

Linkages in Ghana's Gold Mining Industry: Challenging the Enclave Thesis

Robin Bloch
GHK Consulting
robin.bloch@ghkint.com

and

George Owusu
Institute for Statistical, Social and Economic Research
University of Ghana
gowusu@ug.edu.gh

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MAKING THE MOST OF COMMODITIES PROGRAMME

Like many other developing economy regions, Africa is benefitting from a sustained boom in commodities prices. Received wisdom has been that commodities production is an inherently enclave activity and that it undermines the viability of industry. The Making the Most of Commodities Programme challenges this negative view of the commodities sector. It's research analyses the determinants of backward and forward linkages, identifying policy responses which will broaden and deepen them. In so doing it contributes both to achieving sustainable growth and the spreading of benefits to a wider population. By incorporating younger researchers, building a research network, and dialogue with policymakers, the MMCP also seeks to build analytical and policy capacity, and to influence policy outcomes.

The MMCP focuses on a diverse range of commodity sectors in a number of African economies, as well as on key infrastructural determinants of effective linkage development. A number of common factors are identified which will increase linkages beneficially and which lend themselves to policy intervention - the role of ownership, the nature and quality of infrastructure, the national system of innovation, spillover of skills to and from the commodities sector, linkages in regional economies and the nature and consistency of policies directed towards the commodities sectors.

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Abstract

This report contains the findings of research into the case of the gold mining industry in Ghana. By 2009, Ghana was the second-ranked African producer after South Africa, and had become the world's ninth largest producer of gold, at some 3.8% of global production, up from 2.6% five years earlier. Gold production volumes and revenues rose significantly over the decade, Yet gold mining tends to be perceived negatively in Ghana, and is seen as providing far less than it should in terms of public revenue, employment, skills development and spillovers, and localised economic development. Gold mining is often depicted as having an enclave status, disconnected and isolated from the rest of the economy. In contrast, our research findings demonstrate that after a period of strong investment and growth, gold mining can no longer be viewed as an enclave activity and is in fact more deeply linked into the Ghanaian economy than hitherto understood through a set of as yet under-researched, imperfect, but promising economic linkages, notably backward linkages, which can potentially be strengthened by policy and support measures.

'The drive to increase local procurement in the Mining Sector in Ghana: Myth or reality?', Robin Bloch and George Owusu, MMCP Discussion Paper No 1, University of Cape Town and Open University, March 2011.

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1. Introduction and Executive Summary

The overall policy objective of the research conducted under the Making the Most from Commodities Programme (MMCP) is to address the key issue of how to maximise the opportunities for sustainable industrial development for Sub-Saharan African (SSA) minerals and energy producing countries under current conditions of strong demand and improved prices for the commodities these countries extract and export. The MMCP argues that the key to taking best advantage of such opportunities lies first in understanding the nature of the linkages commodity production has with the wider national economy, and then in strengthening these linkages.

This report contains the findings of research into the case of the gold mining industry in Ghana. Gold has been produced for over 1,000 years in the territory of the Ancient Kingdom of Ghana, the Gold Coast Colony and post-independence Ghana. As with South Africa, which Ghana currently follows as the second-ranked African producer, large-scale industrial gold mining in Ghana dates back to the last quarter of the 19th Century (Hilson, 2002). After a period of decline under government control in the nationalist era in the twenty years from the early 1960s, the industry was restructured and modernised under the post-1983 Economic Recovery Programme (ERP), which prominently featured a revised mining code exemplified in new legislation, the Minerals and Mining Law (PNDCL 153) of 1986.

Since the mid-1980s, gold mining has seen sustained increases in foreign investment, output, and export volumes. From 1980 to 2000, production increased some 700%, with a record output, to that point, of 2.6 million oz. in 1999. Gold, which then comprised 97% of mineral exports, became the country's leading contributor to overall exports, at around 37% of their value.

After a brief interruption during a period of gold price weakness at the turn of the century, the industry resumed its upward trajectory. The global rally in the gold price which began in 2001-2002 has not flagged since, as gold has risen from around \$300/oz. in early 2002 to over \$1,400/oz. in the last quarter of 2010. This level has been maintained through the first quarter of 2011, with record highs close to \$1,500/oz. reached in March.

The Ghanaian industry has benefitted substantially from this boom: from what the World Gold Council terms "the 10-year gold bull market" (2010). Production volumes were over 2 million oz. through the past decade, rising gradually to 2.62 million oz in 2007 and to 2.84 million oz in 2008. In 2009, the last year for which figures are currently available, there was an increase to a record 3.12 million oz., with gold revenues some \$600 million higher than in 2008, at \$2.8 billion.

Facilitated by a further revised mining code that was consolidated in the Minerals and Mining Act 703, 2006, investment in the industry increased to a figure of \$3 billion for the four years to 2009. Gold now accounts for around 43% of Ghana's exports. Mining's contribution to Gross Domestic Product, of which gold still represents some 95%, was 5.8% in 2009, up only a percentage point from 1990, but still higher than Ghana's other main export commodities, cocoa (3.9%) and forestry (3.2%).

By 2009, then, Ghana had become the world's ninth largest producer of gold, at some 3.8% of global production, up from 2.6% five years earlier. The Birimian and Tarkwaian gold belts (known as greenstone belts) which characterise the western half of Ghana and which host gold mineralisation that contains both hard rock and placer (alluvial) gold deposits continue northwards and westwards into the broader region. Ghana is thus simultaneously at the forefront of an up-and-coming West African industry, as production increased significantly in the neighbouring countries of Mali, Burkina Faso, Guinea, Mauritania and Cote d'Ivoire.

Gold mining in Ghana appears to feature a positive picture of a long-established mining industry overcoming policy failures, upgrading its capabilities through significant investment, and moving into a new heightened phase of development in which it leads a regional complex in the making. Yet it is no exaggeration to state that the view held about gold mining in academic and policy research and in the national economic and social development policy discussion in Ghana is typically highly negative. Even if at a remove, this negative view then shapes a predominant public perception that gold mining offers Ghana far less than it should in terms of public revenue, employment, skills development and spillovers, and localised economic development.

Gold mining, in fact, is held to create impoverishment and environmental hazard in mining communities which scar rather than benefit the country. In very general terms, and using the words of a recent press article, there is "a sense that, a century after commercial mining began in what was then the Gold Coast, the country is still getting a raw deal" (Burgis, 2010). Another recent academic overview concurs, concluding that "the country is still very far from obtaining optimal benefits from its mining sector" (Akabzaa, 2009, 64). From the industry's perspective, the criticism is unremitting: as one of our interviewees, a senior manager in a mining company, ruefully put it, "We just get bashed."

Underlying this pervasive view, in both academic and policy work, is an often unexamined and at times even reflexive analytical construction. From the era of development economics right through to the present, the industry has been seen as an economic enclave, or as having an enclave character, in which it is disconnected and delinked from the rest of the national economy.

The MMCP perspective, with its focus on researching the nature of and understanding the causes or drivers of present-day linkages, provides a useful opportunity to challenge this conventional wisdom, which is carried through in much of the current research work on the industry. For the MMCP's work to be read, and to have an influence on policy, it needs to contribute to ongoing academic debates and to the policy discussions that are happening in the sites of the research – in other words, those within the specific researched sectors in their national settings. For gold mining in Ghana, it is therefore crucial to begin by interrogating the enclave notion, and, if justified in analytical terms, to start to provide a new narrative on the economic and spatial impacts and potentials of the country's leading extractive sector.

The enclave position was an understandable position for analysts to take in the past. However the restructuring of the industry in the era of economic liberalisation, and more particularly developments over the last decade now invalidate it. Gold mining is

now no longer an enclave activity characterised only by fiscal linkages, and is in fact more deeply linked into the Ghanaian economy than hitherto understood through a set of as yet under-researched, imperfect, but promising economic linkages. The linkages take various forms: principally backward linkages, and final demand or consumption linkages. They include but cannot be only be subsumed analytically under the rubric of local sourcing by local/domestic firms. Fiscal linkages, meanwhile, have strengthened. The linkages are also manifested spatially in the form of visible – and differentiated – clusters (i.e., geographic/sectoral agglomerations of enterprises) of mining activity, which appear to benefit in different ways from external economies of scale (agglomeration economies), notably the localisation economies variant.¹

Most notable here is a supplier and services agglomeration linked to mining company headquarters, which is located in the eastern districts and neighbourhoods of Greater Accra. These clusters are also connected to one another across the country through labour market links, through inter-firm linkages, and physically, via what have, in the last decade, been are improved transport and communications systems. This connectivity has (or can have) real, ongoing effects on the trajectory, vitality and integrative strength of the spatial economy.

We argue that gold mining's economic linkages, spatial effects, and physical connections can be enhanced via industrial, infrastructural, spatial and local economic development policy and support measures. In doing so, we put forward an alternative and more positive and optimistic narrative – with strong policy implications – on the actual and potential economic and broader developmental impacts of the industry in Ghana in consequence of its linkages into the economy. This perspective is of wider relevance as Ghana starts extracting oil from its offshore reserves in 2011.

This report is based on fieldwork conducted in February, July and December 2010, and on a large variety of primary and secondary data sources. We received primary data in Ghana from the Minerals Commission, the Ghana Chamber of Mines, notably its Supply Managers' Sub-Committee, the Ghana Investment Promotion Centre, the Ghana Statistical Services, and directly from a number of mining companies. Secondary data includes information from published sources (academic books and journal articles), and a wide range of 'grey' literature, including company, government and consultancy reports; World Gold Council data and reports; and the precious metals consultancy GFMS's gold industry reports and data. Interviews were carried out in Accra and the mining town of Tarkwa with government officials, mining company managers and staff, academics, development partners and NGO staff.

¹ These are productivity-enhancing scale economies which are internal to the industry, and arise from "within-industry" interactions which accrue to firms on account of the size of the industry in a specific location. Examples of these economies on the supply-side are the sharing of sector-specific inputs and skilled labour, further development of intra-industry linkages, subcontracting opportunities, the sharing of tacit and codified knowledge, and the increased possibilities arising for collective action to lobby government or to bid down prices of intermediate inputs. On the demand side, information asymmetries and disparities for consumers can be reduced, and price and quality comparison buyers attracted (World Bank, 2009).

This report is made up of four sections:

- *Ghanaian gold mining in context*, which discusses the literature on the enclave issue and its portrayal of linkages; portrays the global dynamics of gold mining which drive current growth in Ghana and West Africa; and provides an overview of gold mining's industrial structure and organisation, foreign investment into the industry and of the policy, legislation and institutions which affect it.
- *Linkages in Ghana's gold mining perspective*, which describes the industry's value chain in non-technical terms, and discusses the linkages gold mining has into Ghana's economy and spatial economy, as well as the issue of local (or domestic) inputs and content.
- *Explaining Linkages*, which explains the causes of the identified linkages and their agglomeration effects, drawing on the six MMCP hypotheses: i.e., that the variety, depth and breadth of linkages can be explained by firm ownership, policy, the National System of Innovation (NSI), infrastructure, skills, and regional factors.
- *Conclusions and policy recommendations*.

This report should still be regarded as a work in progress and will be updated in the form of a publication in either journal paper or book chapter format. Data for 2010 is still being made available to us by the Ghana Minerals Commission (GMC). We also now have quite strong relationships with several gold mining companies – notably Newmont, Golden Star Resources, and Goldfields – as well as with the Ghana Chamber of Mines and its Supply Managers' Sub-Committee which is mentioned above. These parties are prepared to provide further information on the dynamics of supply chains, on the locations of suppliers and service providers, and on the design and implementation of linkage and other support initiatives.

2. Ghanaian Gold Mining in Context

2.1 The enclave thesis

As one of the cocoa-gold-timber triad that has underpinned both national economic development and the unfolding over time of the country's spatial economy, gold mining in Ghana is a much researched and studied industry. A small sample of key references would include a useful overview of the history of the industry (Hilson, 2002); a monograph on the early years of the modern industry and the first gold boom in the late 19th Century (Dummet, 1998); a company history of Ashanti Goldfields (Ayensu, 1997); a study of the sector's macro-economic contribution (Aryee, 2001); an assessment of the impacts of liberalisation and mining reform (Hilson, 2004); a recent critique (one amongst many) of mining's environmental impacts (Botchie, Dzanku and Akabzaa, 2008); and a survey of the effects of gold mining's role in national economic development and poverty reduction (Akabzaa, 2009). As is the general case with the literature on mining in developing countries, many accounts are highly critical of the industry and government.

The enclave theme introduced above runs through the literature. The word "enclave" itself has two meanings: a country or a part of a country lying completely within the boundaries of another, or a distinct, bounded area enclosed within a larger unit, as with ethnic enclaves in a large city. The word's economic connotation follows this division. The Routledge Dictionary of Economics refers firstly to:

An isolated economy without forward and backward economic linkages within it, e.g. an agrarian economy which imports its tractors and fertilizers, and exports its products. In such economies, an economic activity does not have any spin-offs in terms of services and processing and so there is an absence of the dynamic effects of intersectoral growth.²

In the broadest terms, then, an enclave economy is associated with a lack of productive, physical backward and forward linkages. These are concepts historically associated with Albert Hirschman's *Strategy of Economic Development* (1958). Some 20 years later, Hirschman in the article "A generalized linkage approach to development, with special reference to staples" categorized linkages for the case of staple (e.g., commodity) production (1977 and 1981; Nelson and Behar, 2008). To the backward "input-supplying" linkages and forward "output-using" linkages he had already defined, he added two further types which particularly characterized such activities:

- Fiscal linkages, i.e., state taxation of the income streams associated with the staple
- Consumption linkages, which are incomes (profits and wages) emanating from staple production spent nationally and in the local vicinity on the outputs of domestic industries, including those which have been stimulated ("called into life," in his words) by these new incomes in a process of import substitution.

² The second meaning is less relevant for us: A sub-economy of an advanced economy, e.g. in the USA, ethnic groups have formed distinct sub-economies with, for example, Cubans or Mexicans comprising both the owners and workers.

It is important also to point out that the linkage concept, for Hirschman, was a dynamic rather than static one, as linkages could change, and either decay, or become enhanced over time. He referred, in this regard, to

the linkage effects of a given product line as investment-generating forces that are set in motion, through input-output relations, when productive facilities that supply inputs to that line or utilize its outputs are inadequate or nonexistent. Backward linkages lead to new investment in input-supplying facilities and forward linkages to investment in output-using facilities (1981, p. 65).

In the late 1990s and early 2000s, as a derivation or offshoot of the resource curse literature, the term “enclave economy” or, alternatively, “enclave export model” was applied to the energy and mining sectors of mineral-rich developing countries (Heeks, 1998). In most accounts, the only real local linkage was of the fiscal variant.³ In providing an even-handed perspective on gold mining’s contribution to the Ghanaian economy, Benjamin Aryee (who is now CEO of the country’s Minerals Commission) associated the enclave condition with one in which the mining sector had more external (foreign) linkages than internal (domestic) linkages. He argued that “Undoubtedly, the strongest link of Ghana’s mining sector with the rest of the economy is fiscal” (2001, p. 73). He added that despite the existence of support service suppliers to the mines (some 60 companies at the time, including geological, drilling and engineering services), most inputs were imported, and ores were exported without further processing.

A few years later, a report on the mining sector by the Bank of Ghana Research Department was less equivocal:

Historically the mining of traditional minerals – gold, manganese, bauxite and diamonds – has been going on for well over a century. These traditional minerals do not have any forward or backward linkages in the development of the economy other than to be exported to generate foreign exchange. Ironically they have been the focus of the investor community because of the short-run profit motivation and capital repatriation as the main business focus. (2003, p. 44).

More recently, an account by Larsen, Yankson and Fold, strongly reiterates the enclave nature of gold mining, going so far as to deny the existence of noteworthy backward or forward linkages, and adding another dimension – the lack of linkages between large-scale industrial mining and small-scale artisanal mining: “There are no

³ This was foreseen by Hirschman, who commented that: ‘The most favourable constellation would of course be one in which a staple was simultaneously endowed with strong production, consumption and fiscal linkages. Unfortunately, this ideal situation is not likely to occur: a little reflection suggests that one kind of linkage is often to be had at the expense of another. For example, the fiscal linkages have made a strong showing in those mining and petroleum activities that had all the earmarks of the “enclave.” **But the enclave is defined by the absence of involvement with the rest of the economy, that is, by the absence of other kinds of linkages.** It is precisely because of this absence of links that the enclave becomes an obvious and comparatively easy target of the fiscal authorities. Being a foreign body, often owned by foreigners to boot, the enclave has few defenders of its interests once the state acquires the will and authority to divert towards its own ends a portion of the income stream originating therein’ (1981, p. 67, our emphasis).

linkages between the two gold mining sub-sectors, stressing the ‘enclave’ nature of the large-scale mining sector.” (2009, p. 266)

There are perhaps several reasons why the enclave conception retains such a strong grip on the academic and policy discourse on mining in Ghana. Dependency theory had a formative impact on a generation of scholars which remains influential in a society which prizes the wisdom of an older generation. The ideological currents characterizing the nationalist era, by the same token, endure as well as a residual suspicion about foreign influence. Ghana’s press, while very lively, is not modernized in either its design or its Op-Ed content, where there is little external voice. Furthermore, the debate on mining in Ghana, as in other mining countries, is highly polarized between the supporters and opponents of the industry: battle is fought almost daily in the press. Critics of the industry, led by domestic activist NGOs, notably WACAM, also tend to have ammunition with which to make their cases, principally the environmental damage caused by what appear to be an excessive amount of industrial accidents, especially cyanide spillages (WACAM, 2009).⁴

Seeing the mining industry through an unchanging or constant enclave lens, however, does not permit the dynamic nature – “linkage effects need time to unfold” as Hirschman put it (op cit, p. 63) – of the linkage concept, as above, to be adequately grasped. Indeed, what is striking about the admittedly limited research on gold mining is how a lack of linkages is very often assumed or asserted as part of the enclave thesis ‘package.’

Larsen, Yankson and Fold’s paper cited above which is entitled *Does FDI Create Linkages in Mining? The Case of Gold Mining in Ghana* is the best current case in point. The paper presents the research findings from fieldwork conducted in 2005-2006. These findings are dismissive of the existence or even possibility of linkages, or of linkage effects catalyzed in consequence of the restructuring of the industry and its expansion on the basis of sustained investment: it is argued that large-scale mining operations have “very few linkages to local suppliers of goods and services” (2009, p. 259). A process of in-sourcing (termed vertical integration) of previously outsourced activities by mining operations is observed. For the authors, ‘local’ appears to denote ownership origin rather than economic or spatial location, with linkages equated only with domestic (or national) industrial sources, and the outputs of international companies (as inputs in the form of goods or services to mining) located in Ghana seemingly excluded. This understates the potential utility of linkages with international or foreign firms:

Linkages can be developed with domestic firms or with other foreign affiliates in the host country. Linkages with the latter may generate a lower degree of local value added than those with the former, but they can nevertheless be important especially in countries where domestic capabilities are at a nascent stage (UNCTAD, 2007, p. 141.)

⁴ See <http://www.wacamghana.com/>. WACAM is not an acronym.

The authors' argument is summarized as follows:

A number of basic service, such as laboratory testing, cleaning, security and various consultancy tasks, are still outsourced, but to foreign companies with subsidiaries in Ghana, not to locally-owned companies. Likewise, there are no significant supplies of mining machinery or equipment from local companies in Ghana: everything is imported or purchased from international dealers with established sales and service operations in the country (p. 266).

However, little detail is provided with which to assess these conclusions. Before presenting findings which provide a somewhat more detailed and different picture, we provide further context for gold mining's growth in Ghana in the past decade.

2.2 Gold mining's global dynamics

We begin with Ghana's place in the global gold mining industry, which is seldom considered in accounts. As indicated above, gold's "record run" over the last decade saw the gold price reach a high of \$1,430 in December 2010. The price still remains close to this level. By that fixing, gold had risen some 90% over its price at the depths of the global recession two years earlier. The price, though, is still 40% below its peak of \$850 in 1980 when adjusted for inflation.

The orientation of **gold demand** is implicated here. This has shifted in recent years with the metal's investment role now challenging that of jewelry fabrication (the trend is typically 70% for the latter), and with consumption from other industrial and medical uses rising as well. Growth in annual identifiable investment increased from 166 tonnes in 2000 to 1,319 tonnes in 2009.⁵ In 2009, it accounted for approximately 38% of world gold demand. Jewelry consumption fell by 45% from 3,204 tonnes to 1,759 tonnes in the same period, or to 51% of consumption, with investment at 38% and industrial use at 11%.

Gold is seen – and promoted – as a good investment during crises in financial markets and during times of accommodative monetary policy and supply (e.g., so-called quantitative easing) .A particular rationale for investment buyers in the last few years has thus been to stabilize their portfolios in a time of crisis. After spending 20 years selling gold, central banks, notably those of China, India, Russia and the Philippines, became net purchasers in 2009. At the same time, new products were devised for investment, notably the exchange traded fund vehicle. Significant de-hedging by mining companies facilitated gold's boom, as they unwound fixed-price bullion contracts, and eliminated fixed-price forward gold sales contracts.

Some 70% of gold demand is from East Asia, South Asia and the Middle East; 55% of this is from China, India, the United States, Turkey and Italy. In 2009, China became the world's second largest consumer behind India in tonnage terms, with much potential for future growth. Despite continual reports calling gold's peak or predicting the bursting of what is perceived as a bubble, the industry itself is optimistic:

⁵ One metric tonne (MT) is equal to 32,150.75 troy oz

There is ample scope for continued robust growth in gold market demand, due among other reasons, to the strength of emerging markets, a fundamental shift in the behavior of central banks, and a recovery and new advances in industrial demand for gold (World Gold Council, 2010, p. 12).

Gold supply is made up of three components: mine production (in 2007 at a proportion of 64%), scrap (23%) and official sector sales (13%). Mining production peaked at around 2,600 metric tonnes in 2001, and was flat or declining thereafter until 2008 onwards, with increases that year and the next. Average total production costs roughly doubled from 2000 to 2007, to \$500/oz.

Although annual mine production increased by 156 tonnes (6%) to 2,572 tonnes in 2009, it still remains below the peak level of some ten years before. In recent years, net official sector sales have declined considerably (by up to 90% in fact), while the annual dishoarding of old gold scrap has doubled – this due mainly to the rise in the gold price. This scrap supply (a large part of “dishoarding” is the jewelry recycling advertised and occurring in every city or town across the globe) has risen significantly. It is expected that gold supply will continue to rise at a high rate in 2011, as mine production and scrap supplies reach record levels. Overall supply growth is forecast to be 7 percent in 2011, up from an estimated 3 percent this past year.

High demand, significant profits and constrained supply have translated into much greater exploration activity by the industry – with mining going deeper and further: pushing out the mineral resource frontier. Moreover as overall production volumes in the traditional top eight countries decline, the role of formerly smaller and less prominent country producers is growing.⁶

Ghana's and West Africa's role within this dynamic is growing faster than anywhere else in the world. The country is the principal contributor to a rapidly growing West African region industry (including Mali, Guinea, Burkina Faso, Mauritania and Ivory Coast), the output of which has risen 65 percent over the last five years to a current total of 190 tonnes or around 8% of the global total above. This is expected to rise another 57 tonnes or by around 30 percent to 2013 (GFMS, 2010). A recent accounting of the region's exploration and development activity identified 55 companies involved in 123 separate projects in 10 countries (ibid).

2.3 An overview of industry structure and organisation in Ghana

In broad terms, gold mining's current industrial structure in Ghana features eight large mines which are owned and managed by five principal large-scale international producers; a small number of far smaller producers; and a significant contribution of registered semi-formal, small-scale producers which generate some 9 to 10% of national output in the present day (triple the level of 20 years ago, but statistical capture of their production has also improved). This by and large excludes the

⁶ In order of their 2008 production, these are: China 285mt, United States 234mt, South Africa 232mt, Australia 225mt, Peru 175mt, Russia 164mt, Canada 100mt and Indonesia 90mt. Ghana was tenth, with 81mt. Significant declines (down approximately 30% or more) have been experienced in the last decade by South Africa, as is well-known, but also in the USA, Australia, Indonesia and Canada. China's production is 60% higher, and Peru's 20%.

contribution to production from the unregistered, informal and technically illegal small-scale artisanal miners known as *galamsey*, whose activities spread through gold mining areas and which employ in an estimated range of 50,000 to 200,000 people (Hilson, 2004).

For gold which is traded, principal consumers are the United Arab Emirates, notably Dubai, and Turkey.

The following Tables 1 and 2 provide detail on the major mines and their outputs, and on the overall structure of production. The major mines are all located in Western Region, with the exception of Obuasi (Ashanti Region), which is the only underground mine represented (Prestea is not operational), and Ahafo (Brong Ahafo Region). The Government of Ghana (GOG) holds a stake of at least 10% in each mining property. Companies (so-called “juniors”) exploring for gold in Ghana include Adamus Resources Ltd., African Gold plc, Moydow Mines International Inc., Pelangio Mines Inc. and Perseus Mining Limited

Table 1: Major Mines in Ghana

Mine	Mine Owner/s and Nationality	Production 2009 (oz)
Tarkwa	Gold Fields (SA) (71.1%) and IAMGOLD (Canada) (18.9%)	655,000
Ahafo	Newmont Mining (USA)	532,000
Obuasi	AngloGold Ashanti (SA/Ghana)	381,000
Wassa	Golden Star Resources (USA)	224,000
Damang	Gold Fields/IAMGOLD	203,000
Iduapriem	AngloGold Ashanti	190,000
Bogoso/Prestea	Golden Star Resources	186,000
Chirano	Red Back Mining (now Kinross) (Canada)	183,000
Total		2,554,000

Source: GFMS, 2010.

Table 2: Gold Production and Revenue in Ghana 2008

Company	Gold Oz.	Revenue (USD)
AngloGold Ashanti Obuasi	357,152	285,175,740
AngloGold Ashanti Iduapriem	214,712	181,281,604
Total AngloGold Ashanti	571,864	465,457,343
Gold Fields Tarkwa	628,864	546,368,743
Gold Fields Damang	197,027	172,085,018
Total Gold Fields	825,891	718,453,761
Golden Star Bogoso and Prestea	169,615	148,801,774
Golden Star Wassa	128,074	108,590,405
Total Golden Star	298,319	(included below)
Newmont Ghana	524,671	450,871,589
Chirano Gold Mines	120,983	75,715,082
Central African Gold	28,162	1,501,457
Med Mining Company	2,617	2,116,885
X'tra Gold Mining	6,131	3,991,992
Total Other Mines	682,565	791,589,185
Total Small-Scale Gold Mines	249,444	340,158,865
Total Gold Production Ghana	2,839,802	2,315,659,154

Source: Ghana Minerals Commission

Table 3 below presents basic industry dynamics over nearly 20 years. If we focus on the last decade, the following are key trends:

- Production volumes have risen by close to a third;
- Exports are three times in value;
- Overall employment is up again after a period of slow decline;
- Expatriate employment is at a low but increasing level (which is unsurprising given the levels of investment now apparent);
- Employment of Ghanaian nationals at senior management or technical levels is also increasing;
- Exploration and mine development levels are promising.

Table 3: Ghana Gold Mining: Key Statistics

Year	1990	1995	2000	2005	2008	2009
Production oz	541,147	1,715,867	2,457,152	2,138,944	2,839,802	3,119,823
Contribution to GDP (%)	4.83	5.63	5.56	5.02	5.58	5.78
Export Value	\$304m	\$647m	\$702m	\$946m	\$2,246m	
Exports % National	19%	44%	36%	34%	43%	
Employment Total	N.A.	19,557	15,120	13,766	17,829	17,332
Employment Expatriate	N.A.	229	219	162	393	451
Employment Ghana Senior	N.A.	2,187	1,505	1,706	3,116	3,180
Employment Ghana Junior	N.A.	17,141	13,396	11,898	14,320	13,701
Mining Leases Granted	3	4	2	2	5	6
Prospecting Licenses Granted	37	23	4	22	41	72
Reconnaissance Licenses Granted	1	42	1	31	35	21
Small-Scale Gold Licences Granted	0	0	9	21	114	66

Source: Ghana Minerals Commission

All of these metrics are influenced by policy and legislation, which we now discuss

2.4 Policy, institutions and legislation

It must be stressed that in terms of policy focus and the associated institutional and legislative framework on minerals and mining in Ghana's post-independence era, two periods can be discerned: the pre-Structural Adjustment Programmes (SAP) era from 1957 to 1983, and the era of reform, privatization and investment from the mid-1980s to the present.

Pre-Structural Adjustment Programmes (SAP) Era (1957-1983)

The immediate post-independence era from the late 1950s to the early 1980s was characterized by strong, active government involvement in all sectors of the economy, including mining. Following a series of legislations which was enacted in the late 1950s, all mining companies were nationalized with the exception of two mines, Obuasi and Konongo (Hilson 2002). In the view of the state, nationalization was necessary to protect employment, and provide maximum access to the foreign exchange obtained through the sale of minerals (Tsikata 1997). The State Mining Corporation (SMC) was established to take over existing mines.

Beginning its operations in 1961, the SMC took control of five gold mines previously under British control, and by 1966 had acquired the following companies: Amalgamated Banket Areas Limited; Ariston Gold Mines Limited; Bibiani Limited; Bremang Gold Dredging Company Limited; Ghana Main Reef Limited; and Konongo Gold Mines Limited (Hilson 2002). Hilson adds that the government also passed the Minerals Act (Act 123) in 1962, which stipulated that the minerals of Ghana are both *de jure* and *de facto* the property of the country and controlled by the presidency.

According to Twerefou et al. (2007) government interventions in the mining sector were carried out without regard to market conditions, investment flows and efficiency. However, the policies on mining adopted at the time were in line with the political and economic ideologies of the then President Kwame Nkrumah's Convention People's Party (CPP) government. This state-led approach to national development continued through the military dictatorship period in the 1970s. In the view of Twerefou et al. the policies pursued under the state-led approach in the mining sector were 'anti-foreigner', which led to capital flight in the sector (ibid, p. 8). In addition, the inefficient manner in which state-owned mining companies were operated resulted in a lack of investment, and only limited maintenance and modernization of mines, which led to declining production levels (World Bank 1984; Bank of Ghana 2003). As Hilson (2002) concludes, Ghana's attainment of its independence in 1957 marked the beginning of a period of rapid deterioration in its gold mining sector.

This rapid decline of gold and other mineral production as a result of excessive state control peaked in the late 1970s and early 1980s. This decline in mineral production was in line with a general deterioration of all sectors of the national economy, which was exacerbated by political instability.

Mid-1980s to the present: economic and political reform, privatization and investment

Faced with deteriorating economic conditions, Ghana adopted the World Bank and International Monetary (IMF) sponsored Economic Recovery Programme (ERP) in 1983 and a Structural Adjustment Programme in 1986. The overall objective of the two programmes was to remove structural constraints to economic growth and to improve exports of primary products, mainly cocoa and minerals. According to Twerefou et al. (2007), cocoa and minerals were given much emphasis as key export commodities under the economic reforms due to their potential to develop and expand within the context of sound policy reforms and improvements in management. This policy approach had important implications for the gold mining industry.

It has now been widely documented that the gold mining industry which was an integral part of the ERP and SAP has witnessed a halting and reversal of the decline in production. As Table 3 above shows, gold production has increased significantly, and, as noted, the country has also attracted major international gold mining companies from major gold producing countries such as the US, Canada, South Africa and Australia. In addition, as will be seen in the next section, the foreign direct investment (FDI) inflow to Ghana has become synonymous with the gold industry. This is due to the large proportion of FDI which has gone to the industry.

The policy measures which have impacted positively on the mining sector in Ghana can be viewed in two inter-related and complementary dimensions, namely macro-economic and sector specific policy reforms. The macroeconomic policy initiatives include trade liberalization, public expenditure management, public sector management, and export promotion. These policy measures have complemented the mining sector specific policies such as the introduction of investment friendly legislation and a fiscal regime, the strengthening of existing and establishment of new mining support institutions, and the reduction of the state's control of the sector. These complimentary policy measures account significantly for the success chalked up by the gold mining industry in Ghana since 1990.

Key to the restructuring of Ghana's mining sector is the series of legislations which have been promulgated since the mid-1980s. Box 1 provides a list of these key legislations. These legislations address a key concern of investors regarding the lack of a credible legislative framework on the governance and regulation of the sector. In addition, these legislations have served to reassure investors regarding the possible takeover by the state (i.e., nationalization) of their investments as happened in the past.

Key among the laws in the mining sector is the Minerals and Mining Law of 1986, which was regarded as a key component of the ERP, and constituted the first ever Ghanaian legislation that was specific to mining (Akabzaa 2009). This law was amended with the Minerals and Mining Amendment Act of 1994 (Act 475) after the re-establishment of civilian democratic rule in 1992. Act 475 has subsequently been amended with the Minerals and Mining Act of 2006 (Act 703). Act 703 is a comprehensive law and covers virtually all aspects of mining, namely, ownership of minerals and the cadastral system; mineral rights; royalties, rentals and fees; dispute resolution; reconnaissance licenses; prospecting licenses and; mining leases. Other areas include surrender, suspension and cancellation of mineral rights; surface rights and compensation; industrial minerals; small-scale mining; and administration and miscellaneous provisions.

Very importantly, Act 703 seeks to promote a localisation policy and facilitate the local content of the industry to maximize the benefits of mining for the Ghanaian economy. In this regard, it provides the following measures:

- A 10% government free carried interest in all large-scale gold mining companies without any financial contribution;
- The reservation of small-scale mining only for Ghanaian citizens;
- Gold mining companies are to give preference to "made in Ghana" products, to public corporations and service agencies located in the country, and to employment of Ghanaians;
- Gold mining companies are required to submit detailed programmes for the recruitment and training of Ghanaian personnel;
- Clause 50(3) of Act 703 specifically calls for eventual 'localization' of mining staff. It defines 'localization' to mean a training programme designed towards the eventual replacement of expatriate personnel by Ghanaian personnel

Besides the restructuring of the laws in the mining sector, efforts were also made to strengthen mining support institutions under an initiative which began in 1986 titled

the Mining Support Programme. The main aims of the programme were to develop the capacity of mining support institutions to enable them to promote investment in the sector and to develop mechanisms for enhance productivity and financial viability.

Key Laws in Ghana's Mining Sector

- 1992 National Constitution, and more specially Article 36(4) which states that 'Foreign investment shall be encouraged within Ghana, subject to any law for the time being in force regulating investment in Ghana'

Mining Code

- PNDC Law 153 – Minerals and Mining Law, 1986
- PNDC Law 218 – Small-scale Mining Law, 1989
- Act 475 – Minerals and Mining (Amendment) Act, 1994
- Act 703 – Minerals and Mining Act, 2006

Fiscal Regime

- LI 1349 – Mineral Royalty Regulation, 1987
- Act 592 – Internal Revenue Act
 - Section 1 and 1st Schedule – Corporate Taxes
 - Section 20 and 3rd Schedule – Capital Allowance

Others

- PNDC Law 219 – Precious Minerals Marketing Corporation law, 1989
- PNDC Law 154 – Minerals Commission Law, 1986
- LI 1652 – Environmental Assessment Regulation Act, 1994

Source: Adapted from Twerefou et al. (2007).

A crucial aspect of the Mining Support Programme was the establishment of the Ghana Minerals Commission (GMC) in 1986 to regulate the mining sector; amend and modify existing legislations; develop guidelines and standards for monitoring environmental issues and to make recommendations on mineral policy. Other functions of the GMC include advising government on mineral matters; reviewing and promoting mineral development and linking the government and all actors in the industry (Twerefou et al. 2007, p. 12).

2.5 Foreign direct investment

It has been argued that foreign direct investment can stimulate economic growth in developing countries by increasing financial resources for investment as well as improving technology and skills. This has made FDI the centre of attention for policy makers in low-income countries in particular (Abdulai 2005; Twerefou et al. 2007). While FDI is noted to impact on a host economy through a variety of channels, it is principally regarded as adding to the resources available for investment and capital formation. According to Abdulai (2005, p. 1), the transfer of technology, skills, innovative capacity, and organisational and managerial practices to developing countries through FDI is enhanced as a result of the activities of foreign direct

investors. He, however, adds that these positive effects may vary in their magnitudes depending on the quality of the business environment in the host economy and the characteristics of the multinational companies involved.

As earlier noted, after years of poor economic performance, Ghana in the early 1980s launched the World Bank/IMF inspired Economic Recovery Programme (ERP) and the Structural Adjustment Programmes (SAPs) to restore economic stability and growth. These programmes resulted in a much more liberalised regime for FDI – addressing investors' concerns, privatizing public enterprises and actively promoting investment. All these objectives are aimed at creating a good environment to boost investor confidence.

No sector of the Ghanaian economy has benefitted from the liberalisation regime than the mining sector in terms of FDI inflows. Since being on the brink of economic collapse in the early 1980s, the mining sector has made notable economic gains, largely because the government, under the auspices of the Bretton Woods Institutions, has over the past 15 to 20 years, been successful in its attempts to promote widespread foreign investment in mineral exploration and excavation projects (Aryee 2001; Hilson 2002, 2004; Bank of Ghana 2003). In fact, it has been noted that, four decades prior to the mid-1980s, no new mine was opened in Ghana due to a myriad of problems faced by mining sector investors and potential investors alike, as a result of the numerous economic, financial, institutional and legal framework within which the mining sector operated (Jonah, 1987; Addy, 1999; Aryee 2001).

Table 4 shows that the mining sector continues to outperform the non-mining sector – attracting a large proportion of total FDI over the last 20 years. In total, on average 95 percent of all FDI in the mining sector goes into the gold mining sub-sector. The Table indicates that between 1995 and 2000 total FDI flows to the mining sector were over 2.2 billion US dollars compared to about 1.6 billion for the non-mining sector for the same period. This implies that the mining sector outperformed non-mining sector by about 30 percent. Then, in distinction to the period prior to the year 2000 which saw fluctuations in FDI inflows, the post-2000 period has witnessed a steady and significant rise in FDI for both the mining and non-mining sectors, with total FDI peaking at about \$5 billion in 2008. It is expected that strong FDI inflows into the mining sector will continue. But intensive oil exploration activities and investment in actual oil production, starting in 2010, will reduce the dominance of the gold sector in terms of total FDI inflows into Ghana.

Table 4: Foreign Direct Investment in Ghana's Mining and Non-Mining Sectors, 1991-2008

YEAR	Producing Mining Companies (US\$m)	Exploration Companies (US\$m)	Mine Support Service Companies (US\$m)	TOTAL MINING (US\$m)	NON-MINING (US\$m)	TOTAL (MINING & NON-MINING) (US\$m)	% of Mining FDI to Total FDI
1991	87.41	192.08	-	279.49	-	-	-
1992	421.30	174.10	-	595.40	-	-	-
1993	6.76	257.14	-	263.90	-	-	-
1994	10.07	88.26	-	98.33	-	-	-
1995	23.97	140.99	-	164.96	182.3	347.26	47.5
1996	79.77	694.99	-	774.76	254.2	1028.96	75.3
1997	218.23	322.03	52.76	593.02	631.6	1224.62	48.4
1998	172.82	63.24	31.48	267.54	169.3	436.84	61.2
1999	153.83	24.19	36.75	214.77	233.8	448.57	47.9
2000	29.91	179.40	22.47	231.78	132.1	363.88	63.7
2001	108.63	145.21	21.69	275.53	89.3	364.80	75.5
2002	110.50	86.44	18.65	313.72	58.9	372.62	84.2
2003	325.69	198.13	21.80	330.43	136.7	467.13	70.7
2004	407.58	125.47	23.39	556.44	139.3	695.74	80.0
2005	543.12	228.50	25.90	661.98	145.0	706.98	93.6
2006	330.36	232.90	23.48	799.50	636.0	1435.50	55.7
2007	410.25	235.41	24.56	670.22	970.4	1640.13	40.9
2008	466.75	270.72	27.83	765.30	3446.83	4977.43	15.4
2009	511.00	222.96	28.30	762.26	558.92	2083.44	36.6

Source: Ghana Minerals Commission; Twerefou et al. (2007); Ghana Investment Promotion Centre (GIPC); World Development Indicators, 2009

Again, and as emphasized by Hilson (2004), policy and legislation dating back to the launch of the ERP have established a more favorable investment climate in Ghana's mining industry. In all, this required extensive review and modification of some 78 acts, ordinances, decrees, codes and laws regulating the mining sector. This facilitated the establishment of new institutions which enhanced the attractiveness of the mining sector to foreign investors. In summary, then, several factors have thus contributed:

- The gold mining industry benefited most from the World Bank/IMF and other international donor financing under the ERP and has, in turn responded most positively in terms of output and foreign exchange earnings;
- Introduction of new laws on minerals and mining including: Minerals and Mining Law 1986 (PNDCL 153), Minerals Commission Law 1986 (PNDCL 154), Mineral (Royalties) Regulations Law 1987 (LI 1349), Small Scale Gold Mining Law 1989 and the Minerals and Mining Amendment Law (Act 475).
- Establishment of the Ghana Minerals Commission as a 'one-stop' government agency for regulating the mining sector, especially in the areas of speedy registration of mining firms, approval of concessions and exploration, etc.
- Introduction and development of new mining technologies and skills;

- In general, improved prices on the international commodity markets, especially for gold, which coupled with increased profitability has played a crucial role in motivating investors to pump more resources in the sector.
- Peaceful and stable political and democratic governance which has facilitated and improved overall investment.

3. Gold Mining's Linkages in Ghana

Against this picture – one of strong global demand for gold, especially over the past decade, and over 20 years of government policy and legislative activity supporting the industry in Ghana, with this facilitating a steady flow of foreign investment which has resulted in increased production volumes – we can now turn to explore the actual pattern of linkages for the gold mining industry.

3.1 Mapping the gold mining inputs cluster

The discussion of the gold mining industry's dynamics above conveys some initial sense of the wide range of actors and activities that characterize the industry. At first glance, the industry's current prominence in Ghana's political economy at least signifies that a description of it as an enclave – to re-iterate, “an isolated economy without forward or backward economic linkages” – no longer appears to be appropriate.

There are number of versions of a generic mining value chain. Vorster's account (2001: 63) which is typical features the stages of:

- Locate: The determination of the presence of a deposit
- Valuate: The determination of the profitability of a project
- Establish: The execution of the mine plan
- Mine: The removal of mineral resources
- Transport: The movement of classified broken rock from source to destination
- Beneficiate: The extraction of saleable products and the disposal of residue
- Market: The maximization of profit
- Divest: The curtailment of operations.

This is too broad to be really useful. In their excellent recent study of the South African mining industry, Walker and Minnitt point out that

Each stage in the chain is designed to increase the grade and economic value of the valuable components of the original ore. A variety of different capital goods, consumables and services are required at each stage to ensure and maintain operational efficiency and productivity. Collectively, the firms which provide these inputs are termed the “inputs cluster.” (2006: 14)

For the case of South Africa where, as is well-known, mining emerged already in the pre-war era as a propulsive lead sector of the economy, they identify a two group or tier structure for the minerals or mining inputs cluster, as follows:

Tier 1: Direct Suppliers

- Engineering and service providers (e.g., project engineering companies)
- Original equipment manufacturers (OEMs) (capital equipment)
- Consumables input suppliers (explosives, chemicals)
- Agents and distributors (pumps, bearings, vehicle parts)

Tier 2: Indirect Suppliers

- Specialized engineering and services (electrical engineering, ventilation)
- Component manufacturers
 - Manufacturers of standard components (cabling, electrical motor parts)
 - Manufacturers of specialized niche components (hoisting hooks, pinch valves)
 - Foundries and machine shops
- Input providers (chemicals, steel products)

To get a full picture for Ghana's mining industry, we can tentatively add two more tiers:

Tier 3: Direct Mining Services:

- Geological, survey, land use planning
- Laboratory services
- Drilling services

Tier 4: Indirect Producer Services, which range from the basic to the sophisticated:

- Finance, Insurance, Real Estate
- Legal services
- Transportation and logistics
- Civil engineering
- Environmental services
- Construction and landscaping
- Catering
- Cleaning
- Security

Ghana's leading Business Directory, the *Surf Yellow Pages Ghana* (2010 edition), indicates a large population of companies involved in mining, the vast majority of which are concerned with gold mining. Some 300 companies are listed under the three categories of mining companies, mining equipment, and mining services which are used somewhat indiscriminately. All four tiers above are well-represented. Tier 1 includes project engineering companies such as Lycopodium, and a strong showing by a number of well-known, international OEM companies (Atlas Copco, Boart Longyear, Sandvik, Liebherr, Mantrac/Caterpillar), input suppliers (Carmeuse Lime Products, Castrol, Maxam, African Explosives) and agents and distributors (Barbex Technical Services, Riepco).

As one moves down through the tiers, the international companies and their agents that still predominate are joined by a number of locally-owned servicing and supplier companies. The majority of the companies listed in the directory, at least 80 percent, are located in Greater Accra, in Accra itself or in the adjacent port/industrial city of

Tema. As will be discussed below, a spatial division of labour operates. Accra aside, where the headquarters of the mining producing companies are, the only other metropolitan area to feature is Takoradi in Western Region (Kumasi, the large metropolitan commercial and political capital of Ashanti Region, is seemingly under-represented). The mining towns spread though out the western half of Ghana feature only direct operational support (i.e., Tiers 3 and 4 above) to the mines in their vicinity, much of this conducted by smaller local companies in the area itself .

The categorization used by the industry itself and by government, notably by the GMC and the Ghana Chamber of Mines (GCOM) is also helpful here. Seen previously in the FDI figures, it is also threefold: producing mining companies, exploration companies, and mine support service companies. Some seven gold production companies, six exploration companies out of the estimated 15 to 20 operating, two contract miners and some 45 mine support service companies are members of the Chamber of Mines, as are a number of associate member associations like the Ghana Minerals Commission, the University of Mines and Technology (UMAT) at Tarkwa, the Geological Survey, and the College of Jewellery in Accra.

The category of mine support service companies is termed affiliate members in the GCOM's lexicon. The Ghanaian offices or registered subsidiaries of the well-known global mining suppliers and service companies mentioned above, such as Atlas Copco, Boart Longyear, Sandvik, Carmeuse Lime Products, Liebherr Mining Equipment, Lycopodium, Maxam and Mantrac all feature strongly. At the same time, a small but growing number of Ghanaian national companies are also listed, which fall into Tier 2 above as component manufacturers and input providers. These are primarily in the metals and metalworking (Tema Steel), chemicals and plastics (Riepcos, Interplast), civil engineering (Engineers and Planners), business services (KEK Insurance Brokers) and logistics (Allship Logistics) fields. While not presently members of GCOM, a number of other locally-owned companies also in these sub-sectors were also mentioned as mining suppliers and service providers by interviewees. Names such as Western Forgings, Tropical Cable and Conductor, and Wire Weaving Industries were indicated by several purchasing managers.

Although they were not made available, the supply chain lists of producing mining companies discussed with us, such as those of Golden Star Resources (which has several hundred suppliers, with 60 active suppliers, defined as 12 orders a year), Gold Fields, AngloGold Ashanti, Chirano, and Newmont (521 suppliers in total) indicate a large number of suppliers and service providers. The general picture is further backed up by Chamber of Mines data on the distribution of mining revenues. This demonstrates a large aggregate spend by producing companies making up some 20 percent of revenues (\$467 million) on local purchases, to which a further 18 percent (\$428 million) on fuel and power must be added. Imported consumables comprise 16 percent of the total, and CAPEX (capacity expansion), the majority of which is imported plant and equipment, 29 percent.

This brief account does demonstrate the **existence** of a range of "input-supplying" backward linkages for gold mining, which is often baldly denied. While many goods and services are supplied by international entities, many of these have had an expanding presence in Ghana over the last decade, and employ local (i.e.,

Ghanaian) managers and staff. In any event, it must be stressed here that the mere existence of a linkage is not necessarily tied to or dependent on its national origin (the depth or breadth of a linkage may be affected, of course). This is a point which is overlooked or misunderstood by analysts, who disallow the presence of linkages if they are not of Ghanaian national origin. In this regard, it is further worth pointing out that the linkage activity of locally-owned companies also appears to be on the rise. It is vital to recognize and further investigate this advance, if it is that, with a view towards facilitating and supporting it: as Gallagher and Zarsky argue, “Endogenous capacities for production and innovation held within domestic firms form the bedrock of sustainable industrial development” (2007, p. 5).

We will deal with backward linkages – as a key, then, to further industrial development – in more detail below. Before doing so, we turn to a brief description of existing forward, fiscal, and consumption linkages.

Table 5: Linkages in Ghanaian Gold Mining: Ghana Chamber of Mines producing members 2008: Distribution of funds

Classification	Amount (million USD)	Percentage
Employees	175	8
CAPEX	669	29
Direct to State	146	6
Mining Host Communities	12	1
Local Purchases (excluding Fuel/Power)	467	20
Local Purchases (Fuel/Power)	428	18
Loans	52	2
Imported Consumables	376	16
TOTAL	2,325	100

Source: Ghana Chamber of Mines

3.2 Forward linkages

Forward linkages, as discussed previously, arise from the processing prior to export of a commodity or staple. Within industrial-scale gold mining in Ghana, gold ores are mined and the metal extracted at the mines themselves to the stage of semi-pure dore bars, which are then sold and transported for further refining, much of this at the world’s largest such plant, the Rand Refinery in Germiston, South Africa. There is little actual refining of gold in Ghana. It is understood that the Precious Minerals

Marketing Company (PMMC), rather than refining, is primarily involved in assaying, purchasing and exporting gold for its approximately 750 gold buyer clients who operate in mining communities in the country to buy gold from licensed small-scale producers (defined as those working concessions of up to 25 acres in spatial extent). *Galamsey* miners are engaged in informal and highly hazardous informal refining. A Chinese-financed refinery is apparently being built in Accra.

Similarly, there is also little evidence of jewelry or other industrial production on any scale in Ghana. In principle, the possibility exists for such downstream linkages, especially jewelry making. However, prospects are now weak due to:

- The higher prices of gold on the world market (jewelry consumption of gold is down all over the world, as seen earlier)
- Weak technology: local jewelry making has a long tradition but is still dependent on older traditional technology
- Weak local demand for gold jewelry (there has been a changing cultural attitude to the use of jewelry as savings/store of value – in effect, real estate has taken its place amongst the middle classes)
- Increases in cheap jewelry imports from Asia and the Middle East.

It needs to be noted that here analysts tend to be dismissive of the potential for forward linkages of this productive type stemming from gold. But given there has been some discussion on the matter, there may be some potential for reviving goldsmith-type activities as an aspect of Ghana's quite active cultural and heritage tourism promotion, something which has apparently been achieved in Indonesia, for example.

3.3 Fiscal linkages

As discussed earlier, the development and utilization of fiscal linkages by the state, usually in the form of tax receipts, can and does coincide with a commodity or stable-based enclave economy. Accordingly, in the literature, there is little disagreement that gold mining in Ghana has over a long time period contributed in major fashion to the government's revenues in the form of royalties (at a rate of 3 percent of the value of production), corporate taxes, payroll taxes, a short-lived reconstruction levy and various other minor instruments, and hence to the country's fiscal health and stability (Aryee, 2001; Akabzaa, 2009).

The Tables below demonstrates a strengthening of the mining industry's contribution to government revenue – and hence of the fiscal linkage – over the past decade, from a level of close to 14 percent of total tax revenue to close to 20 percent. A Mineral Development Fund has been set up by government with a proportion of 20 percent of royalty revenues (the remainder goes into a consolidated account). Half of this goes to support the institutions and agencies which support mining at national level, such as the GMC; the other half is distributed amongst district assemblies (60 percent), stools (20 percent) and traditional authorities (20 percent) which have jurisdiction over mining activities in their locations (Akabzaa, 2009). There are significant political difficulties with the allocation of this revenue at local level, with receipts used for recurrent expenditure by district assemblies and on private projects by chiefs, rather than on remedial or developmental initiatives.

TABLE 6A and 6B: Mining Industry Contribution to Tax Income

Year	Total IRS Collection	Mining Income
1990	91.06	8.94
1991	93.75	6.25
1992	87.82	12.18
1993	87.17	12.83
1994	85.11	14.89
1995	82.12	17.88
1996	85.51	14.49
1997	88.53	11.47
1998	87.87	12.13
1999	88.07	11.93
2000	86.25	13.75
2001	88.08	11.92
2002	88.94	11.06
2003	89.01	10.99
2004	88.44	11.56
2005	85.42	14.58
2006	87.68	12.32
2007	84.15	15.85
2008	82.76	17.24
2009	80.21	19.79

Source: Ghana Minerals Commission

YEAR	CORPORATE TAX GH¢	MINERAL ROYALTIES GH¢	P.A.Y.E GH¢	RECONSTRUCTION LEVY GH¢	WITHHOLDING TAX GH¢	MISCELLANEOUS GH¢	TOTAL INCOME GH¢	TOTAL IRS COLLECTION	TOTAL MINING/TOTAL IRS
	(A)	(B)	(C)	(D)	(E)	(F)	G= A+B+C+D+E+F	(H)	I=G/H
1990	282,594	189,344	-	-			471,938	5,281,807	8.94%
1991	82,184	302,128	-	-			384,312	6,148,563	6.25%
1992	455,505	454,580	-	-			910,086	7,473,153	12.18%
1993	439,345	748,512	264,931	-			1,452,787	11,323,700	12.83%
1994	721,408	1,278,369	481,080	-			2,480,857	16,659,594	14.89%
1995	2,039,297	2,091,193	795,176	-			4,925,666	27,551,320	17.88%
1996	916,053	3,552,703	1,683,453	-			6,152,209	42,449,191	14.49%
1997	986,880	3,459,495	2,502,202	-			6,948,577	60,578,258	11.47%
1998	1,445,077	4,984,124	3,101,651	-			9,530,852	78,543,669	12.13%
1999	3,111,711	4,862,042	2,783,926	-			10,757,679	90,166,376	11.93%
2000	1,578,917	11,873,694	5,924,380	-			19,376,990	140,944,527	13.75%
2001	2,481,289	12,735,839	7,611,168	425,147			23,253,443	195,016,275	11.92%
2002	2,350,116	15,345,247	10,145,767	2,647,463			30,488,593	275,774,778	11.06%
2003	6,813,770	19,438,758	14,104,945	1,678,588			42,036,061	382,407,839	10.99%
2004	10,033,114	21,574,371	13,435,771	5,318,591	11,310,661		61,672,509	533,311,470	11.56%
2005	26,988,964	23,595,190	15,437,126	1,951,628	13,490,703	12,509,203	93,972,813	644,638,505	14.58%
2006	21,566,208	31,625,479	18,271,007	1,582,873	17,381,530	-	90,427,097	734,135,448	12.32%
2007	47,415,690	40,882,042	34,587,597	-	21,208,062	136,537	144,229,928	910,235,784	15.85%
2008	73,554,697	59,006,509	47,139,242	-	30,804,675	277,934	210,783,058	1,222,475,246	17.24%
2009	124,600,880	90,415,902	103,061,985	-	36,288,407	-	354,367,174.02	1,790,557,800	19.79%
TOTAL	203,262,820	257,999,618	178,269,422	13,604,290	130,484,038	12,923,674	1,114,622,629	5,385,115,503	13.10%

3.4 Consumption linkages

As discussed above, consumption linkages are the incomes in the form of profits and wages which arise from commodity or staple production. These can be spent nationally or in local areas on the products of domestic industries, including those which have been instigated by these new incomes. There is much anecdotal evidence of businesses in the mining communities (Accra should be included here) have been stimulated by and depend upon this linkage, but it is difficult to measure and quantify. Western Ghana's mining towns feature a range of informal and business activities – cultivation, animal husbandry, food and beverages, trading and retailing, hospitality and recreation most prominent amongst them – which appear to have been stimulated by mining incomes.

The International Council on Mining and Metals (ICMM) country case study on Ghana's gold mining industry, which is entitled *The challenge of mineral wealth: using resource endowments to foster sustainable development* (2007) provides some limited research findings in this regard. In a case study of the Ashanti Region mining community of Obuasi, which is the site of AngloGold Ashanti's largest mine, the focus is, though, on the rather small estimated proportion of the procurement budget (5 percent of a total of \$110 million, or approximately \$5 million) which is retained in the local economy. This is used to purchase goods and services of the type discussed in the section below. The only attempt at analysis of the derived effect of AngloGold Ashanti's mining activities on the town of Obuasi is an estimate for induced employment in the town of between 20,000 and 50,000, against the backdrop of an employment statistic of 6,673 for the town, which is quite a broad range. In discussions with Newmont in late 2010, we were informed that in early-to-mid 2011 the company will release the findings of an econometric study of the Ahafo mine's impact on local social and economic development, which will presumably provide excellent data for at least one very large case.⁷ In general, assessing consumption linkages, preferably through a series of case studies, represents a more promising vein of research than a blanket dismissal of the positive benefits of mining activities in Ghanaian localities.

3.5 Backward linkages

We can return now to the analysis of backward linkages, which is the crucial linkage element for ongoing industrialization and development. To repeat, backward linkages arise out of activities established to supply inputs to the production of a commodity. As discussed above, we can at least begin to identify increasing evidence of localized (if not necessarily local-owned) productive activity servicing and supplying the gold mining industry, in addition to the large amount of plant and equipment that is being imported by direct suppliers (including their agents) in Tier 1 above. We also see activities from indirect suppliers in Tiers 2; and in the Tier 3 and Tier 4 categories we have added, direct mining service providers, and indirect producer servicing companies. To use Newmont's categorization, this includes participation from five types of localized company: Local-local (i.e., at local mining community level),

⁷ The study, conducted by Prof. Ethan Kapstein of INSEAD, has recently been publicized but not released, to our knowledge. Its findings will be incorporated within later, publishable versions of this report.

Ghanaian-owned, Ghanaian-participating (e.g. joint ventures), Ghanaian-registered (e.g., a subsidiary), and International companies. Newmont, in fact, is in the lead with its local sourcing policy – the company’s in-country spend, with 521 local suppliers listed, is currently at \$150 million, with plans to increase this to \$250 million in the short-term. Other companies appear to follow Newmont’s lead, with GCOM playing a key role in sharing good practice and methods.

The intensification of localized activity is thus being formalized in producing mining company procurement policies, programmes and procedures, and is now conceived as an integral ingredient of “the social license to operate” for gold mining in Ghana. As will be seen below, this is being motivated by government policy and legislation, which acts as a prod or stimulus, and is making localized supplying and servicing into a norm (or convention) of sorts. As one supply manager put it to us, referring to the current business climate, affected as it is by political factors, “Anything you can buy locally, you want to buy locally!” The Minerals Commission is formulating regulations to make it compulsory for all mining companies to develop a Local Business Development Programme (LBDP) which will commit them to significant localization of supply chains. Initial proposals were on the basis of percentage of spend.

Notwithstanding this aim to source locally, our interviews also indicated that buying decisions are not made willfully, and that key factors for supply managers in making decisions on which supplier or service company to use for any given product or service are quality, reliability and timeliness. “We prefer to go with a group of firms we are familiar with, who we believe will deliver – and more or less on time,” stated another supply manager.

Suppliers, on the other hand, are quietly skeptical of this view. Their perception is that cost is the key variable. “They [supply managers] talk about quality all the time,” said one supplier of engineering services, “but they always try to get us to cut our price. Suppliers also point to a principal constraint they face when it comes to making cost reductions, which is that the tariff structure, which exempts mining companies from import duties on a wide range of products (export duties are also excluded), makes it often less expensive to import a good for the mining company than to produce it locally, whether this is by a Ghanaian-owned or Ghanaian-participating company. Suppliers and service companies, notably SMEs, also confront difficulties in accessing finance and high interest rates (Interestingly, several producing company interviewees also complained about the small scale and limited horizons of Ghana’s banks.)

It is necessary to understand the variation in spatial location for servicers and suppliers to gold mining, and, at least preliminarily, the way in which location affects firm operations and potential. We have referred briefly above to the location pattern and dynamics of the gold mining industry across the country. The large majority of the firms making up the mining inputs cluster are located in the Greater Accra Region, notably in the Accra Metropolitan Area itself, and in the adjoining metropolitan area of Tema, which was planned in the 1960s by the famous Greek firm Doxiadis and Associates as the principal industrial centre and port for the country. Tier 1, direct suppliers, and Tier 3, direct mining services, as well as the advanced part of Tier 4, indirect producer services, are literally clustered in Accra, mainly in the eastern districts of the city. Here, they are in close proximity to the

headquarters of the producing mining companies, which in turn are situated in adjacency to Kotoka International Airport, specifically in the neighborhoods of Airport Residential, Cantonments and East Legon, and thus at least partially at a remove from the epic, grinding congestion of central Accra. Here these firms arguably make up the largest part of a wider larger, finance and producer services cluster which has emerged, driven by FDI – and this particularly in the mining sector – in the last 15 years (Grant and Nijman, 2002; Grant, 2009).

Tier 2, indirect suppliers also tend to be located in the industrial estates of Accra, and Tema. As seen above, this tier includes a growing group of small-scale Ghanaian-owned or Ghanaian-participating manufacturers who supply less complex intermediate inputs, notably within the metalworking, engineering, electrical engineering, chemicals and plastics sub-sectors. In this regard, The Chamber of Mines Supply Manager's Sub-Committee has identified 27 product categories, presented in the box below, which are either already being manufactured in Ghana, or should be assessed for "import substitution potential." Annual spend on Ghanaian-owned or participating manufactured products is said to be \$120 million, and the aim is to increase this to \$200 million in the longer term. Here the Chamber is pro-actively seeking, understandably, to move from a proposal on Glocal sourcing policy based on percentage value of procurement spend to one based on targeting products (services are not included) which are being or likely can be made in Ghana.

Backward linkages: the 27 categories

- Activated Carbon
- Yelomine Pipe
- Rock-bolts and Split-sets
- Caustic Soda
- Explosives Manufacturing, including Ammonium Nitrate
- Ventilation Ducting
- Ammonium Sulphate
- Mill Liners
- Grinding Media
- General and Speciality Lubricants
- HDPE & PVC Pipes
- Overalls & Work Clothes
- Cement and Cement products
- Quicklime and Hydrated Lime
- Conveyor Rollers, Idlers & Pulleys
- Steel Products, including fabrication
- Tyre-retreading
- Heavy Duty Electric Cables
- Metal or PVC Core Trays
- Chain Link Fencing, Wire Netting, Barbed Wire, Welded Mesh, Expanded Mesh, Concrete Mesh, Razor wire and Panel Mesh
- Motor Re-winding
- Plastic Sample Bags
- Calico Bags
- Bullion Boxes
- Reversed Engineered Speciality Products
- Cupels & Crucibles
- Wood Products

Finally, at the spatial level of the mines and their surrounding communities, lower level Tier 4 indirect producer services such as construction, maintenance, catering, landscaping, haulage, transportation and security take place, with local-local companies utilized and in the forefront. In addition, at this level Tier 1 direct suppliers have depots and maintenance facilities (there are also some Tier 2 facilities). Procurement policy and procedures again facilitate this, but are augmented at the level of the community by Corporate Social Responsibility (CSR) initiatives, including, and this typically in the case of new mines, producing mining company-designed linkage programmes.

Partly as a result of adopting local content development as well as deriving from political pressure from mining host communities and civil society organizations and NGOs, CSR has come to represent the new face of mining companies in Ghana. Even though Ghana lacks a national policy on CSR, the GMC in 2002 mandated all mining companies to adopt the concept of CSR to assist their host communities (Tememg and Abbew 2009). All large mining companies in Ghana have set up departments and units to deal with CSR. The CSR initiatives have improve mining company-host community relationships, but more importantly, they have provided critically needed social and physical infrastructure which otherwise lay within the mandate of local and central (state) governments.

In some cases to demonstrate the commitment to CSR, foundations have been set up which tie mining production and revenue to funds for CSR. A case in point is Gold Field Ghana Limited's (GFG) Foundation which was set up in 2004 to promote and fund community development projects within the Tarkwa and Damang catchment area of the company's operations under an initiative titled the Sustainable Community Empowerment and Economic Development (SEED) programme. The main objective of the GFG Foundation is to promote the development of the company's primary stakeholder communities. The Foundation's work is funded by a contribution of one US dollar for every ounce of gold sold by the company, as well as a deduction of 0.5 percent of pre-tax profits. Based on this funding contribution, increases in the price of gold and in company profitability imply more funds for community development projects. In addition, other companies providing mining support services to Gold Fields Ghana are also encouraged to contribute either in cash or kind to the Foundation's activities. Table 7 shows the contributions made by the GFG Foundation to various sectors in its primary catchment area.

Table 7: GFG Foundation: Percentage Expenditure on Sectors and Total Contribution (in US Dollars) on Community Development Projects, 2002-2009

Sector	Financial Year								Total (%)	Total Amt (\$'000)
	2002	2003	2004	2005	2006	2007	2008	2009		
Education	57	8	57	35	31	25	36	25	31	2808
Health	21	64	8	27	3	3	5	2	12	1060
Water & Sanitation	9	17	11	19	13	17	16	11	14	1315
Agriculture	-	-	6	1	23	45	31	33	24	2213
Others	13	11	18	18	30	10	12	29	19	1710
Total Amt (\$'000)	474	721	362	915	1380	1391	1932	1931	100	9107
Projects not funded by GFG Foundation										1382
Grand Total										10,489

Source: Gold Fields

As of 2009, the GFG Foundation has contributed about \$10.5 million to community development projects in sectors such as education, health, water and sanitation, and agriculture.

Following the directive from the Mineral Commission other producing mining companies in Ghana have established these Foundations for community development projects in their mining operational areas with similar funding arrangements to that of Gold Fields. For instance, Newmont has a Foundation for CSR, funded by a contribution of one US dollar for every ounce of gold sold by the company as well as a deduction of 1 percent of pre-tax profits. Golden Star Mining Company has established the Golden Star Development Foundation (GSDF) to promote and fund development projects in its operational areas. Projects funded by GSDF in 2008 included establishment of an educational scholarship scheme; provision of educational infrastructure (school building); health infrastructure (including medical supplies) and a community electrification project.

Linkage programmes can be seen as represent a new variant on CSR. A prominent such initiative which has now been embraced by the GCM is the Newmont Ahafo Linkages Programme (ALP). Started in 2007 and supported by the International Financial Corporation (IFC), the ALP is based on the principal that integration of local content is a prerequisite for the achievement of sustainable development, and that mining operations should leave behind positive impacts beyond the lifespan of the mine. Micro businesses and SMEs were a particular target for the award of contracts, this based on the provision of mentoring and advisory services.

Variants of the ALP initiative are now being developed by the various large mining companies. The overall goals of these programmes is to help create and sustain livelihoods both by engaging local businesses and supporting the development of local businesses to access contracts in other sectors of the economy. More

importantly, the impact of these types of initiatives transcend the generation of revenues and employment amongst local entrepreneurs, to building local businesses which can survive beyond the lifespan of the mine.

These recent efforts by gold mining companies and the GCM in terms of local content and local suppliers development programmes and CSR have been dismissed as 'pittance and a mere marketing and public relations tool'.⁸ We, however, share the conclusion of Temeng and Abbew (2009) who after evaluating several CSR projects of gold mining companies in the Western Region, described these projects as 'averagely and patchily successful'. They, however, called for adequate involvement of community members and adequate funding from mining companies to enhance further the success rate of the CSR projects.

It must be further stressed that even if the impact of these local content development programmes and CSR initiatives of gold mining companies are discounted at the national level, the impact of these initiatives at the local and regional levels cannot be dismissed. For instance, as of 2009, GFG has given scholarships to about 270 beneficiaries in its operational areas in Tarkwa and Damang: 153 (senior high school); 29 (vocational school); 65 (tertiary) and; 26 (apprenticeship training). While this may be of no significance at the national, its impact on long-term well being of beneficiaries and their families and communities at the local level cannot be discounted.

4. Explaining Linkages

As discussed above, explaining the linkages – and associated spatial dynamics – between Ghana's gold mining industry and the wider economy necessitates challenging the commonly held view that the industry is an enclave activity with very limited connections to the wider national economy. More often than not, linkages are equated in this perspective only with the level of sourcing by locally-owned companies. Instead, we have argued that such a view is both limited and outdated, and obscures the variety and different degree of linkages and connectivity between the gold mining industry and the wider Ghanaian economy.

The approach of the MMCP holds that the development, widening and deepening of linkages, as well as agglomeration effects, occurs due to a number of factors: the national ownership of mining companies; policy, legislation and institutions; the influence of the National System of Innovation (NSI); the existence of skills within the industry; infrastructural conditions; and an Africa regional dimension, specifically the relative proximity of South Africa as the continent's mining leader. Table 8 below indicates how these factors can be seen as interacting to produce different types of linkages with varying degrees of depth and breadth.

⁸ Interview with the Executive Director of WACAM, an NGO, advocating for the rights of communities affected by mines in Ghana

Table 8: Types of Linkages and Influencing Drivers in Ghana’s Gold Mining Industry

Type of Linkage	Drivers Influencing Linkage					
	Ownership	Policy	NSI	Infrastructure	Skills	Regional
Fiscal	XX	XXX		X		
Consumption	XX	XX		X	X	
Forward		X	X		X	
Backward	XX	XXX	X	XX	XX	X

The Table shows that in the Ghanaian situation, sector-specific policies and legislation as well as the broader policy framework relevant to gold mining have been the strongest factor, and critical to the development of fiscal, backward and consumption linkages (the forward linkage is of course limited). Following policy as causal factors are ownership, skills, and infrastructure. The NSI itself as a factor and the regional dimension appear to be a lot weaker.

4.1 Policy and Legislation

There is no doubt that the present state of gold mining in Ghana is largely due to policy and legislative frameworks which have evolved over the years, more so in the last decades of economic and political reforms. While the existing legislative framework, especially Act 703, seeks to create incentives for and protect foreign investments, it also seeks to enhance local content in all aspects of mining operations.

As seen above, the desire of policy and legislative instruments to deepen local content and the local supply chain has also pushed mining producers and the support services companies to respond by adopting a number of policy measures on local supply development. Currently, the umbrella association of the mining companies, the Ghana Chamber of Mines (GCM) and individual companies have adopted a policy to develop local business through the initiative also mentioned above entitled Local Business Development Programme (LBDP).⁹ This programme seeks to enhance and deepen the backward linkages between the gold mining industry and the rest of the Ghanaian economy in order to make the industry more relevant to Ghana’s economic growth and development.

Interviews with the leadership of the GCM and managers of gold mining companies suggest a strong view that there are real but largely untapped opportunities for Ghana to gain much more from the mining industry through linkages than it is getting now. As Asmah (2009) notes, the GCM has virtually single-handedly added to the national public agenda the core issue of increasing the linkages between the mining industry and the rest of the economy.

⁹ A draft memorandum of understanding between the Mineral Commission and mining companies states that ‘the LBDP will be reviewed annually, in consultation with the Commission and may be altered by mutual consent between the companies and the Commission, with a view to securing the maximum benefit to Ghanaians and local enterprises (Extract from Mineral Commission presentation to February 2010 GCM council meeting).

4.2 Infrastructure

Even though the overall infrastructure of Ghana, such as the transportation networks, power supply and telecommunications remains poor, mining areas in relative terms can be described as an exception to the rule. The need to provide mining areas and other resource-rich localities with adequate level of infrastructure has its antecedence in the pre-independence (colonial) era. According to Dickson (1971, 1975), colonial investments in infrastructure were guided by three criteria, namely: presence of exploitable and exportable resources; the ease with which the cultivation could be encouraged or introduced of cash or tree crops (mainly cocoa, coffee and rubber); and the ease with which these resources could be transported to the seaports (i.e. proximity to the coast).

Therefore, from the investment view point of the colonial administrators, areas of southern Ghana with access relatively closer to seaports and with exploitable and exportable resources such as gold received infrastructural investments. In fact, Dickson (1970, 1975) argued that several present gold mining towns such as Tarkwa, Obuasi, Prestea and Dunkwa, are to all intent and purposes the sole creation of gold mining activities.

In broad terms, this policy orientation regarding the direction of investment in Ghana has remained the same to date. Resource-rich areas such as gold mining areas have continued to receive in relative terms government investments to develop their infrastructure. The success of the mining sector in recent decades is partly attributed to the huge investments in infrastructure made by government with support from the World Bank/IMF and other international donors in mining areas (Owusu 2001; Aryeetey et al. 2009).

The enhanced infrastructure in gold mining areas, particularly that of the road network and ICT, has not only facilitated fiscal linkages in terms of improved production output and hence revenue to the central state and local government, but also broadened and deepened consumption (final demand) linkages, and has supported the physical connectivity that allow backward linkages to operate. Due to improved infrastructures, notably air transport, roads, and power supplies, gold mining and mining support companies now have their headquarters in Accra as well as maintaining offices in their operational areas. The benefits such a situation produces in terms of job creation, demand for services/goods and other benefits to a region such as Accra (national capital) where no gold is mined and the national economy is quite obvious.

4.3 The Mining Specific National System of Innovation and Skills Development

While Ghana's national systems of innovation (NSI), defined as the system of organizations, institutions and policies that combine with a country's physical infrastructure and human capital to create innovation, can broadly be described as weak, the country over time has acquired skills in gold mining, exploration and development (Lim 2008). According to Yawson (n.d), successive governments since independence have endeavoured to make science and technology (S&T) a critical basis for the country's development. Major S&T institutions have been established

over the years including the National Research Council out of which emerged the Ghana Academy of Arts & Sciences and the Council for Scientific and Industrial Research (CSIR); the Noguchi Memorial Institute for Medical Research; the Ghana Atomic Energy Commission (GAEC); the Ghana Standards Board (GSB) and the Cocoa Research Institute.

Other specialized S&T institutions were set up to develop and transfer technologies to various sectors of the national economy, especially the micro, small and medium-sized enterprises (Yawson n.d). Yawson adds that despite the various actions taken by successive governments, Ghana has not been able to develop its S&T base to address the country's basic human needs of food security, shelter, clothing and transportation, due to lack of investment and proper management of S&T. In fact, total expenditure on research and development (R&D) as a percentage of GDP is less than 1 percent. In addition, the failure to establish an independent and lead national science and innovation institution as well as the establishment of S&T innovation fund has exacerbated the gap between S&T application and the development of innovation (Lim 2008). Lim sums up the weakness of the NSI in Ghana broadly as follows:

- Weak institutional linkages and inadequate interaction between research and industry;
- Lack of leading national STI institutions;
- Lack of explicit national STI or innovation policy and related strategy;
- Limited funding for R&D;
- Deficits of technical graduates needed to drive technological innovation;
- Inadequacies in physical infrastructure (especially electricity).

Despite the general weaknesses in Ghana's NSI, in the mining sector a combination of factors such as the long period of gold mining, 'quantitatively' rich mining S&T institutions (including the production by universities of geologists, mining engineering and other allied professionals) and, the transfer of skills and technology through FDI have provided Ghana with mining exploration and engineering capabilities. Even though figures and numbers are hard to come by, it is now a known fact that Ghanaian mining engineers and geologists have not only contributed to the growth of the industry Ghana, but are also leading major mining operations in West Africa and elsewhere in Africa, especially East Africa.¹⁰ The evidence would seem to suggest that years of gold mining has resulted in the development of skills though not directed by a coherent policy framework.

4.4 Ownership and Regional Factors

The existing policy and legislative framework defines ownership as simply Ghanaian or as foreign entities registered locally in Ghana. It does not appear that a particular national ownership at firm level – whether of producing or supply/servicing companies – necessarily impels a particular type of linkage (e.g. Australian producers buying from Australian suppliers). There is no correlation, in other words, between nationality – on producer and service/supply sides – and linkage. Moreover, the same

¹⁰ Interview with Dr. Thomas Akbazaa, Head, Department of Earth Sciences, University of Ghana, Legon.

applies to the strong involvement of South African producers and suppliers: this African regional dimension does not appear to create privilege or advantage for South Africa to South Africa linkages.

The legislation on mining, more specifically Act 703, generally promotes increasing Ghanaian participation in the localization of mining operations and hence a deepening of the local supply chain. The argument here is that providing skills, jobs and business opportunities to local people and business gives them a compelling reason to support large-scale mining activity, as there is the 'feeling of local ownership'. This is in line with a local content argument which in the Ghanaian context has seen policy attention and has been broadly accepted by the Ghana Chamber of Mines and global mining companies whatever their nationality. Ownership is important but apparently it is the shared global nature and ownership of mining operations which is seen as crucial to securing and maintaining a social license to operate a mine.

Increasingly, then, the significance of policy and legislation as well as corporate social responsibility can be regarded as something of a 'proxy' for ownership. This is critical to the development of fiscal, final demand (consumption) and backward linkages as illustrated in Table 8.

5. Conclusions and Recommendations

After roughly a decade of good performance, the gold mining industry in Ghana is now poised for further growth. Moreover, in consequence of strong global demand for gold which appears likely to continue even if this is not at the current record prices, gold mining exploration – and following that, production – in the West Africa region is increasing faster than anywhere else in the world. The mining sector has been a propulsive industry for Ghana; now, there is a strong possibility that the Ghanaian industry can anchor a West Africa mining sector with potential for growth, and for sustainable industrial development.

In this report, we have argued that for the industry's real potentials and benefits to be realised it is necessary, first of all, to go beyond what has become a negative and self-defeating view – that gold mining is an enclave economy, characterised by a complete lack of linkages into the economy. A new story line is needed. We have argued that some 20 years of investment and growth – notably that following the gold price's strengthening from 2001-2002 onwards – have resulted in an improvement in the breadth and even the depth of linkages stemming from gold mining. However imperfect, this is a promising development worthy of further analysis and support in a collaborative effort from government, industry and development partners.

To begin with, the fiscal linkages which can be associated with an enclave industry have been amplified as mining's contribution to the Ghanaian exchequer has grown significantly at both national and at local, mining community levels. Then, consumption linkages, although difficult to measure, can also be seen to be expanding, as incomes from increased mining activities flow through mining communities, stimulating new business activities as "one thing leads to another," in Hirschman's phrase (1981, p. 65).

Forward linkages are understandably weak. Backward linkages, however, are increasing. The most significant recent development has been the emergence at national level of a mining inputs cluster of firms which supply and service both producing and exploration mining companies across the country's various mining communities. The cluster is made up of four tiers: Tier 1 Direct Suppliers; Tier 2 Indirect Suppliers; Tier 3 Direct Mining Services; and Tier 4 Indirect Producer Services.

These mining communities should now include Greater Accra, where we argue the strongest growth in backward linkages can be seen in the form of a mining services input cluster which has arisen in the east of the city. This cluster is largely comprised of Tier 1 and Tier 2 international firms at present that supply and service an increasingly regionalised mining headquarters and the exploration, construction/development and production activities which follow from it. The cluster appears to be strengthened by localisation economies as knowledge and information, labour supply and subcontracting opportunities are shared, and a platform for lobbying government is created.

The Accra area, including the port and industrial city of Tema, also features a small but growing set of domestic, Ghanaian-owned suppliers, largely within Tier 2, which provide physical (manufactured) inputs to the industry, these ranging from engineering and metalworking products through chemicals, plastics, electrical, textile and wood products. Suppliers of this type are also found, but to a far lesser degree, in the other metropolitan areas of Sekondi-Takoradi and Kumasi.

Meanwhile, in the mining communities (i.e., towns) themselves, or perhaps, better, across the western half of the country where mining occurs, in Western, Brong-Ahafo and Ashanti regions, the service depots of Tier 1 and to a lesser degree Tier 2 mining equipment firms are being joined by a range of lower level Tier 4 activities which service the mines themselves, such as transportation, haulage, catering, cleaning, construction and landscaping. Mining company supply chain policies and practices have a positive effect here, as do corporate social responsibility activities directed at alternative livelihood support for local inhabitants.

As implied above, Western Ghana can now be viewed as a mining region akin, say, to the South African Highveld, which contains spatially distinct gold mining zones such as the Witwatersrand, Free State Goldfields. The connective infrastructure, notably road and air, to the headquarters and service complex and to suppliers in Greater Accra is of great importance for maintaining and enhancing linkages. The road infrastructure within the broad region can be problematic, which incurs costs on producers and suppliers.

The industry is not – nor can it be expected to be – characterised by forward linkages, although there is perhaps some limited potential for the development of 'heritage' goldsmith activities on the one hand, and limited refining on the other.

The improvement in recent years of linkages has real policy implications. At present, pushed by provisions in the new Mining Code for improving local content, the Minerals Commission and the industry are working together through the Ghana Chamber of Mines to consolidate and extend existing company procurement

procedures into a national programme to support domestic manufacturers which currently supply or could supply inputs to the industry. The Chamber refers to this local sourcing endeavour as an Import Substitution Strategy (ISS). The effort is worthy of understanding and support, and it appears that the International Finance Corporation (IFC), which finances gold mining activities in Ghana, will provide design assistance for the initiative, drawing on its other supplier development programmes.

Given gold mining's propulsive role, wider industrial policy purposes can potentially be addressed.¹¹ While not deviating from its provenance in supply chain development for the gold mining companies, it can be recommended that the above ISS initiative be conceived and designed to strengthen generalised industrial capacities for Ghanaian manufacturing particularly for complementary intermediate goods which can serve as inputs to a range of productive activities, the upcoming oil and gas industry being a good, perhaps even best example. Industrial capabilities, particularly workforce and management skills, can and should also be nurtured here. A range of business development services, ranging from improving access to finance through industrial extension is relevant, as is better coordination and funding of academic and industrial research activities directed at mining.

Moreover, in conceiving the ISS, the focus has been on manufacturing alone. This is wholly understandable but the enhancing and further 'localising' of the mining service cluster (i.e., strengthening the capabilities of Ghanaian firms) is also worthy of consideration through the utilisation of procurement channels and procedures. Again, there are surely complementarities with other commodity/extractive industries in Ghana, as well as the potential offered by the growing West African regional mining complex to specialist mining service, construction, producer service and transportation and logistics firms. Local economic development policy, which is in its early stages in Ghana, can be formulated in this regard: indeed, a first step lies in notifying Accra Metropolitan Assembly politicians and planners what they have on their own doorstep, and recommending that they consider the mining support service industry's expansion requirements when conducting development and land use planning. Similarly, stimulating complementary industrial activities around engineering and metalworking, which can service and supply the Western Region's gold mining and oil and gas sectors, can be spatially focused and targeted at the port of Takoradi, and its depressed neighbouring city of Sekondi.

Finally, although it has not been a focus in this report, it can be seen above that spatial policy and infrastructure policy can assist in supporting the linkages that have been identified in this report. National spatial policy, which has been oriented towards re-balancing the space economy, should be re-balanced itself in the direction of strengthening transportation facilities and communication links in Ghana's western half, in concert with infrastructure policy and spending. As the resource frontier shifts outwards, policy thinking and support measures need to be allocated to consolidating existing development in order to facilitate the development of further linkage effects and agglomeration economies.

¹¹ As we understand it, an Industrial Policy for Ghana is currently under formulation by the Ministry of Trade and Industry

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