## Extractive Industries and Consumption Linkages to Enhance Industrialisation

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#### Paper prepared for the Consultancy for the United Nations Development Programme Regional Service Centre for Africa

***‘Extractive Industries for Sustainable Development’ Programme January 2018***

**Introduction**

This paper is concerned with providing analysis and documentation on ‘How an Extractives Project (Oil, Gas and Mining) Could Have Beneficial Impacts on Industrialisation through Consumption Linkages’.

The paper attempts to accomplish two major inter-related tasks. First, it tries to significantly expand the analytical basis for judging how to strengthen the role of Consumption Linkages. Secondly, it tries to present a number of country Case Studies that can provide some concrete historical detail on the development of Oil, Gas and Mining Enterprises and their contributions (or lack thereof) to improving Consumption Linkages.

At the end of this paper the reader will find an extensive review of the historical experience of Developed, Emerging and Developing Economies in deriving significant economic benefits from the Extractives Sector. A particular focus will be on concrete policies that have proven to be important.

This review will cover twelve Case Studies in total. Nine of them cover the experiences of both Emerging Economies and Developing Economies in sub-Saharan Africa, South America and Asia. These countries include Botswana, Chile, Ghana, India, Indonesia, Malaysia, Peru, South Africa and Zambia. The paper will also analyses the historical experiences of currently successful Developed Economies. These cases include Australia, Canada and Norway. Interspersed within the main body of this paper the reader will find short introductions to these twelve Case Studies.

It should be noted, initially, that in the literature on Extractive Industries, ‘consumption linkages’ have been regarded as one of the weakest links for promoting broader industrialisation objectives. The basic reason is that Oil, Gas and Mining enterprises are generally believed to provide directly only a limited number of regular decent-paying jobs. National workers are recruited generally for low-paying jobs.

This experience is troubling since direct ‘consumption linkages’ are assumed to rely on either: 1) the payment of wages to workers or 2) the distribution of profits to business owners (most of whom are foreign, not domestic). Both channels would need to be strong enough to produce a significant ‘consumption linkage’.

Generally, profits have not been considered to be a major basis for ‘consumption linkages’. Since many Oil, Gas and Mining enterprises are foreign-owned, most of their profits are usually diverted abroad, to the parent company. In any case, the scale of such profits is often officially under-reported. Exceptions to this rule have been Public Enterprises, which in a significant number of cases (such as in Malaysia and Norway) have sought to direct profits to serve national development.

Hence, unless Oil, Gas and Mining enterprises are publically owned, using profits as a ‘consumption linkage’ to help drive domestic industrialisation and economic development is likely to be difficult. Nevertheless, government efforts could be usefully directed, for example, towards motivating foreign-owned companies to help finance skill development or training of their workforce or even local infrastructure, which could be of benefit both to the companies themselves and the local or regional economy. Examples of such efforts are included in our Case Studies. Again, see the end of this Report for the full description of each Case Study. Their numbers indicate the order in which they are presented at the end of this report. The Case Study of Chile’s Copper Mining is highlighted here in regards to skill development.

#### Chile’s Copper Mining (Case Study #1): A History of Consumption Linkages

*The Case Study of Chile’s copper mining provides an extensive review of the development of the consumption linkages of this sector over time. It is particularly useful for comparing the effects during the period of Import Substitution Industrialisation with those during the later period of Liberalisation and Export Orientation. The Study is also useful for drawing out contrasts between the approach of private mining firms and state-owned firms. Private firms appear to have generated weaker consumption linkages, for example. The Government has also played an important role in trying to utilize the revenues from its mining sector to finance the development of other sectors with a high export potential.*

Generally the most viable alternative for promoting linkages would be to focus on the promotion of ‘decent wages’ for the national workers in Extractives Enterprises. It is worth noting, however, that the total scale of wages often appears to be more significant during the period of ‘construction’ of the Oil, Gas or Mining Enterprise. In such circumstances, a myriad of local ‘construction’ jobs (though often low-paid) usually become available.

Nevertheless, our Case Studies demonstrate that in a number of national cases, Oil, Gas and Mining Enterprises have had such extensive operations that their payments of wages have had a significant economy-wide impact. This aggregate effect is highlighted in the Norway Case Study. In general, Norway has been often cited as a positive example of using the resource sector to advance overall economic and social development. However, their wage payments are currently relatively small in scale.

#### Norway’s Oil and Gas Industry (Case Study #6):

***A Globally Competitive Sector and Its Effect on Limiting Employment Generation***

*The development of Norway’s oil and gas industry has been widely regarded as a ‘success story’. The country has managed to establish both effective leading oil firms and an internationally competitive oil service sector. Local content across this industry is high and it exhibits strong backward linkages. However, its success in generating domestic employment has been more limited. For example, in 2012 less than 1% of the country’s labour force was employed in upstream oil and gas activities and another 3.5% was employed in oil-linked activities. Nevertheless, the high wages in these activities as well as substantial contributions from Norway’s well-developed welfare state have created relatively strong consumption linkages. Moreover, the sector has enjoyed a rising female labour-force participation rate. In the development of the oil sector, the Norwegian government has favoured promoting the role of the state-owned firm Statoil along with supporting the use of locally produced goods and services. Moreover, the government has actively promoted the use of Norwegian local service companies and supported an industry-focused technical and vocational system in order to ensure the development of the local skills necessary for the oil and gas sector.*

In contrast, across most resource-rich Emerging and Developing Economies, national workers in such oil, gas and mining enterprises are usually stuck at the lower end of the wage scale. Moreover, since such Extractives companies are often set up in relatively remote or uninhabited areas—where oil, gas or minerals are available in abundance—the multiplier impact of enterprise wages on the entire economy could often be relatively weak.

Moreover, in such areas the main inhabitants are often poorer peasants or pastoralists, who are relatively uneducated and unskilled. Frequently, when mining operations are unable to deliver economic benefits, political conflicts can become intensified. The Case Study on Peru highlights such problems even though its broad-based mining sector has been growing rapidly and has had a significant impact on consumption linkages.

#### Peru’s Broad-Based Mining Sector (Case Study #10): Decentralisation, Local Communities and the Consumption Linkage

*Peru has a diversified mining sector that has been growing rapidly in recent decades. Much of the industry is concentrated in the country’s poorer rural areas but it has had some impact on consumption linkages. Construction and housing activities have grown noticeably, for example, and there has been a general increase in the demand for local inputs. But not all households have benefited. There has been continuing conflict and social unrest in the mining regions, where most inhabitants are Andean peasants and pastoralists. Employment rates have remained low and education has been inadequate. Although the government has instituted a relatively new ‘localisation’ strategy in order to address such problems, its implementation has been inadequate. For example, revenues transferred to subnational governments have not been spent well and mining companies have appeared to be half- hearted in their own efforts. Partly as a result, political conflicts at the local level have intensified.*

The gender composition of the labour force in the Extractives Industry has been found in a number of cases to have a significant effect on Consumption Linkages. For example, the Case Study of India’s Coal Mining Sector has illustrated how the predominant employment of men rather than women in such sectors can actually have a dampening effect on consumption.

#### India’s Coal Mining Sector (Case Study #9):

***The Gender Dimensions of Employment and the Effects on Household Consumption***

*The state-owned enterprise Coal India Limited accounts for over 80% of India’s coal production and employs over 330,000 regular workers. However, its impact on incomes has varied across gender, class, ethnicity, religion and caste. This case study focussed on the gender impact. It draws on research that suggests that the sector’s heavy reliance on male employees is likely to have contributed to a relatively lower level of consumption than otherwise would be the case since women are more likely than men to spend their wages on the family. Generally, women and children have been driven into India’s poorly paid informal coal mining sector. In response, Coal India Limited has encouraged the formation of the organisation ‘Women in the Public Sector’ in order to help improve the status of women in the coal mining sector. However, the organisation has suffered from being primarily city- based and has not yet been able to adequately represent lower castes and tribes.*

Such social and economic factors constitute a major reason that ‘consumption linkages’ are often the weakest development linkage and are, in fact, frequently ignored in discussions of the impact of Extractive Sectors on Industrialisation. This is one of the reasons that this paper seeks to broaden or ‘reconceptualise’ the nature of ‘consumption linkages’.

In the first place, such linkages are usually regarded as a fairly weak and passive transmission mechanism, which is reliant on other, more robust linkages, especially both ‘backward’ and ‘forward’ *production* linkages and even ‘fiscal linkages’, i.e., the resource revenues that are captured by the public sector and can therefore be spent elsewhere in the economy.

Some analysts do not even use the term ‘consumption linkage’ but, instead, refer more generally to a ‘final demand’ linkage (Auty 2005). Hence, this paper is obliged to reconceptualise, to some degree, the basis for strengthening this linkage in order to enhance the potential to draw out significant development consequences as well as policy implications.

This reconceptualization relies on providing a more ‘proactive’ approach to strengthening such a linkage. This revamping involves utilising a broader ‘human development’ approach, which implies prioritising the potential impact of several ‘linkages’: 1) ‘**fiscal linkages**’, such as the use of tax income from the Extractives Sector for public financing of health and education that helps enhance human development (and, as a result, promotes consumption); 2) the deployment of **active labour market programs** (through the public sector as well as enterprises themselves) which could strengthen and expand the

employment and skill contribution of national workers, both in Extractive Industries and elsewhere in the economy; 3) **horizontal linkages**, which would *explicitly* deploy the skills and capabilities acquired by national workers in the Extractives sector in other productive industrial activities. All three of these development initiatives could help broaden and deepen the impact of ‘consumption linkages’.

We also include **infrastructure** in our analysis since it could indirectly broaden the impact of Extractive Industries on the local or regional economy through helping to expand the potential deployment of the skills and capabilities developed in these industries as well as helping to promote backward and forward linkages.

In general, this paper will focus its historical examination of ‘Consumption Linkages’ on the generation of domestic **productive employment** and the accompanying payment of **decent wages** for workers that can be traced, directly or indirectly, to the economic activities of the Extractives Sectors of Emerging and Developing Economies.

The basic operating assumption of the paper is that significant increases in **domestic consumption** would likely rely, in most circumstance, on generating more **productive employment** in both the extractives and non-extractives sectors of the economy and generating such jobs at decent levels of wages. Historical experience suggests that the preference should be on the creation of jobs in the non-extractives Industrial Sector and, particularly, in the Manufacturing Sub-Sector. But such a broader impact could result as well from expanding the Service Sector.

Though the paper assumes that increasing both wages as well as profits could stimulate aggregate demand, it prioritises the impact of wages on the basis of creating broader employment. And the generation of such broader employment is assumed to rely on achieving greater growth in the non-extractives sectors of the domestic economy.

Such an impact would depend initially and primarily on the channel of creating greater aggregate demand for the goods and services provided by these non-extractives sectors. But this impact would depend, within this context, on the effects created by the purchasing power of the workers employed in the Extractives Sector itself.

It is indeed often true that the relative wages paid in the Extractives Sector can be higher than the average wages paid across most Emerging or Developing Economies. But the Extractives Sector is not usually labour-intensive. As already mentioned, more jobs are often created in this sector during the construction phase of an Extractives Company than during its resultant production phase.

Moreover, the jobs created for national workers thereafter tend to be predominantly lower- skilled and lower-wage. Thus, one of the animating concerns of this paper will be the potential for both creating more jobs within the Extractives Sector and generating higher wages for national workers. The latter effect would depend on improving the skills of national workers. The Case Study of Australia’s modern, diversified mining industry provides some interesting insights on how a Developed Economy has sought to cope with the

economic and social impact of this industry and its rapidly evolving need for an increasingly skilled workforce.

#### Australia’s Diversified Mineral Deposits (Case Study #7):

***The Role of Education and Training Systems for Skills Development***

*Australia’s economy has benefitted historically from the country’s rich variety of mineral deposits, ranging from, gold, coal, copper, diamond and iron ore to oil and gas reserves. While the diversified minerals sector has contributed about 9 per cent of GDP over recent decades, employment in mining has been declining over the same period. The mining sector now only accounts for less than 2% of the total labour force.*

*Because of recent relatively low commodity prices and declining sectoral employment as well as heightened environmental concerns, Australia’s mining sector has been in secular decline. Still its average wage level remains about two-thirds higher than the all-industry average. However, continuing automation of the mining sector has resulted in reduced employment prospects. The jobs that are predicted to remain will require a high level of skill. But Australia’s education system has indeed made noteworthy advances in providing appropriate education and training to address the technological advances in the sector.*

*A significant amount of research has been conducted in Australia in attempting to understand the impact of trends in the mining sector at the level of regions, towns and communities. For example, one of the findings has been that while mining booms might have positive effects at the national level, they can still have substantial negative effects or only temporary benefits at the local community level. For example, when there is indeed a contraction of local mining employment, there are often few alternative employment opportunities. Moreover, the frequent use of non-resident workers in mining operations often imply that local communities are adversely affected by the associated outflow of incomes and profits when mining activity contracts.*

*At the regional level, mining operations can also be a significant potential contributor to Indigenous communities. But the frequent marginalisation of Indigenous communities by many mining operations has run counter to this potential. As a consequence, the Federal Government of Australia has signed an MOU with mining companies that oblige the latter to provide increased employment to Indigenous people. Moreover, the Government has provided financing for a range of initiatives that can provide appropriate skills development and training for these communities. As a result, the share of Indigenous Australians in mining operations has risen recently from 0.5% to 6% and Indigenous women now also account for 19% of all Indigenous employment.*

A major background concern of this overall research paper is also the extent to which the Extractives Sector relies primarily on imports as inputs into its production activities, instead of domestic alternatives. For example, a worthwhile area of investigation might be the extent to which domestic inputs could substitute, where feasible, for such imports. In fact,

some researchers suggest that Extractives companies are now eager to off-load their non- core functions to local low-cost suppliers (see Morris et al. 2011a and Morris et al. 2011b).

The Case Study of Ghana’s Gold-Mining Sector suggests that even though gold mining is widely regarded as an ‘enclave sector’, the government appears to have made some progress in supporting the development of a local cluster of input suppliers.

#### The Ghana Gold-Mining Sector (Case Study #3):

***The Impact on Economic Development at the Local Level***

*Ghana is the world’s ninth largest producer of gold. Since 1986, it has attracted billions of US dollars in investment and by 2009 was accounting for 6% of the country’s GDP. Gold is unusual in the sense that it does not require the employment of skilled labour and it usually has no domestic market. Hence, gold mining is conventionally regarded as an enclave operation with very few national linkages. But recent studies have confirmed that it has stimulated some backward linkages, i.e., helped to set up a cluster of input suppliers, and that it has contributed significantly to fiscal linkages. For example, in 2009 this industry accounted for one-fifth of government tax revenue. Also, recent concrete studies of the regional impact of some of the country’s large mining companies note that they have actively sought to recruit local workers, at least for unskilled jobs, and have been encouraged by the government to seek out local procurement of their inputs. Hence, indirectly (i.e., through fiscal revenue and backward linkages), such companies have contributed to strengthening consumption linkages, at least at the local level.*

This Research Paper will not prioritise investigating the historical experience of the impact of profits in the Extractives Sector on the rest of the economy. As already noted, existing research suggests that if a foreign company is financing an Extractives Project, a large share of its profits is likely to be repatriated. Moreover, Extractives Companies often utilise innumerable international financial channels in order to minimize the domestic taxation of their production activities—whether such companies are foreign-owned or domestically- owned.

Of course, these trends do not imply that governments in Emerging and Developing Economies should not devise more effective means to tax Extractives Companies. The scale of such taxation would be, of course, a significant platform for enhancing ‘fiscal linkages’, which could generate income that could be deployed, in turn, to enhance human development and advance productive skills in particular.

Strengthening Consumption Linkages will obviously depend on projected trends in the global economy and the prospects for Extractive Industries in particular. The global economy has obviously evolved significantly, especially since the rise, for example, of the East Asian ‘Miracle Economies’. For example, the major Emerging Economies of China and India now account for a significant share of global economic growth.

Thus, this Research Paper will provide an analysis of current and projected global trends in such key factors as economic growth and investment as a potentially useful background for

evaluating the current and future economic prospects for Extractive Sectors in Emerging and Developing Economies.

### Historical and Projected Economic Trends

We start our analysis with a brief summary of projected economic trends for the global economy and for major groupings of Developed, Emerging and Developing Economies. The projections of future economic trends through 2022 and 2030 have been developed by a global macro-econometric model, the Cambridge-Alphametrics Model. This model has been used by various United Nations agencies since 2005 and, most recently, it has been utilised by the New Development Bank in late 2017 for its first global development report (New Development Bank 2017).

We start with the medium-term projections produced by a ‘Baseline Scenario’. Such a scenario assumes no major changes in economic policies. For this exercise, the world economy is divided into three Developed-Economy blocs, namely, the USA, Europe and Other Developed Economies, while Emerging Economies are divided into the BRICS group and Other Emerging Economies, and, finally, the remaining bloc of poorer Developing Economies is included.

The Baseline Scenario suggests that the world economy is likely to recover from low economic growth over the coming five years (see **Table 1**). For example, between 2018 and 2022, the global growth rate of GNP per capita is projected to rise to 2.4% from 1.7%. This rise appears to be due mainly to the recovery in growth of per capita GNP among Developed Economies, even though their growth rates would remain relatively subued, namely, 1.5% or less.

### Table 1: Historical and Projected Annual Growth Rates of GNP per capita

**(%) (2005 $PPP)**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **2008-2017** | **2018-2022** | **2023-2030** |
| **World** | **1.7** | **2.4** | **2.5** |
| **USA** | **0.7** | **1.4** | **1.3** |
| **Europe** | **0.6** | **1.5** | **1.8** |
| **Other Developed Economies** | **0.8** | **1.2** | **1.4** |
| **BRICS** | **5.4** | **4.7** | **4.5** |
| **Other Emerging Economies** | **1.1** | **2.8** | **2.8** |
| **Developing Economies** | **2.6** | **2.5** | **2.9** |

**Data Source: CAM World Databank (WD) and Baseline Scenario**

Over the same next five years, the BRICS grouping of major Emerging Economies is expected to continue being the most important driver of global economic growth. Their combined growth rate of GNP per capita would be 4.7%— almost twice the rate of the global economy. The BRICS would account, for example, for about half of the increase in world income from

2018 to 2022. In contrast, the Developed Economies would account for only 24% of this total increase.

The results of projections further ahead to 2030 are also shown in **Table 1**. These projections show that the growth of the world economy increase during 2023-2030 would be broadly comparable to that for 2018-2022. Global GNP per capita would grow at 2.5% as compared with 2.4% for 2018-22.

Without any new source of economic dynamism, growth across Developed Economies is projected to remain relatively slow. For example, per capita growth in the USA would dip slightly, from 1.4% during 2018-2022 to 1.3% during 2023-2030 and per capita growth in Europe and Other Developed Economies would rise only modestly.

The growth rate of the BRICS combined (and of China and India in particular) is projected to slow slightly during 2023-2030. Nevertheless, the BRICS as a group would still lead the world economy in terms of per capita income growth. For example, China and India would maintain annual GNP per capita growth in excess of 5% throughout the period to 2030.

The BRICS’ combined GNP per capita growth of 4.5% in 2023-2030 would be well above the projected growth rate of the world economy as a whole and the BRICS would still contribute around 50% of the global increase in GNP itself.

The per capita GNP growth rate in Other Emerging Economies would remain the same, at 2.8%, over both of these periods, 2018-2022 and 2023-2030. Growth of GNP itself in poorer Developing Economies is expected to reach 5% but their per capita GNP would grow at only 2.9% during 2023-2030 because of high population growth.

Thus, future projected growth across the world economy is likely to improve but remain at modest levels. Such higher growth rates would be propelled mainly by some degree of recovery in Developed Economies. There would be increases in economic growth in non- BRICS Emerging Economies but growth would slow noticeably in the BRICS grouping itself. Thankfully, there would be some improvement in rates of economic growth in poorer Developing Economies though this change would unfortunately be marginal.

Next we examine the underlying future trends in investment—which is a powerful determinant of economic growth—in order to help understand more clearly what is propelling growth and what could be holding it back. The projections focus on non- governmental investment spending, which includes investment by state enterprises as well as private and foreign-owned corporations.

**Table 2** reports levels of this variable (as a ratio to GDP) for 2017, 2022 and 2030. Investment as a ratio of GDP is projected to increase progressively but not dramatically across Developed Economies through 2030.

In the BRICS as a group, however, this investment ratio is projected to decline somewhat, although it is expected to remain relatively high, at about 30 per cent of GDP. The investment ratio in Other Emerging Economies is projected to remain about the same over

the whole period of 2017-2030, i.e., just above 22%. But, unfortunately, the corresponding ratio in poorer Developing Economies is expected to fall noticeably (to 18.8% in 2030 from 20.7% in 2017).

### Table 2: Projected Investment Spending (% of GDP)

|  |  |  |  |
| --- | --- | --- | --- |
|  | **2017** | **2022** | **2030** |
| **World** | **23.9** | **24.6** | **24.8** |
| **USA** | **17.7** | **19.0** | **20.1** |
| **Europe** | **18.4** | **20.4** | **22.1** |
| **Other Developed Economic** | **21.6** | **23.0** | **24.4** |
| **BRICS** | **33.2** | **31.9** | **29.9** |
| **Other Emerging Economies** | **22.2** | **22.5** | **22.4** |
| **Developing Economies** | **20.7** | **19.5** | **18.8** |

**Data Source: CAM Baseline Scenario**

Thus, although the investment level of the BRICS is projected to remain fairly high, the relative stagnation or marginal declines in all three groups of Emerging and Developing Economies should be of major concern since higher levels of investment are needed in many of these economies in order to accelerate their economic development as well as help propel the global economy.

## Trends in Commodity Prices

As a supplement to the projections of GNP per capita and investment as a ratio to GDP, this paper reports the results for the projections of the prices of primary commodities and of oil in particular. Such prices are bellwethers for the future economic prospects of Extractives Companies. As in Tables 1 and 2, **Table 3** focuses on three years, namely, 2017 as the historical starting-point and 2022 and 2030 as future comparators.

### Table 3: Trends in the Prices of Primary Commodities and Oil (US Dollar Price Index: 2005 = 1.00)

|  |  |  |  |
| --- | --- | --- | --- |
|  | **2017** | **2022** | **2030** |
| **Price of Primary Commodities** | **1.32** | **1.53** | **1.82** |
| **Price of Oil** | **0.97** | **1.49** | **1.82** |

**Data Source: CAM Baseline Scenario**

Table 3 shows that the general price of Primary Commodities increased significantly between 2005 (the base year for these computations) and 2017—namely, by 32%. The percentage increase in the price of Oil was, however, significantly higher, namely, 54%.

Over the next five years (2017 to 2022), the general price of Primary Commodities is projected to increase by 16%. But the price of Oil is projected to jump substantially, namely, by about 54%.

There are still positive trends for the later period of 2023-2030. The general price of Primary Commodities is projected to increase by about 19% while the projected rate of increase in the price of Oil would be slightly higher, namely, 22%.

The selection of a different index or a different set of years would, of course, provide somewhat different results. But the most important finding is that these projections provide a fairly positive picture of future trends in the prices of Primary Commodities and of Oil in particular.

So there is an expectation that, in general, the Extractives Sector in Emerging and Developing Economies could enjoy promising economic prospects during the period 2018- 2030. Such an expectation suggests that Governments in these Economies would be in a relatively strong *potential* position to strengthen various linkages from the Extractives Sector to the rest of their economy, including through consumption linkages.

For example, a report by the McKinsey Global Institute in 2013, entitled ‘Reversing the Curse: Maximising the Potential of Resource-Driven Economies’, suggests that up to US$ 17 trillion of cumulative new investment in oil, gas and mineral resources could be needed by 2030 in order to meet the expected growing need for such natural resources (MGI 2013).

### Growing Future Demand for Oil, Gas and Mineral Resources

What such projections imply is that the rate of investment in Extractives Industries might well have to double by 2030. Even on the basis of optimistic estimates of a rise in resource productivity, MGI estimates that US$ 11 trillion to US$ 17 trillion would be needed for investment in oil, gas and mineral extraction by 2030. Such estimates easily surpass any past historical trends in investment.

Such a high rate of investment would be required as a result of the depletion of existing supplies combined with stronger global demand that would be exerted by major growing Emerging Economies such as China and India (MGI 2013, p. 1). At the same time, though, about four-fifths of resource-rich economies that could meet this rising demand still have per capita income levels below the global average. MGI estimates that in 2011 there were already 81 such resource-rich countries and they accounted for about one-fifth of global economic output (p. 2).

Most of these countries have failed so far to translate their resource abundance into broad- based economic prosperity. Part of the reason is that they have undertaken relatively little exploration of their natural resources. One of the reasons is that international investment in exploration has been limited, especially in Africa. However, MGI estimates that the share of future investment that would need to be contributed by low-income and lower-middle- income countries in general could almost double (p. 4) based on rising global demand.

One of the critical factors that would enable these resource-rich countries to meet rising global demand for oil, gas and minerals would be the development of their infrastructure. Such countries would need more than US$ 1.3 trillion in annual infrastructure investment to do so. MGI claims that, traditionally, Extractives Companies have tended to be investors in infrastructure in Emerging and Developing Economies.

Of course, such infrastructure has been closely aligned with their need to export their output to global markets. Nevertheless, such requirements do give national governments significant potential leverage in seeking cooperation from Extractives Companies in financing the expansion of infrastructure that could have significant multiplier impacts on economic development either regionally or nationally. Such infrastructure could be critical for expanding Consumption Linkages as well as Backward and Forward Production Linkages.

MGI also mentions the potential that governments have in ensuring that Extractives Companies contribute to local employment and supply chains. It suggests that the percentage of the revenue created by such companies that is spent on the procurement of local goods and services usually easily exceeds their taxes and royalty payments to the government (p. 13). Sometimes such an effect can be enhanced by local-content regulations.

Some of our Case Study countries provide evidence on the relative success of such regulations. The Case Study of Canada’s mining sector reflects, for example, on the recent impact of the government’s local-content policies.

#### Canada’s Mining History (Case Study #8):

***The Effect of Operations on Indigenous Communities***

*Canada has a long history of mining operations. This sector’s activities have been concentrated in areas occupied by Indigenous communities located in the North of the country. Hence, these communities have been disproportionately affected by its operations. Unfortunately, their ensuing benefits have been limited by factors such as the communities’ lower educational backgrounds, lack of mining experience, cultural barriers and discrimination. Regulations of the mining sector have been devolved primarily to the Province level while the Federal Government has laid out the general regulatory framework. For example, local-content policies have been framed to support Indigenous communities in various ways but their implementation is still based on agreement with mining companies. Also, the hiring of Indigenous people is supposed to be based on Impact and Benefit Agreements but their stipulations and enforcement have often relied on the negotiating strength of local communities. Moreover, outsiders to the community still occupy, in general, the higher occupation ranks and enjoy the higher wages in mining enterprises.*

More broadly, MGI asserts that Extractives Companies need to be evaluated in terms of their contribution to the broader goal of a country’s economic development. For this purpose, MGI mentions five aspects: 1) the companies’ fiscal contribution (taxes and royalties), 2) their job creation as well as skill building, 3) their investment in infrastructure,

1. the social and community benefits that they contribute, and 5) their efforts to support

environmental preservation. Our Case Studies provide concrete examples for the initiatives mentioned in Points #1 through #4.

The Case Study of South Africa’s diversified Mining Sector provides interesting insights into its evolution. South Africa’s mining sector, the largest in Africa, has developed into a relatively high-technology hub. Yet recent trends suggest that it is a sector in relative decline and undergoing downscaling.

#### South Africa’s Diversified Mining Sector (Case Study #12): Examining the Sector’s Social and Labour Outcomes

*South Africa has the largest, most diversified and longest established mining sector in Africa. It has played a crucial role in the country’s industrial development. Moreover, its mining- inputs sector has grown into a high-tech complex and become, to some degree, globally competitive. The Government has attempted to implement a dynamic* ***National System of Innovation*** *based on stronger links between the mining sector and other parts of the South African economy. But one of its shortcomings has been a general lack of skilled technicians and artisans. After the political watershed of 1994, the Government has attempted to implement a Minerals and Petroleum Resources Development Act. New regulations have also included a ‘Broad-Based Socio-Economic Empowerment Charter’, which has been designed to advance the economic interests of South Africans that have been historically disadvantaged. Blacks, women and disadvantaged communities have been targeted. As part of this initiative, mining companies have been required to formulate and implement a ‘Social and Labour Plan’ before being granted permission to start operations. While socio-economic outcomes in the sector have improved, major critical challenges remain. Many miners continue to suffer from poor socioeconomic conditions and major strikes have broken out— such as the much-publicised strike at the Marikana mine, which resulted in the death of 34 mineworkers. Moreover, the mining sector has begun a secular process of downscaling. As a result, Social and Labour Plans have begun to target saving mining jobs and managing the downscaling and, in some case, the closure of mines.*

## Differentiation of Linkages

This MGI analysis helps support this paper’s recommendations for promoting linkages from the Extractives Industry that could enhance broader economic and social development. We now turn our attention to a brief specification of the analytical framework of ‘linkages’, and to ‘consumption linkages’ in particular.

Initially, we draw on the recent 2017 publication by UNCTAD entitled ‘Establishing Development Linkages in the Extractive Industry: Lessons from the Field’ (UNCTAD 2017). This UN document focuses on the Economic Community of Central African States but its general analysis is pertinent to other Emerging and Developing Economies. Our paper also uses Hailu et al., 2014 as a conceptual starting point for its analysis. This particular paper highlights four major linkages: Fiscal Linkages, Production Linkages (which include backward, forward and horizontal linkages), Consumption Linkages as well as Infrastructure Linkages.

Our own analysis delineates six types of linkages from Extractive Industries:

* 1. **Forward Production Linkages**: these involve the processing of commodities of Extractive Industries by local ‘downstream’ industries instead of exporting them as raw materials.
	2. **Backward Production Linkages**: these enable local suppliers of goods and services to provide output that could be utilised by Extractive Industries. Such linkages enable the establishment or strengthening of local supplying industries.
	3. **Fiscal Linkages**: these linkages involve the collection and strategic use of ‘resource rents’ by the public sector (e.g., taxes and royalties). This paper emphasises these linkages because they could be used explicitly to finance basic human development, such as through the financial support of health and education or special training programs.
	4. **Spatial Linkages**: these linkages involve the building of *essential infrastructure* that is designed to facilitate the extraction of resources, but could also be deployed to stimulate broader economy activity, and thus expand the scope for consumption linkages.
	5. **Horizontal Linkages**: these linkages involve utilising the human skills and capabilities acquired in the Extractive Sector to develop other (not necessarily directly related) industrial activities. These linkages thus represent another potentially important development of human capabilities.
	6. **Consumption Linkages**: these linkages entail spending the income generated from the Extractive Industries on goods and services produced by other sectors of the domestic economy. One of the problems with such linkages is that, from a human development perspective, they are a fairly ***passive*** phenomenon. This is in contrast to the characteristics of **Spatial Linkages**, **Horizontal Linkages** and **Fiscal Linkages**, all of which could be utilised to advance human capabilities, such as through improving health and education, directly advancing training and skill development or deploying such productive capabilities in other economic sectors.

### Human Capabilities and Active Labour Market Programmes

We emphasise the importance of Fiscal Linkages in our analysis. One of the major reasons (which we have already mentioned) is that Consumption Linkages are usually framed in relatively passive terms. But behind consumption abilities are the productive capabilities of the workers in the Extractives Sector. And such capabilities can be enhanced in several respects. Firstly, there are general health and education initiatives of governments that can improve the basic human capabilities of all workers. Beyond such basic public initiatives there could also be targeted government financing of Active Labour Market Programmes— in other words, explicit support to skill development and training.

Alternatively, governments could institute agreements with Extractives Companies that include the latter’s explicit agreement to provide their own relevant training to national workers. Such training should lead to the advancement of national workers to higher-paying

jobs. The Case Study on Zambia’s Copper Mining Sector provides an example of a government that recently has moved more assertively to encourage the private companies dominating the Extractives Sector to focus more on developing the skills of its workforce.

#### Zambia’s Copper Mining Sector (Case Study #4): Inducing Companies to Support Skill Development

*The copper sector has a major impact on Zambia’s economy, accounting for about 10% of its GDP as well as 10% of its formal employment. It also accounts for about four-fifths of its foreign-exchange earnings. In the 1990s this sector was thoroughly privatized and liberalized, prompting an increased inflow of foreign financing. But since its profits and much of its wage income flow abroad, this sector has had little impact on consumption linkages. Casualization, lower wages and reduced employment for local workers and subcontracting have also weakened this linkage. However, in 2013 the Zambian Government launched a Mining Local Content Initiative, which has obliged copper mining companies to invest more in the employment and training of Zambian workers. Particularly notable was the announcement by the government of an aggressive skills development strategy. Efforts are continuing to operationalize this ambitious new initiative.*

In general, unfortunately, Active Labour Market Programmes have been neglected as a basis to advance workers’ incomes in Extractive Industries. But within the current global context, in which fears are growing about the possible effects of a rapid new wave of technological change—driven by such potential employment-displacing factors as ICT, Robotics and Artificial Intelligence—such Programmes have acquired a new priority.

In Developed Economies, Passive Labour Market Programmes, such as Unemployment Insurance, have been dominant. But in Emerging and Developing Economies, such programmes have usually been available only to public-sector workers or workers in large formal private-sector firms. Unfortunately, Active Labour Market Programmes have been even less important.

Extensive data on both Active and Passive Labour Market Programmes have been collected in recent years in Asia and the Pacific by the Asian Development Bank. The author of this paper was the lead consultant for the last two rounds of this major effort.

This programme has been spearheaded by the development of ADB’s Social Protection Index (now called the Social Protection Indicator). For example, in the 2016 publication *The Social Protection Indicator: Assessing Results for Asia*, ADB collected comprehensive data on social protection programmes for 25 countries in the region (ADB 2016).

The data have been disaggregated by three major forms of social protection: Social Insurance (such as Health Insurance), Social Assistance (such as Cash Transfers) and Active Labour Market Programmes. Passive Labour Market Programmes—such an Unemployment Insurance—have been included as part of Social Insurance.

But what has been one of the most striking findings from this effort is that Active Labour Market Programmes have constituted only about 3% of all forms of social protection.

Moreover, the dominant programmes within this small category have been the provision of temporary work, such as the very large Mahatma Gandhi National Rural Employment Guarantee Scheme in India. In addition, Bangladesh maintains ten similar active labour market programmes. Two of the largest are the Food for Work Programme and the Employment Generation Programme for the Ultra Poor.

In contrast, programmes designed for skill development and training have been congenitally small or virtually non-existent. Skill development and training programmes account for only 1% of all forms of social protection in Asia. Moreover, very little training has been provided by the larger Employment Guarantee Schemes. The great majority of the work, such as on rural infrastructure, has been unskilled and temporary. The Indian programme guarantees, for example, 100 days of paid *minimum-wage* employment explicitly for unskilled manual work.

Though the trends in Asia could be towards the lower end of the global social-protection scale, they still mirror, to a significant degree, global trends. A pro-active approach to labour market programmes, in which the government actively seeks to upgrade the skills of workers and thus their employability, is not usually a high priority. But the lack of such pro- active programmes is relevant for our current analysis since it poses serious obstacles to expanding and strengthening ‘**consumption linkages**’ from Extractive Industries. Such initiatives could, in fact, improve the opportunities of national workers to move up the employment ladder in oil, gas and mining enterprises and earn higher wages. The Case Study on Indonesia’s Oil and Gas Sector suggests that governments can indeed make progress in advancing Local Capabilities if they are committed to investing tax resources from their Extractives Sectors in the skill development and training of their national workers.

#### Indonesia’s Oil and Gas Sector (Case Study #11):

***Measures to Accelerate the Development of Local Capabilities***

*The Indonesia Government has often been praised for its macroeconomic management of the revenues from its oil and gas sector. It has been given credit, for example, for attempting to invest its oil and gas revenues in enhancing human capital and developing the country’s infrastructure. However, the sector’s labour force has remained short on skills and continues to be disproportionately allocated to low-wage employment. The government has indeed tried to implement ‘local-content’ policies and have more Indonesian workers recruited into the Oil and Gas workforce. As a result, there has indeed been progress in moving domestic workers into higher technical positions (though very few have moved into management positions) and oil and gas companies have invested more resources in providing workers with training schools and scholarships. Recently, the oil and gas sector has also undergone major restructuring. An independent Regulator has been appointed to advance upstream economic activities; and local-content provisions have been incorporated into various laws and regulations. As a result, local-content levels have increased in recent years though upstream investments have remained under-developed.*

### The Role of Local Outsourcing and Consumption Linkages

Traditionally, it has been believed that the large foreign-owned multinational firms that have been influential in the Extractive Industries in many Emerging and Developing Economies have been reluctant to outsource work to local suppliers. Namely, such firms have operated as ‘enclaves’ within such economies. But more recent research has suggested that the opposite attitude—namely, a heightened motivation to outsource the production of inputs to local suppliers—has begun to prevail, even in poorer countries in sub-Saharan Africa (see Morris et al. 2011a, 2011b and 2011c; and Kaplinsky and Farooki 2012; and Kaplinski 2011).

In other words, multinational firms operating in the Extractives sector have increasingly chosen to concentrate on their core competencies—areas in which they enjoy a *global* comparative advantage—and have increasingly sought to ‘farm out’ many non-core production tasks, even to local suppliers, as long as they succeed in maintaining low costs. Lead firms in particular niches of the Extractive Sector have the advantage of being able to play off competing suppliers against one another in order to guarantee themselves the lowest input costs.

Such a strategic shift in orientation by leading international firms implies that Emerging and Developing Economies now have a greater potential opportunity to build up local industries that can competitively supply inputs to their Extractives Sector. Such a major shift would imply, in turn, that there would be greater opportunity for such Economies to develop stronger **backward linkages**—and, even in some cases, the opportunity to cultivate **forward linkages**—namely, developing companies that could be set up to ‘process’ the raw outputs produced by oil, gas or mining companies. This has been the case, for example, in Botswana, where the processing of rough diamonds is now carried out by local companies.

#### Botswana’s Diamond Mining Sector (Case Study #5): Evaluating a Development ‘Success Story’

*Botswana is the most diamond-rich country in the world and is widely regarded as a development ‘success story’. For example, in 2012 its diamond mining contributed 22% of the country’s GDP and 41% of Government revenue. But despite its rapid rate of economic growth, the country has largely experienced a ‘job-less’ expansion. This has been due partly to the capital- and technology-intensive nature of diamond mining. But the government has been successful in developing forward linkages into the ‘downstream’ processing and fabrication of diamonds. This success was due to the government’s renegotiation of its renewed mining agreement with DeBeers in 2005. Estimates of the ensuing generation of additional wages in this downstream cutting and polishing industry suggest that it has been significant. But this impact still needs to be enhanced through the further development of the skills of local workers and the boosting of their wages. These improvements would help expand the consumption linkages of this subsector. Unfortunately, expatriates still account for twice the total wage bill of local workers in these downstream activities.*

As the Case Study of Botswana’s diamond sector suggest, the opportunities offered to domestic companies to either supply inputs or process outputs from the Extractives Sector would still rely heavily on the building up of local capabilities, the primary basis of which would be the skill development and training of their workers. Such a situation implies that governments in Emerging and Developing Economies should definitely prioritise and significantly scale-up programmes of skill development and training.

In fact, when they negotiate with oil, gas or mining multinationals on setting up local operations, governments should stipulate that providing skill development and training to the local workforce should be an integral component of any agreement. Such provisions could help boost the wages of local workers employed by such multinationals. Moreover, as these workers eventually migrate to other companies or industries within the country, ‘horizontal linkages’ would be strengthened. As a result, the overall impact on ‘consumption linkages’ would be enhanced.

As the Case Study of Malaysia suggests, its National Oil Company, Petronas, has invested substantial resources in education and training of national workers. And such investment has helped strengthen domestic consumption linkages.

#### Malaysia’s Oil and Gas Sector (Case Study #2):

***The National Oil Company’s Impact on Consumption Linkages***

*The Case Study of Malaysia’s Oil and Gas Sector—and the role of its National Oil Company (Petronas) in particular—highlights how the government has emphasised the importance of promoting the employment of national workers in this sector and has provided extensive resources to their training. Thus, it has been the substantial investments of Petronas in education and training that have served to enhance the domestic consumption linkages of the Malaysian Oil and Gas Sector. For example, Petronas has set up its own university for engineering, science and technology, a Maritime Academy to support its shipping industry (for transporting oil and gas), an Institute for Petroleum Technology (to specifically promote skills throughout the sector), a Leadership Centre to promote domestic management skills and a Women’s Network to foster their employment in the sector.*

Morris et al. (2011a), “Commodities and Linkages: Meeting the Policy Challenge” is particularly useful in highlighting the importance of skill development and training in Resource sectors. Their major policy recommendations are drawn from a series of Case Studies of African economies: Angola, Botswana, Gabon, Ghana, Nigeria, South Africa, Tanzania and Zambia. Morris et al. 2011b and 2011c make similar policy recommendations.

These three related summary papers combat the common argument that the Resource sectors in African economies are plagued by the so-called ‘Resource Curse’. Instead, they point to the critical importance of developing **local capabilities**, and using such capabilities as a platform for strengthening linkages. This would include strengthening **Consumption Linkages**, which is the focus of this paper.

As Morris et al. 2011a emphasises, “skills and the ensemble of institutions which affect the development of firm-level and sector-level capabilities ‘shouts out’ in all the country studies as being the single most important determinant of linkage development” (p. 7). They emphasise this point of view when they note that such a policy focus is increasingly urgent to meet what they call ‘a global challenge in an increasingly knowledge-driven world’ (a topic that this paper will address in the next section).

Morris et al. 2011a also emphasises the importance of the development by governments of a ‘coherent **industrial strategy** for the commodity sector’ (p. 12). They go further to state that ‘a linkage-based industrial policy should have clear and detailed strategies and instruments for assisting firms engaged in backward and forward linkages to the commodity sector’ (p. 13). This viewpoint is mirrored in the UNECA publication, ‘Making the Most of Africa’s Commodities’ (ECA 2013), which favours adopting and implementing a ‘coherent industrial policy’ in order to promote greater value addition and linkage development in Africa’s commodity sectors.

One of the three main policy-related areas of priority concern for Morris et al. 2011a is ‘Skills Upgrading and Technological Capability Building’ (p. 15). In Africa in particular, they emphasise that ‘many potential local suppliers and processors are generally well behind the international competition’ because ‘they lack skills, technological capacities and supportive institutions’.

Hence, local companies that could benefit from either backward or forward linkages from the Resource Sector are caught in a contradiction: they cannot access such economic opportunities provided by existing supply chains because they lack the necessary skills, technology and management capabilities, but they face notable difficulties in acquiring such abilities if they are not already in such chains (p. 16).

Such difficulties prioritise the development of programmes (which will usually be public or publically supported) that are designed to expand the ‘availability of technical personnel, artisanal skills and general engineering capabilities’ (p. 16). We have quoted extensively from Morris et al. 2011a because the major points that they stress with regard to the general topic of ‘Commodities and Linkages’ are similar to the points that this paper is attempting to highlight and has derived from many of its own 12 Case Studies across Asia, Latin America and Africa.

Morris et al. 2011 (cf. *Commodities and Linkages: Meeting the Policy Challenge*) has also highlighted the important role that the financing of Infrastructure can play in advancing the development of commodity sectors and their broader economic impact. For example, this Research Paper asserts that ‘infrastructure emerges as a significant contextual driver in the development of linkages’ and the general advance in industrial development (p. 7). But the authors warn against focusing on ‘enclave infrastructural projects’, which are designed to advance the interests of the commodity producers themselves.

In this regard, they support the more general (public] financing of Development Corridors, which could have a significantly broader impact. Infrastructure projects that are able to achieve such a broader, regional impact are much more likely to expand Consumption Linkages, especially well beyond the direct workers in the particular Resource sector.

A good example is the Maputo Development Corridor, an extensive road and railway network that has involved cooperation between the Mozambican and South African governments. As a result of this network, a wide range of industries, including petrochemical plants, smelters, ironworks sites and manufacturing plants, have been built up along the corridor between Maputo and Johannesburg (Bastida 2014).

### Addressing Technological Change: the Onslaught of Automation

While there appears to have been a recent strengthening consensus among multinational Extractives companies that it is in their profit-making interests to outsource the production of inputs to local low-cost national suppliers, rapid technological progress might well undercut this recent trend since an increasingly significant proportion of the labour carried out by the workforce of multinational Extractives companies could be displaced by technological change.

The prospects of such technological change could have dramatic repercussions for this Research Paper’s area of focus. Research has begun to rapidly expand to address the potential problems (as well as the possible advantages) of such technological change. The McKinsey Global Institute has already done considerable research on this topic (See, for example, MGI 2017a and MGI 2017b). What is clear across the board is that dramatic structural change is likely to occur over the coming decades.

Most importantly for our own topic, one of the ramifications of such potentially substantial structural change is bound to be the rising need for the retraining of the workforce in the face of expanding automation—as a result of the spread, for example, of Robotics and Artificial Intelligence. The McKinsey Global Institute has recently developed various projections to 2030 for 46 countries, which account for about 90% of global GDP (MGI 2017 December). Their mid-range projection suggests, for example, that 14% of the global workforce would need to migrate to new jobs and learn new skills by 2030 (p. 1).

MGI projects that the most dramatic changes would occur in Developed Economies but it also suggests that significant changes could happen in major Emerging Economies, such as China and India. For China, for example, MGI’s ‘trend-line scenario’ suggests that 13% of its workforce would need to switch their occupation by 2030 as a result of technological change (p. 11). This percentage would represent, in fact, about 750 million workers. In India this projected percentage would be lower, at 6%. But this would still represent about 610 million workers.

Of course, if the new technologies are adopted more quickly and/or more broadly across economic sectors, there would be more dramatic displacements of workers. MGI projects

that the economic activities most prone to automation would be **physical activities in predictable environments**, such as operating machinery or processing data.

Such environments are likely to characterise a significant share of the activities prevalent in Extractive Industries. If this is true, then a substantial number of workers in these industries would need to find new employment and/or learn new skills. In its earlier January 2017 report, MGI estimates that about 60% of all global occupations would have at least 30% of their activities automatable (p. 5). In mining, for example, MGI estimates that about half of all jobs have the potential to be automated, especially those that involve predictable physical activity (p. 7).

Cosbey et al. 2017 (‘Mining A Mirage?’) provides a more focussed analysis of how rapid technological change might affect the mining sector, both in Developed and Developing Economies. This research paper examines what could be expected in the mining sector “if technological change radically alters the amount of money mining firms are spending on hiring, procurement and other practices regarded as creating shared value” (p. iv). The paper assumes that rapid technological change will radically change how mining is done. For example, innovations could include ‘autonomous haul trucks and loaders’, ‘autonomous long-distance haul trains’, ‘tele-remote ship-loaders’, ‘semi-autonomous crushers, rock breakers and shovel swings’ and ‘automated drilling and tunnel-boring systems’ (p. v).

The paper assumes that such technologies could reach the peak of their deployment in the next 10-15 years. As a result, such automation might possibly eliminate jobs that constitute about 70% of the total employment in mines (p. vi). Moreover, over 90% of the impact of such automation is projected to be concentrated in a decline in payrolls. The main proviso is that since wages are lower in Developing Economies, the incentive to rapidly introduce labour-saving technology might well be more moderate.

Such rough projections imply that many ‘midcareer’ workers would have to be retrained. Such extensive retraining would likely be unprecedented in its scope. But the prospect that such retraining would become widely available in Emerging and Developing Economies, as well as in their Extractives Industries themselves, does not currently appear to be high.

Such ‘projections’ suggest that job creation in Extractives Industries would likely be dependent on two possibly contradictory tendencies. On the one hand, active labour market programmes would have to be adopted in order to move national workers up the employment ladder to higher-paying, more technical jobs. At the same time, the lower-paid employees in such companies could face substantially intensified downward pressure on their wage levels as automation increasingly threatens to displace them.

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**Twelve Country Case Studies and Bibliography**

Below are the 12 Country Case Studies that have been written as part of this general Research Paper on ‘Extractive Industries and Consumption Linkages to Enhance Industrialisation’. Included above in the main text have been short, introductory descriptions of their findings. However, many of the actual Case Studies provide significantly more detail.

## Chile (Copper Mining): A History of Consumption Linkages

Today Chile is known as the world’s largest copper producer. Its mining-sector output contributes more than 20% of total Chilean GDP, 60% of its exports and a third of its government income, making the country essentially commodity dependent.

#### ISI and Consumption Linkages

Most original empirical evidence on the consumption linkage from mining is derived from Chile and linked to its Import Substitution Industrialization (ISI) strategies of the 1940s and 1950s. During this period, the Corporacion de Fomento de la Produccion (CORFO or the Chilean Development Corporation), which was the government agency responsible for designing and implementing Chile’s industrial policy, targeted consumption linkages by increasing the price of imported goods through tariffs and non-trade barriers, differential exchanges rates and targeted subsidies (Silva, 2007; Sachs and Maennling, 2015).

However, these measures discriminated against the traditional agricultural and mining sectors (Silva, 2007). The CORFO did not adequately assess which goods and services would benefit the country’s mining sector (GIZ, 2016). Since at that time most inputs to mining, such as machinery and equipment, were imported, the ISI strategy affected the mining sector through causing it to pay higher prices for those imports than it would have had to do under a free-trade regime (Silva, 2007).

At that time, many of the copper mines were largely in the hands of U.S. companies that were benefitting from preferential tax treatment. Hence, they were mostly able to absorb the additional costs of more expensive imports (Sigmund, 1980; Silva, 2007). By contrast, other sectors, such as agriculture, suffered from more expensive agricultural inputs (Silva, 2007; GIZ, 2016). Therefore, the net benefits from the consumption linkage did not

materialize. Hence, while protectionism might result in stronger consumption linkages, it is widely considered to have decreased, in fact, the competitiveness of the mining sector.

#### The Effect of Liberalization on Consumption Linkages

In the context of the broader economic policy shift towards market liberalization and Export Oriented Industrialization in the 1970s, the mining sector in Chile underwent an important legal reform in 1974 (Lagos, 1997). Higher policy priority was given to enhance the sector’s productive output and make Chile an attractive destination for FDI in mining. Policies targeted foreign investors through generous tax and royalty concessions (Ebert & La Menza, 2015). In 2012, for example, Chile had one of the lowest top corporate tax rates on mining companies in a 22-country study of mining-based economies (PWC, 2012). Partly as a result, over the last 40 years Chilean mining output has increased dramatically, doubling its level on average every 12 years (Jara et al., 2010 based on COCHILCO data).

The commodity price boom between 2001 and 2011 resulted in large windfall profits for the government and strong fiscal linkages from the mining sector. For example, the country has often been lauded as an exemplar in managing revenues from copper, mainly through a transparent offshore sovereign wealth fund, and in containing exchange-rate appreciation as a basis to address problems of intergenerational equity and the Dutch disease (Collier et al., 2011, Sachs and Maennling, 2015).

While the Chilean government has clearly been very successful in addressing these aspects of revenue management, most revenue from private resources flow offshore in the form of remittances and profits to foreign multinationals, resulting thereby in a weak consumption linkage (Ebert & La Menza, 2015). With the abandonment of ISI policies and falling logistics and transport costs, there has been limited use of public and private funds to enhance domestic demand through productive investment in non-mineral tradable goods (Ebert & La Menza 2015; Sachs & Maennling, 2015).

Therefore, when taking a broader perspective on domestic consumption and human development, Chile’s sectoral success story could have been complemented by efforts to achieve a more balanced growth trajectory that would have included expansion of domestic demand (Ebert & La Menza, 2015). To some extent, Chile has targeted public investments to create thriving pine-tree, salmon and wine industries by using such incentive measures as export subsidies, credit lines, the sharing of start-up costs and the promotion of suitable technologies (Sachs & Maennling, 2015).

In 2006, the government established the Innovation for Competitiveness Fund, which has channelled copper revenues to finance Chile’s 15-year Innovation and Competitiveness Strategy. The government has identified seven clusters with high export potential, including tourism and agriculture, which could be supported and promoted for advancing diversification efforts (Sachs & Maennling, 2015).

In addition, as part of reducing the reliance on export demand and foreign savings, Ebert & La Menza (2015) has emphasised the importance of Chilean efforts to promote domestic consumption by raising labour productivity and boosting wages. But due to increasing productivity and technological advances, the demand for labour in Chile has declined precipitously (Ebert & La Menza, 2015). High productivity in the mining sector has pushed wages above those in manufacturing and agriculture, yet only 1% of workers in Chile are employed in mining (ibid).

#### Regional Consumption Linkage

Regional impact evaluations on the largest mining regions of Antofagasta and Tarapacá, which produce 75% of Chile’s copper, show that while mining has contributed to the economic advancement of these regions, they still lag behind in some key social and human development indicators (Parra & Franks, 2011). While Antofagasta ranks ahead of the rest of Chile and is close to some developed countries in terms of its income per capita and low unemployment rate, it still lags behind in some key social indicators, such as the quality of education and health, access to health services and life expectancy (Lagos & Blanco, 2010). However, the authors attribute this divergence to a lack of investments in large-scale health and education institutions.

Notably, Lagos and Blanco (2010) show that employment in the important region of Antofagasta is characterised by the largest proportion of high wage-earners in the country. The difference in percentages is 73% in Antofagasta versus 69% in the country. However, Aroca (2001, 20011) highlights the employment of local workers as an important channel for the consumption linkage. But such employment often remains weak because the workers and their families do not frequently live in the region itself.

Aroca 2011 estimates the consumption linkage in Antofagasta using employment and income multipliers and finds that in the mining sector, for each US Dollar that is produced, 9 per cent of it goes to the workers of the mining sector and between 7 and 15 per cent go to the workers in other productive regional sectors (p. 131). He notes that the impact on workers’ income depends on how much of the additional income is spent within the region. This is a critical issue in the mining sector because the magnitude of mining projects generates a labour demand larger than the local labour supply. Thus, workers are pulled in from other regions.

To enhance the impact of workers’ income on the regional economy, Aroca (2001) recommends to policy makers the promotion of labour immigration instead of using temporary ‘fly-in—fly-out’ operations, while noting that this would have a negative impact on the regions that had been formerly home to the commuting workers.

#### State-Owned versus Private-Owned Firms: Their Impact on Consumption

Aroca (2001) also emphasises important differences between the private and state-owned companies with respect to their respective management of the labour force. While state- owned companies hire almost all the workers that they need directly into the firm, private

firms outsource a large part of their operations and thus a large proportion of their potential labour force.

The calculation of an employment multiplier shows that for one worker hired in the private firm, between 3.1 and 5.7 additional workers will be hired in the whole regional economy. But this multiplier is lower for the state-owned firm because it more likely directly hires its workers. By contrast, while the private firm would have around 2000 hired workers, a state- owned firm with a similar level of production would directly employ around 7000 workers. When Aroca multiplies these levels of labour force in each firm (private vs. state-owned) by the employment multipliers, he finds that each firm has a similar overall size of workforce. Thus, there is not an overall difference in labour intensities, but a difference in the management of the firms due to private outsourcing versus public in-house hiring.

The state-owned firm also has a more egalitarian distribution of wages because it hires all the people who work in the mine. Also a state-owned company provides better working conditions and facilities for workers due to the size of its in-house labour force and economies of scale. In contrast, private firms hire only a small portion of the total workers who work in the mine, while the majority are outsourced onto the payroll of other firms. Usually, the salaries paid by the outside supplying firm are lower than the salaries paid by the private firm itself (Aroca 2001).

## Malaysia (Oil and Gas): The National Oil Company’s Impact on Consumption Linkages

Malaysia has been widely cited to have escaped the resource curse, based on its impressive growth record prior to the Asian Financial Crisis in 1997, its transition from an agricultural producer to an exporter of manufactured goods and its achievements on poverty alleviation (Doraisami, 2015). Even though the petroleum sector has never played a dominant role in the Malaysian economy, it has been a driver of economic development for decades.

Malaysia has employed its diverse natural resource endowments, in particular its revenues from crude petroleum and liquefied natural gas (LNG), for promoting industrialisation (Abidin, 2001; Yusof, 2011). Scholars have focused mainly on the fiscal linkage (Doraisami, 2015), while the consumption linkage has been regarded as one of the weaker linkages in light of Malaysia’s small domestic market, namely, its workforce of only 11 million people and its open economy.

Today, Malaysia has developed a skilled and capable nationally based workforce even though it still faces some reported shortfalls. These include the mismatch between labour supply and demand, a national brain drain out of the country (Fleming and Søborg, 2012) as well as a relatively high unemployment rate among new school graduates (Woo, 2006).

The state-owned National Oil Company, Petronas, has been a key vehicle to increase the participation of the domestic workforce in the resource sector. Not only has Petronas

served as a large employer itself, but it has also increased the participation of Malaysians in foreign oil companies such as Shell and Exxon.

Petronas grew from a mere 18 employees in 1974 to 53,149 in 2015, most of whom have been Malaysians (Petronas Annual Report, 2015). A high priority has been the objective of promoting local participation, which has been envisioned since the drafting of the Petroleum Development Act in 1974.

The mid-term review of the second Malaysia Development Plan 1971-75 (p.162) stated: *’The development of petroleum industries will not be merely restricted to the extraction of oil. Vertical integration will be stimulated. To enable Malaysians, in particular Malays and other indigenous people, to participate fully in this expanding sector of the economy, training programmes will be instituted.’* Under the terms of the Production-Sharing Agreement of 1996, contractors are required to:

* + Minimize the employment of foreign workers. To this end, the recruitment of foreign personnel requires the approval of Petronas;
	+ Train domestic Malay personnel. This includes the provision of capability development programs that enable Malay personnel to replace the expatriate workforce;
	+ Commit for each contract the allocation of a minimum monetary amount to the training of Petronas personnel; and
	+ Offer on-the-job training to personnel of the National Oil Company (upon the request of Petronas itself).

*Source: Tordo & Anouti, 2013*

The Malaysian case highlights the importance of government investments in education to create a strong consumption linkage. This is particularly important for addressing skills gaps, which often inhibit productive employment of the domestic workforce. In particular, Petronas has been driving human capital development since its establishment in 1974 and has thus significantly enhanced the employability of a domestic labour force in the oil and gas sector.

The mission statement of Petronas has always included a general commitment to developing and expanding the country’s industrial base, as well as developing local capabilities. Petronas has functioned as a pool for developing skills and local capacities through numerous training programs and the provision of scholarships. Since 1975 Petronas has sponsored more than 11,000 students to pursue secondary education and over 19,000 students to pursue tertiary education at home and abroad (Petronas Annual Report, 2012). The share of students that has pursued studies overseas was around a 38 per cent average between 1975 and 2005 (Petronas, 2005).

In 1997 Petronas established its own University, Universiti Teknologi Petronas (UTP) to train management and technical staff in engineering, science and technology-related academic

programs. UTP has produced more than 15,000 graduates and currently has an enrolment of over 1,200 foundation students, 6,000 undergraduates and 1,200 postgraduates from more than 66 countries around the world (UTP, 2017). The school is well recognised for its programs and has established several industry and academic partnerships. It is also noteworthy that in order to create a viable workforce, Petronas’ investments in education have also targeted primary school students.

Since Malaysian oil and gas reserves are located mainly offshore, Petronas also founded the Maritime Academy of Malaysia (ALAM) in 1983 with the aim of specifically supporting its shipping and vessels industry, which has supplied its oil and gas sector. The ALAM is a one- stop training centre for maritime activities, is owned and operated by Petronas and is a branch campus of the World Maritime University. In addition, the ALAM has several partnerships with leading maritime educational bodies around the world.

To develop the technical capabilities of its employees, Petronas also founded in 1981 the Institut Teknologi Petroleum of Petronas (INSTEP). Originally, the INSTEP was designed to offer programs for oil and gas technicians. Over time, the institute evolved to offer technical programs to general technicians, engineers and technical executives. For such training, the institute has engaged most multinational companies operating in Malaysia. (Tordo & Anouti, 2013)

Today, it offers bridging programs to produce job-ready technical graduates, professional development programmes for ‘upskilling’ workers, as well as competency-based assessment and certification to ensure that workers meet industry standards (INSTEP website, 2017). It also offers an integrated Upstream-Downstream Training Plant (UDTP) to provide simulated practical learning for workers before they are employed in a real commercial plant (INSTEP, 2017).

For managerial capability development, Petronas established a Leadership Centre in 1992, which offers programs across all disciplines relevant to Petronas’ activities (Petronas Annual Report, 2015). In 2015 the Petronas Leading Women Network (PLWN) was launched. In an industry that has traditionally been dominated by men, the women in Petronas’ workforce progressed to make up 28 per cent of its total employees in 2015 (ibid). Also 17 per cent of Board seats across the Petronas Group are now held by women.

## Ghana (Gold Mining): The Employment and Consumption Impacts of Large- Scale Mining

By 2009, Ghana was the second-ranked African gold producer after South Africa, and had become the world’s ninth largest producer of gold (Bloch, 2011). Even though the sector has a long history dating back to colonial times, from independence in 1957 to the early 1990s not a single new gold mine was opened (ICMM, 2007). Therefore, economic reforms along with the Structural Adjustments of the 1980s and 1990s included a new, investor-friendly minerals code. Since 1986, over US$5 billion have been invested in new mining projects

(ICMM, 2007). As a result, the contribution of the mining sector to Ghana's GDP has tripled from slightly less than 2% in 1991 to 6.3% in 2009 (Kapstein, 2011).

In contrast to oil & gas operations, gold mining requires a limited institutional and infrastructural base in order to prosper. It does not require skilled labour and there is no need for a domestic market since gold is mainly exported. Thus, gold mining in Ghana has been conventionally regarded as an enclave operation, exhibiting very few domestic linkages.

In contrast, Bloch (2011) has argued that backward linkages from gold mines have been increasing, shown by the emergence of a mining-inputs cluster of firms across the country’s various mining communities. The strongest linkage from this sector is the fiscal linkage, mainly in form of royalties on minerals revenues and the normal employer profits tax regime. In 2009, for example, Ghana's Internal Revenue Service (IRS) collected US$ 243 million in taxes from the mining sector, equivalent to almost 20% of its total tax collections (Kapstein, 2011).

In the new mining code of 2006, the maximum royalty that can be imposed was reduced from 12% to 6% while the minimum remained 3% (ibid). However, companies usually do not pay more than 3%. In response, Ghana's parliament recently voted to increase the minimum level to 5% for those companies without existing ‘stability agreements’, with effect from March 2011 (ibid).

The significance of the consumption linkage in Ghana is debatable, not least because it is difficult to measure and quantify (Bloch, 2011). The gold sector directly employed more than 17,000 workers in 2011 (Kapstein, 2011).

Historically, there has been some anecdotal evidence that Western Ghana’s mining towns feature a range of informal business activities, which appear to have been stimulated by mining incomes (Bloch, 2011). Recently, there have been more concrete efforts to present quantitative evidence on the consumption linkage (ICMM 2007, Kapstein 2011). According to a study on the Obuasi mine, the country’s oldest and largest mine, operated by AngloGold Ashanti, the mine directly employs about 6,700 employees and contractors, almost all of whom earn wages well over the national average (ICMM, 2007).

Some estimates are available for the Obuasi Mine. According to a rough estimation, this mine’s procurement generates between 1,000 and 5,000 jobs in the region. The induced employment generated by workers’ incomes is roughly estimated to be between 20,000 and 50,000 jobs. Given the absence of other large-scale formal employment, the Obuasi mine is thus a substantial generator of the employment on which the economy of Obuasi depends.

There is also some recent empirical evidence on the Newmont Ghana Gold Limited (NGGL) gold mine in the Brong-Ahafo Region of Ghana. It generates nearly 10% of the nation's total exports, attracts 4.5% of its total foreign direct investment and contributes 1.3% of its GDP (Kapstein, 2011). The Kapstein econometric study suggests that NGGL directly and indirectly

generates some 48,000 jobs in Ghana. There is no direct contribution of NGGL to profits and savings within Ghana because, as a foreign-owned company, all its profits apparently leave Ghana in the form of debt repayments to foreign financiers (ibid).

NGGL has policies in place that require that unskilled jobs within its operations and in its direct suppliers should be filled by local community people. Of NGGL's 1,739 employees, 619 (36%) have been verified to be local. Of its 2,911 contract employees, 883 (30%) are local, 1,960 (67%) are non-local and 68 (2%) are expatriates (ibid). These results are in keeping with the NGGL commitment to have, as a minimum, 35% of its total workforce be local employees. Reflecting their lower skill level at present, local employees earn, on average, US $563.13 per month, equivalent to 64% of the average salary of US $876.13, whereas non-local Ghanaian employees earn 120% of that amount (ibid).

In addition to paying wages and benefits that are above the averages found in Ghana's industrial sector, NGGL invests heavily in worker training (ibid). In 2009 the company spent USD $3.2 million on training; and, on average, each worker had 150 hours of skill training. Furthermore, Newmont has built on the Ahafo Linkages Program (ALP) and developed a broader policy on local content (World Bank, 2012). The ALP was set up, together with co- financier IFC, in 2007 in order to increase income and employment opportunities for the local economy by promoting the development of local suppliers who can provide needed goods and services.

Supported by the Ghana Chamber of Mines, mining companies have begun to develop programs for supporting greater local procurement, including identifying products with high potential for local production and conducting an analysis of local companies to expand production in these areas (World Bank, 2012). By 2009 the ALP had supported 99 companies with nearly USD$ 6 million in contracts and created 439 jobs, of which 330 were skilled and 109 unskilled (Kapstein, 2011).

In sum, NGGL has played a significant developmental role in the communities around the Ahafo mine. The program has also contributed some valuable lessons for supporting local procurement. It has stressed the importance of strong requirements for the entry into a supplier database since the Ahafo project has had 200 SMEs bidding for just five contracts a month. This experience has underlined the need for extra support in tender preparation and bid submission since SMEs do not usually have enough time to prepare documentation (World Bank, 2012).

As an additional supplement, this Case Study of the Resource Sector in Ghana highlights the problems in the significant Informal Sector of Artisanal and Small-Scale Mining.

### Informal Artisanal and Small-scale mining (ASM)

In contrast to formal large-scale mining, mainly operated by foreign mining companies, low- tech, labour-intensive artisanal and small-scale mining (ASM) is still deeply embedded in Ghana’s informal economy. An estimated one million people are employed directly in ASM

sectors in Ghana, the majority operating illegally (without a license or on unlicensed lands) and in very precarious conditions (Okoh and Hilson, 2011), with frequent reports of child labour (ILO, 2013; Hilson, 2010). The adverse environmental and social impacts of illegal artisanal mining in sub-Saharan Africa are well documented. Hilson (2001, 2002) has also found that women comprise approximately 15 per cent of the legal small-scale metal mining labour force but about 50 per cent of the employment in the illegal or ‘*galampsey’* industry.

Studies have highlighted that ASM has replaced smallholder farming as the principal income source in parts of rural Ghana. Structural adjustment policies have removed support for the country’s smallholders, devalued their produce substantially and stiffened competition with large-scale farms (Hilson and Garforth, 2013). Given Ghana’s very high unemployment rate, particularly for the 15–24 age group (30%), coupled with extreme poverty, people have moved from small-holder farming into ASM out of necessity (Banchirigah, 2008).

The government has taken three main approaches to combat the problem of illegal ASM in Ghana: military intervention, formalisation, and alternative livelihood projects (Banchirigah, 2008). However, these conventional strategies have proven largely ineffective in preventing the expansion of illegal artisanal mining in Ghana. Military intervention has required considerable financial backing and has usually been funded by mining companies. As a result, severe human rights abuses have been reported.

Ghana legalised small-scale mining in 1989 when the government passed the ‘Small-Scale Gold Mining Law’, ‘Mercury Law’ and the ‘Precious Minerals and Marketing Corporation Law’. The laws required small-scale miners to register with the Mineral Commission. According to Banchirigah (2007), the responsible agencies (namely, the Mineral Commission and its allied government bodies, the Mines Department and the Geological Survey Department) have not kept pace with ASM’s growth. For example, there have been only about 20 government officers ‘regulating’ ASM in Ghana.

The root of the problem has been the failure to ‘operationalise’ ASM legalisation. The Minerals Commission has delegated each allied government body a specific task with respect to ASM formalisation. However, since the majority of agencies have been unable to fulfil their commitments, the Minerals Commission has been placed in a difficult and overstretched position, often resulting in severe delays in registration (Hilson and Potter, 2003).

The registration process has also imposed additional travel and financial burdens on ASM miners. Banchirigah (2008) argues that inappropriate regulations and the promotion of foreign investment in large-scale mining projects at the expense of the welfare of rural communities have made securing a small-scale mining licence very difficult. These factors have prevented artisanal miners from securing a license, and deprived them of access to the services made available to legal operators, including technological support, credit, loans and education.

The most promising strategy in this area has been the provision of alternative livelihood programmes in an effort to reduce illegal mining and raise rural living standards by providing alternative incomes. Both the Ghanaian Government and several large-scale mining companies such as Anglo Gold Ashanti and Newmont have launched a number of (mainly agrarian-based) alternative livelihood projects. Banchirigah (2008) argues, however, that these activities have done little to address the illegal mining problem. Despite being promoted as ‘alternatives’ to artisanal mining, in many cases it is the nearby local communities that are targeted for alternative livelihood programmes, not ASM miners themselves.

With few employment alternatives, informal miners are forced to continue operating illegally. Thus, livelihood programmes should be restructured to include artisanal miners, initially by offering formalised ASM as an alternative. One potential solution to this problem that has been recently discussed has been to pressure multinationals to relinquish unused portions of their concessions.

## Zambia (Copper Mining): The Effect of Privatisation on Consumption Linkages

Although Zambia’s GDP has grown significantly during the past decade, economic growth has been employment-neutral. Lack of productive employment and income opportunities are at the core of Zambia’s high poverty levels (UNDP, 2016). The copper sector plays a significant role in Zambia’s economy. From 2007, Zambia’s copper exports contributed 74– 81 per cent of total foreign exchange earnings and 10 per cent of formal employment. In 2010 the sector contributed about 10 per cent of GDP (Fessenhaie, 2012 based on World Bank data).

Thus, Zambia’s copper belt has received a lot of attention in the literature on extractive industries. Scholars have focused largely on the economic and social impacts of the privatization and liberalisation of the copper sector in the context of Zambia’s Structural Adjustment Programme in the 1990s (Fraser and Larmer, 2010). This programme involved dismantling the majority-government-owned Zambia Consolidated Copper Mines (ZCCM) and selling all mines but one to foreign investors. These policies succeeded in attracting Foreign Direct Investment (FDI) into the mining sector, including the entry of Chinese and Indian FDI, and dramatic increases of copper production (Fessehaie, 2012).

As incomes and profits are mainly reaped abroad, and foreign goods and services are imported, these reforms have resulted in a weaker consumption linkage. New foreign investors reduced copper employment by almost one-third, stripping the workforce from 31,000 at the sale of the first mine in 1997 down to 19,145 in 2001. This compares to a peak of 62,222 in 1976 under the ZCCM (Fraser and Larmer, 2010). In 2014 only 1.4% of the total labour force was employed in mining (UNDP, 2016). Casualization, lower wages and subcontracting were among the most salient results of privatization in the Copperbelt (Lee,

2010)*.* There is also evidence to suggest a resultant weak fiscal linkage due to tax exemptions given to attract FDI.

With increased foreign ownership and control of the sector, there has been less domestic participation of domestic supplier firms (Fessehaie, 2012). Today the share of domestic firms in the mining sector market—which is estimated at over US$ 2.5 billion a year—is less than 4 per cent.

After the reforms, mining companies were no longer bound to preferential procurement policies. As a result, domestic manufacturing companies suffered (Fessehaie, 2015). Zambia does not have a mandatory local-content policy in its legislation (ibid). Before 2008, voluntary local-content provisions negotiated in the bilateral agreements between the government and mining companies were not implemented (ibid). In 2008, these agreements were replaced by the 2008 Mines and Minerals Development Act, which included provisions on favouring local suppliers (Kasanga, 2012).

In 2013, the Chamber of Mines of Zambia and the Zambia Association of Manufacturers, working with government and mining companies, launched the Zambian Mining Local Content Initiative (ZMLCI). There is some evidence to suggest that these more recent local content policies in the Copperbelt obliged many companies to invest in local employment, training and promotion of Zambian workers (Fessenhaie, 2015).

A recent study by the IMCC points to the positive employment impacts of the four largest mining companies in Zambia. According to the study, these four companies employed 56,300 people in 2012, almost all of whom were Zambian (98–99 per cent) (ICMM, 2014). The study also suggests that the resultant multiplier effects greatly increased the overall employment contribution, suggesting that every job in the mining industry created four to five additional jobs. Hence, the total employment generated by the four largest mines in Zambia is estimated at about 100,000 jobs in the Copperbelt and 40,000 in the New Copperbelt (ICMM, 2014).

The Government of Zambia recognized that localisation requirements also need to be complemented by an aggressive skills development strategy through technical and vocational schools and apprenticeship programmes (Fessehaie, 2015). In fact, 82% of the labour force in the mining sector has no recognised quarrying skills, and training efforts have been poor and unsustainable (Adam Smith International, 2017). In order to address the skills gap, in 2013 the Government of Zambia created a Mining Skills & Training Framework (MSTF) based on the signing of a Memorandum of Understanding in which all parties committed to supporting collaboration, enhanced training and the upgrading of skills.

These efforts were complemented by the creation of an organisation, namely, the Zambian Mining Skills, Education and Training Institute (ZAMSET), based on an industry-government- education system collaboration. Its task was to plan, commission and monitor contracted education-development initiatives (ZAMITA Project Document, 2014). The MOU

acknowledges the need to focus on the skills development system from basic level up to advanced levels and on the need for a private-sector demand-driven system. A key issue for MOU signatories is now how to operationalize the MSTF, especially fostering stakeholder cooperation in the coordination, implementation and financing of the initiative (ZAMITA Project document, 2014).

1. **Botswana (Diamond Mining): The Development of Forward Linkages** Botswana, the most diamond-rich country in the world, is widely regarded as an African success story. Despite the country’s resource wealth, Botswana has experienced sustained rapid growth rates since independence and has been regularly celebrated for its good governance, political stability and strong fiscal discipline (Acemoglu et al., 2002).

Diamond mining has been the backbone of the country’s economy since the 1980s. In 2012 mining contributed 22% of Botswana’s GDP and 41% of Government Revenue. Even though Botswana’s diamond-led growth has resulted in an undiversified economy (which has resulted in a recent slowdown caused by depletion of its diamond reserves, the Government has historically used mineral revenues to successfully foster economic development.

However, despite its success, Botswana has experienced mainly job-less growth, with consistently high unemployment rates, which have even increased in recent times (Pegg, 2010; Mbayi, 2011). The capital- and technology-intensive nature of large-scale diamond mining has resulted in an industry that employs only about 8,000 people in Botswana (IMF, 2007, p. 63), and has only limited linkages with the rest of the economy (Gwebu, 2012).

Notably, Botswana has successfully developed forward linkages into processing and fabrication of output on the basis of over 21 licensed diamond cutting and polishing ventures (Mbayi, 2011). Two manufacturers are even already involved in manufacturing jewellery. The downstream diamond industry has grown as a result of the Government’s mineral beneficiation policy: ‘The Beneficiation Policy and Botswana Excellence: A Strategy for Economic Diversification and Sustainable Growth, National Special Economic Zones and Establishment of a Diamond Hub’ (Mbayi, 2011).

Given Botswana’s high unemployment rate, job creation has been one of the factors motivating the government’s beneficiation policy. Although the government failed to establish a cutting and polishing industry in the early 1980s, some valuable learning took place (Mbayi, 2011). So, under the government’s new policy, independent mines handle their own sales, but all diamonds coming from the new mines must be sold in Botswana.

In 2005, using the renewal of a mining license, the government negotiated a new agreement with the country’s biggest diamond producing company, DeBeers, to help Botswana develop a viable cutting and polishing industry (ibid). DeBeers mines diamonds in Botswana through a 50% government-50% DeBeers joint venture known as Debswana. Prior to this agreement only three cutting and polishing factories were operating in Botswana and there was no local rough-diamond sales to these factories. Instead, their rough diamonds were supplied by the Diamond Trading Company (DTC) International as well as by the open market.

Based on the DeBeers agreement, the government managed to relocate the Diamond Trading Company’s sites and sales offices from London to Gaborone. To deal with activities along the diamond value chain, including facilitating, driving and supporting the creation of a sustainable and profitable downstream diamond industry in Botswana, the government established dedicated institutions such as DTC Botswana, Okavango Diamond Company and the Diamond Office.

Recent studies show that there is a high degree of localisation in the diamond industry’s forward linkages. Wage bill estimates show that consumption linkages resulting from direct employment in the cutting and polishing industry are more valuable than in the supply chain. The cutting and polishing industry accounts for income of about US$48 million per annum and represents 45 per cent of the manufacturers’ local wage bill (Mbayi, 20110).

But there is also a greater proportion of local value added in the supply chain itself than in the cutting and polishing firms, with 46 per cent, or US$4 million, from the supply chain’s wage bill accruing to locals (Mbayi, 2011). The most significant local linkages take place through the direct local employment in the sixteen cutting and polishing factories.

However, a stronger consumption linkage from the downstream sector is being hindered by the limited downstream skills amongst local workers and their low wages (Mbayi, 2011). The proportion of the wage bill accruing to expatriates is almost double that of local workers (Mbayi, 2011). This disproportion results from expatriates getting paid considerably more than locals. Furthermore, about 2,730 local workers are estimated to be employed in these firms, while only 210 expatriates are estimated to be employed (Mbayi, 2011).

Thus, 7 per cent of the workforce earns 65 per cent of the wage bill. So the consumption linkages generated by local workers are considerably less than those generated by expatriates. But, in comparison to local workers, expatriates probably spend a smaller proportion of their wage bill in Botswana. Expatriates earn more because they are more skilled.

Hence, considering how much more the firms pay expatriates, it would make business sense for them to create more skills among local workers. A major drawback in any case is that final demand linkages within Botswana are limited for both sets of workers since a large percentage of the goods consumed domestically are imported from South Africa (IMF, 2007,

p. 40). Norberg and Blomstrom (1993, p. 176) argue further that with majority foreign ownership of firms, ‘‘revenues and profits from the diamond industry have been kept in foreign capital markets rather than invested or consumed at home and this policy has largely reduced the spending effect.’**’**

Thus, while the Botswana diamond sector can be regarded as a relative development success story, public policy still needs to address the creation of local skills in the industry in order to further strengthen the development and localisation of consumption linkages. The government needs a clear policy on the creation of skills and human capital for the cutting and polishing industry, particularly difficult-to-replicate industry-specific skills.

It is advisable to work with vocational training institutes and universities to respond to this need and expand the spread of higher technical skills that are required by the mining industry. With regard to firm-specific skills, the government needs to set clear targets for skills transfers to local workers in the cutting and polishing industry and implement, in particular, the registration of training programs in the 13 firms that have not yet accredited their training programs with Botswana’s training authority (Mbayi, 2011).

## Norway (Oil and Gas): Intersection of Backward Linkages and Domestic Consumption

Norway’s oil and gas industry is regarded as one of the most efficient and transparent regulatory systems in the world. Norway is also widely lauded for its administrative and institutional system of clearly defined separation of government functions (Mehlum et al., 2008). These attributes have generated much interest in the potential transferability of the “Norwegian Model” to other oil and gas producers (Thurber et al., 2011). At the same time, Norway has one of the highest levels of disposable income per capita in the world, a low unemployment rate, good-quality public services and one of the highest living standards in the world (Acheampong et al., 2016).

Norway has established both effective oil firms, such as Statoil and Norsk Hydro, and an internationally competitive oil service industry. The Norwegian petroleum exploration and production segment displays strong backward linkages to local service and construction sectors (Tordo & Anouti 2013). Local content is high, around 50-60% in upstream operations, and up to 80% in maintenance and operations (Nordas, 2003). The Norwegian service and supply industry is currently the second-largest industry after the direct sales of oil and gas.

While the industry is mainly known for its high productivity and innovative capacity, statistics for 2012 show it only employed an estimated 125,000 people domestically (Acheampong et al., 2016). This number implies that less than 1 per cent of Norway’s labour force is employed in upstream oil and gas. Employment in petroleum-linked activities amounts to another 3.5% of the total economy (Nordas, 2003). However, the high wages earned in this sector as well as Norway’s welfare state implies that there are still strong consumption linkages.

Social welfare and public social spending have also been important for Norway’s development. Oil rents constitute extra income for all citizens. Hence, the majority of citizens have reasons to favour an expansion of public *social* spending rather than tax cuts (Mehlum et al., 2008). While manufacturing production has declined as a result of abundant oil income since the early 1970s, oil revenue has helped finance the expanded production of services, particularly in the public sector. However, this expansion in services has not led to a dramatic decline in other employment.

Part of the reason is a sharp increase in the female labour-market participation rate since the mid-1970s (Mehlum et al., 2008). This increase in labour force participation has been

made possible, in part, because of subsidized higher education, especially for women, as well as the increased provision of day care for children since the 1970s. Thus, social policy has contributed significantly to a higher labour force participation rate.

Ryggvik (2015) differentiates between two distinct phases of oil-sector development in Norway. Firstly, during a protectionist phase, there was a strong focus on local content in order to develop effective Norwegian oil companies as well as a national oil service industry. Secondly, there was a phase of liberalization or financialisation, where new forms of contact and openness to foreign ownership resulted in the international competiveness of Norwegian oil firms as well as related oil supply and service firms.

To foster a local industry, the Norwegian government initially promoted local participation by favouring the state-owned firm Statoil in licensing rounds and encouraging the use of locally produced goods and services. The government prefers that Norwegian-based firms should be chosen when they are price-competitive but it does not have any local-content legislation or requirements (Acheampong et al., 2016). However, in the late 1970s and early 1980s, local firms were contractually chosen, even when they were not the most cost- effective (Acheampong et al., 2016).

The government further sponsored a supplier development programme to encourage the use of Norwegian local service companies. This was attributable to deliberate local-content initiatives contained within its operational contracts. When foreign oil companies brought their international supply chains to Norway, they were required to set up fully operational subsidiaries in Norway and encouraged to recruit local staff. The Norwegian government negotiated with oil companies through concessionary procedures in order to expand the existing knowledge and skills base and thus further facilitate the development of local expertise in the sector.

Notably, Norway had very favourable initial conditions for building linkages at the time of oil discovery. The country was able to effectively leverage on its existing industrial base in shipbuilding and marine services (Klueh et al., 2007). Both capital from Norwegian shipping circles and the related technological skills of the shipbuilding industry played important roles when Norwegian firms transitioned into serving the new oil sector (Howard, 2015).

Moreover, Norway’s small, educated and highly skilled workforce is also widely regarded among scholars as its foundation for success. The academic environment in Norway at the time of the petroleum discoveries was quite advanced and educational programmes for maritime activities, energy-intensive process industries, metals and materials and geology were already part of the domestic knowledge base (Acheampong et al., 2016).

Early government efforts in spending on education coupled with industry-wide training efforts have produced a highly skilled workforce (ibid). Norway has had a demand-led and industry-focused technical and vocational system that has long prepared school-leavers to work in the industry. Furthermore, the government has funded dedicated university programmes in Petroleum Engineering (Andrews and Playfoot, 2014).

## Australia (Mineral Mining): How Commodity Prices Impact Local Labour Markets and Consumption Patterns

Australia’s economy has historically benefitted from the country’s various mineral deposits, ranging from gold, coal, copper, diamond and iron fields to some oil and gas reserves. Among the group of developed economies, Australia has a uniquely high level of dependence on the minerals sector. Minerals’ direct contribution to GDP has been around 9 per cent for recent decades (ABS, 2017). Changing work practices and mining methods have meant that mining employment in Australia peaked in 1985–86 and is now considerably below these levels (Sheehy & Dickie, 2002).

Today, the sector employs less than 2% of the total labour force, and employment and wages have been declining. (Australian Bureau of Statistics, 2016). However, the mining equipment, technology and services (METS) sector is highly developed and comprises 7% of Australia’s GDP and 7% of its employment, much more than mining itself (OECD, 2017).

#### Impact of prices and automation on employment and wages

Australia has a long history of booms and busts, dating back to the first gold rushes in the 1890s. Several studies have shown the close link between commodity prices, labour supply and demand in the mining industry. The 2000s commodity boom generated substantial growth in mining, with subsequent impacts on business activity and employment (Rolfe et al., 2007). Tonts et al. (2010) for instance has shown how booms and new investments have resulted in rapid employment growth, often leading to labour shortages in remote locations.

Today, with low mining commodity prices and declining sectoral investments as well as increasing environmental concerns, Australia’s minerals sector has been facing a downturn (ABS, 2017). As companies have been cutting costs, the current downturn has adversely affected employment, working conditions and wages. Despite the decline in wages, average full-time weekly pay in the mining sector is $2,100, which is 67 per cent higher than the all- industries average (MCA, 2016 based on ABS, *Average Weekly Earnings Nov. 2015).*

While the industry has been downsizing, automation has further resulted in reduced employment. Franks et al. (2012) found that as automation increases within the industry, the number of on-site jobs decreases. Some roles, such as driving trucks and trains and manually operating drilling rigs and underground equipment, are likely to disappear over the longer term (ibid). However, while large-scale automation may lead to reduced growth in mining employment, new higher-skilled roles in equipment maintenance, data processing, systems and process analysis, operational control and mine planning are likely to emerge (ibid).

#### Australia’s education and training system for skills development

Notably, while the industry’s labour intensity has been decreasing the sector has attracted and developed a highly skilled labour force. The sector employs more geologists and geophysicists, industrial and mechanical engineers, and metallurgists and physicists than any other industry (MCA, 2016). Australia is globally recognized for its education and

training for the mining sector.

Industry links are fundamental to the success of Australia’s National education and training system. Australian industry and education and training providers work together closely through a number of national government-supported programs. For instance, Mining Education Australia (MEA) is one program delivering undergraduate education in mining engineering. It is a national education joint venture between the four major mining education providers in Australia; Curtin University, The University of New South Wales, The University of Queensland and The University of Adelaide, wherein a common curriculum is delivered in third and fourth year for all students of mining engineering at the partner universities (Austrade, 2011).

Australia also has 11 Industry Skills Councils with the mandate to bring together industry, employers and employees, training providers and governments on a common industry-led agenda for action on skills and workforce development. For instance, SkillsDMC is a National Industry Skills Council for the Resources and Infrastructure Industry, representing the Coal Mining, Metalliferous Mining, Quarrying (Extractive), Drilling and Civil Infrastructure sectors.

As an advisory body established by the Australian Government in 2003, SkillsDMC develops and implements skills-competency standards suitable to the resources and infrastructure industry. It aims at matching the skills demanded by industry with the skills supplied by the training sector. SkillsDMC is thus responsible for defining industry skill specifications, providing best practice solutions for workforce planning and development, as well as facilitating access to skills investment programmes. A particular success has been the development of the Australian Resources and Infrastructure Industry Training Package (Skills Competency Recognition Framework), which has been adopted by industry and government to support workforce development and skilling strategies (SkillsDMC 2017, IPIECA, 2016)

#### Ramifications at a local level and the design of social impact assessments (SIAs)

The mining industry has important ramifications at local level as a source of employment and income for regions, communities and mining-service towns. Local social impact assessments of Australia’s mining industry—mainly focusing on the impacts of commodity booms between 2003 and 2008—have demonstrated a disjuncture between impacts at the national and the local level.

While aggregate studies have generally shown a positive effect of the mining boom at the national and regional levels in terms of income, employment and therefore consumption, there are sometimes adverse effects at the local community level. Companies have been frequently using fly-in-fly-out labour practices to address labour shortages resulting from rapid expansion of mining operations, which local labour markets are unable to effectively address (Tonts, 2009).

Due to commodity price volatility as well as the life cycles of mines, the industry requires a more flexible workforce through the contracting and subcontracting out of on-site activities (Tonts, 2009). While unemployment in mining towns is low, booms often result in a reduction in labour availability for non-mining businesses, resulting in the *crowding out* of

local businesses. The decline of alternative employment opportunities often poses a problem for mining-dependent residents when there is a contraction of mining employment (Lockie at al., 2009).

Furthermore, the increased reliance on a non-resident workforce has meant that an increasing proportion of incomes and profits from mining is flowing out of the mining towns into regional centres (Rolfe et al., 2007). A study on two social impact assessment (SIA) studies of Central Queensland's Coppabella coal mine, the first in 2002–2003 and then the second in 2006–2007, emphasise the importance of also considering the cumulative impacts of multiple mining projects within relative proximity to one another (Lockie et al., 2009).

The single project focus of most SIA studies makes it difficult for policy makers to draw more general conclusions about how communities might be impacted during fluctuations in commodity cycles as well as specific project cycles—namely, activities should be addressed in SIAs (Lockie et al., 2009). Despite the increasing dependence on mining employment and income, communities often fail to reap the benefits in terms of consumption linkages because of severe shortages of skilled labour in other industries and reduced access to accommodation and affordability.

It is important that impact-mitigation strategies focus not only on immediate, or acute, concerns but also on the development of human and social capital necessary for communities to cope with a wind-down of mining activity. Therefore, communities have to consider ways of attracting secondary investment and/or alternative industries early in the operational life of a mine in order to secure long-term significant economic benefits.

**Indigenous employment**

Mining is the most significant economic contributor to Indigenous communities in regional and remote areas of Australia. However, studies have also highlighted the marginalisation of aboriginal peoples in the mining sector (Solomon et al., 2008; Langton and Mazel, 2008). Purpose-built mining service towns have been historically characterised by low representation of Indigenous people (Petkova et al., 2009). The federal government’s response has been to encourage joint initiatives between government agencies, Indigenous advocacy groups and private-sector organisations to tackle the causes of the socioeconomic disadvantage of Indigenous people (Brereton et al., 2008).

In 2005, the federal government and the Mineral Council of Australia signed an MOU, with one key deliverable identified for the agreement being increased employability and jobs for Indigenous people, both within the minerals sector and more generally. To address the problem of lack of education and relevant training amongst Indigenous people, government funding has been made available for a range of initiatives, including the Structured Training and Employment Program (STEP), which is a key component of the Federal Indigenous Employment Policy (IEP).

In addition to spending on other components of the IEP, the Structured Training and Employment Projects (STEP) and Wage Assistance received $28 million and $4.4 million of funding respectively. Other components of IEP have included the National Indigenous Cadetship Programme, Corporate Leaders for Indigenous Employment, Community

Development Employment Projects Placement Incentives, and Voluntary Services to Indigenous Communities Foundation.

It has been recognised that mainstream recruitment practices are frequently not appropriate for Indigenous peoples, and alternative approaches that reflect cultural practices should be applied (Brereton et al., 2008). For example, studies on the Indigenous involvement in the Bowen Basin coal industry in Queensland have shown that the most effective approach or model appears to be a combination of industry-specific training prior to employment complemented by some additional support for training and mentoring post- employment (Brereton et al., 2010).

Over the past two decades, employment of Indigenous Australians in the minerals industry has increased significantly, from 0.5 per cent to 6 per cent (MCA, 2016). The all-industry average is 1.4 per cent. Indigenous women make up 19 per cent of the Indigenous workforce in mining, compared with 13 per cent industry-wide (MCA, 2016). The federal government has been particularly keen to foster links between Indigenous communities and the minerals industry and the sector spent $2.2 billion in procurement from Indigenous businesses in 2013 (MCA, 2016).

Franks et al. (2009) have noted that the on-going impact of automation and remote operations might be disproportionately affecting Indigenous employees, since these are more than half of the workforce employed in lower-skills and entry-level roles that are earmarked for replacement.

## Canada: Mining Operations and Indigenous Communities

Canada has a long-standing mining history dating back even prior to European settlement. The mining industry remains a major player in Canada’s economy and contributes nearly 5% of the country’s GDP. In particular, downstream activities—including refining, smelting and other primary-mineral manufacturing—make a strong contribution to the Canadian economy (UNCTAD, 2011). Overall, mining accounts for about 3% of total employment. The industry employs about 380,000 workers in various parts of the value chain (from extraction to manufacturing), including 10,000 Indigenous peoples (MAC, 2014).

Employment has declined over recent years, a trend attributable primarily to restructuring resulting from technological advancements and foreign competition (MAC, 2014). Mining remains the highest resource-sector wage occupation in Canada (Gibson, 2005). The average weekly earnings of employees in the sector were around US$ 900 in 2000, compared to an average of USD$ 500 in all other industries (Statistics Canada, 2000). Employees working specifically in metal mines did even better, taking home weekly incomes of US$ 1,196 (Statistics Canada, 2000).

Mining development occurs mainly in areas occupied by Indigenous people in Northern Canada, and has therefore impacted this group disproportionately. Access to mining opportunities has often been difficult for aboriginal people because of their differing educational backgrounds, lack of experience in the sector, cultural barriers and discrimination at the workplace, as well as the imposition of the ‘fly-in, fly-out’ system of work schedules that has been unfamiliar to aboriginal people (Sosa and Keenan, 2001).

At the Federal level, the Minerals and Metals (MMR) Policy lays out Canada’s overall regulatory framework for the mining sector (OECD, 2017). Except for uranium, each province has exclusive power over mineral exploration, development, conservation and management (OECD, 2017). Canada has few formal, specific requirements within its federal legislation aimed at encouraging greater local content and participation in mining.

The local-content measures specific to the mining sector are heavily focused on supporting Indigenous peoples as a key target group (OECD, 2017). It should be noted, however, that the Government of Canada does not consider these policies to be local-content policies *per se*, because they are merely requirements for companies to consult with local communities over mining development that might impact established or asserted Aboriginal or Treaty Rights (OECD, 2017). Such policies are therefore less prescriptive than formal provisions in legislation; they are more ad hoc, practical ‘partnership approaches’ to negotiate agreements with stakeholders.

The hiring of aboriginal people is agreed in so-called Impact and Benefit Agreements (IBAs) signed between impacted communities and mining companies. There is little guidance regarding what an IBA should contain and exactly which provisions a ‘First Nation’ of aboriginal people should seek. IBAs often incorporate employment provisions, which might include a hiring policy that gives preference to First Nation job candidates and sets targets or quotas for their employment on a project (Sosa and Keenan, 2001).

For Indigenous people who have little or no formal education, IBAs often establish years of work experience as an equivalent of their years of schooling (Sosa and Keenan, 2001). Some Agreements also specify requirements regarding the advertising of available positions, such as in aboriginal newspapers, in order to give advance notice and priority to aboriginal people (ibid). There could also be some provisions to ensure that aboriginal people are the least affected by lay-offs, such as giving priority to aboriginal status over seniority. Sometimes provisions seek to remove the cultural hurdles to aboriginal participation in the mining workplace and address labour relations and rules for employee discipline, with the purpose of avoiding discrimination against aboriginal people by superiors (Sosa and Keenan, 2001).

Some IBAs contain training and apprenticeship programs, educational programs in primary and secondary schools focused on the mining industry, and scholarships that allow local people to study subjects related to the mining industry. Where a government is a party to an agreement, communities can demand that it cover some of the expenses of this training (Sosa and Keenan, 2001). Since mining projects have a limited life cycle, it is important that communities seek investment in education and training in skills that are transferable to other industries.

Some IBAs go beyond these features and include provisions to help First Nation employees find alternative work when the mine closes. Finally, IBAs might demand that some of the above requirements be imposed not only on the mining company but also on its contractors

and subcontractors, which are not usually parties to such agreements (Sosa and Keenan, 2001).

An ad hoc IBA approach is necessarily strongly influenced by the negotiating strategy and strength of local communities and might imply in some cases less comprehensive enforcement and monitoring of agreements (OECD, 2017). For example, in 2003, Diavik Diamond Mines employed 221 Aboriginal employees out of a total of 611 employees (Diavik Diamond Mines, 2003). But based on a goal of 40% being Aboriginal hires, the 221 number still falls short.

Sosa and Keenan (2001) note that it is common for IBAs to be written in vague language, with ambiguous terms that hinder their implementation and enforcement. A common reason for the failure of an IBA is the premature closure of the mine. Sosa and Keenan also emphasise that it is important to form an effective negotiation team, with people who can represent the interests of all of the sectors of the population involved, as well as experts in environmental, legal and mining issues. The team should also be independent of the internal politics of the community.

Despite IBAs, outsiders still disproportionately occupy the highest ranks and paid positions in mining enterprises (Gibson et al., 2005). Without training provisions, entry-level positions carrying the least opportunity for advancement are commonly occupied by Indigenous people. There is also differentiation among Indigenous communities themselves. Mining companies often favour communities closest to the mines. Hence, more remote communities might be given a much lower priority for mine employment. Within a community, employers also favour those with the highest levels of education and experience. Hence, mining enterprises might leave behind those with the lowest educational qualifications, and thus further stratify communities into “haves” and “have nots”.

Also, due to the time demands and remote locations associated with shift work and mining operations, employment in mines can be more feasible for those with the least financial responsibilities—namely, people without families. Thus mining is “disproportionately attractive to those who least need the income and are most likely to spend it wastefully, if not in socially abusive ways”, such as on alcohol (Hobart, 1982: 72). However, those potential workers who do have families, especially those with elderly or young dependents to support, are, in reality, those most in need of the additional income.

## India (Coal Mining): The Gender Dimensions of Employment and the Effect on Household Consumption

Even though India has been the world’s third-largest producer of thermal coal, the contribution of this sector to its GDP has varied between only 1% and 2% over recent decades (MOPSI, 2016). But direct employment in formal coal mining in India does remain significant so this trend has important implications for the consumption linkage.

The state-owned enterprise Coal India Limited (CIL) accounts for 82% of India’s coal production. CIL is also the biggest employer in the industry, with over 333,000 regular workers. This statistic excludes over 90,000 contract workers (Coal India Limited, 2014; Ministry of Coal, 2017). However, official data on mining employment and production might not reveal the full magnitude of coal-mining activities in the country since informal economic activities are significant.

Moreover, incomes generated in mining often differ across lines of gender, class, ethnicity, and—in India—religion and caste. For example, the magnitude of wages and earnings as well as the ensuing spending on consumption or reinvestment are often differentiated by gender. Employment in mining that offers higher wages and better working conditions continues to exclude women (Lahiri-Dutt, 2007).

Where men are favoured in employment patterns, they are less likely than women to spend money on the family or household needs and more likely to spend on luxury goods such as alcohol (GIZ, 2017). A 2009 World Bank study on the gender dimensions of extractives industries found that where women’s livelihoods have been displaced by the exclusive reliance on male providers, overall household consumption might actually decrease.

Though formal mining activities are usually male-dominated, studies have highlighted the significant participation of women and child labourers in India’s informal coal mining sector (Lahiri-Dutt, 2007).

Within the formal Indian coal industry, the proportion of women’s employment varies regionally, as evident from company data for the years 1999-2000 (Lahiri-Dutt, 2007 based on Coal India Limited data). But among all coal companies in India, CIL and its various subsidiaries have notably the highest female labour participation rate, namely, about 12%.

CIL has encouraged the formation of an organisation called ‘Women in the Public Sector’ (WIPS) with the objective of ‘optimising the full potential of its women employees and [playing] a catalytic role in improving the status of women’ within the coal industry’. WIPS’ activities comprise welfare activities, training and development activities, seminars, cultural programmes, industrial awareness visits and health awareness programmes (Ministry of Coal, 2011).

However, the organisation is city-based. Hence, it has had limited outreach and impacts. The representation of women from lower castes and tribes, who actually work on mine sites, have also been generally absent from this organisation (Lahiri-Dutt, 2007).

## Peru (Mining): Strengthening Local Consumption Linkages

Peru has a diversified mining sector. It is the world’s second largest producer of silver, third largest producer of zinc, fourth largest producer of lead, fifth largest producer of copper, and the sixth largest producer of gold. Driven by privatization and other reforms since the early 1990s, as well as the 2000s commodity boom, the mining industry has been a fast- growing sector over recent decades. This sector has been an important source of FDI for the

Peruvian economy. But even when it is combined with the petroleum sector, it accounted on average for only for about 7% of GDP between 1996 and 2000 (Bury, 2005). In 2005, the mining industry employed over 70,000 people directly and 350,000 people indirectly, many of them in Peru’s poorest rural areas (World Bank, 2005).

The socio-economic impacts of mining operations in Peru are contested, especially at the local level. For example, studies on the large gold mine Yanacocha, which accounted for 43% of all gold production in Peru in 2000 (Newmont, 2002), have shown that its operations have had a significant impact on local economic activities (Bury, 2005). In 2000 the mine employed more than 7,000 people, of whom 57% were from the Cajamarca region, one of the poorest rural regions in Peru (Bury, 2005). It also purchased goods and services from more than 413 providers in the region, and became the largest landowner (MYSA, 2002).

The impact from the consumption linkage from the mine is significant. Construction and housing markets have expanded as the demand for new materials and accommodations have increased. In fact, Aragón (2013) provides empirical evidence that Yanacocha had a positive effect on the local economy through its demand for local inputs. The effect created, in turn, a greater demand for labour-intensive services (ibid). Aragón (2013) argues that this effect resulted, in turn, in an increase of nominal wages in the service sector in Cajamarca city and surrounding areas—relative to those in locations further away.

To the extent that workers are mobile across sectors, this effect could also increase the wages of other workers who are not directly linked to the mine. It was thus found that the expansion of the mine had a positive effect on both nominal and real incomes (ibid). More precisely, a 10 per cent increase in the mine’s demand for local inputs was associated with a

1.7 per cent increase in real incomes. And this increase in incomes was paralleled by an increase in household consumption and poverty reduction (ibid).

However, these effects were present only in the supplying sectors and surrounding areas, and only reached unskilled workers in non-mining sectors (Aragón, 2013). Since the mine began operations in the region, case studies on households in local communities have indicated that a diverse array of changes in household access to resources has taken place (Bury, 2005). Generally, households reported declining access to natural and social resources but increasing access to economic and human resources. However, Bury (2005) also points to the uneven impacts of mining activities across households within the same communities. Not all households have been able to access the available benefits equally.

Although most of these impacts have been related to the operation of the mine (for example, the creation of roads, the generation of employment, the supply of water resources and the purchases of land), ‘Minera Yanacocha’ (MYSA) has also implemented a variety of rural assistance programs that have significantly affected household livelihoods (Bury, 2005). MYSA is a joint venture between the US-based Newmont Mining Corporation, Condesa (a subsidiary of the Peruvian company Minas Buenaventura) and the IFC (which holds only 5% of the shares). It was created with the support of the International Finance

Corporation (IFC) in 1993. Since MYSA's rural programmes have favoured certain communities (such as those closest to the mine or where the mine is likely to begin operations in the future), some households have experienced greater access to economic and human resources than others.

Some commentators have argued that Peru suffers from the so-called resource curse, due to the growing incidence of conflicts and social unrest related to mining operations, especially at the local level (Arellano-Yanguas, 2011). One of main explanations has been the unfulfilled expectations for employment and benefits as well as the inability of the central government to enforce mining regulations at the local level (Arellano-Yanguas, 2011). Most of the formal mining in Peru takes place in remote, poor regions, where the government’s presence is limited. The Peruvian state has a largely centralized structure (World Bank, 2005). The employment rates are very low in these isolated areas, education is of very poor quality, and the inhabitants are usually Andean peasants and pastoralists (World Bank, 2005).

In response to these problems, particularly during the commodity-price boom in 2004-2009, the Peruvian government has adopted a new ‘localisation’ strategy for natural-resources management (Arellano-Yanguas, 2011). Substantial revenues have been delegated to subnational governments, with a strong preference for allocations to mining areas. In the context of this decentralization process, regional governments have been expected to carry out overall monitoring functions. Additionally, the central government has encouraged mining companies to assume a more active role in local communities.

Most observers have argued that this strategy has failed because it has only exacerbated local political conflicts (Arellano-Yanguas, 2011). During the 2004-2008 commodity boom, for example, the outcomes from this programme have been largely negative because the revenues transferred to subnational governments have not only been poorly spent but also have intensified local political conflicts between the mining companies and the local population (Arellano-Yanguas, 2011).

Thus, the mining companies and the government should look for more stable, long-term ways of interacting and negotiating with local communities (Arellano-Yanguas, 2011). The nature of such interactions is largely determined before mining operations actually start— namely, in the early economic engagements of the company to establish the mines. Heightened local expectations combined with the companies’ lack of genuine interest in local concerns—beyond their effort to secure the social licence to operate as soon as possible—prepare the ground for future clashes.

Thus, before the start of large mining operations, the companies and the state should put in place institutionalised mechanisms to guarantee the participation of the local population in the assessment of the operations’ environmental and social impacts (IFC, 2009). In particular, the support by companies for the generation of local businesses and the

development of people’s human capital appear to be the most important contributions to fostering local development and reducing conflicts over the long term.

## Indonesia (Oil and Gas): Measures to Accelerate the Development of Local Capabilities

Based on Indonesia’s rapid growth of the 1970s and 1980s, it has been widely credited with having escaped the resource curse (Rosser, 2007). Analysts have often lauded Indonesian macroeconomic management in avoiding the Dutch Disease during the oil boom of the 1970s (Tordo et al, 2013). Of particular note were its fiscal, foreign-borrowing and exchange rate policies (Usui, 1996, 1997). The investment use of its oil revenues to strengthen the tradable goods sector appears to be another factor responsible for its success (ibid.).

The government has also invested oil windfalls in improving social and economic conditions, primarily for enhancing human capital and the development of the country’s undeveloped infrastructure, especially in less-developed, remote rural areas (Amuzegar, 2001). Nevertheless, despite significant advances in primary education in the 1970s, the labour force in Oil & Gas is still relegated to low-wage employment and there is an overall shortage of skilled workers (World Bank, 2012).

One problem has been the policy focus of maximising enrolment levels by increasing the number of schools rather than enhancing their quality (Tordo et al., 2013). This problem has been exacerbated by relatively low government spending on education: it has ranged between 2.5 per cent and 3.5 per cent of GDP over recent decades—a level lower, for instance, than that of neighbouring countries such as Malaysia and Thailand (UN, 2010).

Since Indonesia has a large population and workforce, there is significant potential for strengthening consumption linkages to support the country’s industrial development. The consumption linkage has been strengthened to some degree through the expansion of the employment of national workers in the Oil & Gas sector. The government has used local- content policies and promoted ‘Indonesianisation’ of the Oil and Gas workforce, in both the National Oil Company, Pertamina, as well as in foreign oil companies (Oon, 1986).

In the early 1950s, before nationalisation and establishment of Pertamina, the government pushed an aggressive ‘Indonesianisation’ of the personnel of foreign oil companies. These efforts were highly successful for jobs requiring a low to medium level of capabilities. However, this initiative had limited success at the managerial level (Tordo et al, 2013). Nevertheless, for higher technical positions, the foreign oil companies established training schools and even offered scholarships to send their Indonesian staff abroad to leading technical schools. By 1963 Indonesianisation of the workforce was formalized as part of the working contracts agreed with foreign oil companies and Pertamina (Hunter, 1966).

Indonesia also targeted backward linkages in the 1970s, with measures such as import tariffs and local-content requirements for the procurement of domestic inputs from supplier companies. These measures proved less successful, however, since contractors had to apply

for exemptions due to the lack of capable domestic service and fabricating companies. By 2000 Indonesia’s achieved levels of local content were still believed to be in the range of 10 to 20 per cent, which were well below the targeted level of 35% (Nordas, Vante and Heum, 2003). Only around 200 local firms were operating in the downstream sector at that time.

Although there were local companies, the capability to supply the upstream activities of Exploration & Production was limited to the large ones (Nordas, Vante and Heum 2003). For example, a World Bank report on skills in Indonesia’s manufacturing sector suggests that the limited availability of qualified local capabilities has hindered its development. According to the report, 69 per cent of surveyed executives in the sector faced difficulties in recruiting skilled workers, and 84 per cent faced difficulties in filling management positions (World Bank 2010).

In 2001 the oil and gas sector underwent a major restructuring process, and Pertamina lost its monopoly over regulatory and operational powers. Part of this process was the formation of an independent regulator, the Executive Agency for Upstream Oil and Gas Business Activities (BPMIGAS), which was created to regulate the upstream sector and act as a government body responsible for the implementation of Production Sharing Agreements.

Today, local content measures are spread across various laws and regulations, and responsibilities are split between the Ministry of Energy and Mineral Resources (BPMIGAS), contractors and the Department of Industry (CCSI, 2015). Enforcement and sanctions are imposed through both industry-wide self-regulation as well as through measures by Indonesian government agencies (CCSI, 2015).

In 2005 BPMIGAS published a set of guidelines on the management of human resources in Production Sharing Agreements. The guidelines aimed at accelerating the development of local capabilities and increasing the share of total expenditures on Indonesian personnel to 75 per cent by 2010 (Tordo et al, 2013). Overall, the Ministry of Energy and Mineral Resources deploys a set of regulations related to the recruitment, training and career progression of the workforce engaged in upstream activities (PWC, 2016). For example, expatriates can be recruited only when no domestic capabilities can be identified (PWC, 2016).

According to an Annual Report published by BPMIGAS, local content levels have increased by 18 percentage points between 2006 and 2011—that is, from 43% to 61% of the total (Tordo et al, 2013). However, some sources, such as Tordo et al. (2013), have argued that upstream investments have decreased by 50% during this same period. However, such outcomes could be due, in fact, to the global Financial Crisis and/or the drop in oil prices at that time.

## South Africa (Mining): A New Charter to Expand Opportunities for the Historically Disadvantaged

South Africa has the largest, most diversified and longest established mining sector in Africa. Historically, the mining industry has played a crucial role in the country’s industrial development, with its minerals–energy complex having constituted the backbone of the economy (Fine & Rustomjee, 1996). South Africa’s mining industry exhibits strong backward linkages, which contribute to the country’s industrialization and employment creation (Kaplan, 2011). Also, the South African mining-inputs cluster, located mainly in Gauteng, has been a well-established regional supply hub for Southern Africa (Fessenhaie, 2015).

The country’s mining-inputs industry has become a high-tech complex, which, to some extent, has become globally competitive (Fessenhaie, 2015). Over time, suppliers have had to find innovative solutions to the geological and metallurgical challenges of hard-rock and deep-level mining because these are the characteristics of its gold mining subsector (Kaplan, 2011).

A very dynamic national system of innovation (NSI), with strong linkages between mining companies, suppliers, research centres, universities and technical and artisanal schools underpins the mining cluster (Fessenhaie, 2015). Nevertheless, in terms of the quantity and quality of universities offering mining engineering and other related programmes, South Africa still falls short of the level of highly industrialized countries such as Australia (Kaplan, 2011). This shortcoming has resulted in a substantially reduced supply of skilled technicians and artisans. Skill shortages exist across the managerial, artisanal and technical levels. Kaplan (2011) attributes this shortage partly to the migration of skilled workers abroad.

Although mining has traditionally been a key sector for South Africa’s economy, its significance has decreased in recent years. In terms of its contribution to GDP, the mining sector has been overtaken both by manufacturing and the finance and service sectors. Hence, analysts have started writing, for instance, about a ‘post-commodity economy’ (Rogerson, 2011). For instance, the number of employees in the South African mining industry dropped from 570,000 in 1996 to just below 500,000 in 2010 (Marais, 2013).

In the gold mining industry, in particular, employment figures dropped dramatically, from 470,000 in 1990 to only 170,000 in 2001 (Harington et al., 2004). According to analysts of South Africa’s gold-mining industry, declining gold prices since the late 1980s, the depletion of national gold reserves and a less attractive investment regime have resulted in a notable decline in the sector (Marais, 2013). However, studies show that some gold supplier firms have subsequently migrated to other mineral commodities, such as coal and chrome (Fessenhaie, 2015).

Prior to 1994, South Africa’s minerals sector developed without significant state intervention. However, after the emergence of the new national government, a significant policy shift occurred. This change followed the example of other countries, such as Australia or Botswana, in favouring a greater and more active involvement of the state in promoting

mineral rights (Mainardi, 1997). As a result of this democratic change, a multi-stakeholder policy review, led by the Department of Minerals and Energy (DME), was undertaken.

This review resulted in the Minerals and Petroleum Resources Development Act (MPRDA) of 2002, which defines the entire regulatory environment of the minerals industry from rights and ownership to mineral sales, beneficiation and marketing (Rogerson, 2011). The main purpose of this new legislation was to address the historical disparities in mining rights, the long-term environmental consequences of mining and the socio-economic conditions prevailing in mining areas.

The new regulations also included the ‘Broad-Based Socio-Economic Empowerment Charter for the South African Mining Industry’, which has aimed to expand opportunities for historically disadvantaged South Africans (Cawood, 2004). Blacks, disadvantaged communities and women have been the main beneficiaries since the Charter has sought transformative change in areas such as ownership, management, procurement, skills development, employment equity and rural development (ibid.).

With respect to human resource development, the aim has been to provide scholarships for mining-related education for the long-term needs of the sector (ibid.). Employers are supposed to provide skills training to miners during employment in order to improve their income-earning capacity, especially in the event of mine closure, and include training in entrepreneurial skills and a programme to ensure adult literacy and numeracy (ibid.).

The Charter has also prescribed mentoring programmes and career paths for historically disadvantaged South Africans (ibid.). In terms of employment equity, the Charter has mandated companies to publish employment-equity plans and achievements and establish targets for employment equity for both junior and senior management positions (ibid.). The aim has been to provide special training programmes for historically disadvantaged South Africans.

A critical regulatory provision of the MPRDA was that mining companies were required to provide a Social and Labour Plan as a prerequisite for obtaining mining rights. This plan should include strategies and targets to address the above-mentioned issues (Department of Mineral Resources, 2004). While the Department of Mines has issued a set of guidelines for the preparation of Social and Labour Plans, municipalities have been responsible for implementation. These plans have gone far beyond the usual mining Corporate Social Responsibility strategies. The development and implementation of such plans—including their integrated development plans that emphasize infrastructure development for communities in areas of mining operations—have provided wide scope for partnerships and collaboration.

This development has resulted in enhanced socio-economic outcomes in the sector (Rogerson, 2012). Nevertheless, critical challenges remain in terms of monitoring the commitments of mining companies to their Social and Labour Plans, especially towards promoting municipal integrated development planning. Furthermore, many analysts have pointed to the continuing poor socioeconomic and living conditions of mine workers as an underlying cause of the much-publicised unrest at the Marikana mine in the Platinum Belt, which resulted in the death of 34 striking mineworkers in 2012 (Cronje, 2014).

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