locally-based diamond buying companies have been established.

Africa's growing workforce should be able to capitalize on direct and indirect employment opportunities generated by sustainable mineral sector growth. Although the extractive industry provides relatively few direct jobs, the potential for job creation through local linkages and the socio-economic impact of mining operations

Figure 2. Economic value distribution in minerals extraction



Source: Anglo American 2012 Sustainable Development Report

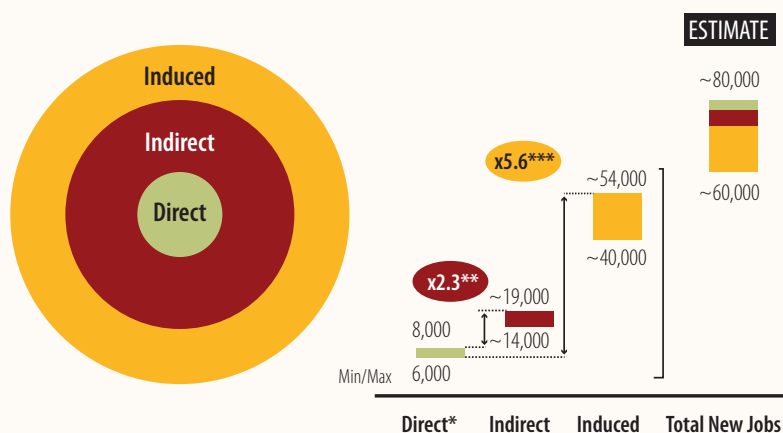
is significant and worth considering. According to an International Council for Mining and Metals study (2008), Tanzania's large-scale mining sector had created about 8,000 direct jobs, but 45,000 indirect ones. (See Figure 3 for direct, indirect and induced jobs created in Uganda).

Authorities that regulate the extractive industries need to upgrade both knowledge and skills. Building governance capacity for the sector is also critical so that regulatory

authorities manage the extractives sector transparently and responsibly. To date, regulation has been characterized by ad hoc negotiations in the award of licenses and concessions, alongside technical and administrative regulatory oversight. Modern extractives regulation involves integrated economic, legal, financial, environmental and technical oversight, within a coordinated, multi-disciplinary regulatory structure. This requires building capacity in Africa.

Figure 3. Jobs generated in Uganda by Lake Albert basin development projects

Concepts of direct, indirect and induced jobs generated by oil & gas projects



Source: SBC research on "stand alone" oil and gas cities (Stravanger - Norway, Aberdeen - UK, Macae - Brazil, Trinidad & Tobago)

Note: *Number of jobs created was computed as peak of manpower (7,000) for Lake Albert Basin Development projects + 15 percent was added to account for uncertainty
 **Ratio direct to indirect varies in the range of 2.3 - 3.8 depending on geography
 *** Ratio direct to induced varies in the range of 6.6 - 8.4 depending on geography

The Skills Gap in both Demand and Supply

GAPS IN THE NUMBER OF SKILLED WORKERS

The extractives sector requires a wide range of skills in order to function effectively and to maximize the potential broader growth and development benefits. A skills gap analysis of the mining sector in Zambia concluded that it was short of about 540 skilled workers in 2012. On the demand side, the surveyed companies employed 9,978 skilled workers, including 1,636 graduates, 1,427 technologists, 970 technicians and 5,943 crafts persons, out of a total of 32,515 unskilled and skilled workers in the sector. Some 300 workers were expatriates and mostly employed in technical and managerial positions. In the coming five years, the study estimates that around 11,000 skilled workers will be needed in the companies surveyed just to maintain the current level of production.

GAPS IN QUALITY OF SKILLS

The global extractives sector is characterized by very high investment risk and capital-intensive activities, requiring high levels of skills. Lack of relevant skills constrains local suppliers in upgrading firm-level operational competitiveness, meeting technical requirements, instituting innovation and adopting world-class manufacturing practices. In Chile, the annual production of copper per worker is almost seven times greater than in Zambia. This difference cannot be explained solely by variables like scale, resources and equipment. Low productivity is in large part driven by skills gaps that are rooted in weak technical and vocational training. Despite the recent expansion of private schools and training institutions in West Africa for future managers, engineers, and mid-level skilled technical staff, only a few

“Continued innovation and human resources development are key to reducing the dependence on the initial factor endowment (natural resources) and to building and sustaining a locally embedded, competitive and diversified economy.”

— Africa Mining Vision, African Union

countries have been able to produce the skills required in the regional mining industry.

Rebalancing towards Science, Technology, Engineering, and Mathematics (STEM) Fields

Despite increasing industry demand, graduates in engineering, manufacturing and other technical fields are scarce. Africa has the highest share of social science and humanities graduates in the world at 70 percent, compared to 53 percent in Asia (OECD, 2012). Preparing more skilled youth for the oil, gas, and mineral sector is a great economic opportunity. This can be done by expanding capacity of technical colleges, universities and secondary school systems that can provide specialized programs of appropriate magnitude and quality. At the tertiary level, extractives-related programs are often too generic, with little laboratory capacity. At secondary level, weak preparation in the sciences keeps many students out of engineering and science degrees

at the tertiary level. A large number of youth could also obtain well-paid jobs by undergoing quality vocational training to become electricians, technicians, and heavy-machinery operators, but the courses need to be designed in close collaboration with the employers. Whereas the development of tertiary level education programs is fundamental, the highest impact on poverty and jobs is likely to come from improving the relevance and quality of vocational secondary level education.

Leveraging Public Private Partnerships

Public Private Partnerships (PPPs) can play a major role in building specialized skills. Increasingly, resource deals include commitments to infrastructure and human resource development. For example, in 2001, De Beers signed a \$7 billion deal in Botswana, including a commitment to build a diamond sorting facility, which created 3,000 jobs.

Mineral companies are interested in skills development for several reasons:

Box 1. Sierra Leone: From Mines to Minds

Sierra Leone’s “From Mines to Minds” pilot project is a public private partnership that brings together the London Mining company; the Sierra Leone Ministry of Education, Science and Technology; the German Agency for International Cooperation (GIZ); and St. Joseph’s Training Institute, a nationally accredited and certified training provider. GIZ’s program document notes that only 23 percent of middle level and 12 percent of senior level staff in the mining sector are Sierra Leone nationals. The project aims to improve the employment rate of St. Joseph’s graduates from the mining district of Port Loko from 40 percent to 55 percent. It will reform the curricula and training delivery for four vocational trades, install infrastructure and equipment for new occupational profiles and ensure efficient use and maintenance of training equipment.

- Companies are willing to invest in training people to meet their own requirements.
- Local employment is consistently the top concern of communities located near extraction projects, and often a central issue behind disputes, grievances and conflict. More local jobs result in more support for the project.
- Local skills development can help retain staff, with the added advantage of having staff living closer to their workplace.
- Some mineral companies invest in skills development to benefit women and marginalized groups.

Governments also have a range of priorities, which drive decision-

making and planning for extractives. Common priorities include (i) retaining maximum value in-country (ii) ensuring sustainability of benefits through local content commitments (iii) maximizing job creation and (iv) stimulating other sectors. Clear governance frameworks, greater autonomy to training institutes and realistic contractual commitments can help foster partnerships with companies in developing curricula, training and building education infrastructure.

Further, PPPs could support cost-efficient regional centers of excellence that create specialized post-graduate education and research, concentrate limited top-level faculty, share knowledge, and train continentally.

The World Bank as Partner

The World Bank Group, with its support to both governments and the private sector, can serve as a catalyst for coordination between the two in resource-rich settings. For example, it is helping to coordinate mining infrastructure investments with national and regional infrastructure development needs. A similar approach to skills development could include centers of excellence for education, collaboration with the African Mineral Development Center (AMDC) and research in the extractives sector, and PPPs with companies that will employ graduates from these centers.

Table 1. World Bank initiatives for skills development in oil, gas and minerals

Project	Description	Amount
Africa Centers of Excellence (under preparation)	Strengthening several centers of excellence in West and Central Africa.	US\$8 million for each center
Ghana Oil and Gas Capacity Building project	Component B will fund the government policy on local content, through support to vocational training and tertiary education and research at the Kwame Nkrumah University of Science and Technology (KNUST).	US\$11 million
Support for the Uganda Petroleum Institute	The project aims to: (i) increase access for new students to quality courses; (ii) improve Uganda Petroleum Institute, Kigumba (UPIK)'s infrastructure and learning quality; and (iii) develop a long term strategic plan for UPIK including access to financing mechanisms.	US\$1.18 million
Mozambique Mining and Gas Technical Assistance Project	Activities include coordination of efforts across sectors in designing qualifications, establishing technical advisory committees with broad representation for mining and gas, and training based on competencies.	US\$50 million
Tanzania Energy Sector Capacity Building Project	Capacity building activities for the Vocational Education and Training Authority (VETA) for Tanzania's gas sub-sector, in alignment with project growth in both public and private employment related to it.	US\$35 million

MORE ON THE TOPIC

- Issues Paper: A Coordinated Approach to Mineral Skills Development in Africa (African Mineral Development Center, 2013)
- Bloch, R. and G. Owusu (2011). Linkages in Ghana's Gold Mining Industry: Challenging the Enclave Thesis. MMCP Discussion Paper 1. Milton Keynes and Cape Town, The Open University and University of Cape Town.
- Contribution of Mining Sector to Economy of Ghana, Business Africa.
- Extractive Industries Transparency Initiative (EITI), Ghana Country Page and Report.
- Extractive Industries Transparency Initiative (EITI), Tanzania Country Page.
- Morris, Kaplinsky, and Kaplan (2011) "Commodities and Linkages: Meeting the Policy Challenge".
- Patrinos HA, Barrera-Osorio F, Guáqueta J, (2009) "The Role and Impact of Public-Private Partnerships in Education", World Bank.
- African Minerals Skills Initiative, Business Plan, May 2013.
- Oyejide, A. and A. Adewuyi (2011). Enhancing Linkages of Oil and Gas Industry in the Nigerian Economy. MMCP Discussion Paper 8. Milton Keynes and Cape Town, The Open University and University of Cape Town.
- Survey and Analysis of Demand for and Supply of Skilled Workers in the Zambian Mining Industry (2011) Passmore M. Hamukoma.

