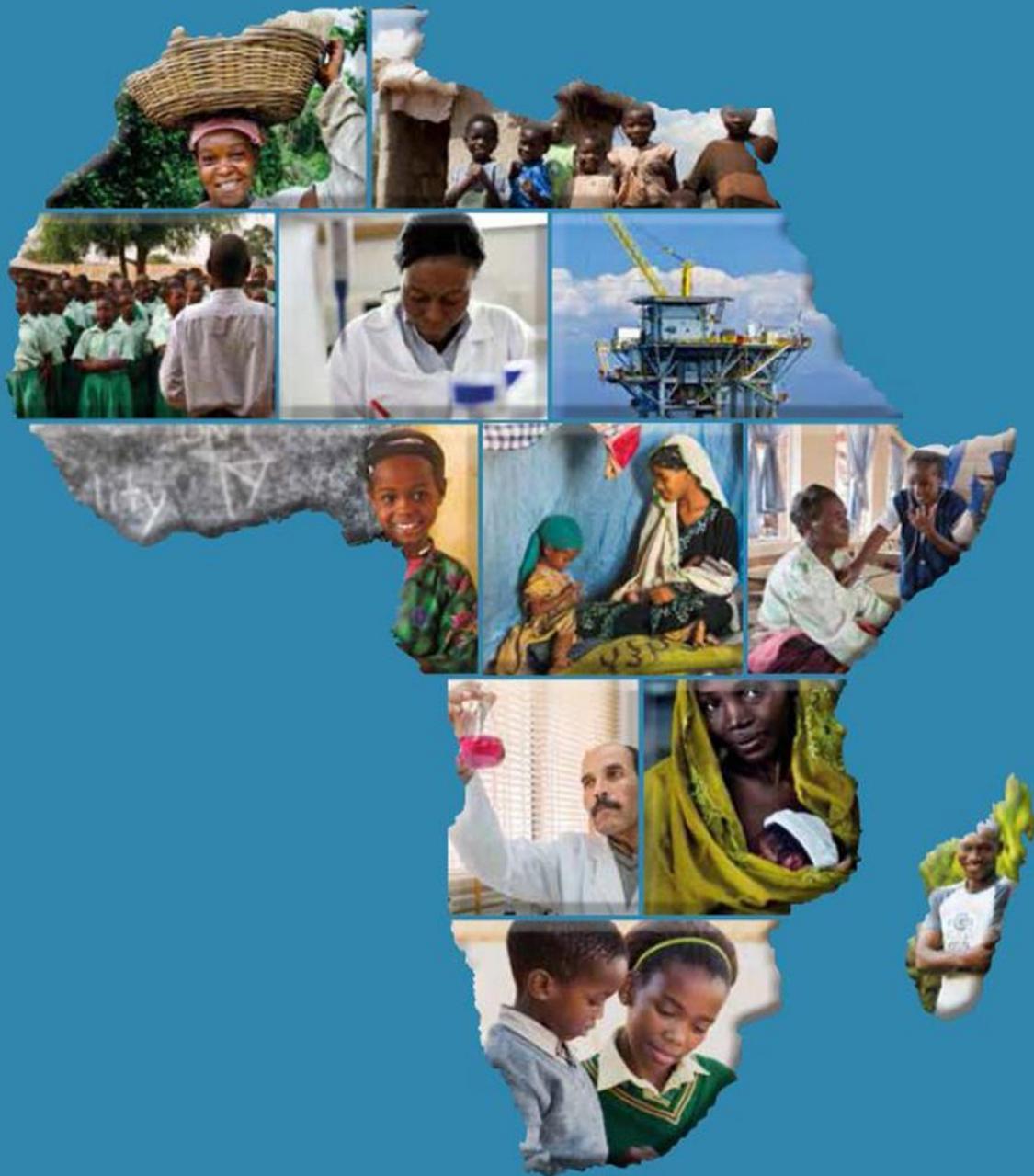


# Flagship Report Paper Series

Paper 7: Leveraging extractive industries for skills development to maximize sustainable growth and employment



AFRICAN DEVELOPMENT BANK GROUP

BILL & MELINDA  
GATES foundation



## Preface

History shows that an abundance of natural resources does not necessarily improve a country's human development. Natural resource-rich countries in Africa tend to have lower average life expectancy and higher maternal mortality and under-five mortality rates than non-natural resource-rich countries with equivalent incomes.

Most governments have expressed a commitment to turn new revenues from natural resources into outcomes that matter for their citizens: better health, better education, and access to quality social services. They also want to make sure the discovery of natural resources translates into more and better jobs, as well as business opportunities. Yet they are also aware that delivering on those commitments demands tough and sometimes complex policy choices: balancing the need for social sector investments with the needs of other sectors across the economy; being transparent and carefully managing citizens' expectations; and adequately distributing benefits both between extractives and non-extractives communities, and between current and future generations.

In light of these challenges, the African Development Bank (AfDB) and the Bill and Melinda Gates Foundation (BMGF) came together to produce a joint Flagship Report: '*Delivering on the promise: Leveraging natural resources to accelerate human development in Africa*'.

This paper is one of a series of eight in-depth technical background papers which supported the development of the flagship publication. While each background paper can stand alone, they also build on each other. Paper 1 sets out a framework for understanding four key channels through which natural resources can translate into improved human development: 1# public spending on health, education, and social protection; 2# public spending aimed at fostering growth and economic diversification; 3# industry spending on infrastructure, procurement, skills, and employment; and 4# companies' spending on social investments. Paper 2 estimates the likely timing and magnitude of revenue from new discoveries of oil, gas or minerals in six African countries: Ghana, Liberia, Mozambique, Sierra Leone, Tanzania, and Uganda.

The next three papers examine the public spending channels described in the first paper. Paper 3 discusses the macroeconomic risks and policy choices associated with an influx of new revenues from natural resources. Paper 4 explores the potential of new revenues to improve health and education services, comparing the expected scale of revenues to financing needs in the six featured African countries and introducing a diagnostic framework for policy choices. Paper 5 looks at the case for using new revenues to fund basic social protection programs, including the potential to boost demand for health and education services.

The final three papers examine the industry activity channels described in Paper 1. Paper 6 looks at how policies on local content can leverage spending on extractive industries projects to create more broad-based economic growth. On a similar theme, Paper 7 explores the policy choices involved in leveraging extractives projects to build skills and human capital. Finally, Paper 8 asks how governments and industry can maximize the human development impact of companies' social investment, a relatively small but potentially important part of company spending in extractive industries projects.

To access the Flagship Report and the other seven background papers that present complementary in-depth discussions of the policy choices described in this paper, readers are encouraged to consult the dedicated website at:

[www.NaturalResourcesForHumanDev.org](http://www.NaturalResourcesForHumanDev.org).

**Paper 1** – A framework: Human development and the links to natural resources

**Paper 2** – Timing and magnitude of new natural resource revenues in Africa

**Paper 3** – Natural resource revenues and macroeconomic policy choices

**Paper 4** – How to use natural resource revenues to improve health and education in Africa

**Paper 5** – How to use natural resource revenues to enhance demand for public services through social protection

**Paper 6** – Creating local content for human development in Africa's new natural resource-rich countries

**Paper 7** – Leveraging extractive industries for skills development to maximize sustainable growth and employment

**Paper 8** – Extractive industries and social investments: Principles for sustainability and options for support

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### Disclaimer

This series of papers focuses on one part of the extractives debate and reflects research gaps identified by the contributors within their areas of expertise. The contributors are not held responsible for the views expressed in this report. This paper is based on research, analytics, and expert consultations completed during the writing of the eight background papers. However, this paper should not be considered as an alternative to in-depth technical expertise. Any mention of specific entities, individuals, source materials, trade names, or commercial processes in this publication does not constitute endorsement by the AfDB or the BMGF.

## Key messages

**Natural resource discoveries are often followed by high expectations about local employment opportunities – but experience shows that there is no guarantee that projects will, or can, employ many locals.** Many jobs demanded directly by industry require skills and competencies that are beyond those commonly available in many African countries – especially in local communities in the remote geographical locations where natural resources are often found.

**Extractives companies share an interest with governments in regard to employing local workers, but the overlap of interests is not perfect.** Governments want to maximize local employment to boost local economic development. For extractives companies, sourcing local workers is typically cheaper than sourcing foreign workers, but quality has to be broadly in line with international benchmarks. Where the quality gap is very large, there may not be not enough time for companies to skill-up inexperienced workers to the competency levels required.

**To reconcile these interests, it is important that government play a facilitating and coordinating role.** This involves working with industry at an early stage of each project to identify what skills and competencies will be needed at what stage. Governments can also guide companies' investment in training through fiscal incentives, such as tax deductions on skills training, co-funding of coordinated investments in the technical and vocational education and training (TVET) system, and facilitating the establishment of industry-wide training facilities.

**Extractives projects create many jobs beyond the direct employment involved in the project.** Typically, more jobs are created by indirect employment – that is, jobs in the project's supply chain beyond the contractors on site – and by induced employment – that is, jobs created as a result of governments spending natural resource revenues, and those directly and indirectly employed by the sector who spend their salaries on locally produced goods and services. Induced employment can be up to 10 times as important as direct employment, though multiplier effects should be treated with caution. The impact and the time profile of the demand for skills will also vary across the mining, oil and gas sectors.

**The biggest opportunities for governments are in skills that are transferable to other economic sectors.** Governments could benefit from focusing on skills that can also be put to use in related or non-resource sectors, instead of aiming to fill gaps in highly technical areas specific to the resource sector. Many skills in the mechanical, process and electrical engineering industries are needed by extractives projects, mostly during the construction phase; thereafter demand drops significantly – especially for oil and gas projects. Training more workers in these transferable skills could provide a range of sectors with a better foundation, helping to lay the ground for economic diversification. There are also opportunities to build transferrable skills for the service sector (IT, accounting etc.).

**Both government and industry need to adopt a flexible approach.** Governments need to accept that international employees are necessary, in particular at the higher skills levels – not least to supervise entry-level local labor, and more generally during the early stages of operation, while local employees are being trained. At the same time, industry needs to play its part in defining, and committing to proactively achieving, rising levels of local employment.

**There is a role for regional initiatives in skills development.** A regional skills survey could identify skill needs and constraints. Issues such as shared facilities, cross-border or inter-university training programs, sponsorships, and research and development could be facilitated by Regional Economic Communities (RECs) in order to minimize individual country costs, foster economies of scale and improve competitiveness.

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## List of abbreviations

AfDB	African Development Bank
API	African Petroleum Institute
APPA	African Petroleum Producers' Association
BMGF	Bill and Melinda Gates Foundation
CMV	Country Mining Vision
EPC	Engineering, procurement, and construction
EQF	European Qualification Framework
ICMM	International Council on Mining and Metals
ILO	International Labour Organization
IMTT	Integrated Mine Technical Training (Tanzania)
NGOs	Non-governmental organizations
OECD	Organization for Economic Co-operation and Development
OPM	Oxford Policy Management
PPP	Purchasing power parity
RECs	Regional Economic Communities
SMEs	Small and medium-sized enterprises
SOGA	Skills for Oil and Gas Africa
UNDP	UN Development Programme
VETA	Vocational Education and Training Authority



# 1 Introduction

New natural resource discoveries in several African countries will give policy-makers a fresh opportunity to address the issue of investing in the skills and competencies that the private sector requires, both for the extractives sector but also for other sectors. This paper explores the type of skills needed by the extractive industries, and how host countries' labor supply can best be developed to match parts of this labor demand while ensuring that the skills developed are sustainable, or transferable to other, non-resource sectors – such as the infrastructure, utilities and service industries. The paper focuses on the policy options available to government, while also taking into consideration the possible role that donors can play.

This paper complements, in particular, Paper 6 on local content and Paper 8 on social investment. Skills development is an important part of successful local content policies as it supplements efforts to improve the business and investment climate. Labor demand from extractive industries is an opportunity for government, the private sector (extractives and others) and third parties to work together on skills development with the objective of creating sustainable improvements to human development.

Skills development in and around the extractive industries involves a combination of pre-employment training, on-the-job learning and upgrading of skills and competencies through further continuous professional development and further education. The challenge is to create skills and competencies that are not only required by the extractive industries but are also transferable to other sectors, thus helping to lay a foundation for economic diversification.

Past experiences show that there is no guarantee that extractives projects will, or can, employ many locals – in particular, an internationally mobile workforce exists for the specialist sector skills that are required for certain phases in the project life cycle. Companies therefore do not have to rely on the capacity of local labor markets to meet their labor demand requirements. Nonetheless, there are two main advantages for extractives companies in hiring and investing in local labor. First, local labor tends to be cheaper than relying on international workers: according to an International Labour Organization (ILO) study in 2012,<sup>1</sup> most extractive companies are interested in reducing the high cost of maintaining an international workforce.<sup>2</sup> Second, it reduces the risk of conflicts with local communities: World Bank (2014b) states that local employment is consistently the top concern of communities located near extractives projects.

Natural resource discoveries are often followed by high expectations about local employment opportunities, but there may be little understanding of what skills will be demanded or what

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<sup>1</sup> ILO (2012) 'Current and future skills, human resources development and safety training for contractors in the oil and gas industry'.

<sup>2</sup> On the other hand, in African low-income countries labor costs tend to be higher than elsewhere, suggesting that low-wage labor is not actually an important competitive advantage for Africa. African firms on average have to pay a labor premium of 80 per cent compared with the average firm in other regions at the same level of GDP (African Economic Outlook 2013). Africa's higher labor costs could be driven by a range of factors. A high price level is likely to be an important factor. Decomposing purchasing power parity (PPP) exchange rates shows that low-income countries in Africa on average have a PPP price level that is about 20 per cent higher than the average for the four poorest comparators. In other words, for the same wage in dollars a worker in a poor Asian country can buy more than a worker in low-income Africa.

gaps exist between the quality of the skills and competencies needed by the industry and those supplied by the host country's educational and skills development systems and existing labor market. This paper adds to the debate in this area by analyzing the challenges associated with current labor supply in relation to demand for direct, indirect, and induced employment, and the policy options for governments in regard to bringing supply and demand closer together. The paper aims to identify where collaborative efforts to improve the quality of skills available in our sample countries<sup>3</sup> can serve the extractives and other sectors.

The rest of the paper is structured as follows:

- Section 2 defines direct, indirect and induced employment in the extractive industries and presents the context for skills development in extractive industries as a platform for skills development and employment opportunities in non-resource sectors;
- Section 3 analyzes the key characteristics of the labor demand created by the extractives sector; in particular, it focuses on the types of skills and competency levels required by the industry;
- Section 4 complements Section 3 by analyzing the quality of the labor supply in host countries, and discusses how this supply can be developed to match parts of the extractives labor demand while being transferable;
- Section 5 summarizes some of the challenges that can arise in matching demand and supply sides around labor markets in the extractives sector. The section then brings the discussion back to the stakeholders that are likely to be involved in skills development policies. It analyzes how government, the private sector, donors and other stakeholders can collaborate in this area;
- Section 6 draws conclusions based on the preceding sections, by setting out some of the policy implications for governments; and
- Annex A presents a typology of skills support for extractive industries.

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<sup>3</sup> The sample countries identified in Paper 2 are: Ghana, Mozambique, Uganda, Tanzania, Sierra Leone, and Liberia.

## 2 Definitions and context

In the discourse of labor economics, labor demand refers to the amount and quality of employment that an economy, sector or company requires at a given point in time. Labor supply refers to the individuals who participate in the labor market and their given endowments in terms of human capital. Intermediating labor demand and supply are institutions and processes, including education, civil society, training providers in the private and the public sector, and other stakeholders, including those in the extractives sector.

This section describes the increase in labor demand created by extractive industries. For many African nations, there is a particular need to extend the economic opportunities created by the sector to women and to youth. Women often face challenges in advancing their careers, and unfavorable treatment in the workplace from their male counterparts, while youth are particularly at risk of not gaining access to the formal labor market or dropping out of the productive workforce due to prolonged periods of under-employment.

### 2.1 Employment generated by extractive industries

When analyzing the employment effects of a large extractives project, three types of effects are usually distinguished: direct, indirect and induced employment. There exists no universally recognized definition of the terms, but definitions differ only very slightly between users. Östensson (2014) uses the following definition (see also Figure 1):

- **Direct employment** refers to those that are employed by the company that owns and operates the extraction site. Contractors' staff are usually included if their regular workplace is at the site.
- **Indirect employment** concerns those working with other companies that supply goods (such as machinery and raw materials) and services to the extractives project in question, or that use its outputs. These employees are part of the supply chain.
- **Induced employment** includes those who are employed as a result of the in-country spending of those who receive income from the extractives sector (i.e. government in the form of taxes and salaries, and the wages and dividends of those employed and contracted by the sector).

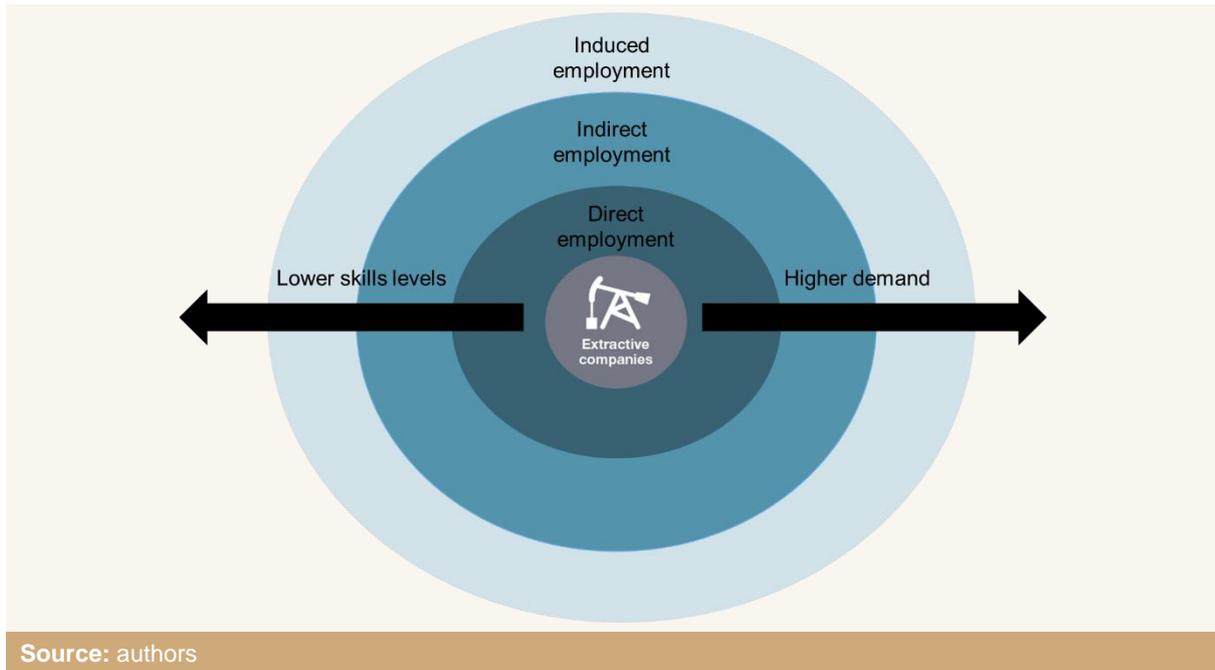
The size of the direct employment opportunities depends on a range of factors, including geological properties, environmental considerations, and engineering design. These factors can preclude easy comparisons of local employment numbers across projects – for example, underground mining typically generates higher direct employment numbers than open-pit mining, relative to production volume and value, as it is more labor intensive.

It is also often difficult to compare direct and indirect employment across countries, industries and projects, for two reasons. First, differences in job classifications: national accounts generally classify jobs according to the business of the employing company rather than the job performed, so employees of civil engineering companies contracted by a mine are usually not classified as mineworkers. Second, differences in outsourcing strategy: a company that outsources little is counted as making a large contribution to direct employment while creating few indirect jobs, whereas a company that outsources a lot makes only a small contribution to direct employment but will appear to generate many

indirect jobs. Whether or not (and what) to outsource can be conditioned by technical considerations: for example, what type of engineering design is required for the geography and the environment of the project.

For these reasons, multiplier effects – the number of indirect and induced jobs created by each direct job – should be treated with caution. For example, the Escondida copper mine in Chile creates 5.7 indirect or induced jobs for every direct job, whereas the same country's Candelaria mine creates only 1.76 – but much of this discrepancy is explained by the fact that Escondida subcontracts many activities (McMahon and Remy, 2001).

**Figure 1: Direct, indirect and induced employment**



Definitional issues aside, other factors that influence the magnitude of the multiplier effect include geographical scale – the multiplier will be lower at the local level than the national level, as some products are available nationally but not locally (Schodde and Hronsky, 2006) – and levels of income and economic diversification. In general, higher income countries with more diversified economies are better able to respond to demand for supply of goods and services.

While all comparisons should be treated with a great deal of caution, it appears relatively safe to state that oil and gas, on average, have smaller indirect employment multipliers than non-fuel mining. This is because fossil fuel production tends to use more highly specialized production equipment that is seldom available in countries that have no history of such production, while much of the equipment used in mining is the same as that employed in civil engineering and construction, activities that are present in most countries. Furthermore, mining projects require more on-going investment during production, whereas oil and gas projects have front-loaded construction phases.

On the other hand, the induced employment multiplier is often higher in oil and gas exploitation, mainly because it is more capital intensive. Once past the construction phase, projects need relatively few direct employees, but these are on average highly qualified and

well-paid. Each oil and gas worker can support a relatively large number of local people with his/her expenditure.

It is possibly illustrative that across Mozambique, Uganda, Kenya, and Tanzania over 1 million jobs are expected to be created as a result of planned oil and natural gas projects.<sup>4</sup> Most of these are expected to be generated by indirect and induced demand – every job created directly by the industry is projected to create four jobs via the indirect channel, and as many as 10 through the induced channel.<sup>5</sup>

### Box 1: Estimates from Mozambique, Uganda, Kenya and Tanzania

Mozambique and Tanzania have some of the largest offshore gas fields in the world, requiring the construction of LNG trains, power plants and pipelines. Standard Bank has estimated that 700,000 workers will be needed in Mozambique across induced, indirect and direct employment categories. In Tanzania the estimate is 350,000 workers. In Uganda, according to the Industrial Baseline Study presented by Tullow, CNOOC and Total, there will be a need for 100,000–150,000 workers to develop oil fields that have already been discovered. Many blocks in the Rift Valley area have not yet been explored, so an estimate of 200,000 workers is not unrealistic. In Kenya, a similar manpower estimate can be envisaged.

Source: Cambridge Education (2014)

## 2.2 Timing of labor demand

The timing of the labor demand is crucial when analyzing how direct employment opportunities can be expected to translate into indirect and induced demand for labor. The highest demand for labor arises during the construction phase of the project life cycle, which is also when most opportunities for local labor participation exist. Once a project has been set up and is operating, the demand for labor not only drops significantly but also tends to be more specialized. It is also during the construction phase that the demand for *transferable* (or portable) skills also required by other related economic sectors (e.g. infrastructure development, provision of utilities, the construction industry) is usually highest.

Figure 2: Extractives project lifecycles



Source: Paper 1 – A framework: Human development and the links to natural resources

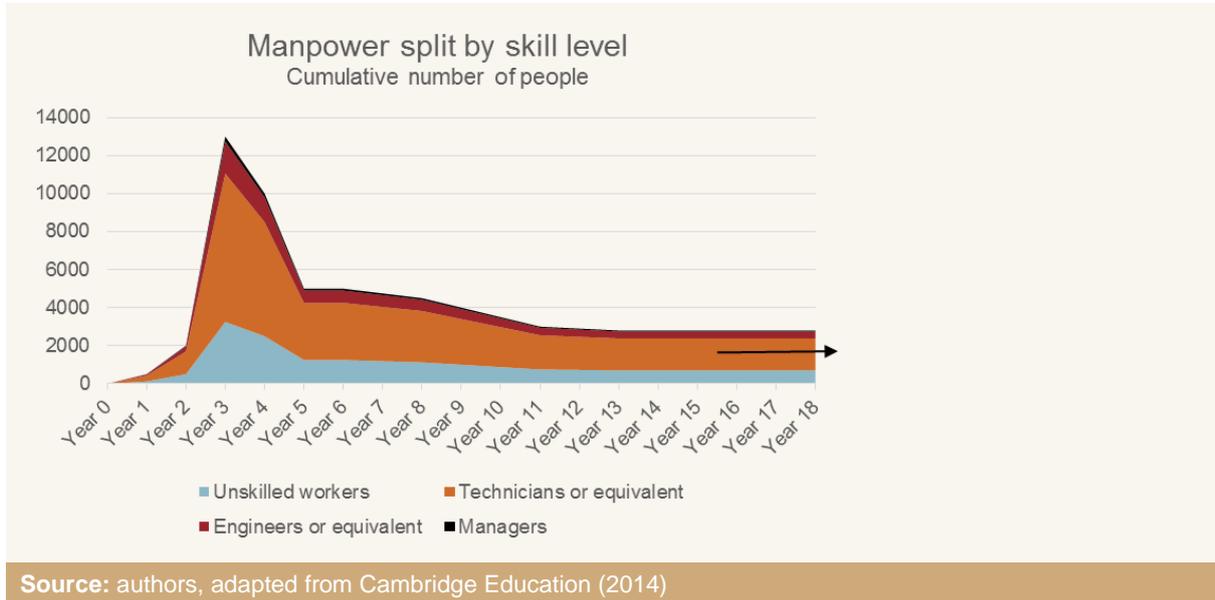
Construction activities tend to start between five to 17 years after the beginning of exploration, for mining, while this time period is usually shorter, being seven to 12 years, for oil and gas (see Figure 2). Figure 3 below illustrates the spike in direct labor demand expected around the construction phase for a typical oil and gas project. This profile is similar to that of a mine but, as mentioned above, mine projects involve expansions that require

<sup>4</sup> Cambridge Education (2014) 'Feasibility study on strengthening skills development for the oil and gas industry in Tanzania, Mozambique, Uganda and Kenya'.

<sup>5</sup> Norad (2013) 'Mapping and analysis of the needs for petroleum related education in Tanzania'.

periodic reinvestments and associated construction activities. More medium to long term developmental impact will come from the indirect and induced employment generated by the sector's supply chain and associated investment and consumption spending, including such spending by governments.

**Figure 3: The time-limited nature of labor demand – a small window of opportunity**



Source: authors, adapted from Cambridge Education (2014)

The time profiles for potential indirect and induced employment are similar to that for direct employment. However, normally the capacity of the local economy to respond to the demand posed by extractive industries and their employees for goods and services develops over time, so both indirect and induced employment are likely to increase as the extractive project matures. In particular, the part of induced employment that is attributable to government spending is likely to grow over time as government revenues from projects increase.

The relatively long lead times from discovery and declared commercial viability to construction – and, even more importantly, the longevity of many extractive industry projects – means that in principle there is a reasonable amount of time available to plan for the type of skills that will be needed by the sectors positively impacted by the presence of natural resources projects, and to implement the right set of policies and incentives to ensure that a broader platform for skills development is in place. Nonetheless, there is always a risk that during this lead time price movements could affect the potential profitability of a project – putting a squeeze on the training budget – or even render a project unviable. This risk, which could deter governments from investing in specialist skills development, can be mitigated by focusing skills development efforts on transferable skills.

### 3 What quality and standards of labor are required?

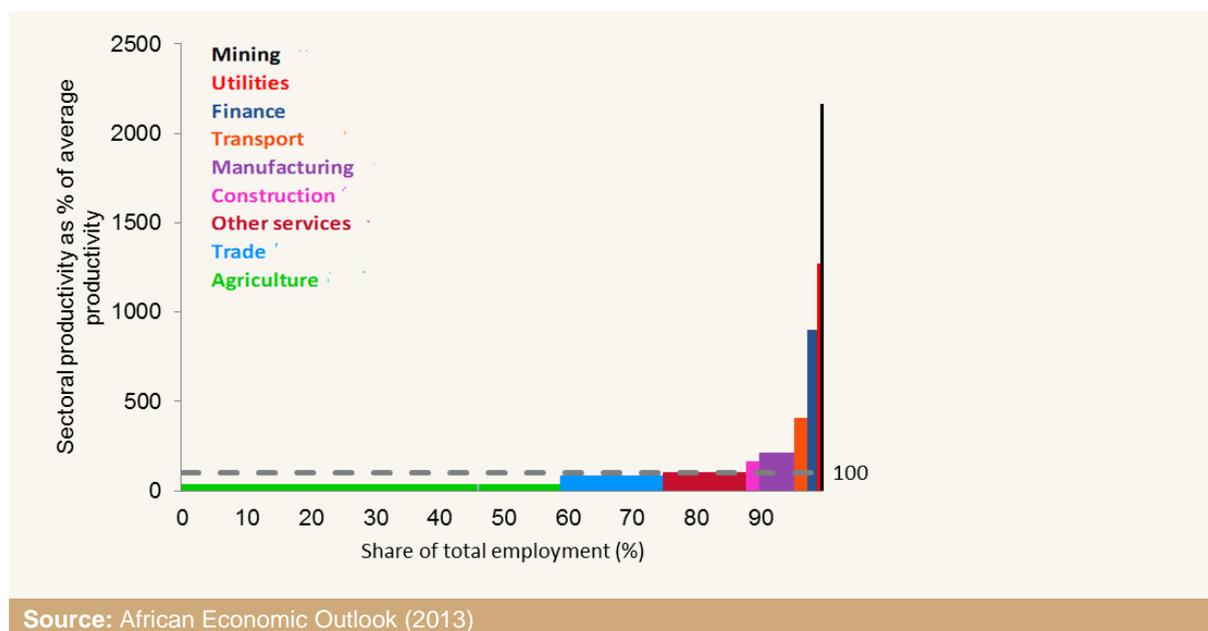
This section focuses on the opportunity of using the demand created by and around the extractives industries sector to improve skill development more systemically. In particular, it attempts to provide more precision regarding the levels of skills and competency required.

#### 3.1 What quality of skills do extractive industries demand in direct and indirect employment?

Extractive industries are capital intensive – in mining, US\$ 1 million of investment corresponds to three jobs, on average. In oil, the investment per job is 10 times higher (FDImarkets, 2013). These industries are therefore characterized by very high labor productivity, as shown by Figure 4, which compares labor productivity in different sectors in Africa.

The high labor productivity implies that extractive industry companies are prepared to pay high salaries for the skills and competencies they require, but at the same time they can be very demanding when it comes to the quality of labor required, not least because of the stringent safety standards with which they must comply.

**Figure 4: Labor productivity in Africa, 2005**



Extractive industries are global and rely on a highly mobile labor force which moves in line with the life cycle of projects – to a larger extent in mining than in oil and gas. The qualitative characteristics of the sector's labor demand have created the need to compare skills and competency levels across countries. Industry-specific qualifications, which typically come into play at the skilled and the professional level, are one way to achieve this. Another way is to verify individuals' competencies against companies' internal competency frameworks. Table 1 indicates five industry-relevant workforce levels.

**Table 1: High-level skills categories as described by industry (oil and gas)**

Skills level	Description of skills level
<b>Basic/ entry</b>	<ul style="list-style-type: none"> <li>Covers labor with little prior exposure to TVET, other than initial workplace induction and health and safety training. Sometimes also referred to as 'unskilled' labor.</li> <li>Even at this level certain minimum skills, such as relevant language comprehension, literacy and numeracy skills, and health and safety conscious workforce behaviors, are prerequisites.</li> <li>In Organization for Economic Co-operation and Development (OECD) countries, the foundational competencies expected at this level would typically include completion of secondary education and may possibly include very initial entry-level TVET, e.g. access/entry awards completed by those who have not formally completed secondary education level degrees but who have completed mandatory schooling.</li> </ul>
<b>Semi-skilled</b>	<ul style="list-style-type: none"> <li>Covers labor with more specific crafts-level skills, acquired either by completing initial TVET or other forms of workplace-based experiences, such as formal apprenticeships or more informal on-the-job training. Importantly, at this level relevant prior work experience within or outside the sector is considered more important than formal qualifications. Actual competencies would typically be verified individually.</li> <li>In OECD countries this level is typically equivalent to the completion of initial multi-year TVET and reflects competencies equivalent to the completion of higher secondary education. However, for specific oil and gas workforce roles, the required training may be shorter and may last just a couple of months, especially where recruits bring relevant practical experience gained on-the-job or as part of competency-focused TVET.</li> </ul>
<b>Skilled</b>	<ul style="list-style-type: none"> <li>Covers labor with more advanced level technical skills, typically accumulated over a number of years. Specialist technicians will have completed multi-year TVET, on the basis of which they will have then branched into specialist areas, including team leadership and supervisory responsibilities. At this level, formal qualifications reflecting practical experience become more important.</li> <li>In OECD countries this level is equivalent to the competencies of advanced technicians at the higher end of the skilled level, i.e. &gt; 5 years on top of semi-skilled training.</li> </ul>
<b>Professionals</b>	<ul style="list-style-type: none"> <li>Covers experienced employees with recognized specialisms or professional degrees, built either on advanced TVET and continuous professional development, and/or university degrees combined with relevant work experience. Particularly sought after are those who have combined advanced levels of TVET with complementary tertiary education.</li> </ul>
<b>Management</b>	<ul style="list-style-type: none"> <li>Covers professionals with substantial work experience who also manage teams and sit on corporate management teams.</li> </ul>

**Source:** Based on interviews with industry representatives

In oil and gas projects, much of the labor demand is for semi-skilled and skilled workers. In contrast, mining companies normally need a higher proportion of employees at the basic/entry level, in particular during the construction phase. The extent to which some of the soft skills associated with this level in Table 1 are required depends on the availability of local supervisory staff. For example, if local staff with good international language skills exist at the semi-skilled and skilled level, it is not essential for those at the basic/entry level to possess more comprehensive language skills. Likewise, while in OECD countries those at the basic/entry level would normally be expected to have completed secondary education, in other country contexts it would be sufficient for this workforce segment to have acquired workplace-relevant competencies outside of the formal education system (i.e. primary education plus practical work experience).

Table 2 compares the level of training and experience that would typically be associated with the five broad skills categories presented in Table 1. The table uses as a proxy reference benchmark the competency levels described by the European Qualification Framework (EQF). The general descriptions, timeline and experience in this table vary as a result of differences in the strength of individual countries' education, TVET and higher education systems; references to formal education are only indicative, and do not preclude the fact that the associated competencies can also be acquired through other forms of learning.

**Table 2: Skills categories compared to EQF levels and levels of experiences required**

EQF reference level	Skills level (as defined by industry)	General description	Timeline/experience
Level 1		Basic general skills	Primary education
Level 2		Basic factual knowledge of a field of work or study (e.g. lower secondary school)	Lower secondary education
Level 3	Basic/ entry	Competencies equivalent to completion of secondary education	Approx. 10 years of general education and/or entry-level TVET
Level 4	Semi-skilled	Competencies equivalent to the completion of initial TVET, or completion of higher secondary education	Approx. +3 years on top of general education
Levels 5 and 6	Skilled	Competencies equivalent to advanced technical training and work experience, with specialisms and supervisory responsibilities	Approx. +2 to 4 years on top of semi-skilled training, and for supervisory roles
Levels 7 and 8	Professionals	Experienced employees with recognized specialisms or professional degrees	Approx. +1 to 5 years on top of advanced technical skills training and/or university postgraduate degrees
Levels 7 and 8	Management	Professionals with substantial work experience who also manage teams and sit on corporate management teams	Typically > 5 years of work experience as a professional

**Source:** EQF documentation and industry approximations

Typically, the greatest direct and indirect demand for labor that arises from an extractives project relates to the semi-skilled and skilled level. This is confirmed by Table 3, which lists the top eight roles that have been flagged as required by the oil and gas industry over the next decade in Mozambique, Kenya, Uganda and Tanzania. Notably, at least five of these roles are transferable between the oil and gas industry and other economic sectors. Skills related to construction, electrical and mechanical work can be put to productive use in a range of other industries, such as infrastructure development.

**Table 3: Direct employment – top 8 workforce roles required by oil and gas over the next 10 years**

Workforce roles	Qualifications	Skill level
Crane operators	Diploma + ind. cert.	Semi-skilled to skilled
Steamfitters and pipefitters	Diploma + ind. cert.	Semi-skilled to skilled
Heavy equipment operators (except cranes)	Diploma + ind. Cert.	Semi-skilled to skilled
Truck drivers	Diploma + ind. Cert.	Semi-skilled to skilled
Welders, millwrights, and machinists	Diploma + ind. Cert.	Semi-skilled to skilled
Oil and gas well-drilling workers and service operators	Diploma + ind. Cert.	Semi-skilled to skilled
Oil and gas well drillers, servicers, testers, and related workers	Diploma + ind. Cert.	Semi-skilled to skilled
Oil and gas drilling, servicing, and related laborers	Cert. (artisan / crafts person)	Basic/entry

**Source:** Cambridge Education (2014)

Direct employment opportunities in the oil and gas industry arise primarily through engineering, procurement, and construction (EPC) contracts. EPC contractors typically have short lead times between contracting and deployment, as well as a time-bound contract duration, i.e. for the construction phase. These contractors typically rely on the verification of individuals' competencies to assess opportunities for local employment. Without access to semi-skilled tradesmen and technicians in the national labor market, their efforts will focus on basic/entry-level workers that can be trained up to take on specific roles within relatively short periods of time.

Unless they expect a longer term presence in a host country, it is less feasible for EPC contractors to establish and operate workforce training programs that would cover several years, as would be required to train basic/entry-level workers to become skilled specialist tradesmen, technicians and professionals. The provision of such training is, however, more feasible if an emerging basis of more broadly trained semi-skilled and skilled tradesmen is already available: for example, a generalist semi-skilled mechanic or machinist can be trained to work with specialist oil and gas or mining equipment.

Mining companies are organized differently and they usually contract for smaller chunks of work (when they do not carry out the work themselves), rather than using EPC contractors. Accordingly, they normally do both hiring and training themselves – at least if they are reasonably large. This is one reason why they are more likely to employ and train locals – along with the fact that local hiring tends to be cheaper, and they want to maintain good relations with the local community.

Partly because natural resources are often located in remote areas, far away from centers of population, the immediate environments of oil, gas, and mining projects often have undiversified economies and a small pool of qualified potential employees, even at low skill levels. The education infrastructure and institutions are usually also poor. In countries such as Mozambique, Uganda and Kenya – where gas has been discovered in remote areas – this means that not only are direct employment opportunities likely to be limited, but there is also usually little scope for indirect employment of locals, except for very low-skill activities such as catering and simple construction work.

### 3.2 What skills are required for induced employment?

Induced employment, which results from mine or oil company employees spending their wages or governments spending revenues, is often much more important in terms of job creation numbers than either the direct or indirect employment created by the project. This employment is often important also from the point of view of poverty reduction, because it generates jobs in the informal sector and for those who would otherwise not be employed – for instance, household employees. Induced employment can be strongly concentrated close to the project site, provided that those directly and indirectly employed reside in, and spend some of their income in, the area. This adds to the possibility of building a diversified local economy around extractive industries.

The sectors that are most important for induced employment are services of different kinds, including bars and restaurants, transport and financial services, retail and agriculture. The skill requirements in all of these sectors are usually lower than in the extractives sector, and local people may therefore find it easier to meet these requirements. The skills needed are also more likely to be transferable, and although the jobs are strongly linked to the mine or oil well site, they may in the long term form the nucleus of local economic development, particularly if the extractives project in question has led to an improvement in transport infrastructure. However, depending on how it is managed, the rapid growth of localized economic activities around extractive sites might lead to disruptive migration patterns, overpopulation in areas with low service provision, and other socially disruptive dynamics.

### 3.3 What are the labor demands from other sectors that overlap with those linked to extractives?

The skills and competencies required as a result of direct and indirect labor demand from the extractives industry include those used in the construction and utilities sectors (e.g. downstream energy and electricity, water, communications) and by technicians in the mechanical, process and electrical engineering industries. These skills and competencies are typically acquired via formal and informal TVET, including work experience. In addition, extractive industries also need employees with more general business skills, such as IT, accounting, and project management, as well as geology and engineering skills.

All these skills are also demanded by certain other economic sectors, which may already be struggling to recruit skilled employees. There is therefore a risk that the extractives sector will compete with other industries for the services of people with relatively scarce skills, particularly in the sample countries. On the positive side, policies which succeed in leveraging extractives projects to train more workers to acquire skills and competencies that

are demanded across different sectors have the potential to contribute in the long term to economic diversification and development (see Box 2).

The situation is largely different with respect to induced employment. Most of this is unskilled to semi-skilled, and many of those concerned are likely to have been previously unemployed or underemployed.

### **Box 2: Kenya's need for 'transferable' skills**

The investment goals spelled out in Kenya's Vision 2030 have been headline-grabbing, with the call for an 'Army of 1 Million Artisans' that is required to deliver these goals.

Housing Finance managing director Frank Ireri has stated: 'Technical and vocational education and training (TVET) is the weakest link in the entire education system yet we require a skilled workforce to roll out projects identified in Vision 2030.'

Housing Finance's flagship project seeks to offer formal skills to thousands of artisans in the construction industry. The organization hopes the support for vocational institutions will help bridge the skills gap in a market that is facing a shortage of artisans as mid-level colleges turn into universities. Housing Finance plans to train 250,000 artisans annually over the next four years.

**Source:** Housing Finance Foundation (2013); Business Daily (2013)

## 4 How well does labor supply match the demand?

This section reviews the quality of the labor supply in our sample countries. Since the quality of the labor supply is ultimately determined by the education and TVET systems in each country, this section also identifies some of the systemic challenges associated with raising the quality of the supply.

Understanding the supply of labor is as important as understanding the demand. Without an understanding of where it is realistic to close gaps the opportunity for skills development could be missed. Extractive industries require a large range of technical, operational, and commercial skills sets, ever increasing in complexity, and companies are struggling to find and train sufficient staff to meet the growth of their companies and the demand of the industry (ILO, 2012).<sup>6</sup> Box 3 provides an example of how demand is not met in African countries due to the low quality of the labor.

### Box 3: The Kenyan experience – how low quality hinders skills development through extractives

An OPM skills assessment study (forthcoming) has found that even where skilled labor theoretically exists, the skills may not be the right ones – or at an adequate level. For example, while a reported 35,000 people hold a welding qualification in Kenya, employers have reported that it is difficult to find a welder who is adequately trained. Conversely, skills may have been gained through work experience but without acquiring formal certification. The result is that employers cannot rely on certificates from formal TVET institutions as a guide to an individual's actual competencies – instead they have to conduct their own verifications of competencies to determine how much additional on-the-job training new recruits will require.

Prior to the recently introduced reforms to the TVET system, instructors were often out of touch with modern workplace practice and technical innovation, and curricula for some subjects were outdated. As a result, many trainees wasted time and money learning content and completing examinations only to find they had little or no value to prospective employers. In theory, channels existed for employers to communicate what skills they needed to those in charge of certifying TVET courses, but in practice training institutions were not responsive to the needs of potential employers.

Source: OPM (forthcoming)

### 4.1 The quality of general education

The workforce in the African continent is set to grow to approximately 163 million in this decade; by 2035 it will be bigger than China's, making it the largest workforce in the world. The growth of Africa's workforce should make it possible to exploit the employment opportunities (direct, indirect and induced) generated by sustainable oil, gas and mineral sector growth, and growth other industries (OECD, 2014). However, a large factor in realizing the opportunity for this spike in employment is the quality of education.

<sup>6</sup> With increased sophistication of mining techniques and technology, qualified jobs are becoming harder to fill. According to a Price Waterhouse Coopers report analyzing recent mining trends, companies are growing increasingly concerned with the 'labor crunch' (Price Waterhouse Coopers, 2011).

We start by describing how different education levels are a proxy for the various levels of skills and competencies sought by and around the sector. This enables us to roughly match the supply of labor with the demand from industry. So, how can the four main categories of education be linked to industry demand for labor?

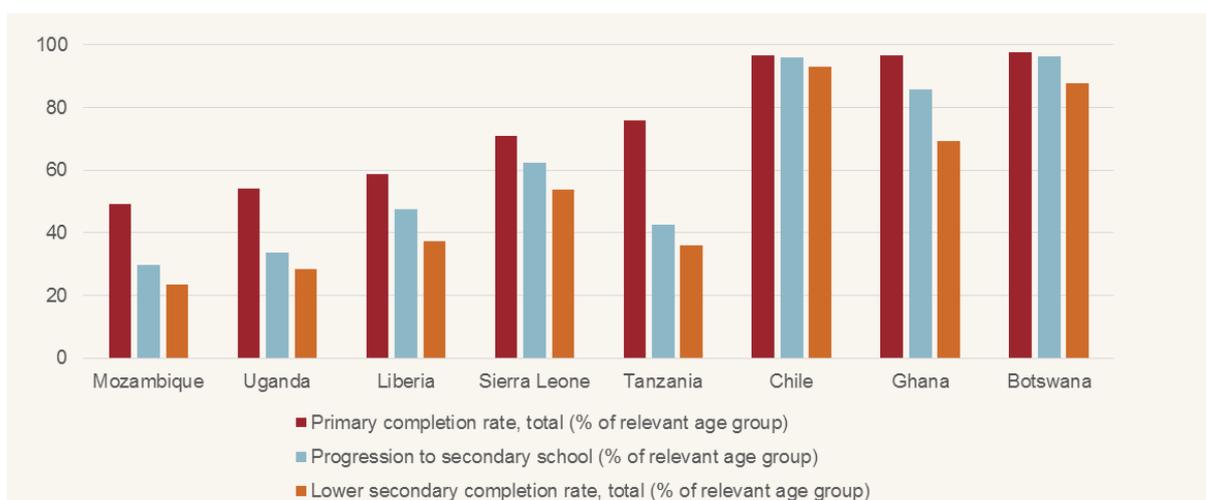
- **Primary education** provides the basic numeracy and literacy foundations, which will lead to successive informal and autodidactic learning and/or more formal vocational education and training. However, in itself it does not provide people with sufficient skills to take up the direct and indirect jobs generated by the extractives industry.<sup>7</sup>
- **Secondary education** levels provide the basis for taking up more advanced informal and autodidactic learning opportunities, and/or more formal vocational and technical education and training. These skills and competencies are highly transferrable and are also common in small-scale self-employment – hence they offer potential for increased local employment opportunities.
- **TVET** ideally builds on lower secondary education and is considered equivalent to higher secondary education but with learning focused on specific workforce roles. These skills and competencies are highly transferrable and sought after by industry around semi-skilled and skilled employment.
- **Tertiary education** is important for those who aim to enter the labor force at the professional level. However, often industry values TVET education that is supplemented with a university degree – sometimes called the ‘dual’ way.

With this in mind we can look at educational attainment in our sample countries. How many people actually complete secondary education? How many adult and young people can read and write? Figure 5 shows low educational attainment at secondary school level in our sample countries. These levels still need to catch up with the global standards achieved by other resource dependent countries. Moreover, Figure 6 shows that literacy rates are higher among young adults in our sample counties than among the total adult population; however, these levels still remain lower than in countries such as Chile, Brazil and Botswana, that have managed to benefit from natural resource extraction.

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<sup>7</sup> There are notable differences across countries as regards how many years are counted as ‘primary education’. Variations range from four to eight years.

**Figure 5: Education attainment in our sample countries compared with other countries (latest year available)**

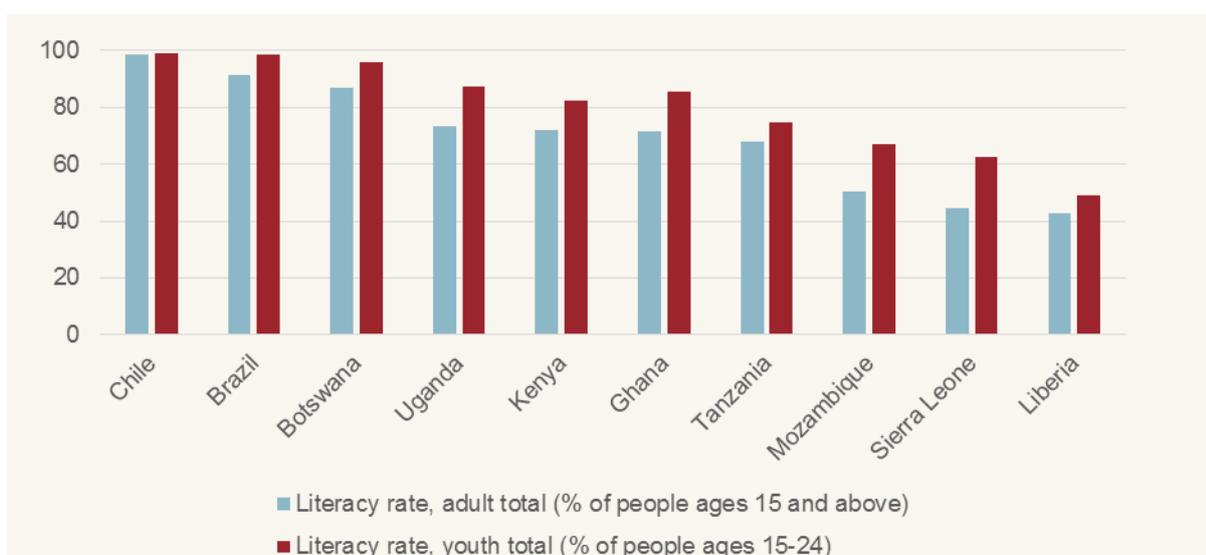


Source: World Bank (2015)

Note: No data available for Kenya and Brazil

This suggests that generally low levels of educational attainment could undermine the achievement of higher local employment targets. Even for so-called unskilled jobs, employees in extractive industries and in most of the supplying industries are expected to possess skills and competencies that lie above those typically associated with completion of primary school, and that correspond more to completion of lower secondary school, or at least primary school with relevant practical experience where additional skills and competencies have been gained via informal learning. As a consequence, the local workforce in our sample countries is not very well prepared to gain access to immediate employment opportunities in the extractives industry. Furthermore, this low base level also places constraints on the level and volume of training that individual extractives companies can provide on their own.

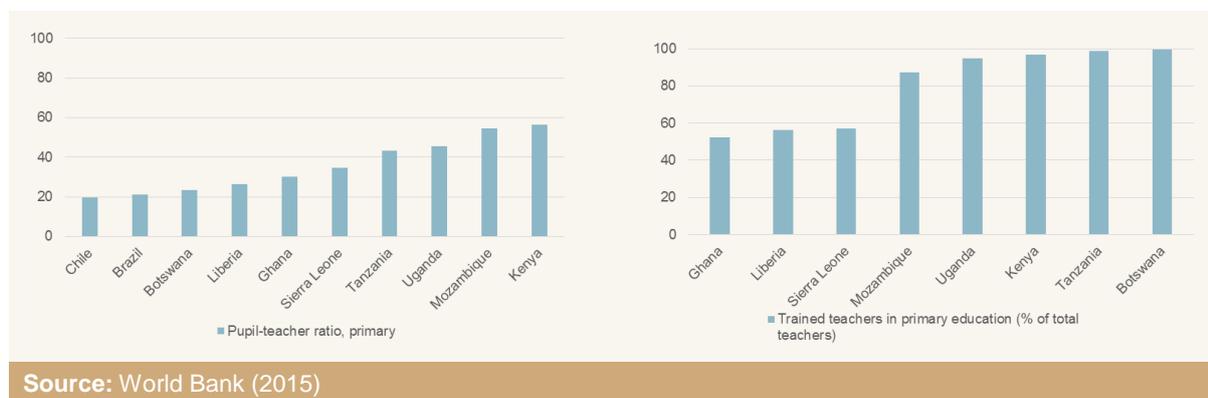
**Figure 6: Skills levels in our sample countries compared with other countries (latest year available)**



Source: World Bank (2015)

Not only do large parts of the sample countries' labor supply not meet the educational levels required by industry, but the educational quality at each level may also be insufficient. Although data on education quality are scarce, pupil/teacher ratios and the share of trained teachers can be used as a proxy to indicate that our sample countries are lagging behind, both in absolute terms and relative to other countries (see Figure 7).

**Figure 7: Education quality in our sample countries (latest year available)**



Source: World Bank (2015)

The low quality of education leads to a low quality of skills in the labor market. A 2012 study on 133 extractive companies and educational institutions in 49 countries highlighted three important issues: a lack of equipment and infrastructure in institutions; limited lecturer capacity; and a gap in regard to addressing the technical and technological requirements of the industry. The study also showed that university departments produced inadequate graduates for the industry, and were failing to meet the needs and technical standards of the sector across borders (Gruen, 2014).

Associated challenges for policy-makers are understanding what factors are in fact constraining people from achieving higher levels of educational attainment – an issue that is discussed in more depth in Paper 5 – and raising the overall funding for their education system – an issue that is discussed in more depth in Paper 4.

## 4.2 TVET: an opportunity to upgrade the labor supply?

The important contribution TVET makes to the skills level in the labor force is well recognized in OECD countries and is increasingly gaining the attention of education researchers. In the most industrially diverse countries the majority of the labor force will have completed some form of formal TVET, including several years of practical work experience. Unfortunately, in many developing countries and some developed countries TVET has often been seen by secondary education graduates as the less prestigious alternative to entering tertiary education.

When a country faces the prospect of employment opportunities from extractive industries a somewhat ill-founded belief can often exist that tertiary education graduates are more valuable than TVET graduates, and that somehow higher numbers of the former can substitute for the absence of the latter. In fact, the productivity of university graduates can be severely hampered if there is not a complementary technical and vocational workforce. This is particularly the case for industries that are built on increasingly technically sophisticated production mechanisms (such as the extractives industry). Some countries have already

realized the need to reform and prioritize their TVET systems (see the example of Mozambique in Box 4).

#### Box 4: Mozambique: Attempts to address TVET skills gaps

Mozambique is endowed with a range of mineral deposits, including fuel and non-fuel minerals. The rapid economic growth in general, and in the mineral sectors in particular, has resulted in high demand for skills at higher education and TVET levels.

Training provision has thus far failed to meet demand. TVET represents a key area of skills shortages according to industry: mining company Rio Tinto estimates it will need around 700 skilled professionals and 9,300 semi-skilled and unskilled workers. However, the education system is skewed toward tertiary education: in 2010 there were 81,250 students enrolled in higher education, compared to 38,000 enrolled across all TVET institutions.

To enhance TVET provision the Ministers of Education, Labor and Higher Education and the *Confederação das Associações Económicas de Moçambique* agreed in 2004 to incorporate TVET initiatives into an integrated TVET reform program. An Inter-Ministerial Commission for TVET Reform and a National Public–Private Commission for TVET Reform (COREP) were created through a government decree of 2005. These efforts are being supported by donors, including the World Bank and GIZ, including through the establishment of a competency-based curriculum (in consultation with industry), the standardization of certificates between institutions, and a competitive fund to finance training initiatives managed by COREP. The impacts of such initiatives on human development are not yet known.

Source: OPM (2013)

Reforming a country's TVET presents a number of obstacles, before the desired outcomes can be achieved. The African Economic Outlook report of 2014 identifies the following key challenges:

- delivery of training is often being undertaken by many agencies;
- stakeholders' inability to fulfill their roles due to capacity constraints, especially financial constraints;
- limited workplace training opportunities for the students;
- poor capacity to deliver at many training institutions and a lack of funding; and
- perceived low standing in society of TVET (as discussed above).

Another core challenge is that TVET systems sometimes have to build on poor educational foundations, such as a lack of good quality primary and secondary education. Inadequate educational systems create systemic bottlenecks as those who have received basic TVET cannot progress to higher levels of technical education or training to take up more skilled jobs. This is either because their qualifications are not sufficient for entry and/or because they lack the required foundational competencies (such as numeracy and literacy skills). The same types of barriers are faced by those whom the industry have trained to carry out specific workforce roles at the basic/entry level: these workers will struggle to move up to the semi-skilled level. The question then becomes: how can a country be successful in skills development through investment in TVET if the primary/secondary education systems are not good enough?

## 5 Opportunities for using extractive industries to catalyze skills development

This section first presents some of the policy challenges that can arise in matching demand and supply of labor around the extractives sector and creating long-term improvements in local employment. Then it brings the discussion back to the stakeholders that are likely to be involved in skills development policies, and analyzes how government, the private sector, donors and other stakeholders can collaborate in this area.

### 5.1 What considerations should guide government policy?

Since the life of any particular mine or oil well may be limited, from the point of view of the national economy it would be preferable if investments in skills and competencies were focused on transferable skills, to serve not only the extractive industries, but also other economic sectors. The non-resource economy would thereby benefit from the presence of extractives sectors, and indirect and induced employment opportunities would also be generated. This will ultimately also increase host countries' tax bases and reduce dependence on the extractives sector.

With this in mind the nature of the opportunity created by an extractives project changes. Instead of focusing solely on the quantity of labor demanded – which in most developing countries cannot be satisfied domestically in the short term – governments may be more interested in giving priority to the acquisition of transferable skills (e.g. construction, process engineering, auxiliary services) and not narrowly specialized extractives sector skills. Given the unmet demand for trades-people such as electricians, carpenters, plumbers and welders in many developing countries, particularly in Africa, this could be the right course of action.

Such a policy could also offer a solution to the dilemma posed by extractive industry labor requirements. Governments could in fact be better off by letting extractive industry companies solve their industry-specific labor requirements, and instead concentrate on meeting the more general demand for skilled people – while recognizing that the extractive industries will also benefit from an improved supply of semi-skilled and skilled labor. Over the longer term, a combination of government-provided TVET and industry-specific training by companies may be the most efficient way of both satisfying the industry's requirements and establishing a solid skills base in the country.

### 5.2 Challenges to successful skills development

A number of institutional and resource constraints work against human capital development in the extractive industries – as well as in other sectors – in Africa, although some are specific to the extractives sector. The key barriers and challenges in regard to achieving a successful skills policy in emerging natural resources-rich countries include:

**Coordination:** Companies, especially those working in the supply chain, are primarily interested in their specific skills needs, while the government's interest is in developing the skills base of the economy. Both extractives and non-extractives companies face the 'free rider' problem – the risk that other companies and their suppliers will poach employees that

they have trained. Although extractives companies commonly offset this risk by training more people than they expect to need, this strategy carries a cost. There is potential for government to play a coordinating role here. One possibility would be to map, build and communicate the capabilities of domestic firms – thereby helping to identify opportunities for supply and growing the supplier sector. Industry associations such as chambers of mines and skills councils could play a key role in such initiatives, by helping to promote a better flow of information about both supplier capabilities and extractive industry requirements. The government also has a role in facilitating the pooling of training resources into industry-wide initiatives. Support from the extractive industries to such initiatives could be voluntary or mandatory (e.g. through a training levy paid into a pooled fund). These mechanisms could help to overcome the ‘free rider’ problem by ensuring that skills are created at industry level and all industry participants contribute proportionally.

**Timing:** Skills training requires time. Ideally, a skilled workforce should be available when a project reaches the development stage. This is, however, very unusual. The sample countries are starting from a low base since working age populations are currently largely engaged in the mostly informal agricultural sector. Even with the long lead times common in extractive industries, it is not possible to meet industry requirements with respect to labor supply from the start. This means that both government and industry need to adopt a flexible approach to meeting the skills requirements, with government accepting that a higher level of international employees may be necessary initially and industry recognizing and committing itself to a rising target for local employment. The long lifetimes of most extractive industry projects are an advantage in this context, which should make it easier for industry and government to make long-term commitments.

Government needs to develop short-term, medium-term and long-term plans. For example, government might take the following measures in the short term:

- tailoring work permit regimes to allow skilled foreign experts take up the appropriate positions in the extractives sector while they are involved in training local capabilities; and
- engaging international experts to train the budding cohort of the local workforce.

In the medium term, additional measures could include attachment of local tradesmen and technicians in extractives operations abroad so that they can gain the relevant experience.

In the long term, it could become important to maintain the standards and competitiveness attained and to look toward supplying extractive industries in other countries with professional services.

**Education:** The quality of education is compromised at the primary and secondary school stages, making acquisition of the desired skills difficult to achieve at a later stage. Effective teaching can be achieved through reducing pupil–teacher ratios, reducing primary school dropout rates, and increasing the time students spend in school. In addition, a key requirement for ‘moving up’ from semi-skilled to skilled is practical work experience. However, if the industry is in a strong growth phase, it might not be able to provide on-the-job training opportunities for a sufficient number of actual or potential employees. Other solutions might therefore have to be sought, possibly including apprenticeships in similar industries and/or simulation exercises during training.

**Institutional development to counter the lack of knowledge about the industry:** There is often a lack of knowledge and understanding about the extractives industries within

government, particularly if the country has little history of extractive industry investment. In addition, expertise about the industries is often concentrated in one government department and is not shared outside specialized departments. In general there is a lack of civil servants with an industry-relevant background and training. This undermines policy effectiveness and underlines the need for knowledge about extractive industries at different levels in government.

**Trade-off between natural resource revenues and employment:** A lack of locally available skills makes local content policies difficult to reconcile with a competitive extractive industry. When considering skills transfers and employment targets, government needs to consider the impact on project profitability and therefore the potential impact in terms of revenues foregone. In other terms, skills transfer requirements need to be considered as part of an overall negotiation strategy when government is considering the benefits it wants to receive from an extractives project.

**Crowding out of skills in other sectors:** If the skills demanded by the extractives sectors are not developed, there is a risk that other related economic sectors could suffer from a temporary crowding out effect of skilled labor as extractive companies draw semi-skilled and skilled labor away from other industries. Even temporary crowding out can have a serious negative impact on non-resource sectors, sucking out the investments in human capital that they have already made, and putting upward pressure on wages. This in turn may affect the overall level of prices in the country and its external competitiveness, one of the manifestations of Dutch disease.

**Local expectations:** Local populations normally have high expectations regarding employment, even if these are unrealistic as the project is located far from the main centers of population. It is critical for the government and its private sector partner to manage expectations. Failures of communication are at the bottom of most conflicts concerning employment outcomes. While conflicts over employment outcomes will never be wholly eliminated, their number and seriousness could be considerably reduced if a few simple rules were followed:

- Investors should be conservative when communicating estimates of employment.
- Investors should make particular efforts to communicate clear answers to the questions: *What types of jobs will come? When will they come? What are the base requirements? How can potential employees gain access to work, and have their competencies assessed?*
- Governments, both national and local, should make clear the local needs and conditions to investors, and should adapt local development planning to include realistic estimates of future employment impacts of investments.

### 5.3 The role of key stakeholders in skills development

The core element of successful skills development is not only analysis but also coordination of activities between government, industry (extractives and non-extractives), regional economic organizations, donor agencies and other stakeholders such as non-governmental organizations (NGOs), as mentioned above.

Companies invest substantial resources in training their employees. Governments can complement this through coordinated skills development initiatives within, for example, the existing TVET system. However, collective action and cooperation with industry is essential if the educational and skills investments made by government are to translate into increased employment opportunities for nationals both in the extractives sector and beyond. This is not easy to get right, and many countries have struggled to match the skills produced in-country with those demanded. While the need for primary and secondary education to give students sufficient preparation for further training is self-evident, other actions are less obvious, particularly since there may be a lack of trust between government and extractive industry companies.

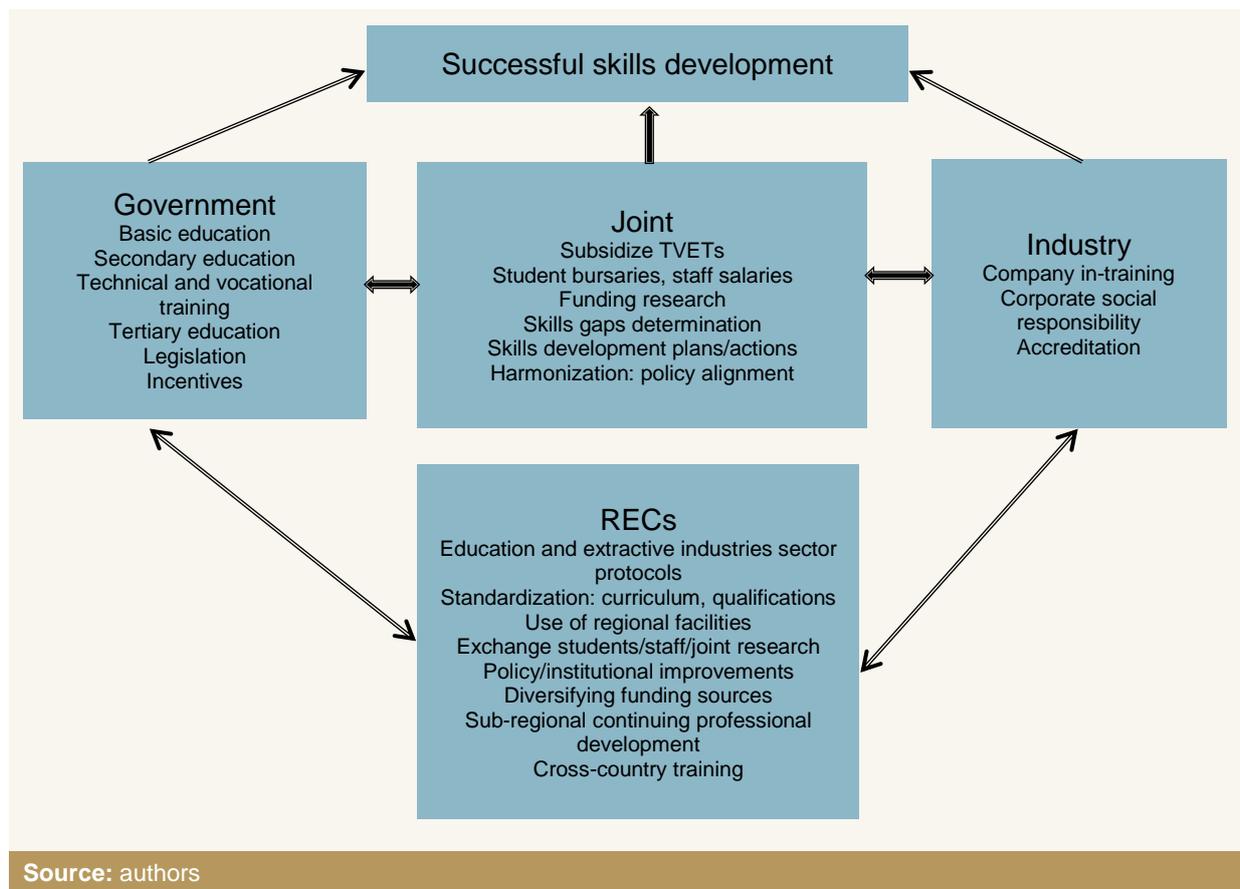
When this lack of trust can be surmounted, the rewards may be considerable. In northern Chile, for instance, a vocational school set up by a mining company after consultation with the government was turned over to the government and has continued educating skilled staff for the local mining industry (International Council on Mining and Metals (ICMM), 2007). Another example is an effort associated with the Diavik Diamond Mine in Canada's Northwest Territories, where an integrated approach was applied to local training, employment, and procurement, with commitments formalized in a series of agreements and policy statements.<sup>8</sup> These included five 'participation agreements' with neighboring indigenous communities, covering training and employment. By 2008, the mine employed about 800 people and had met its target of ensuring 67 per cent of its workforce comprised of residents of the Northwest Territories. Although the mine did not meet its aboriginal employment commitment, reaching 34 per cent instead of the targeted 42 per cent in 2008, the absolute number of people hired was far higher than the original estimate.

Figure 8 shows some of the roles and responsibilities that various stakeholders could play in improving education and training to benefit from the opportunity presented by labor demand in the extractives sector. Government remains the main provider of primary and secondary education, while the natural focus for industry is around training activities. The intersection between the two main stakeholders in skills development is TVET. However, the determination of skill types and levels, to avoid mismatch between practical industry requirements and the education system requirements, is also essential.

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<sup>8</sup> The description is based on ICMM (2010).

**Figure 8: The roles of the various stakeholders in skills development**



### 5.3.1 The role of government

Although there is not a perfect overlap between the interests of extractives companies and the government – as representatives of the people living around an extractives project – in terms of local skills creation, the interests of public and private actors can be reconciled if government plays a facilitating and coordinating role through:

- improving policy coordination (i.e. integrating extractive industry policy fully into a country's development agenda) at national level;
- developing national and regional accreditation frameworks for mining and energy education and training programs at tertiary, vocational and secondary school levels; and
- supporting the creation of regional workforce planning and forecasting processes by acting as a clearing house for private sector workforce needs and forecasts (World Bank, 2014b).

Governments that are directing the development of the extractives sector commonly start by developing an extractive industries resource policy, which may cover both extractives or may concentrate on either minerals or oil and gas (Otto and Cordes, 2002; Mtegha, 2014). The policy will contain several elements, one of which is human resources – detailing overlaps with the human resource requirements of non-resource sectors. Skills development in extractives is naturally part of skills development across the labor market, as transferable skills will benefit society and government the most.

### 5.3.2 The role of industry

It is important that government collaborates with industry, which has a superior level of information regarding the needed skill set, and has the potential to influence skills development both directly and indirectly: for example, procuring from local firms – especially small and medium-sized enterprises (SMEs) – and fostering technology transfers by attracting foreign direct investment.

The private sector has the potential to:

- provide in-house training programs to meet operations' requirements;
- provide training bursaries at recognized universities or TVET institutions. These graduates, technicians and artisans are then, normally, bonded to the companies for prescribed periods during which they would not leave the employer without compensation, but will later become available for other positions in the labor market; and
- provide training in response to the requirements of the social license to operate. This will include various training programs to enable local people to participate in providing supplies and services to the company. Other requirements will include social investment activities, such as training teachers and health personnel in facilities sponsored or supported by the extractive companies, or providing other training – for instance, in agriculture – in support of local communities.

### 5.3.3 The role of donors

Donors and cooperating partners can support government efforts and provide expertise and training. Significant donor activity related to the extractives sector is underway in Africa, some large projects are being planned by major multilateral and bilateral donors, and a range of interventions by NGOs and the oil companies themselves are taking place (Cambridge Education, 2014). One example is Skills for Oil and Gas Africa (SOGA), the regional donor initiative in East Africa that will run over five years with the aim of increasing the number of local people gaining better employment in and around oil and gas investments, raising incomes, and improving the quality and relevance of TVET systems.

### 5.3.4 The role of RECs

RECs can facilitate the harmonization of policies, standards, qualifications and accreditation. Skills training is currently not coordinated at a continent level, and studies by the Centre for Sustainability in Mining and Industry and the Australian Centre for Sustainable Mining Practices in 2012 drew attention to opportunities for more collaboration between universities in Africa that offer courses in mining, oil and gas. These courses range from those on core skills along the extractives value chain to those relating to law, contract negotiations, health and safety, taxation and social issues. RECs also have a role to play in promoting the harmonization of training curricula and of certifications across the region, as well as fostering larger markets for skills by facilitating labor mobility. Opportunities exist for RECs to facilitate such collaboration, and skill gap analysis undertaken at the REC level may identify commonalities that can be addressed jointly by the member states, which would have great cost advantages in regard to achieving some of the needed skills development objectives.

## 6 Key policy implications

This paper has analyzed the opportunities for leveraging the extractives sector to lift overall skills levels and increase direct, indirect and induced employment in Africa. It has also highlighted the challenges our sample countries face in terms of their skills gaps. The challenge for policy-makers is to come up with realistic policies that can benefit the extractives as well as non-extractives sectors. Based on the previous sections we present some key policy implications for government.

### **Understand the demand from both extractives and non-extractives sectors to identify transferable skills**

Many governments collect statistics on the labor market and conduct surveys to inform technical skills strategies. This necessary step is critical for the planning of training and education strategies and is a good starting point when seeking to identify areas with potential for creating transferable skills.

### **Understand the qualitative demand profile of extractives companies: what do they demand and when do they demand it?**

It is important to consider how the demand profile of oil, gas and mining projects changes over time: at different points in the project cycle, different sets of skill categories may be in demand. While the education and training system may not be able to respond with perfect timing, understanding the lead times provides a good starting point for planning.

### **Analyze the characteristics of current labor supply**

Understanding existing bottlenecks will allow governments to prioritize, with a view to achieving the best possible human development outcome. Extractive companies will require skilled labor across their range of operations, and it is important to recognize that not all skills can be sourced locally, at least not at the outset. Rather than aiming to fill every gap in technically specialized areas, governments should focus on nurturing the skills required by the sector that are broad and transferable to other sectors. Companies will then have the option of providing on-the-job training for more specific skills, should they deem it necessary. A thorough skills gap analysis should form the basis for setting priorities.

### **Gauge the interest of all stakeholders in coordinating work on skills development**

Donors, the private sector and RECs can all play a role in promoting skills development. Governments can work with donors to attract their support for existing projects and ideas, e.g. programs to support the development of TVET, and turn to them for training support where needed. Private companies (extractives and non-extractives) can share vital information, conceptualize and initiate training initiatives, and fund targeted schemes to add sophistication to the existing skill set. Finally, RECs can play a crucial role in harmonizing policies and standards across countries so as to expand the relevance of the skills nurtured in different countries.

### **Consider how regional collaboration could improve training in the high-level skills required by the sector**

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Regional initiatives in skills development could create synergies between countries for the common good. A regional skills survey would be useful to identify skill needs and constraints. RECs could minimize individual country costs and improve competitiveness by coordinating on issues such as shared facilities, cross-border or inter-university training programs, sponsorships, and research and development.

### **Understand the trade-off between skills development requirements and revenue collection**

Any requirements imposed on extractives companies to contribute to local skills development implies costs, and may reduce taxable revenues. However, resources spent on training in transferable skills may nonetheless constitute a good investment for the whole of society, by helping to lay the foundation for economic diversification. Governments can guide the investment in training through fiscal incentives: for instance by offering tax deductions on skills training by companies, by imposing payroll levies on extractives firms to help finance pooled investment in training (such levies exist in several countries), or co-funding coordinated investments in the TVET system.

### **Strengthen institutions to ensure industry expertise reaches those in charge of skills**

Governments often lack the skills they need to effectively engage with, legislate for and administer the extractive industries. Even where there are civil servants who have industry-relevant backgrounds or training, they are often concentrated in one department. Governments need to ensure that expertise in the industry is shared among all departments who need it, including those responsible for education and skills development.

### **Invest in improving the quality of education**

There are considerable gaps in the sample countries between the skills and competencies of local workers and demand from industry. While improving education will have benefits far beyond the extractives industries, this points to the urgent need to improve the quality of education – particularly to lower secondary level.

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## Annex A Typology of skills support

The current skills development climate for the extractive industries shows some islands of best practice regarding investment in skills and human capacity, with examples of coordinated interventions. Effective and sustainable skills development requires coordinated efforts of the government together with other donors, academic institutions and companies in the extractive industries. Table 4 sets out a typology of skills support for the extractive industry.

**Table 4: Typology of skills support**

Initiative	Focus	Funders	Examples
Networking and funding of universities and higher education centers	Capacity building universities Higher education centers	Multilateral donors Bilateral donors Governments	Strengthening Tertiary Education in Africa through Africa Centres of Excellence – Collaboration between World Bank Oil, Gas and Mining Unit and the World Bank Education Unit in Africa, launched in 2013. The project will focus on strengthening seven to 10 existing institutions in West and Central Africa. Investment of around US\$ 8 million in each Center of Excellence. International research networks, private sector input to strengthen curricula.
Workforce development	Extractive industries graduates and professionals	Government Extractive industries companies	<p>Integrated Mine Technical Training Programme (IMTT) – In Tanzania, IMTT has developed a tailored curricula focusing on skilled artisans for the mining industry. Students are recruited by companies that provide complementary on-site practical training and training grants.</p> <p>Nigeria Petroleum Technology Development Fund was established in 1973 and was given responsibility for developing, promoting and implementing petroleum technology and human resource development.</p> <p>SOGA is a £25m five-year, regional program launched in February 2015 with the aim of increasing the number of local people gaining better employment in and around oil and gas investments in East Africa, raising incomes, and improving the quality and relevance of TVET.</p> <p>Mozlink SME Support – Mozal aluminum smelter in Mozambique initiated a local enterprise development program, Mozlink, with the International Finance Corporation and the Investment Promotion Centre of Mozambique. Mozlink provides technical and managerial assistance to support local mining SMEs to participate in Mozal’s supply chain for goods and services. By 2007, Mozlink had built the capacity of 45 local SMEs.</p> <p>Australia National Workforce Development Fund – an Australian government program that helps employers to tailor training programs to suit their current and future workforce skill needs. With co-financing from mineral industry companies, the program features strong on-the-job training programs.</p>

Skills capacity planning	Extractive industries-focused training	Government	<p>Skills Competency Recognition Framework – the Australian mineral skills sector body has developed a framework for the harmonization of competencies and training to optimize the critical mass of skills available and to support skills mobility in the extractive industry.</p> <p>South Africa Sector Skills Plan - Mining Qualifications Authority Sector Skills Plan for the Mining and Minerals Sector 2011 – 2016.</p> <p>Country Mining Vision (CMV) – in a development by the African Mineral Skills Initiative, the CMV helps countries articulate their respective vision statements regarding the potential contribution of the extractive sector to their national development goals. The CMV process involves a broad range of stakeholders from society, business and government, and supports collective national ownership of development planning.</p>
Vocational training centers	Extractive industries-focused training	Government Mineral industry companies Bilateral donors	<p>African Barrick Gold and AngloGold Ashanti, in collaboration with the Tanzanian Chamber of Minerals and Energy and Vocational Education and Training Authority (VETA), have embarked on a technical training project, the IMTT. The program is specifically designed to train artisans (tradesmen) and is located at the Moshi VETA institute.</p> <p>See also boxes elsewhere in this report on private sector support to vocational training centers by Newmont Ahafo (Ghana) and London Mining Marampa (Sierra Leone).</p>
Extractive industries association training centers	Extractive industries-focused training	Mineral industry companies' associations Mineral industry companies	<p>African Petroleum Institute (API) – The African Petroleum Producers' Association (APPA) is establishing the API in Cairo to promote the training of human resources in the oil and gas sector in APPA Member Countries, providing training and cooperating with training institutions of member countries</p> <p>School of Petroleum Studies – incorporated in 2007 in Kenya as a wholly owned subsidiary of the Petroleum Institute of East Africa, offers first class specialized training with a curriculum focused on downstream and upstream oil and gas.</p>
<b>Source:</b> World Bank (2014b)			