Economic Commission for Africa

Promoting Mineral Clusters: The Case of Tanzania

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Table of Contents

List of Tables

List of Figures

List of Boxes

List of Abbreviations

AIM	Investment Market
ASM	Artisanal and Small-Scale Mining
BIF	Banded Iron Formations
BOT	Bank of Tanzania
CDC	Colonial Development Corporation
CINGEX	Canadian National Geological Exploration Limited
DMS	Dense Media Separation
EAC	East African Cooperation
ECA	United Nations Economic Commission for Africa
GGM	Geita Gold Mine
IDRC	International Development Research Centre
ILO	International Labour Organisation
IMTCL	Interstate Mining (Tanzania) Company Limited
IPTL	Independent Power Tanzania Limited
JV	Joint Venture
KIA	Kilimanjaro International Airport
MBEXCO	Mbeya Exploration Company
MCDP	Mwadui Community Diamond Partnership
MEM	Ministry of Energy and Minerals
ML	Mining Licence
MOF	Ministry of Finance
MRD	Mineral Resources Department
MtDC	Mtwara Development Corridor
NDC	National Development Corporation
NGOs	Non Government Organisation
PFC	Pulverized Fuel Combustion
PGMs	Platinum Group Metals
PK	Pyroclastic Kimberlite
PML	Primary Mining Licence
RC	Reverse Circulation
RFP	Request For Proposal
RFQ	Request for Pre-Qualification
RVI	Royalty-Value Index
RVK	Reworked Volcaniclastic Kimberlite
SEAP	Structured Engineers Apprenticeship Programme
SG	Specific Gravity
SML	Special Mining Licence
STAMICO	State Mining Corporation
SWOT	Strengths, Weaknesses, Opportunities and Threats
TAMIDA	Tanzania Mineral Dealers Association
TANESCO	Tanzania Electric Supply Company
TAWOMA	Tanzania Women Miners Association
TAZARA	Tanzania Zambia Railways
TCC	Tanzania Cigarette Company
TCCIA	Tanzania Chamber of Commerce, Industry and Agriculture

TCME	Tanzania Chamber of Minerals and Energy
TDL	Tanganyika Diamonds Limited
TIC	Tanzania Investment Centre
TOR	Terms of Reference
TPH	Tonnes Per Hour
TRA	Tanzania Revenue Authority
TRC	Tanzania Railways Corporation
UDSM	University of Dar-es-Salaam
UNDP	United Nations Development Programme
VAT	Value Added Tax
VETA	Vocational Education Training Authority
WDL	Williamson Diamonds Limited

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Section One: Introduction

1.1 Background and justification

Tanzania's mineral endowments are considerable. It has large reserves of non-fuel resources like gold, diamonds, coloured gemstones, nickel, tin to name a few. In the wake of the liberalization of the economy, the government has been heavily promoting private investment in the minerals sector. This has transformed the minerals sector of the country into the fastest growing sector of the local economy.. From 1999 to 2003, the value of output in the minerals sector grew by an average of nearly 15% per year, mainly because of substantial increases in gold production, a result of many projects coming on stream. During the same period, the value of output in the construction and electricity/water sectors grew by an average of 10% and 4% respectively. While giving a speech on the "State of the Economy" to the parliament in July 2007, the Minister for Planning reported that the mining sector contribution to the country's GDP in 2006 was 3.8% which was an increase from 3.5% in 2005. The value of Tanzania's mineral exports has risen substantially since 1999. Most of the increase is due to gold exports, which increased in value to US$504.1 million in 2003 from US$ 374.3 million in 2002 and US$39.8 million in 1999. The share of total exports attributable to minerals rose to 48% in 2003 (44% gold and 4% other minerals such as diamonds and coloured gemstones) from 42.5% in 2002 and 13.5% in 1999. Tanzania's minerals industry, particularly gold mining, is likely to grow substantially in the near future as a result of increased investment in new projects. Estimates are that gold production would reach 59 t in 2005 and 61 t in 2007, with the potential to generate in excess of US$ 900 million of exports at prices of US$500/oz. This would represent more than 50% of the country's total exports.

Notwithstanding the impressive growth of the minerals sector in Tanzania in the last 10 years, some stakeholders contend that the sector has failed to deliver the expected windfalls to the rest of the economy. Analysts criticize the depth and dearth of linkages between the minerals industry and other sectors of the local economy, in particular, its contribution to the development of local small and medium-scale enterprises. They argue that the minerals industry forms a capital-intensive enclave, foreign-owned, operated largely by expatriates and using inputs (especially equipment) purchased abroad. They posit that large-scale foreign mining companies receive preferential treatment to the detriment of local artisan and small-scale miners, who feel marginalized by a system, which is focussed on satisfying the needs of foreign investors.

They also argue that the environmental and social impacts associated with mining, including planning for mine closure and for a post-mining scenario have not been appropriately accounted for and addressed. Criticism has also been made to the process in which decisions on mineral projects have been taken, with little or no consultation of local communities who can potentially be negatively affected by the projects. They further contend that in many developing countries, abundance of mineral resources has led to regional inequalities, creation of local pockets of poverty, corruption, conflicts, and wars of attrition.

For the minerals industry in Tanzania to gain greater social acceptance and improve its development outcomes, there is a need to embrace an approach which promotes an equitable creation, investment, distribution and management of mineral wealth. This requires a conducive and competitive policy, legal and regulatory environment and framework for business development; strong and capable institutions that promote good governance and management systems; opening up opportunities for local participation; sharpening investment decisions; promoting linkages between the minerals sector and other sectors of the economy; empowering

local communities in mining areas; gender mainstreaming; and facilitating knowledge and competencies creation for a post-mining scenario.

The fourth phase Government of Tanzania is already aware of this need and since it came in power in 2005 it has made it a priority to assure the public of the need to increase its participation in the development of the policy and ensure equitable distribution of the gains from the sector. In 2006, the Government established a committee to consult the public and key stakeholders of the mineral sector to find ways of addressing the public outcry. One of the major tasks of the Committee was to revisit the contracts entered between the Government and large mining companies, particularly to verify the claims that the contracts were one sided and are in favour of mining companies and did not benefit the country. Public meetings have been held and now the Government through the Ministry of Energy and Minerals and the Committee are engaged in one-to-one consultations with mining companies to address the situation.

Inability to adequately handle the above issues can exacerbate existing and latent tensions. The Tanzania Minerals Cluster Policy Study is a contribution to the process of formulating viable policy options that can assist the Tanzanian government and other stakeholders in (i) better mapping mining benefits streams; (ii) identifying the entry points to unbundle the minerals sector to open-up opportunities for local participation; and (iii) undertaking structural interventions that can maximize the contribution of the minerals sector to growth and development of the country.

1.2 Objectives of the study

The main objective of the study is to undertake an assessment of the extent, importance and outcomes of the minerals cluster or clusters[1] of Tanzania. As a follow-up to the pilot study of the minerals clusters of South Africa and Mozambique conducted by the United Nations Economic Commission for Africa (ECA) in 2004/2005, the current study evaluates the development outcomes of the minerals industry on the Tanzanian economy, including assessing inter-sectoral linkages and the multipliers between the minerals industry and other economic activities. From this, lessons are drawn and policy options and strategies are suggested that have the potential, in the long term, to improve the contribution of the minerals sector to the development of the country, at national, local, corporate and community levels.

1.3 Target group

The study is aimed at policy and lawmakers, private sector executives including their associations (e.g. Tanzania Chambers of Mines and Energy), NGOs and CBOs, development practitioners, academia, unions, international and sub-regional organizations and other stakeholders interested in the development of Tanzania. Lessons learnt, policy options and strategies designed from the Tanzania study might also be applicable to other African countries.

1.4 Content

The study report is divided in five main sections. The first section is the introduction. The second section examines the broad role of the Tanzania minerals industry, particularly its key attributes in terms of contribution

1 Could be commodity-specific as was observed in the Mozambique and South African studies carried out by ECA in 2004/2005

to GDP, income generation, employment creation, export earnings and other variables. Existing mining laws and regulations have been reviewed with a view to assessing their potential to support cluster growth.

The third, forth and fifth sections attempt to measure the levels of cluster activity around the minerals sector in the country. The third section focuses on the gold mining cluster. Diamond mining cluster is in section four. Section five handles tanzanite mining clusters. Existing linkages (upstream and downstream) between the minerals sector and other sectors of the economy are discussed using case studies. Data and information constraints did not permit use of quantitative analysis. The case studies allowed assessment of cluster inducing factors and correlation between the minerals sector and other sectors of the economy, including socio-economic and environmental variables.

The level of transactions between the minerals sector and other sectors are measured, particularly local procurement of goods and outsourcing of services (consulting, engineering, financial, etc.), and contribution to the creation of local physical, knowledge, technological, human, social and institutional capital. An attempt has been made to derive GIS-based poverty/prosperity maps to compare mining with non-mining districts. Effort has been also deployed to understand how mining is integrated into and has contributed to local systems of innovation and diffusion of technology.

The sixth section presents a SWOT (Strengths, Weaknesses, Opportunities and Threats) analysis of each mining cluster (e.g. The Lake Victoria Gold Field). This is carried out with a view to identifying the challenges and constraints to growth, as well as the impact of any growth inhibiting externalities. The SWOT analysis identifies trends and target actions to militate against any cluster inhibiting factors.

Finally, the seventh section draws conclusions and derives appropriate policy lessons and implications, strategies, and provides an indication of roles and responsibilities of actors that should contribute to the expansion of the minerals clusters in Tanzania and maximization of its development outcomes at national, local, corporate and community levels.

1.5 Methodology and Approach of the Study

Research methodology

To undertake the study, three independent but complementary methodologies were used. These included [1] desk study, [2] field survey and [3] data analysis and report writing.

Relevant top executives and senior officials in key government ministries, public institutions, private sector organizations and key individuals in the mining were consulted. This was aimed at searching for new ideas, exchanging views and opinions on the development outcomes of the minerals industry in Tanzania including assessing inter-sectoral linkages and the multipliers between the minerals industry and other economic activities.

Desk study - Literature review

The desk study included review of all relevant documents i.e. the Tanzania Development Vision 2025, National Investment Policy, National Mining Policy and other sector policies and any other relevant research and consultant documents. The research team collected basic relevant data and information on policy, institutional, resource use, legal and regulatory frameworks for sustainable mining sector development. The

team investigated the depth and dearth of linkages between the minerals industry and other sectors of the local economy, in particular, its contribution to the development of local small and medium-scale enterprises.

Secondary data on gold, diamond and tanzanite mining performances and opportunities were collected during literature review and some during fieldwork interviews by collecting relevant national documents/ statistics or literature, as they were made available by government ministries and departments.

Field surveys

Field surveys were carried out in Dar-es- Salaam, Arusha, Shinyanga and Mwanza regions. The team consulted and had interviews with several policy research institutions, beneficiaries and other stakeholders. The field surveys were carried out at two levels: first focusing on secondary data and information about current status, constraints and performance of the mining sector linkages; and second, at the level of the regulatory coordination and collaborating institutions. Both included interviews with senior and top public as well private sector officials. There was a formal interaction with key stakeholders to investigate major community development investments in mining and linkages with other socio-economic activities and achievements, and gaps and needs for sustainable mining policy strategy.

Data and information sources

Conventionally two types of data were collected; primary data and secondary data. The former was undocumented information and data that was obtained from the surveys conducted during fieldwork (i.e., through specific questionnaire) and some unprocessed information from officials' data files. The later was documented and/or processed information obtained from key institutions and other published or unpublished sources from other government ministries and public institutions. The key institutions consulted include the State Mining Corporation (STAMICO), Tanzania Investment Centre (TIC), National Development Corporation (NDC), MPEE, Ministry of Energy and Minerals (MEM), Ministry of Finance (MOF), Tanzania Chamber of Minerals and Energy and University of Dar-es-Salaam (UDSM) - Mining & Mineral Processing Department. Specific consultations with the City Council in Arusha (for Tanzanite mining related impacts in the economy) and the District Council and business communities in Geita town (for gold mining sector impacts in the economy of the District) were also carried out. The objective was to have a qualitative assessment of the magnitude of change attributable to mineral resources development, impact of the minerals sector on the local economy, including a cost/benefit analysis, linkages and multipliers.

Report writing

The team compiled all findings, identified policy implications, and suggested policy options and strategies to expand the Tanzania minerals cluster and its benefits.

Validation of the study

The study has only been subject to an internal review mechanism. This included establishing confidence limits (high, moderate or low), consistency and validity of data and robustness of main findings (e.g. degree of consensus among stakeholders on the impacts of mining in the country) and recommendations.

Expected outcomes and results

This study informs and provides inputs to policy makers and other stakeholders about minerals cluster development underpinned on maximization of linkages (backward, forward and lateral) between the minerals sector and other sectors of the economy. This could lead to the development of robust national minerals clusters which can foster:

- Local procurement of goods and outsourcing of services;
- Increased local downstream processing of minerals;
- Higher local value addition;
- Development of local mining inputs industries;
- Migration (lateral migration) of mining technologies to other industries;
- Increased social, human, knowledge, institutional and physical capital creation;
- Development of centres of technology innovation and diffusion;
- Increased employment, GDP and exports;
- Improved management of mineral wealth and its benefits including distribution in mining areas;
- Development of sustainable livelihoods in mining communities; and
- A more balanced and diversified economy.

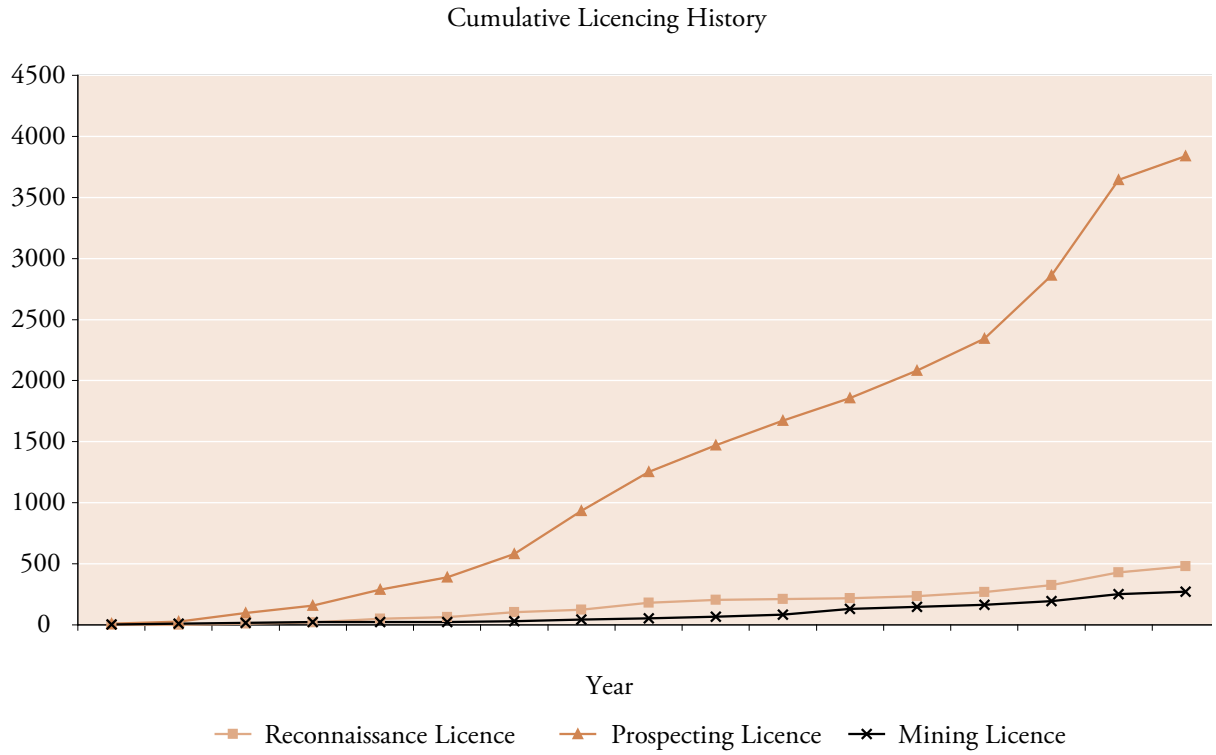
Section Two: The Tanzania Minerals Industry

2.1 Background and geological setting

Tanzania can be generally categorized as a mineral economy, with the mining sector accounting for approximately 4% of GDP and close to half of the country's exports. The country is endowed with rich mineral and energy resources, ranging from metallic mineral deposits, gemstones and industrial minerals to fossil fuels including coal and natural gas. It is ranked 4th in terms of diversity and richness of mineral resources in Africa, preceded only by South Africa, Democratic Republic of Congo and Nigeria, (Ikingura, 2006). Whereas numerous mineral occurrences were recognized and mapped during colonial time that is prior to 1961, no intensive exploration and exploitation of mineral resources were undertaken apart from the exploitation of a few high value minerals such as gold and diamond that were mined by medium- to large-scale operations. The post independence period promulgation of the Arusha Declaration in 1967 led to the nationalization of private investments, closure of existing mines and an almost freeze of foreign investment in mineral exploration and mining. As a result, during the post independence period up to the first half of the 1980s the mineral sector development operations were largely state owned and run by government enterprises, notably the National Development Corporation (NDC) and later the State Mining Corporation (STAMICO).

During the second half of the 1980s, the Government embarked on a programme to restructure the country's economy. Immediate steps were taken in order to create an environment that would encourage both local and foreign private investment with mining being one of the areas accorded priority. A mineral sector policy was enacted in October 1997 with the aim of developing legal, fiscal, regulatory and institutional reforms aimed at promoting the mineral sector. The vision of the 1997 Mineral Policy was to have a strong, vibrant, well-organised private sector led, large and small-scale mining industry conducted in a safe and environmentally-sound manner; contributing over 10% of the GDP; a well developed gemstone lapidary industry; and providing employment to Tanzanians. The mineral policy was followed by a new Mining Act, 1998, Mining Regulations, 1999 and associated reforms in the country's fiscal regime. The combination of these reforms had immediate success. It made Tanzania one of the most favourable destinations for foreign investment in mining and mineral exploration in Africa, south of the Sahara. During the period following the reforms and up to 2005, the country witnessed an exploration boom with more than 50 foreign companies and over 250 local companies acquiring mineral rights of over 2,200 mineral prospecting licenses and 170 mining licenses, (MEM, 2005).

Figure 2.1: Reconnaissance, prospecting and mining licences issued between 1990 to 2006



The exploration boom was also reflected by an increase in foreign capital inflows to the mining sector from insignificant levels in 1995 to US $1.4 billion in 2004. In addition to a transparent legal and regulatory framework, the reforms of the fiscal regime also introduced fiscal incentives aimed at attracting both local and foreign investment into the sector. The fiscal incentives included the following:

- Income tax 30%;
- Royalty 3% of net back value, 5% on diamonds and uncut gemstones;
- Import duty, free on exploration and development capital equipment, 5% as cap limit, after 1 yr of commercial production;
- Dividend withholding tax = 10%;
- No tax holiday;
- External account allowed ;
- Government equity participation - None mandatory;
- No export duty;
- No exchange control; and
- VAT zero-rated on exports.

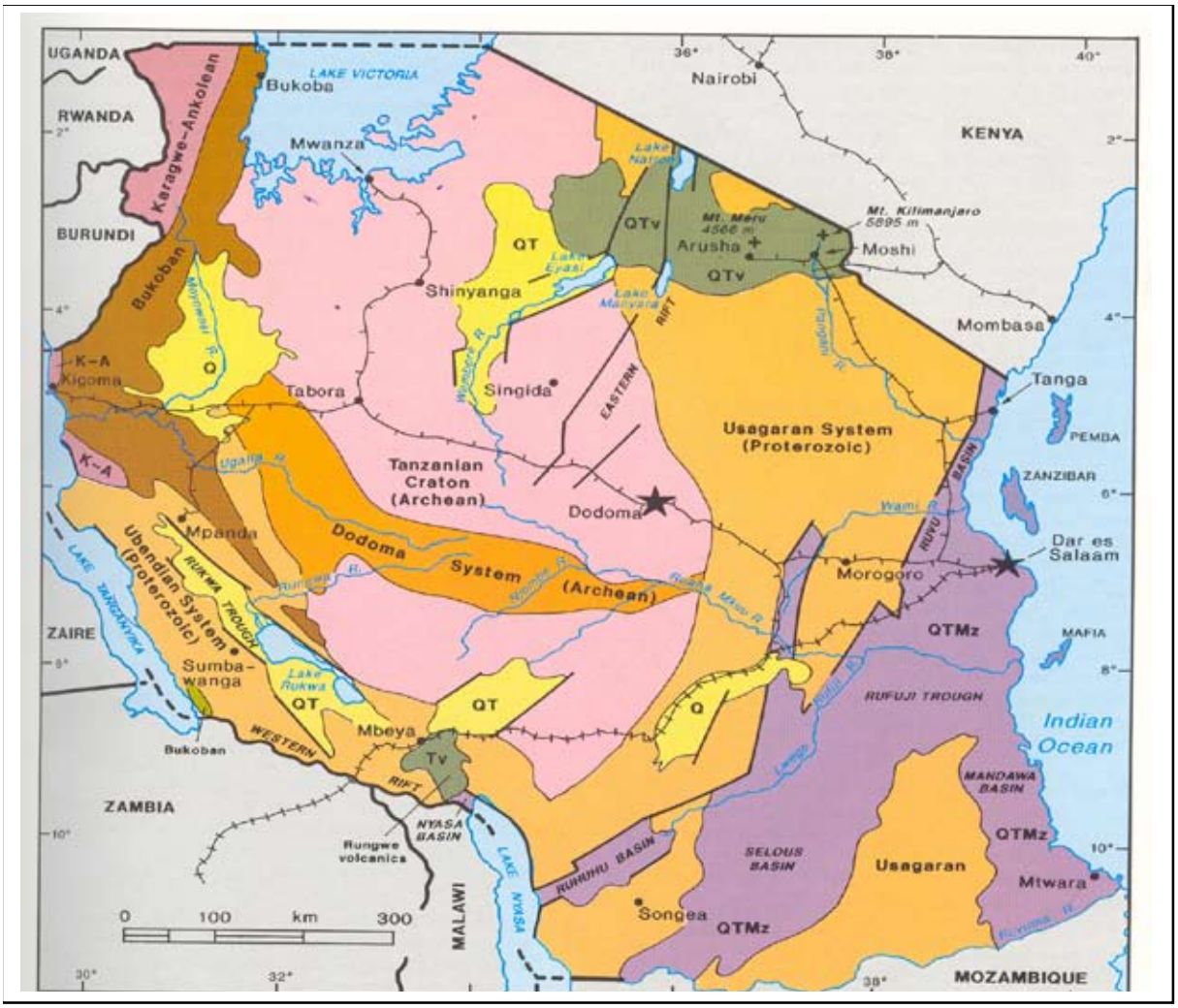
Although there has been a boom in geological exploration and investment in the mineral sector, it has been limited to a few high-value minerals. As a result, most of the country's mineral resource potential has been left unexplored. However, the ongoing exploration have already resulted in the discovery of resources in the excess of 45 million ounces of gold, inferred resource of 26.4 million tonnes of nickel and 50 million carats of Tanzanite. The under-explored geological formations with high potential for economic mineralization extend over 800,000 square kilometres, (MEM, 2005).

The geological environment in Tanzania is linked to a series of events, which began with the evolution of the ancient Archaean craton. The metamorphic re-workings and accretion of other continental matter

modified the craton which was later covered with continentally derived sediments of the Karoo sequence. Marine sediments along the coast later covered the Karoo sediments. The process of sundering the craton along the East African Rifts began during the Tertiary times, (MEM, 2005). The Tanzanian Craton is a very prospective geological structure. It occupies over one third of the country and contains "greenstone belts" that are internationally known for hosting gold deposits as evidenced in countries like Canada, Australia and most of West Africa. Tanzania also possesses widespread Proterozoic formations that are comparable to geological environments hosting gold deposits in South America and West Africa.

Apart from the gold potential, Tanzania is also endowed with world-class diamondiferous kimberites which have been mined for over 65 years. There are over 300 known other kimberite pipes extending from Mwanza through Shinyanga to Tabora and Singida, 20% of which are estimated to be diamondiferous. The Usagaran and Ubendian systems have been known to host unique coloured gemstones, some of which can only be found in Tanzania. Within the Proterozoic, potential graphite deposits have been established, e.g., those at Mirerani in Arusha. The potential for nickel and cobalt mineralization has been established within an extensive belt of the Kibaran Fold System extending into Uganda and Burundi. Tin and tungsten have been mined in the Karagwe area within the Karagwe-Ankolean System.

Figure 2.2: The geological Map of Tanzania *(Source: MEM, 2005)*



Base metals like copper and lead have been mined in the Mpanda Mineral Field. Other metals are also known to occur within Proterozoic formations and can be potentially present in the greenstone belts. More than 20 carbonatites have been identified in the northern part of the Eastern and the Western Rifts between Lakes Rukwa and Nyasa.

Overall, there are groupings of mineral deposits that are fairly obvious in the geological setting of Tanzania and they include (MEM, 2005):

- Gold deposits hosted by Archean greenstones and banded iron formations of the Lake Victoria Goldfields;
- Diamond bearing Kimberites in the central part of the Tanzanian Craton;
- Tin and tungsten in the Karagwe-Ankolean Super group of northwest Tanzania;
- Carbonatites clustered in the north part of the Eastern Rift and Western Rift between Lake Rukwa and Nyasa; and
- Major gemstone districts concentrated in the Palaeoproterozoic Usagaran Super Group.

Apart from these obvious groupings, there are many other important deposits that do not fall in these groupings, e.g.;

- The Mpanda base metal and gold district;
- The Lupa goldfield; and
- Isolated carbonatite groupings.

In addition to these groupings, there are also geological environments that occur in Tanzania where although no commercial deposits have been discovered, they are globally known to host certain minerals. These include various types of massive sulphides which may contain copper, lead, zinc, silver and other minerals (similar to the Canadian Archaean greenstone belts), (MEM, 2005). The generalized map of the mineral deposits of Tanzania is shown in Figure 2.3.

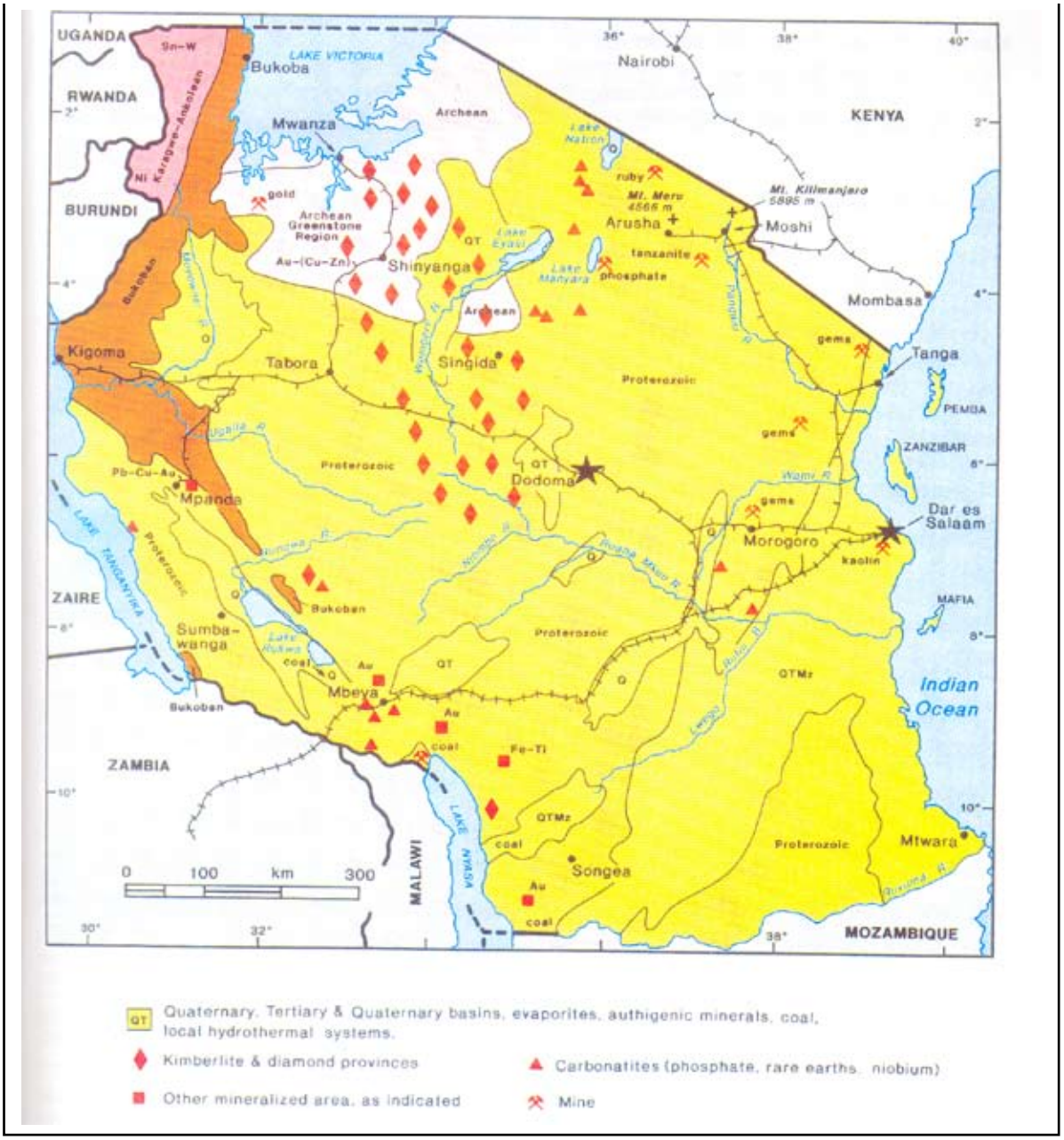
2.2 The performance of Tanzanian economy

Macroeconomic performance

Official reports (URT, Economic Surveys, *(several issues*) and Semboja, 2004) and other sources suggest that the overall impact of the first (1985/6 – 1995/6) and the second (1996/7 – 2006/7) generation reforms, on the macro-economic and mining sector development, have been significantly positive and consistent. The economy grew at a rate of 6.8% in 2005, compared to 6.7% in 2004. The inflation rate was targeted not to exceed 4.0% by June 2007. However, inflation shot up from 4.3% in July 2005 to 6.9% in April 2006. Revenue collections as a percentage of GDP are targeted at 14.5% in 2006/2007, 14.7% in 2007/2008 and 14.8% in 2008/2009. While the Government believed it would comfortably reach its revenue targets for 2006/07, revenue as a percentage of GDP is expected to fall to 13.6%. There is also expectation of an increase in broad money supply (M2) which would be consistent with the country's economic growth and inflation rate.

Table 2.1 shows the rate of GDP growth of Tanzania for 1995 and from 2000 to 2005. The table suggests that the performance of Tanzanian economy has been encouraging. The growth rate increased from 4.8% in 2000 to about 6.0% in 2004. This has been attributed to a relatively strong performance of the agriculture,

Figure 2.3: Generalized Location of Mineral Deposits of Tanzania *(Source: MEM, 2005)*



mining, trade as well as manufacturing sectors. Per capita GDP during 2004 grew by 3.6 %, compared with 2.8% recorded during 2000. During 2005, the agriculture sector grew by 6.5% with most of the growth emanating from food crop production. The mining sector achieved the highest growth rate of 18% in 2003 with a slight drop to 16.4% in 2006.

Table 2.1: GDP Growth Rates 1995, 2000-2005

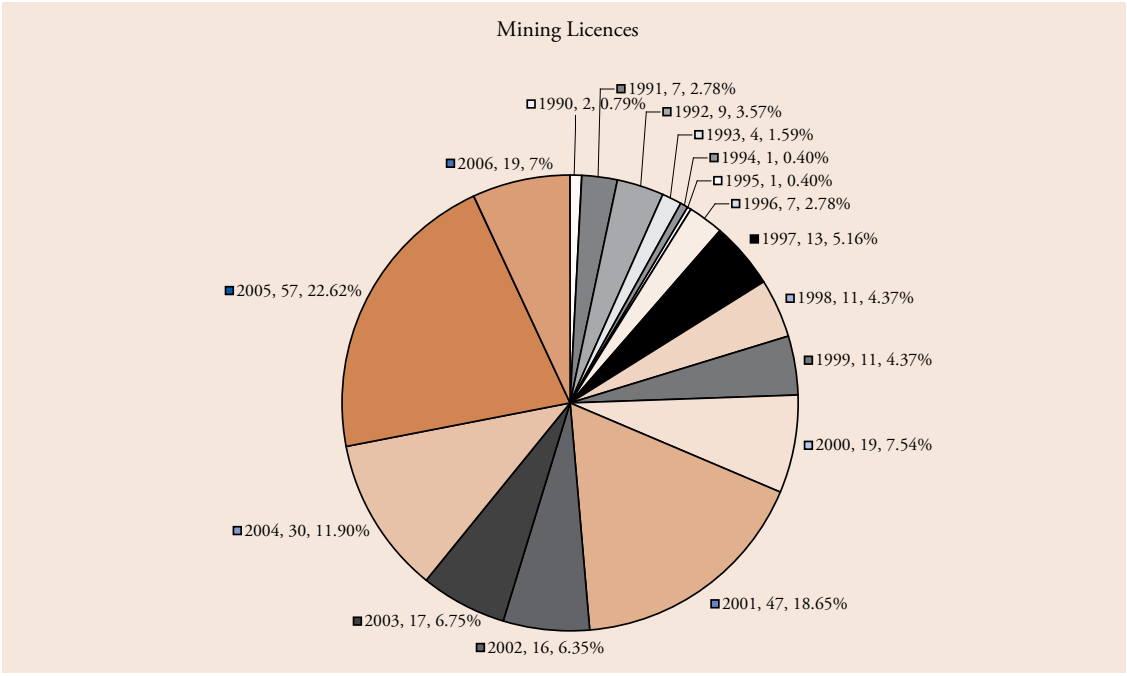
	1995	2000	2001	2002	2003	2004	2005*
Agriculture	5.8%	3.4%	5.5%	5.0%	4.0%	6.0%	6.5%
Mining and Quarrying	11.7%	13.9%	13.5%	15.0%	18.0%	15.6%	18.5%
Manufacturing	1.6%	4.8%	5.0%	8.0%	8.6%	8.6%	9.0%
Electricity and Water	6.1%	5.9%	3.0%	3.1%	4.9%	4.7%	5%
Construction	-14.7%	8.4%	8.7%	11.0%	11.0%	12.0%	14.0%
Trade, Hotels and Restaurants	3.5%	6.5%	6.7%	7.0%	6.5%	8.0%	8.5%
Transport and Communication	5.9%	6.1%	6.3%	6.4%	5.0%	6.2%	6.5%
Financial and Business Services	0.6%	4.7%	3.3%	4.8%	4.4%	4.5%	4.7%
Public Admin. & Other Services	-2.7%	3.6%	3.5%	4.1%	4.1%	4.5%	5.2%
Less Financial Services	-5.4%	1.4%	2.5%	2.8%	3.5%	8.0%	5.0%

URT, Economic Surveys, and ERB Projections for 2005

The Mineral sector performance

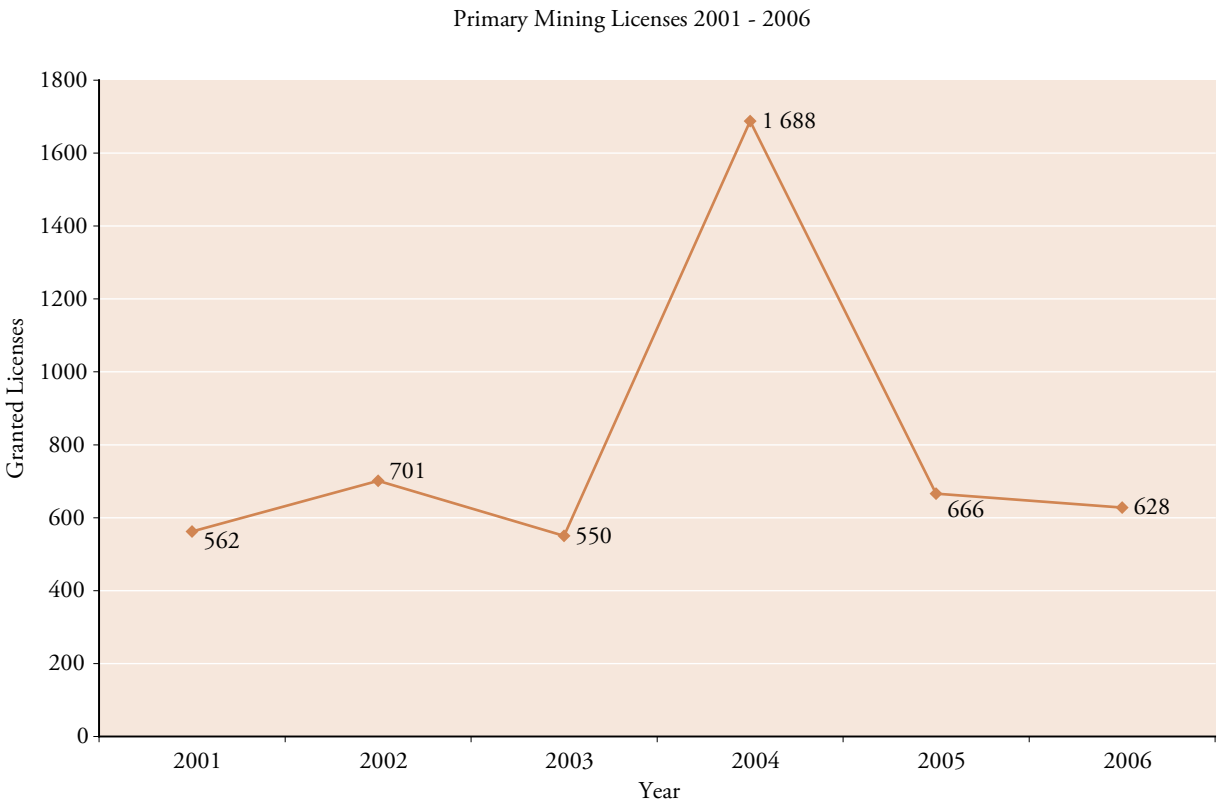
The socio-economic reforms undertaken by the Tanzanian Government since1995 have had a remarkable impact on the mining sector. A clear evidence of this is the fact that over the last ten years (1997 – 2006), 273 mining licenses and over 3,248 prospecting licenses were issued. Figure 2.4 shows a record that 57 mining licences were issued in 2005 alone for medium and large-scale operations. In 2004, small-scale mining licences reached a record of 1,688 licences (Figure 2.5). The increase in the number of licensed small-scale mining operations is attributed to awareness raising campaigns about opportunities in the sector conducted by the Government through its District (Resident) and Regional (Zonal) offices. The available records show that a total of 4,795 licences were issued to small-scale miners between 2001 and 2006.

Figure 2.4: Mining licences issued between 1990 and 2006



Source: Ministry of Energy and Minerals, 2007

Figure 2.5: Small-scale mining licences issued between 2001 - 2006



Source: Ministry of Energy and Minerals, 2007

As evidenced by the continuous growth of the minerals sector after the enactment of the mining policy in 1997 and the Act in 1998, six large-scale gold mines were established up to 2007. These are, Golden Pride (Resolute Tanzania Ltd) which came into operation in 1998, Geita Gold Mine (AngloGold Ashanti) which started operation in 2000, Bulyanhulu Gold Mine (Barrick (Tanzania) Limited) that came into operation in 2001, North Mara Mine (Formerly Afrika Mashariki – Barrick (Tanzania) Limited that started operation in 2001, Buhemba Gold Mine (Meremeta Limited) that started production in 2004 and Tulawaka Gold Mine (Barrick (Tanzania) Limited that started operation in 2004. In addition to the six mines, another gold mine owned by Barrick (Tanzania) Limited and to be known as Buzwagi Gold Mine is at the construction stage in Kahama District, Northern Tanzania. Similarly, two other projects are at pre-feasibility study stages for the establishment of gold mines. These are, the Iamgold Project in Rwamgasa (formerly Buckreef gold mine) and Nyarugusu areas and the Nyakafuru Project by Resolute (Tanzania) Limited and Mabangu Minerals, all in the Lake Victoria Goldfields. Figure 2.6 shows the location of some of the gold mines that have been developed between 1997 and 2005 and prospects in advanced development stages within the Lake Victoria Goldfields.

In addition to gold mining projects, a nickel mining project is also in the final stages of the feasibility study in the north-western Tanzania, close to the Burundi border. The nickel project at Kabanga is owned by Barrick Corporation (50%) and Xtrata (50%) and is schedule to start construction in 2009. The Williamson Diamond Mine at Mwadui (160km south of Lake Victoria) has embarked on a recapitalization programme which will lead to expansion of production to reach 1.0 million carats in the next five years. Williamson Diamond Mine which has been in operation for over 65 years is owned by De Beers (75%) and the Government of Tanzania (25%).

Tanzanite mining in Arusha remains the most dominant gemstone mining industry in the country. However, the official contribution of Tanzanite to Government revenue when compared to other minerals is only 1.1%. Despite this meagre contribution, the city of Arusha is a booming town with its economy mainly dependent on tourism, Tanzanite and other gemstones mining. Arusha has also become the focus of a value adding industry with a large number of lapidaries and gem cutting schools (including one built by Government). As a result, Arusha is the major gemstone trading centre probably competing with Dar-es-Salaam which is a gateway for most minerals exporters. The low official contribution to the Government revenue might be attributed to the informal trading of Tanzanite which is mainly dominated by local Tanzanians (except for one medium scale mining company – Tanzanite One which is a South African Company). Apart from trading informally, most miners and dealers in Tanzanite live and trade within Arusha and hence the massive investments in hotels, tourism and other service industries are tremendous. As a result, it can be concluded that the Tanzanite sector contributes indirectly to the economy of Arusha and the country at large. The impact of Tanzanite mining is explored separately in Section 5 of this Report.

In the South of the country in Mbeya Region, a local company, TanPower Resources that acquired Kiwira Coal Mine which was under the management of a Chinese team, has embarked on an expansion programme with the aim of increasing power generation at the mine from the current 11MW to 100MW. The expansion programme which is already in progress aims to generate 50MW in phase I through improvement of the Kiwira Mine and installation of a new power generation plant at site. The second phase will involve development of a new colliery at Kaburo Ridge which is located south of Kiwira and towards the Malawi boarder. The new collier will be supported by either a road network or a conveyor system for the transportation of coal to the Kiwira based power generation plant. The power plant will also be expanded to allow the generation of the planned 100MW.

Mbeya Region also hosts probably the only proven iron ore reserve at Liganga and a large good quality coal in the neighbourhood at Mchuchuma. The project, which is being promoted by the National Development Corporation on behalf of the Government, has completed a feasibility study for the development of a 100MW power plant at Mchuchuma followed by the development of the iron ore mine.

The industrial minerals sector in the country has been neglected. This might be attributed to a perception that gold and gemstones generate higher returns and do not require infrastructure access to local markets, a key requirement of industrial minerals. In general, industrial minerals are high volume and low value minerals. Therefore, the poor infrastructure in most areas with industrial minerals potential can be one of the reasons behind the dismal performance of this sub-sector. The main industrial mineral contributor to the national economy is limestone which is quarried by large cement producing companies. Other minerals include pozollana and gypsum which are primary ingredients in cement production. With the country booming construction industry, aggregates (mainly limestone and granites) have also increased substantially in production in the last five years (2002-2007). A summary of the production figures of the major minerals and their comparative contribution to Government revenue are summarized under Table 2.3.

Figure 2.6: Some of the mines and prospects in advanced stage around the Lake Victoria Goldfields *(Source: MEM, 2005)*

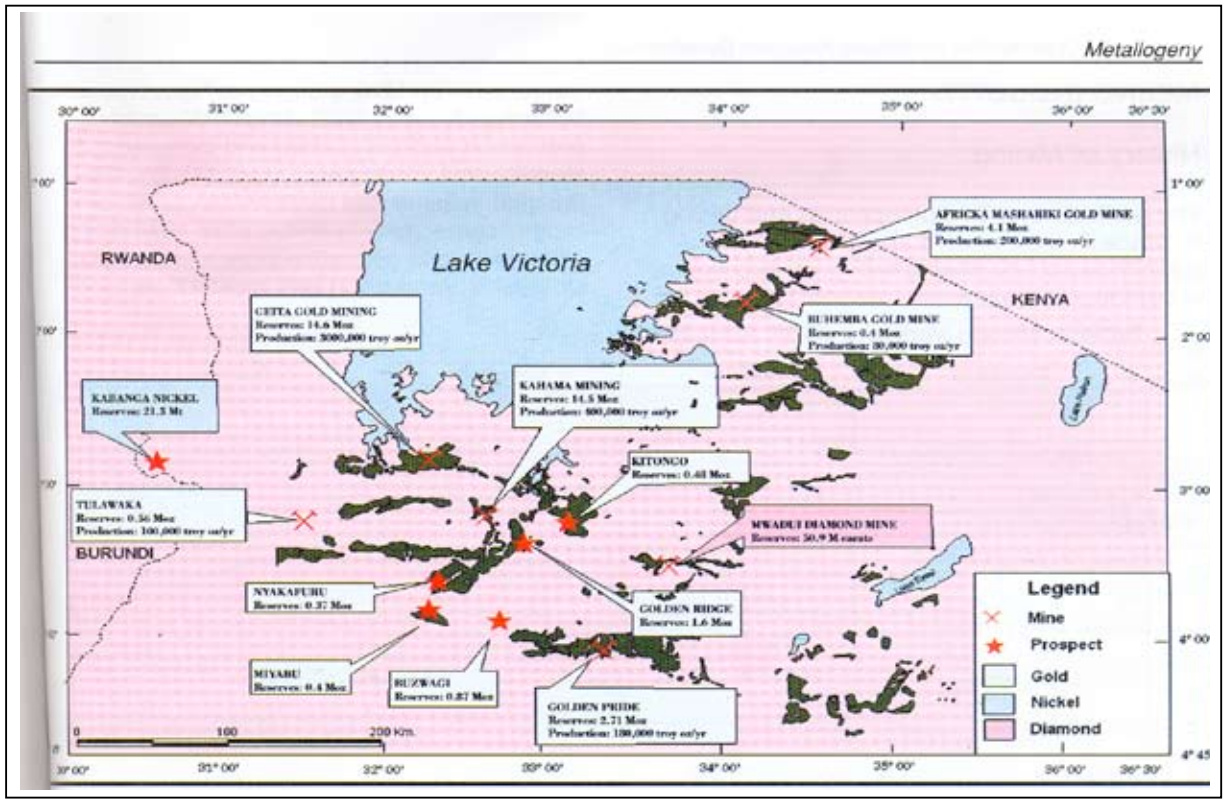


Table 2.1 above indicates that in relative terms the mineral sector is one of the fastest growing sectors in the country. It is also the fastest growing in terms of its contribution to the economy and export activities. Between 2000 and 2006, this sector grew at an average annual rate of 15.4% , with a peak growth of 18% in 2003. **(Better to take this part to page 13 where a summary of Table 2.1 is made)** Table 2.2 shows that the annual mining sector contribution to the GDP increased from 1.7% in 1997 to 3.4% in 2005 (URT, 2000).

Table 2.2: Contribution of Mining Sector as Percentage of GDP (1990 as base year)

Year	Value (% of GDP)	Year	Value (% of GDP)
1988	0.80	1997	1.70
1989	1.80	1998	1.91
1990	0.91	1999	2.00
1991	1.00	2000	2.40
1992	1.12	2001	2.50
1993	1.12	2002	2.81
1994	1.30	2003	2.89
1995	1.38	2004	3.12
1996	1.50	2005	3.50
		2006	3.80

Mineral production

Table 2.5 shows mineral production by major types and values in USD between 1997 and 2005. The Table suggests that gold, diamond, tanzanite, silver and copper dominate the formal mining sector. Silver and copper are produced as by-products of gold production. There is also a number of varieties of gemstones which are produced by small-scale miners, but due to the complexity of record keeping within the sector, production information is difficult to come-by. The production of all minerals, except diamond, has been increasing over time, reflecting an increasing importance of mining investments and developments. Williamson Diamond Mine which is the only diamond producing mine in the country, apart from small-scale producers, suffered from lack of investment in the 1980s and second half of the 1990s. In 1995, the Government sold 25% of its shares to De Beers as a way of rescuing the mine from closure. De Beers who now owns 75% of the shares, has engaged in recapitalization of the project as a way of improving its performance. Following the takeover of management by De Beers, production increased from 90,144 carats in 1998 to the peak of about 285,467 carats in year 2000 and dropping to about 150,234 carats in 2002. Refurbishment of the processing plant and other production units has since seen a continuous pickup in production to a peak of 273,842.50 in 2004. At present, diamond production is averaging 200,000 carats. However, the company has embarked on further refurbishment and expansion of the processing plant with the plan of increasing production to 1.0 million carats in the next five years.

The first important issue to note is that the mineral production values in USD terms has been increasing through out the sample period that is from US$ 16.1 million in 1997 to about US$ 856.78 million in 2006. Table 2.3 suggests that the mining sector has become one of the major foreign currency earners in Tanzania during the last nine years. Gold export values shows an exponential increase starting at US$ 13.108 million in 1999 and jumping to about US$ 114.365 million in 2000 and to about US$ 707.375 million in 2005. The production values of diamond have been steadily increasing from US$ 16.100 million in 1997 to about US$ 23.908 million in 2005. The Table also shows the total production values of the 5 types of minerals exports for the period of 1997-2005 as US$ 2,783,955,711. Figure 2.7 shows the dominance of gold at 90.89% of the total production followed by diamond at about 6.4 percent, copper at 1.49%, tanzanite at 1.10 percent and silver at 0.33% during the sample period 1997 – 2005. The production figures for tanzanite shows only those values from one large-scale producer (Tanzanite One) as the small-scale production figures are not usually recorded. As such, the actual contribution from tanzanite is much larger than the one reflected by the presented figures.

Figure 2.7: Mineral production composition by major types (%)

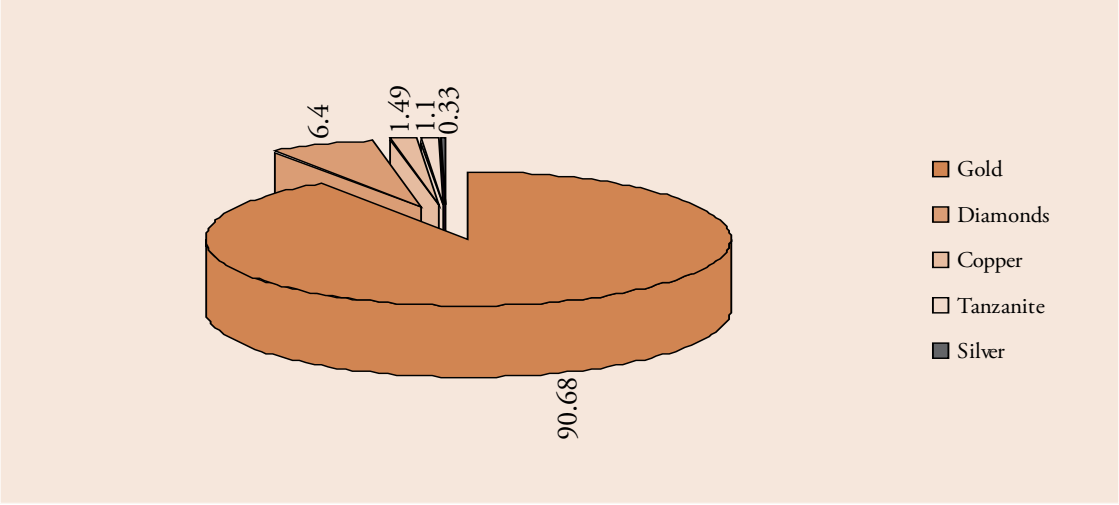


Table 2.3: Mineral production between 1997 - 2006 and associated values

Mineral	Unit	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006*	Total
Gold	Weight Oz.	-	-	48 078	388 324	1 012 595	1 147 109	1 410 799	1 494 487	1 722 503	1,282,253	8,586,147
	Value USD	-	-	13 108 000	114 364 608	282 845 552	362 828 129	509 831 362	602 318 193	707 375 243	772,060,000	3,364,731,087
Silver	Weight Oz.	-	-	3 093	45 574	268 495	340 941	377 363	427 573	455 718	480,840	2,399,595
	Value USD	-	-	16 000	220 421	1 159 597	1 539 322	1 794 751	2 876 624	1 652 096	5,540,000	14,798,811
Copper	Weight Oz.	-	-	-	-	6 984 766	9 309 812	8 191 035	136 613 983	8 072 118	7,241,639	176,413,353
	Value USD	-	-	-	-	5 005 881	6 537 417	6 017 802	12 178 061	11 637 006	19,900,000	61,276,167
Diamonds	Weight MC.	116 776	90 144	208 604	285 476	189 484	152 234	207 328	286 000	190 384	272,204	1,998,634
	Value USD	16 100 000	10 200 000	17 600 000	28 700 000	17 700 000	13 000 000	22 015 000	28 986 000	23 908 012	25,910,000	204,119,012
Tanzanite	Weight gm.	-	-	-	-	-	-	-	-	-		-
	Grade A	-	-	-	15 469	10 345	5 559	4 616	38 469	8 709		83 167
	Grade B	-	-	-	52 744	94 129	61 692	62 311	792	49 195		320 863
	Grade C	-	-	-	31 086	133 360	162 346	220 025	157 549	224 111		928 477
	Total wt. Gm.	-	-	-	99 299	237 834	229 597	286 952	196 810	282 015		1 332 507
	Value USD	-	-	-	173,955	1,460,000	3,249,706	3,249,706	5,988,476	16,526,003	26,276,570	56,924,416
Others#	Weight	-	-	-	-	-	-	-	-	-		-
	Value USD	-	-	-	-	-	-	-	-	-	5,083,430#	5,083,430
Total Value	Value USD	16 100 000	10 200 000	30 724 000	143 458 984	308 171 031	387 154 574	542 908 621	652 347 357	588 539 183	854,770,000	3,570,105,025

Source: Ministry of Energy and Minerals and TCME, 2007

** Data extracted from the 2007 Budget speech of the Minister of Energy and Minerals*

 # Includes gemstones (except tanzanite), gypsum, salt, phosphate and bauxite

Mineral Exports

Large-scale mining

The major mineral export from Tanzania is gold followed by diamonds, copper and gemstones which are dominated by tanzanite. The share of mineral exports in the total exports has been increasing, reaching the peak of 48.9% in 2003. The major destinations of mineral exports from Tanzania are United Kingdom, France, Japan, United Arab Emirates, India, German, United States of America and South Africa. Mining companies operate offshore accounts. Export earnings from the sale of gold enter the Tanzanian economy as remittances to domestic banks to facilitate domestic operations like payment of wages and salaries, taxes and levies, other transfers to the government and payment to local services. The major mineral exports by weight and value is shown in Table 2.4 below for the period of 2002 – 2006.

Table 2.4: Mineral exports (Million USD)

Mineral Type	Unit	2002		2003		2004		2005		2006	
		Weight	Value (US$m)	Weight	Value (US$m)	Weight	Value (US$m)	Weight	Value (US$m)	Weight	Value (US$m)
Diamonds	Carats	239,761.14	28.13	236,582.34	31.86	303,920.34	33.68	219,639.48	25.35	272,203.67	25.91
Gold	Kg	43,320.00	374.33	48,005.70	504.14	48,047.40	596.62	45,340.82	655.5	39,749.84	772.06
Gemstones	Kg	195,841.60	19.77	1,531,547.09	19.05	1,613,848.47	26.89	627,796.22	40.53	2,498,636.90	31.01
Salt	Tonne	-	-	16,977.77	1.32	26,232.67	2.05	16,962.50	1.63	18,226.21	2.00
Phosphate	Tonne	896.00	0.04	1,322.00	0.06	6,200.00	0.51	613.00	0.03	2,880.70	0.28
Bauxite	Tonne	-	-	-	-	-	-	1,850.00	0.03	5,373.00	0.05
Gypsum	Tonne	-	-	-	-	-	-	2,400.00	0.05	3,650.00	0.03
Silver	Kg	7669.00	0.95	7986.00	1.32	13,216.07	2.95	12,890.89	2.99	14,906.04	5.54
Copper	Pounds	9,309,812.00	7.70	8,191,035.00	7.33	9,348,180.64	12.17	7,632,958.95	12.62	7,241,639.19	19.90
Total Value (US$ m)			429.76		565.10		674.87		726.79		856.78

Source: Ministry of Energy and Minerals, 2007

Statutory taxes and other contributions paid to government

Table 2.5 below shows the contribution of the large-scale mining operators in terms of statutory taxes and other contributions paid to the Government for the period of 1997-2005. The table does not include data and information of VAT and specific local government taxes and levies. The table suggests that, like other sectors, the mining sector is subject to many complex and different tax regimes.

The total statutory taxes and contributions have been increasing through the sample period, from US$ 2.151 million in 1997 to about US$ 68.959 million in 2005. This cumulates to a total amount of US$ 255,526,893 by year 2005.

Table 2.5: Statutory Taxes and other contributions paid to Government from 1997 to 2005

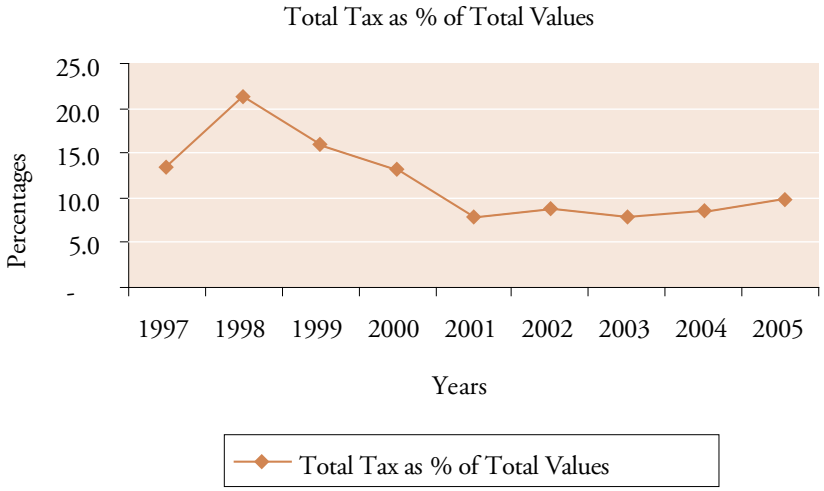
B: Name	1997 US $	1998 US $	1999 US $	2000 US $	2001 US $	2002 US $	2003 US $	2004 US $	2005 US $	Total US $
Paye-Expatriate Salaries	346,580	331,726	342,863	3,427,180	1,673,437	6,770,045	5,979,923	3,820,819	13,384,701	36,077,274
Payroll Levy-Expatriates	45,942	38,766	38,532	454,676	257,985	410,809	595,961	865,303	7,962,051	10,670,025
Paye-Expatriate Gratuity	-	-	-	-	277,129	551,992	2,864,187	40,219	80,854	3,814,381
Withholding Tax-minesite	43,985	103,459	353,493	5,785,560	5,462,412	5,545,412	5,282,195	4,951,055	10,129,473	37,657,045
Withholding Tax-Dar	-	-	-	102,065	77,652	44,103	-	-	-	223,820
Payroll Levy	7,000	25,000	123,719	241,558	686,160	1,013,976	732,468	966,988	1,136,072	4,932,942
Veta Levy	130,715	120,454	226,292	377,001	350,066	326,044	325,365	467,376	234,580	2,557,893
NSSF	274,932	274,239	519,891	1,102,515	1,027,327	2,083,173	3,465,274	4,296,450	4,417,997	17,461,798
PPF	-	-	-	4,212	-	-	15,585	3,205	32,056	55,058
PAYE	330,704	489,522	1,050,623	1,421,202	6,294,386	3,738,105	3,601,625	3,948,247	3,435,161	24,309,574
Stamp Duty	-	2,063	2,237	114,403	152,945	200,695	20,561	41,386	215,664	749,954
Donations	46,199	51,332	60,391	178,324	138,718	228,903	315,778	296,899	156,949	1,473,492
Road Toll	-	-	200,000	400,000	400,000	600,000	800,000	812,795	2,217,386	5,430,181
Mining Lease	52,000	71,000	150,000	307,000	314,000	337,000	189,636	456,785	513,654	2,391,075
Royalty	706,601	474,892	1,246,819	4,652,166	7,051,885	10,917,305	16,521,980	21,451,896	23,528,443	86,551,988
Import Duty	166,386	199,540	201,027	380,513	251,449	1,495,646	971,207	2,384,568	5,616,220	11,666,557
Income Tax	-	-	-	-	-	-	1,112,332	2,204,259	2,509,049	5,825,640
Others	-	-	366,583	-	-	177,269	1,531,981	1,483,523	2,386,824	5,946,180
TOTAL	2,151,044	2,181,993	4,882,471	18,948,376	24,415,552	34,440,477	44,326,058	48,491,773	77,957,134	257,794,876
Tax as % of value	13.36	21.39	15.89	13.21	7.92	8.90	8.16	7.43	13.25	110

Source: Ministry of Energy and Minerals and TCME, 2007

An IMF study done by Sunley and Ismayilov (2005)[2] on some aspects of mining taxation in Tanzania suggests that the tax revenue from the mining sector contributed to 3% of the total government tax revenue in year 2003. It was projected that in 2005 the contribution would be about 3.4%. Figure 2.8 shows the total taxes and contributions as percentage of total mineral production during the sample period of 1997 to 2005. On average, about 9.2% of the total value of mineral products are paid to the government in a form of taxes and other contributions.

The data suggests that currently, many gold mining companies pay taxes. However, it should be noted that many foreign owned mining firms benefit from very favourable investment incentives.

Figure 2.8: Total taxes and contributions as percentage of total mineral production values



Source: Plotted from data obtained from Ministry of Energy & Minerals, 2007 (see Table 2.5)

Mining tax composition

For illustration purposes, all taxes, levies and other forms of contribution have been aggregated. Table 2.6 shows the total mining statutory taxes and other contributions during the period of 1997 to 2005 in percentage. It should be noted that labour taxes include all employment related taxes and that there are multiple types of employment taxes applicable to all businesses including mining.

Labour or employment taxes

Labour taxes constituted the largest component of mineral taxes. They contributed about 54.5% of the total taxes paid by mining companies to the government machinery. The second largest and most important for the government and development of the sector is the royalty, contributing to about 34% of the total taxes paid by mining companies during the sample period. Import duty is the third and this contributes to about 4.8% of the total mining taxes.

2 Sunley E. Emil and Ismayilov Jamal, (2005). Some Aspects of Mining Taxation. An official IFM report prepared for the Minerals Policy Review Committee, Ministry of Energy and Mineral, URT, Dar er Salaam

Table 2.6: Major taxes and other contributions during 1997 to 2005 (%)

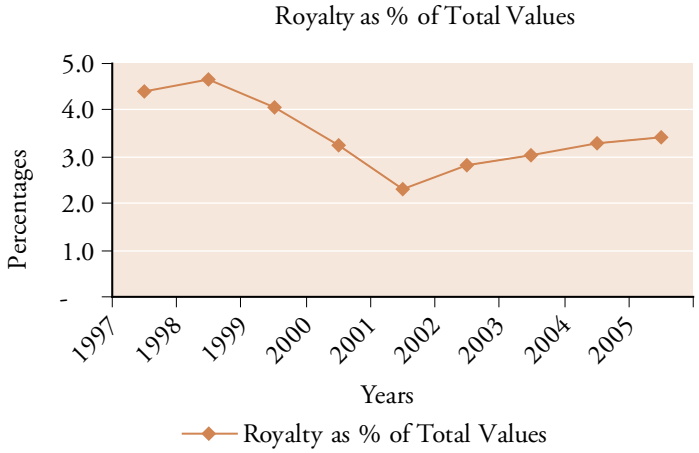
Type of Tax	1997	1998	1999	2000	2001	2002	2003	2004	2005	Average
Labour Taxes	54.9	63.4	58.7	68.2	66.0	59.5	52.9	49.5	48.9	54.5
Stamp Duty	0.0	0.1	0.0	0.6	0.6	0.6	0.0	0.1	0.2	0.3
Road Toll	0.0	0.0	4.4	2.1	1.6	1.7	1.9	1.4	2.6	2.0
Mining Lease	2.4	3.3	3.3	1.6	1.3	1.0	0.4	0.8	0.7	0.9
Royalty	32.8	21.8	27.6	24.6	28.9	31.7	38.2	38.1	34.2	34.0
Import Duty	7.7	9.1	4.4	2.0	1.0	4.3	2.2	6.6	7.0	4.8
Income Tax	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	3.6	1.1
Others	2.1	2.4	1.5	0.9	0.6	1.2	4.2	3.2	2.6	2.5

The royalty value index

According to Section 86(1) of the Mining Act 1998, mining licence holders are required to pay to the government a royalty on the net back value of minerals produced under the licence at a rate of 3% for gold and other minerals and 5% in the case of diamonds and gemstones. Table 2.6 shows that the amount of royalty paid to government rose from 32.8% in 1997 to 34.2% in 2005. This amount is composed of both royalty paid by diamond and gold mining firms. Figure 2.9 shows royalty as percentage of total mineral production during the sample period, 1997 to 2005, that is, Royalty-Value Index, (RVI). This RVI index measures the amount of royalty paid to the government. Figure 2.10 shows that RVI increased from 4.4% in 1997 to a peak of about 4.7%, and then dropped to about 2.3% in 2001. Thereafter, the RVI started to increase to 3.0% in 2003 and 3.4% in 2005. The average RVI for the sample period is about 3.1%.

As shown in Table 2.3, although the total production of gold has been increasing over the entire sample period, the production of diamonds which is the second most important mineral in terms of contribution to statutory taxes, has been cyclic. With the royalty payment charged on the netback value of the minerals produced, the cyclic nature of the diamond production can be associated with the cyclic nature of the RVI. However, as shown in Figure 2.9, with the rapid increase in gold production, the RVI has also been increasing between 2001 and 2005.

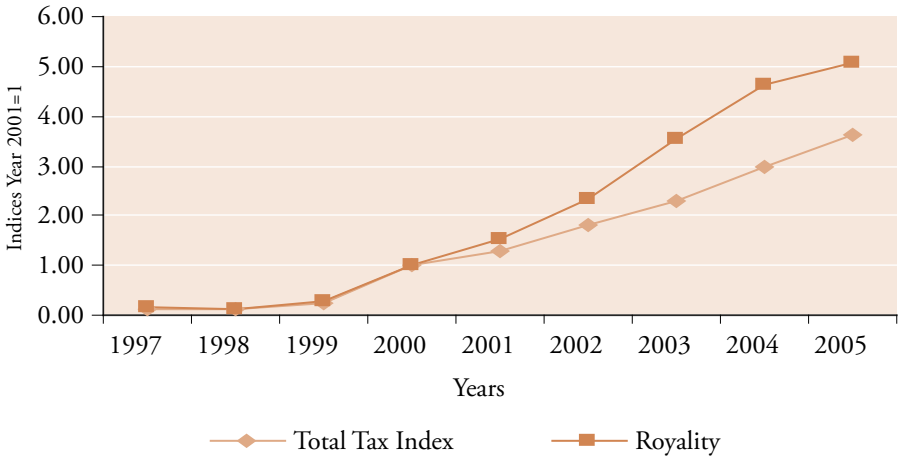
Figure 2.9: Royalty as a percentage of total mineral production values 1997 - 2005



Data and consultations with mining firms suggest that firms have been paying their taxes and contributions as per the policies, laws and regulations of the mining sector. Figure 2.10 shows that during the sample period, both total tax and royalty indices have been increasing. These indices are pegged to 1 in year 2000.

Since 2000, the total tax revenue has been increasing as a result of an increase in the royalty paid by gold mining firms. This positive and increasing trend is largely attributed to increasing investment, development and operations of large-scale gold mining in the country.

Figure 2.10: Total tax and royalty indices



Corporate income tax

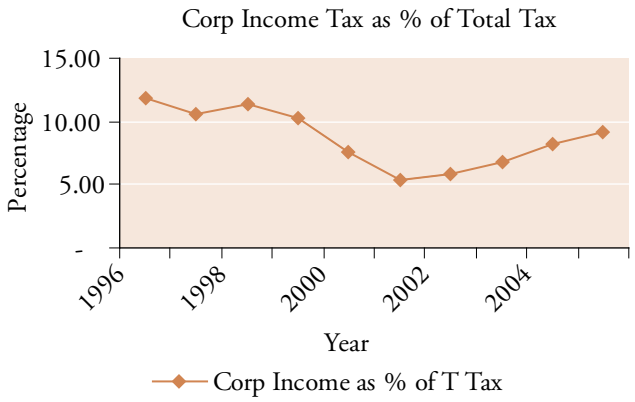
The national corporate income tax is the most important tax revenue of the country's economy. The current corporate income tax rate is 30%. No windfall tax or additional profits tax is applicable to the mining sector. Figure 2.11 shows that the percentage contribution (paid by mining companies) of corporate income tax to the national total tax revenue has been on average around 8 – 10 percent. This contribution has not been stable during the sample period. It has been falling from 11.82% in 1996/97 to about less than 5.41% in year 2001/2002. Thereafter it started to rise to about 9.08% in 2005/2006. These cyclical movements are results of systematic and transitory implementation of investment and fiscal policies, laws and regulations. It should also be noted that many new gold mining private investments benefited from tax holidays during exploration, construction, development and initial operations.

Figure 2.11 shows corporate income tax as a percentage of total large-scale mining revenues collected by the government. Table 2.6 and Figure 2.12 show that large-scale mining companies paid 0 percent income tax during the first six years of the sample period, 1997 to 2002. This has been attributed to fiscal incentives provided to all large-scale mining firms. Aggregated statistics and Figure 2.12 suggest that some of the large-scale mining firms started paying income tax after 2003.

In 2003, about 0.03% of the total mining tax revenue originated from income tax. This increased exponentially to about 0.33% in 2004 and to about 3.66% in 2005. Available data indicates that not all new mining companies operating in the country have started paying corporate income taxes. Consultations with tax consultants came up with the following as major reasons that contribute to the failure of mining companies to pay corporate taxes:

(i) All large-scale mining operations are capital intensive and have high capital costs;
(ii) Large-scale capital investments have long-term gestation periods;
(iii) All operators have other huge capital and infrastructure investment externalities, (energy, water and communication);

Figure 2.11: Corporate income tax as a percentage of national total tax revenue

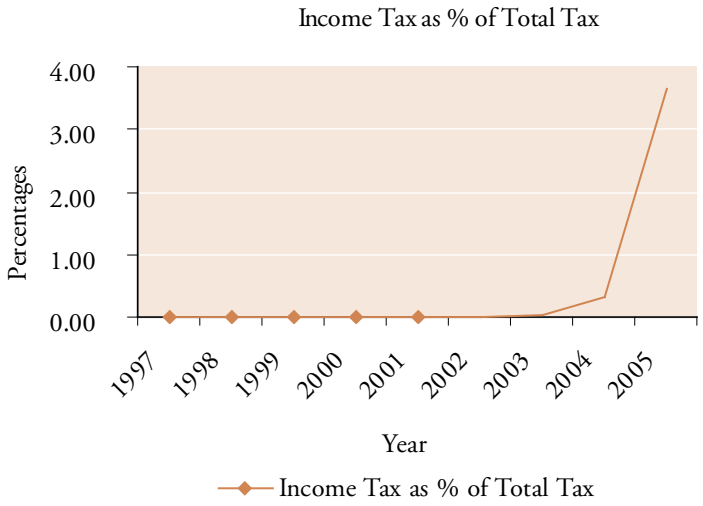


(iv) All large-scale mining projects incur large costs in acquisition of initial data and information used in feasibility studies, facility agreements, preparing life of mine plans, ore reserve models and development agreements; and

(v) Large-scale mining investments are sensitive to international macro-economic factors (financial market risks, FOREX, Gold Price Variations and Forward Hedging and Inflation).

Consultations with various industry experts suggest that few of these large-scale mining companies are about to make a turnaround and start making positive commercial profits and become potential taxable entities. It is expected that this will happen soon, that is two to three years from 2007. This calls for government and large-scale mining firms to collaborate and determine when (timing) and how best to collect corporate income taxes. These are complex policy and legal implementation issues and demand adequate knowledge, institutional capacity and information on taxation framework for mining operations. There are potential areas of conflict and confusion in the nature of the capital structure, (e.g., equity capital, syndicate, own and bank loans); capitalization rules, ring fencing and other tax components. The capacity to administer mining related taxes and interpret mineral economics data is still limited within the Ministry of Energy and Minerals and other relevant institutions responsible for tax administration. In realization to this deficit, the Tanzania Revenue Authority has recently (January 2008) announced sending some of its staff for specialised mining taxation training (East African Newspaper, Monday, 14th January, 2008).

Figure 2.12: Corporate Income Tax as percentage of Total Tax Revenue in Mining Sector



Contribution of mining companies to community development

Available data suggest that corporate entities in the mining industry in Tanzania have been playing a significant role towards supporting community and social services. These include education, health services, and clean and safe water, as well as establishing of micro finance schemes in both urban and rural areas. Table 2.7 indicates that the amount spent for community projects for the last nine years totalled US$ 32,999,522.

Private mining firms supported the construction of rural and feeder roads in their respective project areas during the period 1997 - 2000. However, the impressive expenditures shown during the early years of project development declined substantially when mines stared production. For example, whereas about US$ 1.1 million were spent on roads in 1997 and 1998, the figure declined to US$ 807,157 and US$ 351,762 in 2001 and 2002 respectively. As such, the higher expenditure in 1997 – 1998 reflects the period when most projects were developing infrastructure to gain access to mining areas. The lower figures between 2001 and 2005, are reflections of the level of expenditure on maintenance and not new constructions.

The amount spent on education has been increasing since 1999. In 2000, US$ 196,929 was spent to support education while for 2005 the amount spent increased to US$ 1,118,689. Out of the five community projects that received support from the major mining companies, micro finance schemes received the least support of below 1% of the total.

The mining sector has also contributed to poverty reduction in a variety of ways in Tanzania. Mostly, this has been through generating income and through creating opportunities for growth for lateral or downstream businesses. It has also contributed indirectly, through investments enabling better social and community services and catalysing improvements in physical infrastructure in some regions.

It appears that large-scale mining had a significant effect on the well-being of the population in specific areas of the country, namely those that are endowed with mineral resources such as gold, diamonds and gemstones. The extent to which natural resource exploitation benefits the national economy largely depends on the use that central and local government's make of taxes and levies charged on the extracted resources. At the moment, it seems that the government is investing these funds effectively, with direct and indirect potential benefits to rural communities. Mining companies have also been investing in human capital formation, especially of mine employees. The local employees of the mining companies earn relatively good salaries which are used in the form of direct consumption and part as savings and investments.

Revenue distribution

Table 2.8 and Figure 2.13 show the distribution of revenues from five selected large-scale mining companies operating in Tanzania. The table shows that on average, 11% of revenue is paid to government in the form of statutory taxes and fees while about 57% is used to cover production costs. The shareholders are getting about 11% of the total revenue.

This may suggest the following:

- On average, mining projects in Tanzania (most of which are gold mining) appear to be not very profitable (at least now). This could be to a large extent attributed to high production costs, which averages 57% (with the lowest around 45% and the highest 76%) of mining revenues (detailed in next Section);
- Government contributions (mineral resources) are more or less the same as those of investors (financing); and

Table 2.7: Amount spent by mining companies on community projects

	1997	1998	1999	2000	2001	2002	2003	2004	2005	Total
Education	-	-	61,431	196,929	338,886	435,179	177,183	824,276	1,131,977	3,165,862
Health	-	-	27,264	242,905	1,032,583	271,000	170,516	662,372	741,815	3,148,454
Water	22,820	360,991	2,054,866	3,307,440	1,306,420	120,494	83,999	378,965	1,298,276	8,934,272
Roads	1,119,487	1,117,851	2,015,193	3,255,230	807,157	381,778	51,213	311,407	2,417,900	11,477,216
Micro finance scheme	-	-	-	46,133	-	39,668	13,139	5,120	46,917	150,977
Others	-	-	-	1,023,720	161,999	272,267	585,363	2,403,047	4,472,789	8,919,185
TOTAL	1,142,307	1,478,842	4,158,754	8,072,357	3,647,045	1,520,386	78,491,237	23,039,801	74,359,602	195,910,329
Tax+community expense as % of value	20.46	35.89	29.43	18.84	9.11	9.29	22.62	10.97	25.88	182

Table 2.8: Revenue distribution in selected mines

	Geita Gold Mining	Kahama Mining Corporation	Resolute (T) limited	Placer Dome Tanzania	Buhemba Gold Mines Ltd	Average
Government taxes	12%	0%	11%	9%	21%	11%
Royalties	3%	3%	3%	3%	3%	3%
Loans & interests	10%	15%	10%	15%	0%	10%
Production costs	57%	45%	60%	47%	76%	57%
Share holders	13%	19%	5%	17%	0%	11%
Capital reinvestment	5%	18%	10%	9%	0%	8%
Social & community programs	0%	0%	1%	0%	0%	0%
Total	100%	100%	100%	100%	100%	100%

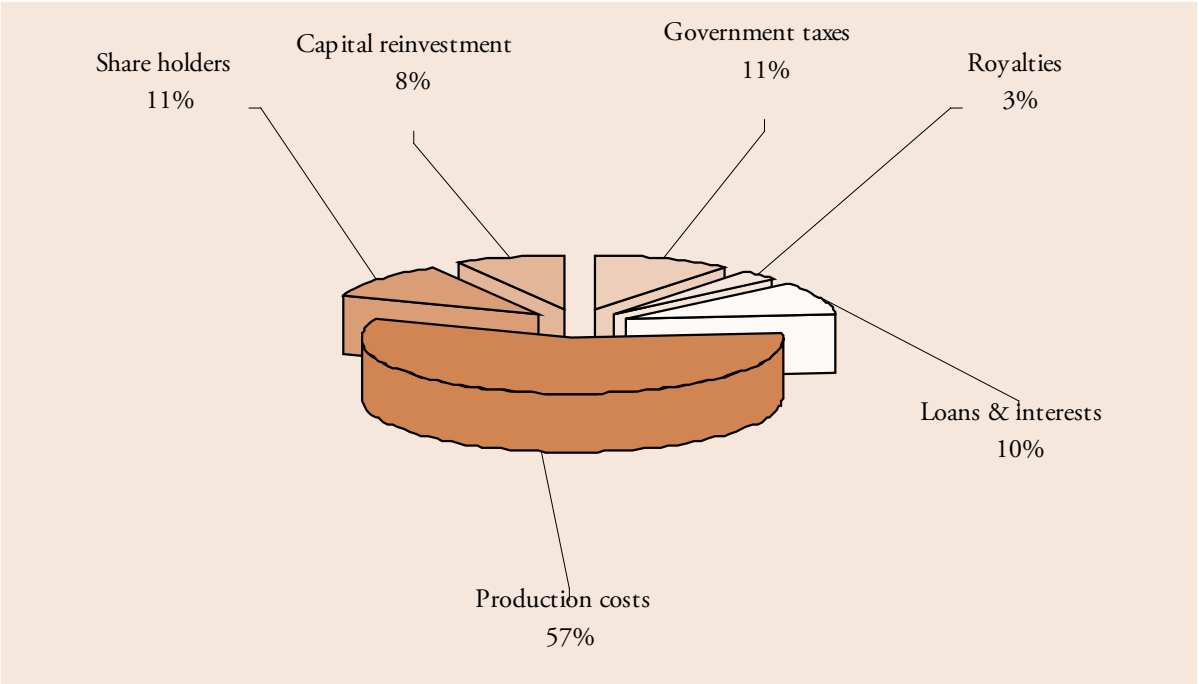
- Government and shareholders are receiving a corresponding and fair return on their share of contributions.

High cost of production

In most large-scale mining companies, the corporate management handles issues related to the cost of production. This suggests that management has enormous power on corporate financial decisions. The cost of production provides an indirect indication of potential revenue loss to Government. The higher the cost of production the lower the taxable income, since production expenditures are tax deductible. A key responsibility of management is to keep down the cost of mining processes. This has a direct bearing on investment, production, sales and hence influencing global demand for the Tanzanian minerals. Available information suggests that the cost of mining in Tanzania is relatively high.

Members of the public have been questioning why the cots of production in Tanzania are said to be very high. This has prompted the government to launch an investigation. However, the increase in gold production prices is a global trend. A report entitled "Gold and Silver Analysis" based on a survey conducted by GFSM Ltd and posted on the "Mineweb" on 13th April 2007 shows that global mine production cash costs rose by US$45/ounce, or 17%, year-on-year to US$317/ounce. According to information available on the websites of mining companies in Tanzania, the cash costs were, by December 2006, US$339/ounce at Bulyanhulu, US$279/ounce at North Mara, US$280/ounce at Tulawaka, US$497/ounce at Geita and US$312/ounce (increasing to US$403/ounce in 2007) at Golden Pride mine. The GFSM Ltd survey outlined that the increase in cash costs in 2006 was roughly twice the size of those experienced in 2004 and 2005, with much of the increase largely beyond miners' control. The increase in production costs is, according to many producers, attributed to "increased procurement costs of essential infrastructure, including diesel, tyres and extraction reagents. Costs of contractors and skilled workers have also been on the increase as a result of the boom in the mining industry".

Figure 2.13: Average revenue distribution in selected mines



Despite the contributions made by the mining sector into the Tanzanian economy and communities surrounding the mining areas, it is still evident that a significant amount of the wealth created by mining goes as cost components for operations, management and financing of companies, most of which are done overseas.

Employment

Artisanal and small-scale mining sub-sector

A Baseline Study conducted by the Ministry of Energy and Minerals in 1996 (MEM, 1996) estimated that more than 550,000 people were directly involved in artisanal and small-scale mining activities around the country. Consultations with experts, private and public sector officials suggest that currently there are about 650,000 – 750,000 people (conservative estimate) engaged as miners and workers in the artisanal and small-scale mining sector. There is an increasing number of people in Tanzania whose livelihoods depend on the often scant proceeds of small-scale mining. The number has been fluctuating depending on the timing, intensity, geographical location, trade and nature of mining activities. For example, there were indications that about 200,000 – 250,000 were involved in the mining rushes in Ngara-Kibondo Districts. In 2002, the Morogoro Region experienced about five gold mine rushes in Uponda, Mvua, Mane, Merela A, Mindu, Merela B and Turiani villages. Many of these people moved from one village to another searching for sustainable mining opportunities as miners, traders and/or workers.

Participants in artisanal and small-scale activities are becoming full time miners, traders, workers and others alternate mining with other economic activities, principally farming. Most artisanal miners originate from rural areas and have minimum skills and education levels. The majority of the workforce in small-scale mines is constituted of primary school dropouts with no formal training in mining skills. The number of artisanal miners is also not fixed, as they are self-employed, with no formal employment contracts or agreements and the intensity of mining operations changes from one season of the year to another. However, in many mining areas, the tendency has been more people to rely on mining as a source of employment, income and livelihood.

The Tanzania mining policy aims to promote small-scale mining that is organized and that abide by the health, safety and environmental standards set by the Government. However, the limited capacity of the Government to administer the sub-sector has so far made these goals difficult to be achieved. For the impoverished rural communities, "mining holds out a promise of cash earnings, with the additional prospect that - a bit like holding a lottery ticket - there could be a large windfall sometime in the future as long as one remains in the game." This reinforces the vicious circle of appalling working conditions, significant environmental damage and poverty in communities whose survival depends on artisanal and small-scale mining. Work in informal small-scale mines tends to be low-paid, seasonal and highly precarious, but provides direct employment, though often at a subsistence level. In addition, it also contributes significantly to the national production of precious metals, gems, building materials and (mostly) non-fuel minerals.

Large-scale mining sector

Table 2.9 reveals that there are few people employed in the formal private owned large-scale mining industry in Tanzania, especially if compared with the artisanal and small-scale mining sectors. This might be due to the capital-intensive nature of large-scale mining, which only requires a few workers to man the highly mechanized extracting machinery.

Table 2.9: Employment in the Large-scale Mining Companies

	1997	1998	1999	2000	2001	2002	2003	2004	2005
Foreign Employees	12	20	22	400	875	1197	363	387	552
Tanzania Employees	927	687	852	1413	1592	1973	3700	3745	5842
On site contractors			335	1064	1969	2760	2261	3582	4089
Professionals	37	32	59	99	235	323	151	135	325
Other cadres	805	553	431	504	685	829	800	800	1588
Total Employees	1781	1292	1699	3480	5356	7082	7275	8649	12396

Source: Ministry of Energy and Mineral, 2007

The total number of formal employees in the six large mining companies operating in Tanzania increased from 1781 in 1997 to about 12,396 in 2005, i.e., an increase of about 86%. In 1997, Tanzanian employees dominated the structure of employment in the mining sector. They represented 52% of the total workforce. By 2005, the structure of employment had changed with the Tanzanian employees representing only 47% of the total force followed closely by on-site contractors which represented about 33% of the total labour force.

The number of foreign employees has been increasing since 1997 due to the growth of the mining sector and hence the demand for specialized skills. In 1997, there were just 12 foreign employees, but by 2005 the number of total foreign employees increased to 552 or 4.5% of the total number of employees. By 2005, gold mining companies were employing 87% of the total mining labour force in the country with the rest employed by diamond mining (Williamson Diamonds Limited) at 8% and tanzanite (TanzaniteOne) at about 5%.

Unfortunately, the supply of local mining professionals in Tanzania has been limited and cannot cope with the demand caused by an unprecedented rapid development of mines. Expatriates have invariably filled the gap. Although they do not represent a large proportion of the mining workforce, they dominate the skilled and managerial positions.

Training

Table 2.10 provides information on the number of Tanzania workers who were trained both within the country and abroad as well as the amount spent to cover for all the training expenses undertaken. The Table illustrates that in 1997 they were only 6 professionals who had the opportunity to attend training with the number declining in the following year to 4. However, training of Tanzanian professional workers increased dramatically since 1999 when 1,309 people were trained. In 2003, the number increased to 2,203. However, in 2004 and 2005, the number of trained professionals decreased to 226 and 342 respectively.

Table 2.10: Number of trained workers

Type	1997	1998	1999	2000	2001	2002	2003	2004	2005
Professionals People Trained	6	4	1309	1772	1823	1956	2,203	226	342
Other Cadres	167	16	61	97	84	301	359	2,993	2,775
Total trained	173	20	1370	1869	1907	2,257	2,562	3,219	3,117

This decrease is difficult to explain, but could be linked to mining companies turning their focus to training of technicians and artisans which were in great demand as mining activities grew. The number of other cadres including technicians, artisans and other groups increased from 167 trainees in 1997 to 301 in 2002 and to 2,775 in 2005. During the period 1997 to 2005, a total cost of US$ 4,849,399 was incurred for training

of 9,641 Tanzanian professional workers. During the same period, a total of US$10,776,701 was spent to train a total of 6,853 other workers. Though a number of other cadres are relatively small compared to the professionals trained, the high cost incurred is mainly due to the fact that training was conducted outside Tanzania.

In 2000, to respond to the mining sector demand for skilled professionals, the Government established Mining Engineering and Mineral Processing Engineering programmes at the University of Dar-es-Salaam. The programmes have been instrumental in producing mining and mineral processing graduates for the mining industry. On average, a total of about 40 graduates per year have been produced since 2004 and the mining companies have employed almost all with a few joining the Government.

Labour issues

One of the major issues of concern in the mining sector in Tanzania is the use of expatriates (Box 2.1). Invariably, this has fueled public discontent.

Box 2.1: Labour issues in the Tanzanian mining sector

To respond to the lack of experienced local mining professionals, many companies being set up in Tanzania revert to importing expatriate labour, mainly from South Africa, Canada and Australia. Since the first mining company started production, localization was supposed to be built in place to address the imbalance and to enable locals to take over key management positions in these companies. Not withstanding the establishment of a mining school in 2000, the localization programme has not been effective. This has been fuelling discontent among local workers. All key management positions continue to be occupied by expatriates. As a result, some of the experienced Tanzanians are looking for greener pastures elsewhere, e.g., Zambia and Democratic Republic of Congo. Also, discontent among local workers has been associated with inadequate consideration to social requirements and differences in wages between local and foreign workers. In addition, mine managers are also under pressure because residents of the communities surrounding mines have high expectations of getting employment in the mines. In most mines, every morning, hundreds of unskilled labourers queue up at the gates hoping to be hired. Sometimes, the complaints have not only been leveled against hiring expatriates, but also hiring skilled technicians from other parts of Tanzania. To the surrounding community, this is a sign that the mine, despite the fact that, according to them, they are the custodians of the exploited resources is ignoring them. Recent efforts to address these issues have been made through collaboration between the Tanzania Chamber of Mines and Energy and the Ministry of Youth Development and Sports. A formal recognition agreement has been put in place in order to govern and regulate the relationship between mine management and trade unions. A Code of Conduct for labour relations in the gold mines has been prepared. The agreement sets the scene for the rules, protocols and the relationship to be adopted by both parties for orderly trade union and company interaction. The agreement spells out the rights of the employee, rights of the members of the Trade Union and rights of the employer necessary for long-term sustainable industrial harmony

Women employment

In the large-scale mining sector, the number of women mining professionals (geologists, mining and mineral processing engineers and related fields) is still limited. It should also be noted that since the establishment of a mining school in the University in 2000, only 6 women have graduated in mineral processing engineering and none in mining engineering. Every year, there are one or two women graduating from the geology department at the University of Dar-es-Salaam. There are also a limited number of women technicians that are employed in the mining sector. However, a large number of women can be found in the supporting services, e.g., accountants, doctors and nurses, community and social workers and other fields. Notwithstanding, the number of women, especially the professionals, is still limited. This is not only limited to the mining sector, but represents a national trend.

On the other side, the number of women directly involved in small-scale mining has been increasing. Whereas the percentage of women in the sector was estimated to be around 24% in 1996[3], it is now estimated to be around 35%. Direct involvement is found in mining, processing and mineral trading activities while their indirect involvement is in the provision of other social and economic services in mining communities. A few women are permit holders and entrepreneurs in gemstone and gold mining (about 5%), some are members of private sector associations such as TAWOMA or less formal groups; but, the vast majority do unskilled, menial work, particularly in mineral processing, or provide goods and services to mines and mining communities. While some women receive equal pay when they do the same job as men, the fact that certain jobs are proscribed for, or others seem to be restricted to women means they commonly earn less than men who work in small-scale mining. The increase on the number of women involved in small-scale mining has been due to several factors. These include the impact of structural adjustment programmes, low commodity prices, and limited employment opportunities in the public and private sectors. Many people, especially women who relied on subsistence agriculture, have been forced to seek new, alternative or additional paid employment for a better quality of life or, more usually, for survival. Also, an increasing number of women are heads of households in Tanzania, having to seek employment where they can. In rural areas in particular, small-scale mining is often the only means of earning cash without moving to the nearest city. Moreover, the closure or restructuring of former state-owned mines has made many experienced male mineworkers available to undertake small-scale mining; women, as family members or seeking opportunities on their own behalf, have joined them. Thus many women come to small-scale mining from necessity -- either because they move to a site with their partners, or because of adverse conditions in other activities they are involved in.

Child labour

Currently, there are no child workers employed in large-scale mining firms in Tanzania. These are commonly found in informal artisanal and small-scale mining operations. The 1996 Baseline Survey identified that the principle cause of child labour in mining is growing economic hardships, causing poor families to involve their youngsters in economic activities. Other reasons include the increase in education costs and the decline in education quality and opportunities, especially in rural areas. This situation has forced children as young as 10 years old to become involved in economic activities including mining.

There is a consensus among experts that child workers are generally less demanding, more obedient, and less likely to object to their treatment or conditions of work. They can easily be taken advantage of and often they are. The great majority of children, work long hours for substandard wages under unhealthful conditions. They have few if any legal rights, can be fired without recourse, and are often abused. While a few may be relatively well off compared with their peers, almost all are deprived of an adequate education and options for future work. They also may face exploitation by adult co-workers who force children to take on some of their tasks. The reasons why children work are many and often complex. Those seeking to explain the use of child labour frequently point to traditional patterns of economic life and maintain that child labour is a time-honoured and inevitable fact of life. They view poverty and survival as driving forces and can envisage a significant reduction in child labour only in the context of industrialization and rapid economic development. Advocates for children's rights and other expert observers often challenge this analysis as too simplistic. They note that economic and social conditions vary from region to region and country to country. They argue that while poverty may be one very important contributing factor, other factors must also be taken into account (Phillips et al., 2001).

However, the Government drive to ensure that all children at the age of 7 are enrolled in school has had an effect in reducing the number of child miners. Under this programme, parents whose children do not go to

3 It was established during the baseline survey in 1996 that 143,153 or 24% of ASM participants were women.

school can be prosecuted. In addition, other programmes like the International Labour Organization (ILO) "Rebound Programme" which is currently being implemented at the tanzanite mining site in Mirerani, Arusha in Northeast Tanzania, have contributed substantially in reducing child labour.

Impact of HIV/AIDS pandemic

A major threat to labour force participation in the mining sector is the HIV/AIDS pandemic. An estimated 1.5 million Tanzanians are infected with HIV, which will progress to AIDS and eventually result in death. Some of these are found in the mining areas or villages. The significance of the disease is that it kills adults in the prime of their working and parenting lives, thus reducing the labour force, impoverishing families, orphaning children and destroying mining communities. Over 80% of AIDS cases are women and menbetween the age group of 20-40. This group, which plays an important role in mining development, is the most exposed to HIV infection. Impacts of the epidemic are lower life expectancy, higher dependency ratio, absenteeism at work place, decline in productivity, increasing health costs, rising infant mortality and decline in the mining production and its contribution to GDP growth.

2.3 Mining, investment and taxation policy reforms

General policy environment

Tanzania has, in the past 15 years, been undergoing socio-economic and political reforms which have re-oriented the economy from a government-led to a private-sector-led one. The country has made significant progress in the formulation and implementation of socio-economic policies. The reforms and changes in policies have resulted in the shrinking of the formal public sector, which used to be the main employer in the formal sector. Having been guided by socialist policies since the late 1960s, re-orienting the economy has meant making a deliberate effort to promote private sector development, although barriers still remain. Below, the first and second-generation reforms that were pursued since early 1980s to date are examined with respect to their impacts on mining investment and development in Tanzania.

The first-generation reforms

The policy, legal and regulatory framework of the mining sector in Tanzania has gone through different transformations which have mainly been necessitated by the shift from private-led to public-led and back to private-led economic policies. Institutionally, prior to 1965, there were two independent departments, namely the Department of Geology and the Department of Mines. In 1965, the two were merged to form the Mineral Resources Department (MRD). A Commissioner, who is the advisor to the Government on all mining related issues, heads the MRD, which has often found itself under different ministries. The Department has Zonal and Resident offices spread around the country.

Since the mid 1980s, the country introduced a series of policy reforms intended to restore macroeconomic balance, stimulate economic growth and facilitate social and political development (URT, 1996 and Semboja, 2004). According to Campbell, 2004, although the regulatory and legal framework reforms undertaken over the 1980s and 1990s have resulted in more favourable environment for foreign investment, they have also resulted in "redefining the role of the state that is so profound that it has no historical precedent". The author argues that this trend has had the effect of "driving down norms and standards in areas of critical importance to social and economic development, as well as the protection of the environment".

The Tanzanian experience with the first generation reforms from 1986 - 1996 partly conforms to Campbell's argument that because of the reforms, foreign investment into the country increased. The experience also seems to suggest that individual initiative and market-oriented economic systems propelled higher growth rates than centrally planned economic systems. These broad based measures included the overhauling of the fiscal regime, liberalization of internal and external trade, the removal of restrictive tendencies, the liberalization of foreign exchange markets and the institution of a general policy environment, which was more favourable to private sector investment. The country shifted from its previous reliance on control mechanisms to a predominantly market-oriented environment and private enterprise development. Significant progress has been made with the development of a more market-oriented financial system with the liberalization of interest rates. A substantial number of both local and foreign banks and non-banking institutions have been established to provide short, medium and long-term investment loans to the private sector. Although the socio-economic impacts resulting from the development of the large-scale mining sector have not trickled down to grass-root levels, the performance of the sector does not suggest any scaling down of norms and standards by the Government.

The second-generation reforms

The second-generation reforms occurred between 1996/7 and 2005/6, when many Sub-Saharan African economies were facing huge debt problems making poverty an important policy issue. These second-generation reforms scaled-up the fiscal, monetary, legal, regulatory and institutional reforms initiated during the first generation reforms. The formulation and implementation of a series of sector specific, macro-economic and other broad-based national development policies mark the second-generation reforms. The broad-based policies include the National Development Vision 2025 (URT, 1999b), the National Poverty Eradication Strategy, (URT, 1998b), Tanzania Assistance Strategy, (URT, 1999a)) and the Poverty Reduction Strategy Paper, (URT, 2000). The most relevant sector specific national development policies relevant for mining include the National Investment Policy (1997), the National Mining Policy (1997), and the Sustainable Industry Development Policy, (1996).

The 1997 Mineral Policy

The overall objective of the 1997 Mineral Policy was to attract and enable the private sector to take the lead role in the development of the sector. Accordingly, the policy objectives are [1] to stimulate exploration and mining development; [2] to regularize and improve artisanal mining; [3] to ensure that mining wealth supports sustainable economic and social development; [4] to minimize or eliminate adverse social and environmental impacts of mining development; [5] to promote and facilitate mineral and mineral based products; [6] to promote and develop Tanzania as the gemstone centre of Africa; and [7] to alleviate poverty especially for artisanal and small scale miners.

Although some of the policy objectives were achieved and hence lead to the minerals exploration boom and a number of regularised small-scale mining operations increased, implementation of others has remained unachievable. As a result, there have been a lot of outcries from the public that the mining sector is not contributing to the country's economic growth. Further still, people started questioning the authenticity of the development agreements that the Government entered with the private mining companies. These outcries led to calls for review of the development agreements as detailed in Box 2.2 below.

Box 2.2: Call for Review of Development Agreements

Since large-scale mining started in the country (1997/98), there have been a number of outcries from the public that mining companies are reaping the country's resources leaving the country and the population at large in abject poverty. Initially, the complaints were on exploration companies in that they were pilfering minerals (especially) gold by shipping out bulk samples. After the operations started, the surrounding communities that had high expectations of immediate change in their economic well being through direct employment, investment by companies in community socio-economic projects, improvement of infrastructure and other indirect benefits, started crying foul. This was taken on by their members of parliament and national media and became a national issue. While all this was happening, the Government remained silent, a situation which made the media and public think the Government had something to hide since the Government and private mining companies were the only and principal signatories of the Development Agreements. The Members of Parliament from the mining areas, especially those from the Lake Victoria Goldfields were most operations are located, called for development agreements reached between the Government and mining companies to be made public and reviewed accordingly.

In 2005, during the presidential and parliamentary campaigns, the issue of reviewing the development agreements became a political issue with both the opposition and candidates of the ruling party promising to look into it once they got into power. Immediately after the elections, the new President set up a committee to look into all issues the public was complaining about and make recommendations to Government. A number of consultation meetings were held involving the public, mining companies, Government officials including key ministers, various members of Parliament and members of the civil society. However, before the Government committee could publish its findings, the political opposition parties complained of bias by the committee, as its membership did not represent the wide spectrum of the society. In reply to the complaints, the President reconstituted the committee (in November 2007) by adding more members from the political opposition parties and other members of the civil society groups. The new Committee, which is chaired by a retired judge, has its mandate also extended to include conducting consultation in other mining countries outside Tanzania.

However, in between consultations by the first committee and its reconstitution in November 2007, a number of issues and actions emerged. When presenting the budget speech in July 2007, the Minister for Energy and minerals announced that the Government is continuing to review the Mining Contracts in order to ensure the country benefits from the exploitation of the mineral resources. He further announced that from the discussions with the mining companies, Barrick Gold Corporation that owns the mines of Bulyanhulu, Tulawaka and North Mara; and Resolute (Tanzania) Limited that owns the Golden Pride mine have agreed to undertake the following:

- To remove the 15% additional capital allowance on unredeemed qualifying capital expenditure which will allow the companies an early return of investment and hence early payment of corporation tax.
- To pay $200,000 per year to the local authorities relevant to the respective mines. The relevant authorities include Tarime, Kahama, Nzega, Biharamulo and Geita.
- Barrick Gold Corporation agreed and has voluntarily started paying US $7 million per year to a fund known as "Mfuko wa Uwezeshaji" or translated as the "Empowerment Fund" until when its mines start paying the relevant taxes (Corporate tax).
- Resolute (Tanzania) Limited has removed the clause in its contract that was allowing it not to pay income tax on its foreign workforce. By removing that clause the Company will be forced to pay approximately US $2.2 million every year as income tax. In the year 2006/07 the Company has paid US $2.3 million income tax.
- Anglogold Ashanti, the Company that owns Geita gold mine has agreed to pay the Geita District Council US $200,000 per year to support local development. Discussions on other areas in its development agreement are still going on.

The reconstituted Committee has been given three months (starting November 2007) to complete its consultations and produce a report to Government which will then be made public. In parallel to the Committee conducting its investigations, negotiations between Government and the mining companies is also ongoing. However, the level of discontent of many stakeholders with mining in Tanzania, suggests that the terms agreed between Government and the mining companies are perceived by them to be too generous.

Section Three: The Gold Mining Industry

3.0 Introduction

In this section, the impact of the Tanzanian gold mining industry is reviewed in terms of its role and significance as the historic core meso-mining cluster in the country. The cluster forms a major component of the Tanzania mining economy and consists of a number of distinct geographically based sub-clusters. They all exert significant direct and indirect impacts on the national economy as well as the relevant local and regional economies.

Although it is believed that Arab traders were the first to find gold in Tanzania, documented evidence shows that the first discoveries of gold in the country were made by the Germans in the Lake Victoria Goldfields around Kahama and Geita areas around 1898. Gold, together with diamond, were the country's principal mineral products in the 1900's. Gold continued to have major impacts on the country's economy until 1966 when the last mine at Geita was closed down. The closure of most of these mines was due to a combination of exhaustion of reserves and the introduction of nationalization policies that did not encourage private investment. Following the nationalization of most private investments, the Government established the State Mining Corporation (STAMICO) in 1973 to carry out mineral exploration and development of mining projects. STAMICO was responsible for the establishment and management of one gold mine in the area namely, Buckreef Gold Mine in Geita District, Mwanza Region (in the Lake Victoria Goldfields). The mine which operated until 1990 when it was taken over by a private company (East African Mines – now under IamGold), produced only 100kg of gold. Table 3.1 shows some of the former important gold mines up to 1998.

Following the country's economic reforms, which started in the second half of the 1980s, and the enactment of the new mining policy in 1997 and the new Mining Act in 1998 coupled with fiscal reforms, the gold mining sector has witnessed astronomical development. This resulted in the establishment of new, modern and mechanized mining, which started with the inauguration of the Golden Pride Mine in 1998 located at Lusu, Nzega District in Tabora Region (Central Tanzania). A number of exploration activities increased during this period and the results have been encouraging with at least one large-scale gold mine coming into production every year since 2000.

The gold mining sector continues to set the pace for the mineral industry growth in Tanzania with several prospects in advanced feasibility study stages. These include those at Nyakafuru (Resolute (Tanzania) and Mabangu Mining) and Buckreef and Nyarugusu prospects (IamGold), Golden ridge (Barrick Tanzania Ltd). Several other advance exploration programmes are going on, e.g., those at Canuck, Matinje, Bumbiti and other locations all located within the Lake Victoria Goldfields. Exploration of gold is also ongoing in the traditional gold mining areas of Chunya and Mpanda mineral fields and in non-traditional gold mining areas that have recently been discovered following rushes by artisanal and small-scale miners. These include Morogoro (East of Dar-es-Salaam), Tanga (north of Dar-es-Salaam) and Songea, southeast of Tanzania. A list of advanced gold prospects in the country is given in Table 3.1.

3.1 Known gold occurrences in Tanzania

Gold mineralization in Tanzania is known to occur in three main areas (Figure 2.2):

- The Lake Victoria Goldfields which is made up of the south-west Mwanza, Musoma and Iramba-Sekenke goldfields;
- The Lupa Goldfield in south-western Tanzania; and
- The Mpanda mineral field in western Tanzania.

Table 3.1: Advanced gold prospects in the Lake Victoria Goldfields

Greenstone Belt	Prospect	Developer
Kahama	Golden Ridge (Nyaligongo)	Barrick Tanzania Ltd
	Itetemia (near Bulyanhulu)	Barrick Tanzania Ltd
	Jubilee Reef	
	Kanegele	
	Miyambi	
	Nyakafuru	Resolute Tanzania and Mabangu Minerals
Geita	Buckreef	IamGold
	Mgusu	
Rwamgaza	Nyamutondo	IamGold
	Rwamgaza	IamGold
	Nyarugusu	IamGold
	Buziba	IamGold
Mabale-Buhungikira	Kitongo	IamGold
	Luhala southeast of Kisuge Hill	
Nzega	Chocolate Reef	
	Canuck	Resolute (Tanzania) Ltd
	Matinje	Resolute (Tanzania) Ltd
	Bumbiti	Resolute (Tanzania) Ltd
	Kitowero – in Proterozoic Rocks of the Masasi High	
	Wingayongo – in faulted coastal basin	
	Matabe – Bukombe District	
	Mwiruzi Biharamulo District	

Source: *Compiled from various sources including MEM (2005) and personal consultations*

3.2 Operating mines

To date, more than US$ 1.70 Billion has been invested in the development of seven mines (inclusive of Buzwagi mine which is still under construction and is estimated to cost US$372 million). All the seven gold mines (Table 3.2) are within the Lake Victoria Goldfields as follows: one located in the Geita Greenstone belt (Geita Gold), one mine in the Nzega Greenstone belt (Golden Pride), two mines in the Kahama Greenstone Belt (Bulyanhulu and Buzwagi) and one mine in the West Rwamagaza Greenstone belt (Tulawaka). Locations of all the mines are shown in Figure 2.6. Detailed information on the seven mines is provided under Table 3.2.

3.3 Potential prospects

Gold exploration in Tanzania is still very active especially in the Lake Victoria Goldfields. Some of the potential prospects in the area include the following (MEM, 2005):

- **Ikungu –** This prospect lies on the shore of Lake Victoria, 18km southwest of Musoma town. Drilling work has been carried out in these areas, which also has artisanal workings by a joint venture between Sampo Resources Ltd. and Patricia Gold Mines Ltd. followed by JCI Ltd. This work was able to outline a resource of 185,000 ounces of gold with some intersections showing grades of between 12g/t and 27.77 g/t.
- **Mgusu Deposit –** This deposit is located west of Geita Gold Mine on Saragula Hill. The area was initially drilled (3 holes) by UNDP and later explored by Pangea Minerals/Ormonde leading to the

delineation of five mineralized structures. A resource of 1.8 million tonnes at an average grade of 4.6g/t was calculated for a total inferred resource of 271,000 ounces of gold within a depth of 150m from surface.

- **Buckreef Deposit –** By 2001, exploration work by Ashanti and East African Mines established a resource of 614,000 ounces of gold at an average grade of 4.08g/t. The established intersection through drilling by Ashanti gave grades of between 6.39g/t to 18g/t, thus confirming a rich mineralization to depths of up to 400m below surface. Further exploration by Spinfex provided an estimated inferred resource of 1.15 million ounces with prospects for high grades. The project has been acquired by IamGold who also acquired other prospects in the area including Buziba, Nyamutondo, Mawemeru, Kitongo, Isagenghe and Nyarugusu all of which were originally explored by Gallery Gold of Australia.
- **Itetemia –** Barrick Tanzania Limited and Tan Range, as a joint venture, are exploring this deposit.
- **Busulwangili –** This deposit is located south and along the strike of the Bulyanhulu gold deposit which hosts the only underground gold mine in the country. Trenching conducted by Ashanti indicated encouraging results including 9.5g/t over 12m.
- **Golden Ridge –** Pangea Goldfields of Canada and Randgold Exploration of South Africa, as a joint venture, have explored the deposit. The interest in the project was later acquired 100% by Barrick Tanzania Limited. By 2000, the reserves stood at 700,000 ounces of gold with a resource of 2 million ounces of gold. The project is in advanced feasibility study stage.
- **Nyakafuru –**Sukuma Mines, East Africa Mines and Spinifex Gold Limited carried out mineral exploration work in the deposit from 1992 to 2002. In 2002, Mabangu Mining (a 100% owned subsidiary of Resolute Tanzania Limited) formed a Joint Venture (JV) with Sukuma Mines and over time formed additional JVs with Sub-Sahara, African Eagle and Sun Mining, to bring a large portfolio of PL's under the umbrella of "The Nyakafuru Joint Venture". Through the exploration work carried out by Mabangu mining improved the definition and reliability of the Nyakafuru resource to 19.35 Mt grading 1.72 g/t with 1.07 Moz gold (using a 0.5 g/t cut-off grade). The project is in the initial stages of a feasibility study.
- **Jubilee Reef –** This deposit is being explored by Maiden Gold and has shown encouraging results with initial grab samples assaying up to 15.3g/t gold. RC drill results on intersections of up to 3m indicating 9.45 g/t gold from depths of 95m.
- **Other prospects –** There are several prospects in the LVGF that are currently being explored and that are showing encouraging results. Some of these area are located in the Nzega Greenstone Belt and they include the Old Canuck mine, Matinje prospect, Bumbiti and Igusule that are being explored by Resolute (Tanzania) Limited. Other prospects in this area include the Kirondatal and Old Sekenke Mine.

3.4 Gold mining and processing

Mining techniques

Two main techniques namely open cast mining and underground mining have been applied to mine gold. In Tanzania, there is only one underground mine, i.e., Bulyanhulu Gold Mine that is managed by Barrick Tanzania Limited. The other six gold mines (including Buzwagi that is under construction) are open cast. The choice between underground and open cast techniques is based on many considerations, but is mainly dictated by geological features and economic considerations.

Recovery and refining

All the five operating gold mines have a processing plant at site. However, whereas four mines (Geita, Golden Pride, North Mara and Tulawaka) produce gold bullion at site, Bulyanhulu Gold Mine which operates a complex ore, produces gold bullion from the free gold contained in the ore and exports the rest as concentrate to Japan (and China) for refinement and recovery of gold, copper and silver. Bulyanhulu Gold Mine was also the only mine that did not use cyanidation as the main gold recovering process. Whilst this is still the case, the mine is in the process of constructing a cyanidation plant that will be used to treat tailings that have been found to contain recoverable amounts of gold. This practice has provoked public outcry. Many have asked why Barrick does not build a copper refinery plant in Tanzania. The main explanation has been that the limited amount of copper in the concentration does not warrant the investment in the refinery.

All gold bullion produced by gold mining companies in Tanzania is sent abroad, where it is further refined to separate the gold from the associated minerals such as copper and silver. After refining, the gold, copper and silver are credited to the exporting companies. As such, the copper and silver production indicated in the minerals production figures in the country are by-products of gold refinement.

The issues discussed above suggest that it might be difficult to promote further local downstream processing and value addition in Tanzania. Attempts to establish a large-scale gold refinery in Tanzania were first made by a Swedish company called Boliden in 2000. Although at the time there were only two mining companies in production, there was limited interest from other potential gold producers to use a local-based refinery. The difficulty of establishing a viable local refinery stems emerged from the fact that most multinational gold producers have their own refineries and they do not want to use local ones. In addition, some of the medium and small-scale producers also have binding contracts with large refineries abroad and are under pressure to ensure that they produce the refined quality demanded by the international metal markets, i.e., 99.99 gold purity. In 2005, Mintek of South Africa approached the government (Ministry of Energy and Minerals) with the idea of setting up a refinery in Tanzania with government participation. Since the government was adamant to keep itself out of direct production activities, the proposal did not go through.

3.5 Artisanal and Small-scale Mining

Like large-scale mining operations, artisanal and small-scale mining activities are concentrated in the Lake Victoria Goldfields (LVGF). It is estimated that about 80% of the artisanal and small-scale gold mining is carried out within the LVGF greenstone belts. Of the total estimated 600,000 artisanal and small-scale miners, 70% are said to be involved in gold mining, with gemstones taking 20% and other minerals the remaining 10%. As such, the estimated number of artisanal and small-scale gold miners is estimated to be around 336,000. This number fluctuates over time depending on the weather, new discoveries that lead to gold rushes and other considerations. Most gold miners tend to switch to agriculture during the wet season as most of their pits are flooded, which makes it difficult to mine.

Many artisanal mine workings are not new discoveries, rather developments on old formal mines, exploration sites and tailings dams. Mining in such areas include the mining of crown pillars, reworking of tailings and waste piles. Many new discoveries are made by pure luck. Farmers, herdsmen or people digging latrines have been instrumental in finding gold nuggets that led to the discovery of major deposits. Such examples include those at Bulyanhulu, Nyambegena and Serengeti in the LVGF.

Table 3.2: Operating large-scale gold mines

Mine	Location/District	Owner	Start of mining	Resources (M Oz)	Investment (million US$)	Level of employment[a]	Average annual Production (tons)
Golden Pride	Lusu/Nzega	Resolute (T) Ltd.	1998	76.82	77.00*	619	5.70
Geita Gold Mine	Geita	AngloGold Ashanti	2000	527.02	450.00	2,296	18.43
Bulyanhulu Gold Mine	Bulyanhulu/Kahama	Barrick Tanzania Ltd.	2001	411.07	610.00	1,913	11.34
North Mara Gold Mine	Nyabigena & Nyabirama/ Tarime	Barrick Tanzania Ltd	2002	116.23	72.00*	1,068***	8.51
Buhemba Gold Mine	Musoma	Meremeta Ltd.	2003	21.26	65.00	438***	2.27
Tulawaka Gold Mine	Biharamulo	Barrick Tanzania Ltd.	2005	20.22	49.00	508	2.84
Buzwagi Gold Mine	Buzwagi/Kahama	Barrick Tanzania Ltd.	2008	75.00	372.00	-	7.50**
Totals				1,247.62	1,695.00	6,842	56.59

** Initial Investment*
*** Planned annual production*
**** 2004 figures.*
a. Level of Employment by 2005 inclusive of Tanzanians, foreign and onsite contractors employees.

Source: Ministry of Energy and Minerals: Budget Speech of the Minister of Energy and Minerals to the parliament in July 2007

Following the enactment of the new mining policy in 1997 and the new mining act in 1998, small-scale miners were provided with simplified licensing procedures that have enabled a large number of former illegal miners to become formal miners. According to the Ministry of Energy and Minerals' available records, a total of 6,868 Primary Mining Licences (PML) were issued to small-scale miners between 2000 and 2006. Although this might seem like a small number out of the nearly 600,000 miners, it is significant if one considers that in 1998 almost all small-scale mining operations were illegal operations. Although not all licences are active, the operating ones employ more that 100 miners each with the number depending on the productivity of the particular area. If it is assumed that at least 50% of the issued PMLs are active licences, then more than 300,000 miners are working in licensed areas. However, the problem with the current system is that it allows the licensees to turn into landlords who exploit the cheap labour of unlicensed miners most of which do not even understand the licensing procedures. In addition, the new mining act, which allows transfer and mortgaging of mineral rights, has enabled licensees to sell (mostly outright sell) off their mineral rights to large-scale operators. This affects the majority of miners who depend on such areas for their livelihoods. In some cases, e.g., at Mugusu, 25km west of Geita Gold Mine, the miners obtained a court injunction and blocked the licence holder from selling his mineral right to a large-scale exploration company.

The outright sale of mineral rights by small-scale miners, the lack of capacity of the government to carry out exploration in new areas, as well as the joint-ventures that some licence holders enter with large operators that benefit only the ASM licence holders, created a shortage of mining land for small-scale mining. The government is aware of this problem and has since 2000 been continuously calling for large-scale mining companies to look for ways of assisting the artisanal and small-scale miners by, for example, releasing part of their acreage. In response to these calls made by the former President (Hon. Benjamin Mkapa) and the current one, Hon. Jakaya Kikwete, mining companies have started to take actions. In Shinyanga, were De Beers manages the Williamson Diamond Mine, a project aimed at assisting artisanal and small-scale diamond mining was launched in August 2006. In addition to training and assisting miners to access fair markets and prices, the project aims to allocate blocks inside the mine lease where the miners can be organized and work. It should be noted that in Nyarugusu, where Iamgold is conducting exploration within the Rwamagaza greenstone belt, the company has already surrendered certain areas for the use of organized small-scale mining groups. Similarly, at the North Mara mine owned by Barrick Tanzania Limited, the company has identified areas within the lease area for ASM usage. Negotiations are currently proceeding on the legal aspects for surrendering the areas.

Mining techniques

Mining is usually conducted through pitting with pits haphazardly located through the entire claim area. Pits are usually timbered in areas of bad ground and in mining levels. However, in areas where timber is expensive, mining is carried out in unsupported pits. The excavated rocks are normally manually hoisted to surface where they are manually crushed by using wooden mortars and half axle pestles before feeding it in grinding mills. Artisanal and small-scale mining is usually carried without much exploration and testing of ores to establish the available resources or even the processing technology required for handling the particular ore chemistry. As such, due to lack of knowledge of the characteristics of the ore body, a paucity of technical talent and desire to get rich quickly with minimum inputs, mining occurs only on the rich part of the vein, which in most cases is less than 30 cm. The marginal ore, which is normally wider, is left un-mined resulting in loss of resources. In areas where large operators have taken over areas previously mined by ASM operators, the extraction of the marginal ore usually requires special technical attention. Where small-scale miners extract the marginal ore, there are losses due to low grades and poor mineral processing technology to recover the gold. Such ore can be found at almost all small-scale mining sites, e.g., at Matinje in Igunga District where the grade of marginal ore varying from 15 to 60 gm/t have been found. The grades of samples taken

at Matinje, Mgusu and other localities confirm that the ore processed by small-scale miners is often of high grade, 58.8 gm/t.

Small-scale gold recovery

After mining, gold ores are usually processed on the mine sites. At first, physical separation, which requires size reduction of the material, has to take place prior to actual ore separation. General recovery is low due to the simple technology employed, especially during size reduction of the ore. Three major concentration stages of gold recovery operations commonly used by miners are: - panning, sluicing and amalgamation. However, these methods are not efficient to extract gold from low-grade ores or refractory gold, which is locked up in sulphides because sulphides do not react with mercury. Depending on the type of ore mined, processing could either involve panning alone, e.g., in the processing of alluvial/eluvial gravels excavated from the riverbeds, a combination of panning and sluicing or through a three-stage approach of panning, sluicing and amalgamation.

A two-way approach, which is a combination of panning and sluicing, is used to recover coarse and fine gold from alluvial/eluvial deposits. Mined ore is passed through an inclined sluice box whose bottom is lined with a sisal mat and fitted with riffles to trap the gold from several cycles. Coarse gold is trapped by the riffles and on the sisal mat placed in the sluice box. The sluice box is emptied by removing the sisal mat and washing it thoroughly in a bucket of water to remove all the entrapped gold. The pulp obtained is then panned to remove all light materials until the heavy gold bearing fraction is left behind. Where the third stage is required, i.e., amalgamation is used to recover gold by mixing mercury with the sluiced concentrate and the gold-mercury amalgam heated to dispel mercury and recover the gold.

The amalgam bullion is recovered by heating it in the open on a soft drink crown cap in silver paper or on a shovel over a charcoal fire. Amalgamation is applicable where gold - occurs as fine particles. Mercury is added in the form of a small bead, commonly the amount that can be contained in a soft drink crown cap, and is allowed to circulate in the pan during the final stages of washing. The excess mercury is removed from the amalgam by squeezing it through a fine cloth.

From the survey conducted as part of this study, 97% of the mines crush the ore by hand using hammers and stones, 3% use mechanical jaw crushers, 64% grind ore by using wooden mortars and vehicle half-shaft axles as pestles, and 18% use batch mills driven by tractor engines. The remaining 18% grind the ore manually using hammers and stones. Regarding refining, 79% heat the amalgam bullion in the open air, 3% use mercury retorts, 5% use furnace and crucible and the remaining 13% pan and hand sort. Some operators showed reluctance to use mercury retorts to recover the mercury due to cultural barriers; many operators heated the amalgam openly inside their bedrooms.

Although the act does not allow small-scale miners to use cyanide, organized operations that can demonstrate expertise in the use and management of cyanide can apply and obtain a permit to use cyanide for processing. At Matinje in Nzega District, Tabora Region, a formal small-scale mining company has applied and obtained a permit to use cyanide.

Small-scale gold refining

All the gold produced by artisanal and small-scale mining is not refined. With the exception of the alluvial gold that is almost pure gold, most gold is “sponge gold” still containing substantial amounts of impurities including mercury. Most buyers of gold produced by small-scale miners take care of that by deducting a certain

percentage in the purchase price per ounce of gold. Most (more than 90%) of small-scale gold producers sell their gold through gold brokers and dealers. Under the Mining Act 1994, only brokers are allowed to deal in mining areas with dealers restricted to do their business in regional headquarters. However, it is the licence holders (PML licence holders) and dealers that are allowed under the Mining ac 1998 to export gold. Brokers cannot export gold but can only sell it to the dealers. The introduction of brokers was intended to provide direct market access to the miners most of whom cannot travel to the big towns where the dealers are located. Other buyers of small-scale mining produced gold are jewellers who either buy directly from brokers or from miners who take their gold to the town centres.

Both the dealers who need to export the acquired gold and the jewellers who use it to produce jewellery refine the gold through backyard refineries. Most of the refining is done through rewashing the gold in concentrated acids (mainly sulphuric acid) and then smelting the cleaned gold at higher temperatures. The smelting also helps to amalgamate the small sponge gold balls that are bought from individual miners into single bullion for either exporting or using in jewellery.

Gold markets

There are a few middlemen in gold trading, and the collection networks are more established than those of gemstones. Gold brokers usually provide mercury and other supplies including food and working tools to miners on specific agreements as a way of booking production. Small-scale brokers purchase gold by experience without much technical knowledge of gold markets. The produced gold is usually sponge gold with a lot of impurities including mercury and is weighed by using a hand scale - balance with razor blades as units of measure (1 chapa = 1 cent = 2 gms). There are many rules used when weighing the gold. This is usually done to compensate for the high price, which the gold broker offers, compared to the official rate. It was noted that gold dealers do not visit mining areas at the same frequency as their gemstone counterparts. The usual practice is to assign agents or brokers because quality control is less complex and purchase prices are stable for considerable periods of time. The major gold buying centres in Tanzania are Mwanza, which is the major city in the Lake Victoria Goldfields followed by Dar-es-Salaam, which is a major exit for most exporters and has a large number of jewellers. Other small gold trading centres include Mbeya, Musoma, Songea and Arusha.

Linkages with the rural economy

There are evident interlinkages between artisanal and small-scale mining and the rural economy. This stems because miners get their basic supplies from the nearby villages and license holders recruit labour from the surrounding villages. In most villages, ASM usually starts with a mine rush and normally involves experienced miners who are not necessarily indigenous to the locality where gold has been found. As the rush group moves in, the locals would both join in and learn by doing. Those who do not join in the direct gold production activities become suppliers of labour, construction materials, food, guesthouse vendors and specialised services. Specialised services to the mining and processing include manual crushing and grind of ore, construction of supports in the excavated underground pits, panning and sluicing of the ore during processing. Whilst these services require experienced service providers, most of local people get training from a few individuals of the invading gangs. Apart from direct participation and collaboration with the experienced miners, there are number of villagers who also benefit through reworking the tailings once they have been discarded. These are mostly groups of women and sometimes children who do not have the energy demanded by the upstream mining and processing activities. The extent to which a village can benefit from mining activities depends on its level of economic development and the extent of the participation

of its people in mining. Villages with little to offer due to the poor development of their people tend to be negatively affected by the presence of mining activities in their areas.

3.6 Gold contribution to the national economy

Gold compared to other exports

Available data since gold mining companies started production in 1999 show that gold is the leading mineral exported from Tanzania. In addition, the gold mining industry contributes further to the mineral exports through gold by-products such as copper and silver. Gold produced by large-scale mining companies is exported in raw form, implying that total production is equal to total export in terms of volume. Table 3.3 provides a comparison of gold exports with other minerals, traditional, non-traditional and manufactured goods exports between 2001 and 2006.

Table 3.3: Gold exports to other exports (Million USD)

	2001	2002	2003	2004	2005	2006
Total Minerals	302.2	383.8	552.2	680.2	711.3	823.9
Gold	254.1	341.1	502.8	629.4	655.5	773.2
Diamond	27.1	22	28.6	26.6	24.4	22.4
Other minerals	21.1	20.7	20.7	24.8	31.4	28.3
Traditional exports	231.1	206.1	220.5	297.8	354.5	267.1
Non-Traditional exports	620.2	773.5	995.7	1175.3	1321.8	1455.9
Manufactured goods	56.2	65.9	83.8	110.1	156.1	195.8
Total Exports	851.3	979.6	1,216.10	1473.1	1676.3	1723
% Share of exports to total exports						
Mineral exports as % of total exports	38.9	42.5	48.9	46.2	42.4	47.8
Gold exports as % of total exports	32.7	37.8	44.5	42.7	39.1	44.9
Diamond as % of total exports	3.5	2.4	2.5	1.8	1.5	1.3
Other minerals% of total exports	2.7	2.3	1.8	1.7	1.9	1.6
Traditional commodity as % of total exports	29.8	22.8	19.5	20.2	21.1	15.5
Non-Traditional as % total exports	72.9	79.0	81.9	79.8	78.9	84.5
Gold exports as % of total mineral exports	84.1	88.9	91.1	92.5	92.2	93.8
Manufactured goods as % of total exports	6.6	6.7	6.9	7.5	9.3	11.4

Source: Tanzania Revenue Authority (TRA) and Bank of Tanzania (BOT)

In comparison to other minerals, gold represents 93.8% of the total mineral exports. This figure increased from 84.1% in 2001 to the current level of 93.8% over a period of six years. Figure 3.1 shows the comparison of gold with other mineral exports. In comparison with other exports, gold represented 32.7% of the total exports in 2001 increasing to 44.9% in 2006. Export earnings from the sale of gold enter Tanzania's economy as remittances to domestic banks to facilitate domestic operations like payment of wages and salaries, taxes and levies, other transfers to the government and payment to local services.

Figure 3.1: Share of gold exports in total mineral exports

Source: Compiled from data collected from Tanzania Revenue Authority and Bank of Tanzania

Generally, this indicates that the investment in the mineral sector in Tanzania is still dominated by gold mining. Several reasons could explain this. One could be that gold potentially offers quick returns and the other could be associated to the fact that the country's poor infrastructure still inhibits access to other mineral resources. Notwithstanding, as presented later, there is also a noticeable increase in others minerals investments. .

Statutory contributions to the government

Gold also shoulders the highest contribution in terms of statutory taxes and other contributions paid by mining companies to government. Table 3.4 shows that out of the cumulative US$ 255,526,893 statutory taxes and other contributions paid by mining companies to the government between 1997 and 2005, US$ 207,912,724 or 81.37% came from gold mining companies. On annual figures, the contribution from gold mining increased from US$ 281,938 in 1997 to US$ 51,565,349 in 2005. The figures do not include data and information of VAT and specific local government taxes and levies.

Table 3.4 also shows the taxes and contributions paid by gold mining firms as a percentage of total gold production values during the sample period 1997 to 2005. On average, about 7.66 – 19.85% of the total value of gold production is paid to the government in the form of total taxes and other contributions.

Community support projects

Of all mining activities, gold mining contributes the largest share (84.67%) into community programmes. These include support to road construction, education, health services, and clean and safe water as well as establishment of micro finance schemes in both urban and rural areas. Records from five gold mining projects located in the Lake Victoria Goldfields (Table 3.5) indicate that during the period 1997 – 2000, they contributed 30.2 million to community projects. Geita Town (Box 3.1) depicts the impact of gold mining in the region.

Table 3.4: Contribution of gold mining to statutory taxes and other contributions paid to government

Name	1997 US $	1998 US $	1999 US $	2000 US $	2001 US $	2002 US $	2003 US $	2004 US $	2005 US $	Total US $
PAYE-Expatriate Salaries	130,148	103,294	103,631	3,141,248	970,497	6,178,876	5,534,462	3,330,949	7,654,620	27,147,725
Payroll Levy-Expatriates	25,790	20,244	21,016	405,819	182,685	338,769	491,027	753,131	6,653,153	8,891,635
PAYE-Expatriate Gratuity	-	-	-	-	277,129	276,073	2,822,598	-	6,981	3,382,781
Withholding Tax-minesite	-	69,793	253,668	5,582,484	5,289,110	5,355,165	5,099,645	4,450,795	6,034,628	32,135,288
Withholding Tax-Dar	-	-	-	102,065	77,652	44,103	-	-	-	223,820
Payroll Levy	7,000	25,000	123,719	240,254	683,305	995,924	704,141	791,128	808,364	4,378,836
Veta Levy	4,000	23,330	71,824	267,740	237,727	211,636	223,906	467,376	180,549	1,688,089
NSSF	-	38,167	279,281	957,083	841,900	1,910,503	3,111,212	3,768,151	2,937,850	13,844,148
PPF	-	-	-	4,212	-	-	15,585	3,205	31,709	54,712
PAYE	63,000	259,000	591,832	1,047,880	5,865,033	2,812,442	3,181,660	3,436,542	3,031,285	20,288,672
Stamp Duty	-	2,063	2,237	114,403	152,945	50,695	20,561	41,386	130,293	514,583
Donations	-	-	-	102,828	47,311	208,826	312,621	296,470	132,151	1,100,207
Road Toll	-	-	200,000	400,000	400,000	600,000	800,000	573,080	1,617,386	4,590,466
Mining Lease	52,000	71,000	150,000	307,000	314,000	337,000	189,636	431,625	422,952	2,275,213
Royalty	-	-	394,000	3,256,249	6,162,385	10,213,268	15,304,668	19,828,891	16,282,897	71,442,358
Import Duty	-	-	44,000	266,000	165,415	1,338,795	792,165	2,247,957	4,881,285	9,735,618
Income Tax	-	-	-	-	-	-	1,112,332	2,020,867	-	3,133,199
Others	-	-	366,583	-	-	177,269	1,531,981	250,313	759,246	3,085,393
TOTAL	281,938	611,891	2,601,792	16,195,266	21,667,095	31,049,344	41,248,201	42,691,866	51,565,349	207,912,742
Tax as % of value	0	0	19.85	14.16	7.66	8.56	8.09	7.09	17.42	83

Source: Tanzania Chamber of Minerals and Energy, 2007

Table 3.5: Contribution of gold mining projects to community development programmes

	1997 US $	1998 US $	1999 US $	2000 US $	2001 US $	2002 US $	2003 US $	2004 US $	2005 US $	Total US $
Education	-	-	11,458	151,458	307,680	407,585	118,465	686,364	745,843	2,428,854
Health	-	-	27,264	242,905	1,028,183	271,000	170,516	323,156	372,748	2,435,771
Water	-	340,000	2,037,000	3,270,000	1,286,000	100,920	6,999	302,752	1,277,953	8,621,624
Roads	1,100,000	1,100,000	2,000,000	3,174,980	789,480	364,996	26,696	279,007	122,500	8,957,659
Micro finance scheme	-	-	-	46,133	-	34,668	13,139	5,120	46,917	145,977
Others	-	-	-	1,023,720	46,023	187,443	567,659	2,383,821	3,492,634	7,701,300
TOTAL	1,100,000	1,440,000	4,075,722	7,909,196	3,457,366	1,366,612	903,475	3,980,220	6,058,596	30,291,185
Total as % of value	0	0	50.94	21.08	8.88	11.75	8.27	7.75	19.47	128

Source: Tanzania Chamber of Minerals and Energy, 2007

Table 3.6: Direct employment in gold mining

D: Employment	1997	1998	1999	2000	2001	2002	2003	2004	2005	Total
Foreign Employees	5	13	40	223	248	315	332	359	319	1,854
Tanzanian Employees	85	102	688	1,418	1,692	2,330	2,776	2,725	2,891	14,706
On site Contractors	-	-	335	774	1,335	1,877	2,261	3,022	2,126	11,730
Professionals	-	-	69	214	290	338	16	-	325	1,252
Other Cadres	-	-	295	602	902	927	-	-	1,588	4,314
Total Employees	90	115	1,427	3,231	4,467	5,787	5,385	6,106	7,249	33,856

Source: Tanzania Chamber of Minerals and Energy, 2007

Employment

The gold mining companies remain the largest employers in comparison with other mining companies given the size of the operations and levels on investment. The largest two gold mines, i.e., Geita Gold Mine and Bulyanhulu Gold Mine employ an average of 2000 workers each. The other smaller mines employ less but with the majority of the employees being local Tanzanians.

Table 3.6 shows direct employment in gold mining for the period 1997 to 2005. From these figures it can be seen that formal employment has increased from 90 in 1997 to about 7,249 in 2005. .The increase is linked to the increase in the number of operating gold mines. It should be noted that the numbers fluctuate between periods of mine construction and the time when the mine comes into full operation. This is more so with the numbers of contractors, the majority of which are foreign contractors who leave after the mine has come into operation. Also, one of the largest employers, Geita Gold Mine has now got rid of the mine contractor and adopted its own mining techniques, which reduced the number of foreign employees. Similarly, Tulawaka Gold Mine and Golden Pride Mine are both served by a local mining contractor, CASPIAN. However, the limited number of local professionals (mining engineers, explosives engineers, geotechnical engineers, maintenance engineers and others) means that even CASPIAN still relies to a large extent on foreign experts.

Over the sampled period of 1997 to 2005, the number of Tanzanian employees increased from 85 in 1997 to 2,891 in 2005. At the same time, the number of foreign employees working in gold mines, which were 5 in 1997 increased to 319 by 2005. Despite the increase in the number of local Tanzanians employed in the mining industry, the increase in the number of professionals has been minimal. The introduction of Mining Engineering and Mineral Processing Engineering degrees at the University of Dar-es-Salaam has contributed to the increase of local professionals.

Box 3.1: Socio-economic impact of gold mining on the Geita Town

Geita town is a one of the 5 District headquarters of Mwanza Region and is located around 25km south of Lake Victoria towards the northwestern side of the country. Although the socio-economic impacts of large mining projects on local communities have not been widely documented, a survey, which was conducted and documented by Ikingura, 2004 and updated by the authors of this report in July 2007, demonstrates the visible socio-economic impacts of Geita Gold Mine (GGM) on the neighbouring Geita town. The Geita Gold Mine is the largest open cast mine in the country and is located on the outskirts of the Geita Township, towards the west and mainly within the Geita Forest Reserve. The mine was lunched in 2000 and has an annual gold production capacity of about 600,000 ounces of gold. The Geita town was essentially reminiscent of an old mine ghost town, being formally a town which served formal colonial gold mining operations at the Old Geita Mine (1934-1966). Prior to the opening and operation of GGM in 2000, the town was essentially a stagnated petty business center, very dusty, with old buildings conspicuously stained red-brown by mantles of red soil dust derived from weathering of iron-rich rocks or Banded Iron Formations characteristics of the Geita hills. Six years later, following the establishment of GGM, the Geita town is a booming business center and probably the fastest growing town in the Mwanza region. Demographic data could confirm this assertion, but it is obvious that the population of Geita has grown substantially. Geita District now boasts of the third largest population in the country (more than 700,000 people) after Ilala and Kinondoni Districts of Dar-es-Salaam region. The town has been electrified and water supply services improved. Glittering roofs of new and modern residential houses, most of them owned by GGM COMPANY employees, now illuminates the foot slopes of Geita Hills, formerly a green belt. New businesses have been launched, including telephone and Internet services. Decent hotels and guesthouses have been erected to serve the growing community of Geita town, GGM employees, and the increased number of visitors to the town and the mine. A town that in 1999 did not have a single decent guest house now has two Hotels that can be ranked as 3-star hotels and more than 10 modern guest houses most connected with satellite dishes and access to internet. Through assistance from GGM, the town has a "Television Receiver Station" on Geita Hill from which the Geita town residents can be connected. The station was handled over and is managed by the Geita Town Council. Villages located along a 25 km stretch of the water pipeline from Lake Victoria at Nungwe Port to the Geita mine are supplied with water draw points, thus easing the problem of safe water supply to the villages. The Geita district hospital has been rehabilitated by GGM to provide better health services to the Geita town and is now one of the few District hospitals in the country with HIV/AIDS centre with the capacity to manage retroviral drugs for people leaving with the disease. A new health center has also been built near Kasamwa to serve villages that are away from Geita. In fact GGM spends nearly 100 low much in dollar USD million shillings annually to support community development projects around Geita. Apart from the community support services, GGM organizes an annual fund raising event christened "Kilimanjaro Challenge" to support families affected by HIV in the country. In the last two years, this initiative has been raising around TShs. 150 million annually most of which is distributed to HIV/AIDS support programmes. Although there are many programmes that GGM has assisted the community with, one of the major projects that are noticeable in Geita town is the Nyankumbu girls' secondary school which is still under construction. The school is already being used following the high demand of such an institution. The transformation of Geita town has also attracted the most successful small-scale miners and brokers to invest in the town especially in guest houses. The Government is tarmacing a major road which links Geita to Mwanza City thus reducing the dust which had become characteristic of the town.

The training, which started producing graduates in 2004, produces an average of 40 engineers every year with the majority getting employment in the gold mines. Other mines and the government absorb the remainder. The Department of Geology of the University of Dar-es-Salaam also produces about 10 geologists every year. Most of these young graduates have not yet acquired enough experience to take over senior management positions. Notwithstanding, there have been complaints from some of the mines that expatriates have acted deliberately to frustrate the up and coming young engineers and thus forcing them to leave. Recently, it has been witnessed that an exodus of young engineers from gold mines are joining other mines, e.g., cement quarries and some leaving the country to Zambia and the Democratic Republic of Congo.

Most gold mines have also had a shortage of well-trained technicians and artisans for managing and servicing the mining infrastructure. As a result, most mines have been training their own technicians and artisans either on site or by sending them outside the country, mainly to South Africa. However, the country now has two technical schools which are giving trainings to mining technicians and, spread across the country, several artisan schools which belong to the Vocational Education and Training Authority (VETA). Collaboration

between the various gold mines and VETA is underway to ensure the artisans are trained to meet the job demands of the gold mining sector.

Training

Due to the shortage of experienced local professionals, most gold mining companies have been forced to embark on extensive training programmes. The lower cadre technical staffs, e.g., artisans, have been mostly trained on site while higher cadres have been sent outside the country for training. The major gold mines, i.e. Geita Gold Mine and Bulyanhulu Gold Mine have their own training schools and processes are underway to have them certified and recognized nationwide to the equivalent of the training offered by VETA institutions. The Bulyanhulu Gold Mine has an underground operations training centre that caters for training of all new recruits for underground mining. Other gold mines have onsite training facilities that cater for their specific needs. According to Table 3.7, a total of 3,708 employees were trained in various categories between 2001 and 2006 at a cost of US$ 4,611,543.

The gold mines have been at the forefront to support the Mining and Process Engineering Department at the University of Dar-es-Salaam. The supports have included donation of laboratory-scale mining and mineral processing equipment, computers and software, as well as to post their mining experts and trainers temporarily in the Department to provide training to lecturers and students.

Table 3.7: Number of people trained and expenditure in gold mining

	2001	2002	2003	2004	2005	2006*
Professionals						
People Trained	1,823	1,956	2,203	226	408	510
Amount spent, US$	446,000	477,752	528,355	1,552,050	3,177,817	4,607,835
Other Cadres	84	301	359	2,993	2,781	3,198
Amount spent, US$	1,930,000	1,938,767	2,090,477	1,386,553	1,350,407	1,823,049
Total trained people	1,814	2,134	2,485	3,861	3,700	3,708
Total Amount spent, US$	2,376,000	2,416,519	2,647,115	2,996,874	4,651,941	4,611,543

Data Source TCME, 2006 and Economic Research Bureau (ERB) estimates for 2006

3.7 Input supply chains in gold mining operations

The gold mining sector utilizes both specialized and generic types of goods and services. The suppliers of these inputs are many and operate at different scales in a fairly competitive market environment. The specialized inputs are largely technical or scientific in nature and they include machinery and plant and maintenance spares.

There are significant numbers of Tanzanian businesses supplying specialized mining products such as spare parts, fuel, cement, iron and steel products. Table 3.8 shows, in percentage terms, the types and amount of goods consumed by three large-scale gold mining firms in Tanzania. Table 3.9 depicts the same for services. Table 3.8 shows that fuel is the most important and costly input representing about 29.29% of the total consumption at Bulyanhulu Gold Mine and 91.88% at Tulawaka Gold Mine. Other important inputs include machinery and equipment, spare parts and general merchandise. The other inputs include food and other related canteen services.

The raw data suggests that most of the goods (fuel, machinery and equipment) are sourced from locally registered business firms. However, it is important to note that most of these goods are imported and not

locally produced. There has been a move towards local firms with the intention of reducing procurement costs as well as the need to integrate with local economies. However, Table 3.8 suggests that there are some key items that make up a great deal of the large scale corporate spending on procurement, on which firms focus on a global market. Most large-scale firms do global benchmarking so that they know when they are paying different prices, for example, for a similar piece of heavy mobile capital machinery, and can ask themselves and their suppliers questions about these.

Table 3.8 Types and amount of goods consumed in gold mining

Goods	Bulyanhulu	North Mara	Tulawaka
Fuel	29.29	67.91	91.88
Machinery & Plant	12.50	17.58	0.83
General Services	9.48	0.61	0.50
Maintenance Spares	7.47	1.61	1.52
Chemicals	6.25	0.19	0.67
Lubricants	5.31	0.17	0.42
Vehicles, spare parts & services	2.26	1.88	0.86
Office Equipment	2.24	0.11	0.43
Safety Equipments	2.25	0.27	0.00
Construction	1.28	0.52	0.19
Electrical Equipments	0.36	0.21	0.42
Printing Works	0.17	0.27	0.00
Mining Services	0.00	5.52	2.06
Others	21.15	3.13	0.22
Total	100.00	100.00	100.00

Source: Compiled from data provided by Barrick (Tanzania) Limited for the year 2007.

Provision of services

Table 3.9 shows types and amount of services consumed in percentage in some selected large-scale mining firms in Tanzania. There are various types of services needed as inputs in gold mining operations. The Table also shows that transportation, mining and construction services are the most important inputs and costly services used. For example, mining services are most costly for North Mara and transport services are costly for Tulawaka mining companies. Other important services include electricity supplies, construction and building.

It is noted that community and social services are included into public services for accounting and taxation purposes. Table 3.9 shows that Bulyanhulu and North Mara mining companies contributed to about 2.23 - 2.44% as part of the public services. This amount includes payments to the offices of the District Executive Directors in the respective districts as part of corporate social responsibilities towards community and social services. These corporate entities in the mining industry have been playing significant roles in contributing towards the support of community and social services that include education, health services, and clean and safe water as well as establishing of micro finance scheme in both urban and rural areas.

Table 3.9 Provision of services in gold mining

Services	Bulyanhulu	North Mara	Tulawaka
Transportation Services	24.18	1.72	51.27
Construction and Buildings	18.12	4.71	0.00
Electricity Supplies	14.91	2.68	0.00
Geological Services	9.99	3.99	0.00
Mining Services	9.64	42.33	0.00
Public Services	2.44	2.23	38.12
General Engineering	2.25	18.05	0.00
Consultant Services	0.33	0.93	0.00
ICT Services	0.11	0.17	7.35
Others Services	18.02	23.19	3.27
Total Services	100.00	100.00	100.00

Source: Compiled from data provided by Barrick (Tanzania) Limited for the year 2007.

It is noted that by now, 2007/2008, Tanzanian large-scale companies have gained business experience and working relation with local communities. These companies have the potential to bring significant economic benefits to village, ward, district and regional levels through direct and indirect employment, infrastructure improvements, education and skills building, access to information, direct support for social services and through contributions. Meanwhile, many companies have recognized that their own bottom-line will improve if they can figure out ways to optimize cost, quality, flexibility, networks, local knowledge and other considerations in the value chain. Increasingly, these companies, using local management staffs, are overcoming cultural, communication, and procurement hurdles in recognition of the fact that better incorporating local people and businesses into their supply chain can save the company money while also helping to manage current social or political controversies surrounding company contracts and activities.

Inputs by major categories

Table 3.10 shows the supply of inputs by major categories in percentage terms of the three large-scale mining firms in the country for the year 2007. The table suggests that both goods and services are important inputs for the mining operations. About 59.2% are input costs related with services at Bulyanhulu mining operations. Both North Mara and Tulawaka mining firms tend to use more goods than services. The input cost structures shown in Table 3.10 are functions of the procurement and supply chain systems used by the mining companies. This depends on the purchasing and procurement policy adopted, materials management, logistics management, contract management, strategic sourcing and information systems.

Table 3.10: Inputs by major categories in percentage terms

	Bulyanhulu	North Mara	Tulawaka
Total Goods	40.81	84.94	98.60
Total Services	59.19	15.06	1.40

Table 3.11 below shows that between 1999 and 2005, mining companies spent a total of US $2.8 to procure goods and services. Out of this, 99.4% were procured locally and the rest abroad. However, most of the goods indicated as local procurements represent imported goods done by local supply companies as a clear reflection of the local weak manufacturing base. However, with respect to services, the share of local procurement is much more significant. As indicated in Table 3.9, nearly 60% of all the services procured at Bulyanhulu mine are local and represent transportation, construction and buildings, electricity and public services (including community support services).

Table 3.11: Local and foreign procurements for the gold mining companies between 1997 - 2005

Procurement Sources	1997	1998	1999	2000	2001	2002	2003	2004	2005	Total
Goods:										
Foreign (USD)	-	-	48,078	388,324	1,012,595	1,147,109	1,410,799	1,494,487	1,266,803	6,768,194
Local (USD)	-	-	13,108,000	114,364,608	282,845,552	362,828,129	509,831,362	602,318,193	707,375,243	2,592,671,087
Total (USD)	-	-	13,156,078	114,752,932	283,858,147	363,975,237	511,242,161	603,812,680	708,642,046	2,599,439,281
Services:										
Foreign (USD)	-	-	16,000	220,421	1,159,597	1,539,322	1,794,751	2,876,624	1,652,096	9,258,811
Local (USD)	-	-	-	-	6,984,766	9,309,812	8,191,035	136,613,983	8,072,118	169,171,714
Total (USD)	-	-	16,000	220,421	8,144,363	10,849,134	9,985,786	139,490,607	9,724,214	178,430,525
Goods & Services:-										
Foreign (USD)	-	-	64,078	608,745	2,172,192	2,686,431	3,205,550	4,371,111	2,918,899	16,027,005
Local (USD)	-	-	13,108,000	114,364,608	289,830,318	372,137,941	518,022,397	738,932,176	715,447,361	2,761,842,801
Total Goods & Services (USD)	-	-	13,172,078	114,973,353	292,002,510	374,824,371	521,227,947	743,303,287	718,366,260	2,777,869,806

Section Four: The Diamond Mining Industry

4.1 Introduction and background

In Tanzania, the diamond mining sector consists of artisanal, small, medium and large-scale firms. They all exert significant direct and indirect impacts on the district, regional and national economies.

Tanzania has been a diamond producer for several decades, with the bulk of production coming from the Williamson Diamonds Mine at Mwadui where commercial production began in 1940. Over 300 kimberlites are known in Tanzania of which, 20% are diamondiferous. Some 600 dipolar magnetic anomalies with similar geophysical characteristics to known kimberlite pipes have been recorded during recent geophysical surveys. Also of relevance are the psuedo-kimberlites or para-kimberlites along the young craters where diamonds have been discovered.

Alluvial diamonds have been recorded, but a large deposit of economic exploitation has not yet been found. Locating shallow buried superficial deposits using airborne infrared surveys may prove useful. However, the alluvial diamonds found around the Mwadui area, the source of which has been linked to the explosion during the formation of the kimberlite pipe, are the major source of most medium-scale and artisanal and small-scale diamond mining in the area.

Although there are small amounts of diamonds produced from other parts of Tanzania like Mwanza and recently Songea, the Shinyanga Region in the northwest of the country has for more than 65 years been the main source of the country's diamonds. To many Tanzanians, diamond mining is synonymous to Williamson Diamond Mining Company or "Mwadui". The mine has trained and developed the majority of the country's senior engineers and other professionals, the majority of whom are the country's current leaders. As such, the description of diamond mining in Tanzania would not be complete without a detailed account of what happens at Williamson Diamond Mines Limited or simply at "Mwadui", Box 4.1.

4.2 Large and medium-scale diamond producers

In the Shinyanga Region, the only other diamond producer apart from Williamson Diamond Mines Ltd, is El Hilal Minerals located on the border with WDL. El Hilal Minerals can be categorized as a medium-scale operation. It has five (5) mining licenses covering a total area of 38.8 square kilometres. Most of the area covered under the El Hilal mineral rights lies in what used to be a controlled area surrounding the Williamson Diamond lease prior to the enactment of the 1998 Mining Act. El Hilal Minerals started production in 2004 with 3,234 carats, which increased to 10,326 carats by 2006. Unless massive investment is done, production is not expected to go beyond 50,000 carats per annum. In addition, El Hilal Mineral's production is based on the alluvials that were scattered during the eruption that lead to the formation of the Mwadui Kimberlite pipe. As such, the diamond grade decreases as one moves away from the pipe.

The area around Mwadui has a number of prospecting licences owned mainly by local companies. Artisanal and small-scale miners are working in the majority of these areas on the agreement to sell the produced diamonds to the licence holders. Whilst the practice is illegal, it is openly practiced. Other artisanal and small-scale miners work in specific small-scale licensed areas (with Primary Mining Licences - PMLs) and others in a block of 140 hectares that have been set aside by government for small-scale mining. Table 4.1 gives a summary of some of the licences in areas surrounding the Williamson Diamond Mine.

Box: 4.1: The Williamson diamond mine

The Williamson Diamond Mine Limited (also known as the Mwadui mine) became well known as the first significant diamond mine outside of South Africa. The mine was established in 1940 by Dr. John Williamson, a Canadian geologist, and has been in operation since then, making it one of the oldest continuously operating diamond mine in the world.

Following the death of Dr. John Williamson in 1958, his heirs sold the mine for about £4 million (GBP) to an equal partnership between De Beers and the colonial government of Tanganyika. As such, during the period 1958 to 1970, the mine was under the management of De Beers. In 1971, the Government of Tanzania nationalized the mine and took over its management and in 1973, the State Mining Corporation started managing the project on behalf of the Government. The period that followed the nationalization of the mine and up to the early 1990s saw a continuous decline that almost brought the mine to closure. The poor performance of the mine could be linked to the decrease in ore grades as the mine went deeper, loss of skilled foreign labour and engineering staff after nationalization, a bloated labour force resulting from government employment efforts, and inadequate capital investment in the mine's equipment. As shown in Figure 4.1, production decreased from more than 750,000 carats in 1971 to less than 100,000 carats in 1990. Following this poor performance and the then ongoing economic restructuring of the country's economy, the Government invited De Beers to take over management of the company and sold its 25% shares. As such, the mine is currently 75% owned by De Beers and 25% by the Government of Tanzania. The Williamson Diamond Mine is a large open pit currently about 90 meters (300 ft) deep. Diamond mining operations at the Williamson diamond mine are composed of three distinct activities: mining of the pit, re-treatment of tailings from the 50s and 60s and gravel mining within the lease area. The mine currently employs about 1,100 staff, mostly Tanzanians. The mine is now characterized by low ore grade of about 6 carats per hundred tons of ore. The diamond grade has been decreasing with depth; having started at an average of almost 100 cpht in the 1940s, it decreased to about 62 cpht in the 50s to about 30 cpht in the 60s. Production in the 1950s and 1960s was usually between 500,000 and 750,000 carats per year with the peak year of production being in 1966 when 924,984 carats were produced.

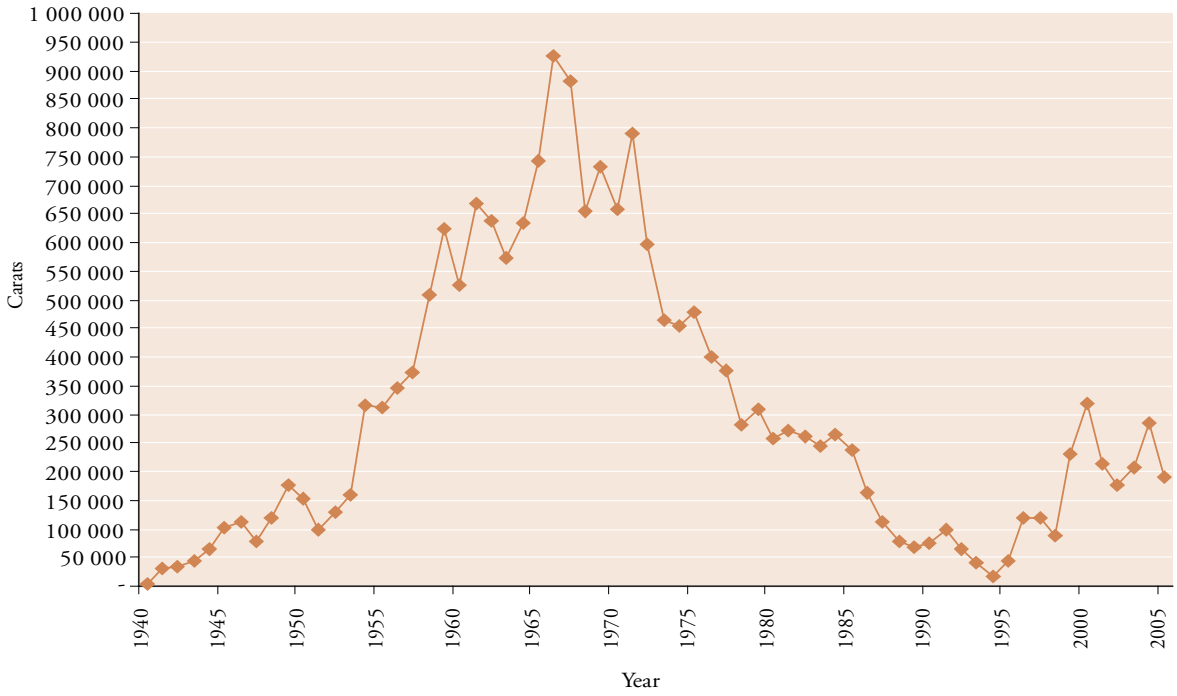
Since takeover of management of the mine, De Beers has embarked on recapitalization of the plant in order to improve its equipment availability and overall performance. Current annual production is at an average of 200,000 carats and is expected to rise. The mine is also evaluating the possibility of engaging in a phased expansion programme that will enable the mine to produce up to 1.0 million carats per annum by treating an average of 15 million tones of ore. This is a huge investment that is also faced with huge challenges. Mwadui is located in a semi-arid area of Shinyanga that receives little amount of rain and the potential for ground water within the area is limited. Currently the mine relies on rain harvesting through earth dams that were built in the 1940s and 50s. The demand for power is another challenge for a plant that needs to increase its capacity 5 fold. Despite these difficulties, the mine is in the process of assessing the viability of the envisaged expansion programme.

The diamonds produced at Mwadui are shipped to the Government sorting house, TANSORT which is housed in London were the diamonds are sorted into parcels the value of which is fed back to the Government for the calculation of royalty. Royalty for diamonds is charged at 5% of the netback value. According to Section 86 of the Mining Act, 1998 (with 2004 amendments), the "net back value" means the market value of minerals FOB at the point of export from Tanzania or, in the case of consumption within Tanzania, at the point of delivery within Tanzania, less: -

(a) the cost of transport, including insurance and handling charges, from the mining area to the point of export or delivery: and

(b) the cost of smelting and refining or other processing costs unless such other processing costs relate to processing normally carried out in Tanzania in the mining area.

Figure 4.1: Carats produced from 1940 to 2005



Source: Compiled from data of the Ministry of Energy and Minerals and Williamson Diamonds Limited

Table 4.1: Summary of the large-scale mineral rights owners around Mwadui area

Licence holder	Licence Type	Licence number	Area km2	Date issued	Expiry date
El Hillal Minerals Limited	Mining Licence	ML 150/2003	9	18/07/03	17/07/2013
El Hillal Minerals Limited	Mining Licence	ML 151/2003	7.7	18/07/03	17/07/2013
El Hillal Minerals Limited	Mining Licence	ML 152/2003	6.4	18/07/03	17/07/2013
El Hillal Minerals Limited	Mining Licence	ML 153/2003	8.5	18/07/03	17/07/2013
El Hillal Minerals Limited	Mining Licence	ML 154/2003	7.1	18/07/03	17/07/2013
Diamond Africa Limited	GML (Application)*	GML-625/2006	17.5	-	
Atlas Africa Limited	Prospecting Licence	PL 3920/2006	45.9	05/05/2006	04/05/2009
Hamdan Diamonds Ltd	Prospecting Licence	PL 333/2005	8.1	14/06/2005	13/06/2008
RSR Tanzania Ltd	Prospecting Licence	PL 251/2004	8.3	18/05/2004	17/05/2007
Sejo Company Limited	Prospecting Licence	PL 2306/2003	30.7	04/09/2003	03/09/2006
Bahati Kalekwa & Partners	Prospecting Licence	PL 2636/2004	2.4	01/09/2004	30/08/2007
Sarah Francis and Isaya Elias	Prospecting Licence	PL 3008/2005	0.2	28/01/2005	27/01/2008
Black Lion Invest. (1990) Ltd	Prospecting Licence	PL 3081/2005	0.1	10/03/2005	09/03/2008

** Had not been issued at the time of the study*

Source: Ministry of Energy and Minerals

4.3 Artisanal and small-scale diamond producers

A recent study carried out in the area by MTL Consulting Company Limited (MTL, 2006), estimated the number of people involved in artisanal and small-scale diamond business to be around 20,000. The majority of these operations are located in villages surrounding the Mwadui mine and to a lesser extent at Ibumi village in Shinyanga rural district, Nyangwhale in Kahama District, and at Mabuki in Mwanza Region, all within the Lake Victoria area.

Most artisanal and small-scale diamond miners also referred to as "diggers", work under the sponsorship of another person. The financing person meets all the costs that allow the diggers to produce diamonds, i.e., food, accommodation (for non-indigenous diggers) and meets other costs for health and other out of pocket expenses. As such, at this level, the diamond mining network revolves around two major participants, the "Miner" and the "Sponsor" or "Financier". The financiers include licence holders (mainly holders of prospecting licences that instead of conducting exploration, lease their licences to the artisanal and small-scale miners), business people, brokers and dealers. The major group of financiers are the brokers, both licensed and unlicensed ones. In Maganzo village, which is located along the Mwanza Shinyanga highway which is a major diamond-trading centre, there are 20 licensed brokers and approximately 40 - 50 unlicensed ones. Miners usually work in groups of 5 – 10 people and they are financed as a group (MTL, 2006). Almost 65% of all financiers are "Agents" of the dealers, 15% are "Licence Owners", 15% are brokers and 5% represent other businessmen from the area. However, almost half of the brokers work for the dealers, thus making the dealers the biggest group of financiers as they control 72.5% (65% through Agents and 7.5% through Brokers) of the business (MTL, 2006).

The diamond buying and selling network is complex and usually involves different groups of people from local areas within Shinyanga, Dar-es-Salaam and outside the country. A simpler buying network is one that involves the financiers of miners who buy all their production. In determining the buying price, the financier would first assess the quality and weight of the stone and give an offer of what he thinks the diamond is worth. The price offered is usually meant to recover the cost incurred by the financier although no records of those costs are kept. In addition, the cost reduction for one group takes on all costs for all the groups and it is repeated over to each group. If the financier is not experienced enough to determine the value of the diamond, he would either call or consult the dealer or accompany the miners to the dealer where he would engage in the negotiations separately. Most brokers are experienced in valuating diamonds although in most cases they do not have enough cash to pay for the large stones. In such cases, they would offer a price, take the stone(s) negotiate and sell to the dealer before paying the miners.

Apart from a network of miners – brokers – dealers based in Shinyanga, buyers from Dar-es-Salaam or outside the country also come into play. Alternatively, consultations with brokers are made prior to arrival of the buyer after which a parcel is prepared for collection by the buyer. Another alternative is where the buyer from Dar-es-Salaam or abroad contacts the broker in Maganzo and sends him an air ticket to collect and deliver a parcel of diamonds to wherever the buyer is. In such cases, the parcel would be declared in Dar-es-Salaam or shipped out through illegal channels. The shipment through illegal channels is usually done to those with cutting and polishing facilities for the production of jewellery.

At the top level of the diamond trading chain are the licensed dealers who, according to the requirements of the Mining Act 1998, should trade in the Shinyanga regional headquarter. However, as indicated above, most dealers penetrate the production areas by dealing through brokers and agents. By the end of 2006, there were 13 licensed dealers from all over the world with operating offices in Shinyanga town. Table 4.2 shows a list of licensed dealers operating in Shinyanga.

Economic significance and contribution

Diamond artisanal mining is not only a source of employment to those living around the project, but also an important source of livelihood. Table 4.3 below illustrates the significance of artisanal mining activities in terms of income generation, employment creation, and revenue collected by local and central government.

Table 4.2: Licensed dealers in Shinyanga

Name of company or owner	Nationality of Principal Shareholder
Marline Diamond Co. Ltd.	Lebanese
Rama Gem Diamond Co. Ltd	Lebanese
Lamal Investment Ltd.	Lebanese
Classic Gemstones Ltd. (associated with Steel International Co. Ltd.)	Indian
Hassu Purshotam Morarji	Indian
Ntungwa Investment Co. Ltd.	Tanzanian
Bapu Gems Limited	Tanzanian
Shy Gems and Minerals Co. Ltd	Indian
Minerals and Metallurgical Services Ltd	French
Tri Stone Diamonds Co. Ltd	Australia
Kilimanjaro Precious Stones & Minerals Ltd.	South Africa
Prestige Diamonds Tanzania Ltd	Italian
National Indian Bullion Refinery (Tanzania) Ltd	Indian

Source: Shinyanga Zonal Mines Office, Ministry of Energy and Minerals, 2007.

Table 4.3: Socio-economic significance of artisanal diamond mining

	Frequency		Percent	
	Not significant	Most significant	Not significant	Most significant
Income earnings for the family	84	248	25	75
Revenue generation to local and central govt.	286	46	86	14
Employment opportunities for family members	210	122	63	37
Non mining community	303	29	91	9

Source: Mwadui Community Diamond Partnership, 2007.

75% of families in the project area regard artisanal mining as the most significant contributor to family income. However, only 37% of the households considered artisanal mining as the major source of employment. Agriculture remains the main employer; with the majority of the population in the area living on peasantry farming. 86% of the people interviewed indicated that artisanal mining makes an insignificant contribution to the revenue of local government authorities. The limited direct contribution to local government's revenues is a result of the current centralized management system, which does not have provisions for the involvement of the local authorities in the sector's management. Only 9% of the non-mining community thought ASM was significant. However, the major beneficiaries who are the brokers and financiers (traders, brokers and dealers) are also members of the community. An assessment of the economic life in Maganzo, which is the main diamond-trading centre in the area, reflects the impact of diamond mining in the local economy. Maganzo, which was in the last five years a destitute village near the Mwanza-Shinyanga highway, now is a booming town with shops full of imported goods, modern houses and good schools. The town is expanding fast as shown by new constructions of modern houses. Therefore, although the US$14million per annum diamond industry seems to have not benefited the majority of the community, individually, the benefits of the investment in the area are visible.

Overall, the illustration above shows that ASM has had little impact on the economy of the area. In other words, apart from the income that individual miners gain, most earnings from an industry that is potentially worth US$14 million per annum are taken out of the area by diamond traders (brokers and dealers). There are basically no forward and backward linkages between artisanal diamond mining and other livelihood activities that could benefit the non-mining communities. Projects like MCDP (see Section 4.3.2) that is

promoted by De Beers and the government of Tanzania, could help provide fair markets and prices and hence increase the number of beneficiaries of diamond mining in the area.

Diamond exports

As indicated earlier, the diamonds produced from Williamson Diamonds mine are exported through the government sorting house, TANSORT that is currently located in London. Other producers including dealers, who buy diamonds from ASM producers, export their diamonds directly to any market abroad. Common destinations include Belgium (Antwerp), Israel, India, Lebanon, United Arab Emirates (Dubai), South Africa and more recently Russia and China. Table 4.4 below represents official export figures that are declared by producers and dealers through government offices. Apart from the large producers (WDL and El Hilal), the declaration of diamond purchases by dealers is done by filling in monthly returns to the mining office in the area. At the time of export, the parcel must be inspected by a mining official, sealed, and an export permit issued. However, the study conducted by MTL Consulting Company Limited in the area in 2006 established the existence of channels for exportation of undeclared diamonds. Most of those exporting undeclared diamonds, both local and foreign buyers, target the jewellery market that is not well monitored by the Kimberley Process. Also, local jewellers buy diamonds either directly from diggers or from brokers without any assurance whether they are declared or not. The study estimated the diamond production by artisanal and small-scale miners to be around 100,000 carats per annum. Only about a quarter of these carats go through official channels. The official diamond exports from artisanal and small-scale mining, which are captured by the declaration of exports by dealers, is shown in Table 4.4 and Figure 4.2.

Table 4.4: Total annual diamond exports from Shinyanga area by category

Year	WDL		EL-HILLAL		DEALERS (ASM)	
	Carats	US$	Carats	USD	Carats	USD
2000	312,515.00	41,969,704.00	-		24,288.00	1031543.7
2001	201,617.75	29,868,090.00	-	-	13,567.92	650,472.70
2002	182,706.02	25,577,162.60	-	-	15,383.20	764,757.10
2003	209,771.22	28,599,503.80	-	-	17,466.20	1,224,033.56
2004	273,842.50	32,748,193.50	3,234.05	458,618.43	23525.54	1,236,731.55
2005	195,139.00	22,251,130.60	8,297.95	1,359,393.98	11,659.94	1,256,291.37
2006*	120,202.05	13,515,476.85	10,326.74	2,662,091.40	7,393.60	1,058,296.10

** Up to August 2006*

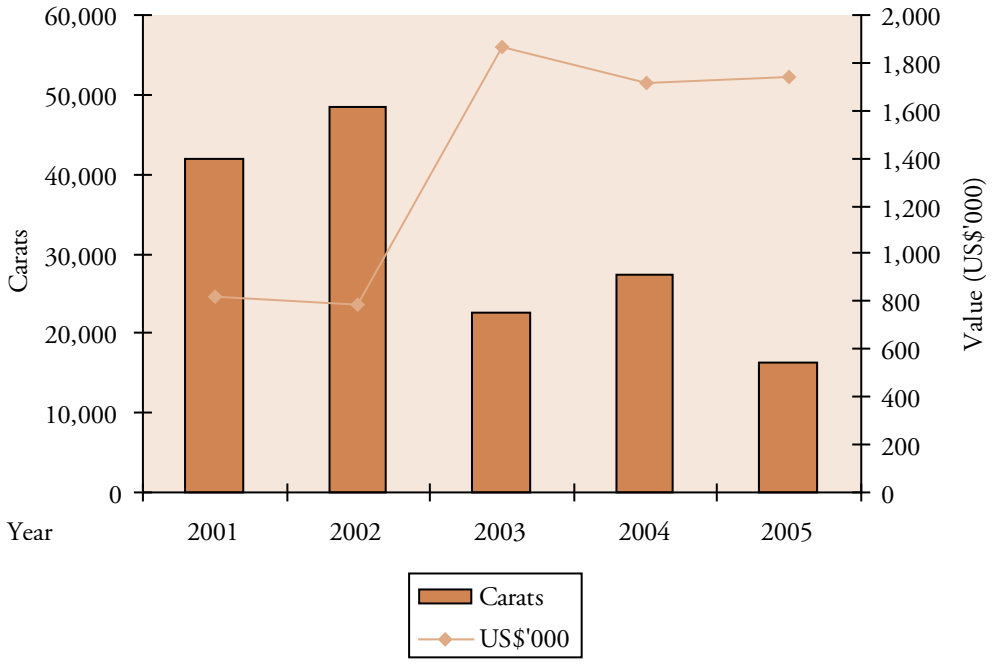
Source: Shinyanga based Zonal Mines Office, August 2006.

4.4 Contribution of the diamond sector to the economy

Community support

Table 4.5 shows the contribution of Williamson Diamonds mine to community projects between 1997 and 2005. According to these figures, the support given over the period is US $1,396,539 with the largest contribution going to the health sector at US$633,448. The education sector followed by water projects enjoyed the second and third positions respectively. Table 4.5 also indicates that, on average, the mine spends about 15% of the value of the diamond production on community support. Consultations suggest that

Figure 4.2: Official diamond exports from the ASM sector



WDL has a significant effect on the well-being of the population in Shinyanga region, Kishapu district, and Mwadui surrounding villages.

Table 4.5: Contribution to community projects by WDL

	1997	1998	1999	2000	2001	2002	2003	2004	2005	Total
Education	-	-	49 973	45 471	31 206	25 794	30 867	104 352.28	85 701	373 364
Health	-	-	-	-	-	-	-	339 215.98	294 232	633 448
Water	22 820	20 991	17 866	33 640	15 720	14 574	70 000	75 713.69	-	271 325
Roads	19 487	17 851	15 193	15 250	12 277	11 382	16 017	-	-	107 457
Micro finance scheme	-	-	-	-	-	-	-	-	-	-
Others	-	-	-	-	-	-	2 000	1 706.03	7 239	10 945
TOTAL	42 307	38 842	83 032	94 361	59 203	51 750	118 884	520 988	387 172	1 396 539
as % of value	11.87	15.77	13.43	9.39	11.34	18.14	12.20	19.34	21.98	14.87

Source: Ministry of Energy and Minerals and Chamber of Minerals and Energy

In addition to community support programmes that are implemented directly by WDL, De Beers has committed seed funding to the tune of US $2 million to initiate a programme known as "Mwadui Community Diamond Partnership", (MCDP), Box 4.2.

Statutory taxes and other contributions paid to government

Data from Williamson Diamonds Limited was the only one used to assess the level of linkages between the diamond sector and the national economy. Notwithstanding, this is representative because Williamson mine represents 90% of the total diamond production in the country. As shown in Table 4.6 below, between 1997 and 2005, WDL paid a total of US$25,094,804 in statutory taxes and other contributions to the government. Royalty payments, which for diamond are charged at 5% of total value of production,

Box 4.2: The Mwadui Community Diamond Partnership (MCDP) Project

The objective of the MCDP programme is stated as being "To alleviate poverty and accelerate sustainable socio-economic development in communities around the Williamson diamond mine in Mwadui, Tanzania, through the development of a multi-stakeholder partnership to formalize, transform and support artisanal and small-scale mining communities". To facilitate the implementation of the project, a rapid appraisal of the artisanal and small-scale diamond mining activities and the socio-economic setting of the communities around the mine were conducted in August 2006. These were followed by a detailed diagnostic study which was carried out between September and December 2006. The diagnostic study identified various strategies for assisting the artisanal and small-scale diamond mining communities in 10 villages surrounding the Mwadui mine. In addition, the study identified potential livelihood activities that could be developed in the area and the social programmes that could be supported.

The key issues identified by the study are, among others, access to land, access to fair markets and prices, technology, knowledge regarding the diamond business, health, safety and environmental management and related issues. In addressing the access to land issue, the programme in collaboration with the Mwadui mine has identified blocks within the WDL lease area that can be made available to trained and organized diggers. The mine has also made available a building that will be used as a training centre for the project. Discussions are currently going on with potential diamond buyers including banks that will be able to provide fair prices to the miners. Buildings for the project office were donated by WDL and they were opened by the President of Tanzania, Hon. Jakaya Kikwete on 24 September 2007 during the official launching of the project. The project is expected, in the initial phase, to take three years upon which individual groups of miners would have attained expertise to run their own small-scale diamond mining enterprises. The project will be extended to cover areas outside WDL lease and to include areas in other private mining company leases.

amounted to US$8,428,747 over the same period. This is almost 10% of the total royalty paid by the mining industry over the same period. Similarly, the total statutory taxes and other contributions paid by WDL is almost 10% of the total tax paid by the mining industry to government over the same period, i.e., 1997 – 2005. Table 4.6 does not include data and information of VAT and specific local government taxes and levies. Given the fact that WDL contributes 90% of the diamond production, it is fair to say that the diamond mining sector may contribute slightly more than 10% of the total statutory taxes and other contributions paid to government by the mining industry.

Direct employment

The number of workers employed by Williamson Diamond mine stood at 849 in 1997, but declined to an average of 461 workers between 1999 and 2001. The decline is attributed to the reduced production and restructuring that was going on following the change of management in 1995. However, following the ongoing refurbishment of the plant, the number of employees has been on the increase reaching a pick of 1,128 in 2004 and is current around 1,000 workers. Of all the major mines in Tanzania, WDL has the lowest number of foreign employees which stands at around 1% of the total employees. According to Table 4.7, the mine has had between 7 and 8 foreign employees with the highest number over the period being 11 in 2003. The mine, which over the years carried out in-house mining, contracted a local contractor, CASPIAN Mining in 2004. The large number of local employees can be attributed to the fact that the 65 year old mine has over the years developed training programmes that enabled it to develop the required local expertise.

Table 4.6: Statutory Taxes and Other Contributions Paid to Government

Name	1997 US $	1998 US $	1999 US $	2000 US $	2001 US $	2002 US $	2003 US $	2004 US $	2005 US $	Total US $
Paye-Expat Salaries	216 432	228 432	239 232	240 432	222 492	225 045	365 467	405 966	527 322.57	2 670 821
Payroll Levy-Expats	20 152	18 522	17 516	46 487	46 473	50 073	70 247	77 364	72 892.29	419 726
Paye-Expat Gratuity	-	-	-	-	-	-	-	-	-	-
Withholding Tax-Mwadui	43 985	33 666	99 825	203 076	173 302	190 247	182 550	500 260	618 281.38	2 045 192
Withholding Tax-Dar	-	-	-	-	-	-	-	-	-	-
Payroll Levy	-	-	-	-	-	-	-	138 262	158 207.97	296 470
Veta Levy	126 715	97 124	154 468	109 261	100 025	99 488	101 459	-		788 540
NSSF	274 932	236 072	240 610	90 274	92 232	114 559	254 670	340 942	463 285.37	2 107 576
PPF	-	-	-	-	-	-	-	-	346.47	346
PAYE	267 704	230 522	458 791	366 198	349 198	849 836	369 738	442 546	338 577.07	3 673 110
Stamp Duty	-	-	-	-	-	-	-	-	-	-
Donations	46 199	51 332	60 391	75 489	48 566	14 978	3 157	-	13 862.42	313 974
Road Toll	-	-	-	-	-	-	-	239 715	-	239 715
Mining Lease	-	-	-	-	-	-	-	13 160	17 770.25	30 930
Royalty	706 601	474 892	852 819	1 355 326	828 936	620 091	1 041 405	1 391 200	1 157 476.59	8 428 747
Import Duty	166 386	199 540	157 027	114 513	86 034	141 905	179 042	135 889	197 755.80	1 378 092
Income Tax							-	183 392	450 610.00	634 002
Others	-	-	-	-	-	-	-	1 215 204	852 357.60	2 067 562
TOTAL	1 869 106	1 570 102	2 280 679	2 601 056	1 947 258	2 306 222	2 567 735	5 083 900	4 868 746	25 094 804
Tax as % of value	11.61	15.39	12.96	9.06	11.00	17.74	11.66	17.54	20.36	14.08

Source: Ministry of Energy and Minerals and Tanzania Chamber of Minerals and Energy, 2007

Table 4.7: Employment

D: Employment	1997	1998	1999	2000	2001	2002	2003	2004	2005	Total
Foreign Employees	7	7	7	7	8	9	11	8	8	72
Tanzanian Employees	842	585	454	454	453	506	524	560	629	5 007
On site Contractors	-	-	-	-	-	-	-	560	330	890
Professionals	37	32	30	30	28	37	51	51	-	296
Other Cadres	805	553	431	431	433	478	484	484	-	4 099
Total Employees	849	592	461	461	461	515	535	1 128	967	5 969

Source: Ministry of Energy and Minerals and Tanzania Chamber of Minerals and Energy, 2007

Training

As illustrated in Table 4.8, between 1997 and 2005, a total of 586 workers were trained for a cost of US$162,401. Out of the trained workers, 120 were professionals and 466 were from other cadres. The number of trained professionals per year ranged from a minimum of 2 to 8, between 1997 and 2003, but picked up to 23 in 2004 and reached a peak of 64 in 2005. The intensity of training in the more recent years can be attributed to the ongoing refurbishment and improvement of the processing plant in order to meet production targets. Apart from training its own workers, WDL collaborates with high institutions of learning by accepting students for practical training. In addition, the mine has been at the forefront of proving training grounds for the "Structured Engineers Apprenticeship Programme" (SEAP) in collaboration with the Engineers Registration Board. The SEAP programme seeks to provide experience to young graduates as a way of improving their chances for securing employment and according them training that will enable them to be registered as professional engineers. The mine is also well known in the country for training of technicians and different non-technical cadres, e.g., secretaries.

Table 4.8: Training of Tanzanian workers

	1997	1998	1999	2000	2001	2002	2003	2004	2005	Total
Professionals:										
People Trained	6	4	2	8	-	5	8	23	64	120
Amount spent USD (*)	16 896	368	3 562	12 919	-	6 752	14 186	19 682.00	17 728	92 093
Other Cadres	167	16	61	6	-	60	82	74	-	466
Amount spent USD (*)	10 199	867	3 549	882	-	4 009	46 302	4 500.00	-	70 308
Total trained people	173	20	63	14	-	65	90	97	64	586
Total Amount Spent $	27 095	1 235	7 111	13 801	-	10 761	60 488	24 182	17 728	162 401

Source: Ministry of Energy and Minerals and Tanzania Chamber of Minerals and Energy, 2007

Supplies of specialized goods and services

Table 4.9 shows the major types of goods purchased and consumed at WDL and includes both specialized and other types of goods and services. One notable characteristic of these products is that many companies supply them and these operate in a competitive market environment. The data suggests that there is a wide assortment of industrial, commercial, and consumer products consumed by mining companies in their various operations. This suggests greater opportunities for increasing "local" content within the mine's supply chain.

The specialized products are largely technical or scientific in nature and they include machinery and plant and maintenance spare parts. These are used only in mining, but many are also used in various other industrial applications.

Table 4.9: Major categories of goods and services demanded by WDL in 2005

Major Category	Details of components
Machinery & Plant	Conveyors and Accessories(e.g. trough, rackets, rollers, conveyor belts)
Maintenance Spare parts	Vee & Wedge Belt
	Machines and machine parts
	Scrubber Spares
	Bearing Assemblies and Bearing parts
	Steel Products
	Pipes and Pipe Fittings
	Welding Equipments and Electrodes
	Others(e.g. construction materials etc)
Office Equipment	Computer and computer accessories
	Office accessories (e.g. stationeries)
Safety Equipment	Safety boots (gum and leather boots)
	Protective clothing and filters
	Helmets& gloves
	Others
Food and Refreshments	Processed (e.g. sugar, sausages etc)
	Unprocessed (Rice, Maize etc)
	Drinks (Soda, etc)
Electrical Equipments	Cable (High tension cables, PVC armoured cable etc)
	Electrical accessories (Bulbs, Sockets etc)
	Transformers
Fuel	Diesel - (3,438,657 Litres)
	Petrol - (9,960 Litres)
	Kerosene - (1,080 Litres)
Lubricants	Lubricants
Chemicals	Limes
	Ferrosilicon
	Aluminium Sulphates
Vehicle , spare parts & services	Vehicles
	Spare parts (e.g. tyres, gear box etc) and services
Printing Works	Printing Works

Source: Williamson Diamonds Limited, December 2006

There are two sources of supplies and they include suppliers from Tanzania and those from South Africa. It was established that 97% of the total purchases of steel products are purchased in Tanzania.

In 2005, most machines and machine parts were mainly imported from South Africa. Locally, there are few importing firms specializing in mining machinery, equipment, spare parts and materials. These have considerable depth capacity in products related to mining, environment, exploration, feasibility studies, mineral processing and mine automation. *WDL has its own system of procuring engineering services which is done under well managed global procurement principles, which are cost effective, efficient and transparent. The engineering services* have intangible products that encompass a whole host of specialist knowledge and include specific undertakings that bring together capital, raw materials and/or technology. These services can be classified as project engineering and management engineering services.

Size of supplying firms

Table 4.10 shows a list of some of the firms that supply materials to Williamson Diamonds Mine. There are firms of all sizes based in Tanzania that supply specialized mining goods and services. Financial capacity, knowledge and level of information about the sector and delivery of the services determine their size.

The majority of Tanzanian mining supply firms are small, with annual revenues of less than US$5 million and with less than 100 employees. While there are also few larger firms, some with international operations, the typical Tanzanian mining supply firm handles products with low specialized technology that occupies a specific market niche. There are significant numbers of small-scale firms supplying small foodstuff items and intermediate materials used in non-core mining activities. However, it is interesting to note that small-scale suppliers derive a substantially larger proportion of their total revenues from mining companies than the larger ones do.

Table 4.10: List of Firms Supplying Inputs by major products

Materials	Supplier
Steel Products	Tanuk Mining Services Mwanza
	Urafiki Automobiles Ltd Mwanza
	Pentread Enterprises Ltd Shinyanga
	Kanegere Commodity Supply Mwanza
	H.J Stanley & Sons Ltd Dar es Salaam
Aluminium Sulphate	Twiga Chemical Dar es Salaam
Cement	Twiga Cement Dar es Salaam
	Juma Motor Transport Shinyanga
	Tanuk Mining Service Ltd Mwanza
	Urafiki Automobiles Ltd Mwanza
Lubricants	BP (T) Ltd Mwanza
	Shell (T) Ltd Mwanza
Gas Oil	BP (T) Ltd Dar es Salaam
	Oryx (T) Ltd Dar es Salaam
Industrial Diesel Oil (IDO)	Oryx (T) Ltd Dar es Salaam
	BP (T) Ltd Dar es Salaam
Petrol	Hak Filling Station Mwadui
Welding Gas	TOL/Boc
Stationery	Masumini/BMTL/Mountzion
Pipe Fittings	Kanegere/Tanuk/Urafiki/Plasco/DPI
Paints	Berger/Pentread Enterprises
Chemical Lime	Kanegere/Twiga Chemical Dar es Salaam
Motor Rewinding	Radi/ABB Dar es Salaam
Daetsung Cables	Daetsung Dar es Salaam

Source: Williamson Diamonds Limited, 2006.

Table 4.10 indicates that there exists some form of backward linkages between the diamond mining industry and its suppliers in Tanzania. When WDL buys pumps, lubricants, steal products from companies, which are not categorized as mining companies, these are considered as backward linkages. The same inputs are also needed in other sectors. This suggests that there are chances for migration (lateral migration) of mining technologies to other industries. Backward linkages make up the supply chain for the diamond mining industry. These linkages multiply the jobs generated by mining, both directly and indirectly. If these companies, which supply these inputs, purchase intermediate inputs from other companies, the indirect

effects sales are also generated by diamond mining activity. Although there is no study that has been done to establish the levels of employment associated with these linkages, it is estimated to be substantial.

The potential benefits of backward linkages go beyond the jobs that result from supplying domestic mines. If the pump supplier begins to sell pumps in other large-scale mining companies and in neighbouring countries, then the backward linkages would contribute to the creation of a new domestic as well as export industry. Currently, the Lake zone towns of Mwanza and Shinyanga, where the main suppliers to the gold and diamond mines are located, are also major suppliers to the Democratic Republic of Congo, Rwanda and Burundi. Although there was no data on the level of supplies to these countries, it seems that the level of transactions is high.

Table 4.11 shows that WDL procures more goods and services locally than abroad. Between 1997 and 2005, a total of US$55,060,712 worth of goods and services were procured locally compared to US$31,759,736 that was procured from foreign markets. More notable is the fact that 91% of the supply of services to this mine, i.e., consultancy services, contractual services and others were procured locally, i.e., US$ 28,788,752 compared to US $2,812,386 worth of foreign services over the study period.

Table 4.11: Local and foreign procurement of goods and services at Williamson Diamond Mine between 1997 and 2005

	1997	1998	1999	2000	2001	2002	2003	2004	2005	Total
Goods										
Foreign USD	1 843 000	2 114 000	2 074 000	1 973 000	2 197 000	2 170 000	3 716 812	7 494 429	5 365 108	28 947 349
Local USD	1 946 000	1 741 000	1 674 000	1 575 000	1 668 000	1 644 000	2 403 570	3 493 267	10 127 123	26 271 960
Total - Goods	3 789 000	3 855 000	3 748 000	3 548 000	3 865 000	3 814 000	6 120 382	10 987 697	15 492 231	55 219 310
Services:										
Foreign USD	67 500	69 000	71 500	70 800	75 412	109 579	103 240	440 210	1 805 145	2 812 386
Local USD	61 000	63 000	69 000	69 500	95 000	160 000	119 000	13 509 208	14 643 044	28 788 752
Total - Services	128 500	132 000	140 500	140 300	170 412	269 579	222 240	13 949 418	16 448 189	31 601 138
Goods & Services:										
Foreign	1 910 500	2 183 000	2 145 500	2 043 800	2 272 412	2 279 579	3 820 052	7 934 639	7 170 253	31 759 736
Local	2 007 000	1 804 000	1 743 000	1 644 500	1 763 000	1 804 000	2 522 570	17 002 475	24 770 167	55 060 712
Total - Goods & Services	3 917 500	3 987 000	3 888 500	3 688 300	4 035 412	4 083 579	6 342 622	24 937 114	31 940 420	86 820 448

Source: Ministry of Energy and Minerals and Tanzania Chamber of Minerals and Energy, 2007

Demand for other goods and services

Table 4.12 shows some of other types of goods and services demanded and consumed by WDL. In a sense, "other products," such as financial services, electricity, security, management and water services are essentially non-technical in nature. Suppliers of some of the products such as water and electricity generally do not advertise to mining companies. These establish long-term contracts and agreements of service delivery, tariffs, mode of payment and other procurement issues. Furthermore, applications of some of these products in mining are often little different from applications in other areas of the economy. These include managerial, accounting, legal and security services. In addition to strong ties with suppliers of specialized products, Tanzanian mining companies also have strong links to suppliers of these products. However, the high level of consumption by mining companies of these products and services has a major impact on the overall viability and success of the supplying companies.

Table 4.12: WDL demand for other goods and services

Type of Support Service	Comment on the nature of input suppliers			Value of sales
	% Local	Firm Sizes	% Import Content	
Electricity Power	100	Large - TANESCO	0	
Water Supplies	100	Large - Lake Victoria Water Basin Authority	0	
Fuel	100	Large – BP & ORYX	100	
Security Services	100	Medium, SECURICOR	25	
Management and advisory services				
Consultancy services in technical social issues				
Consultancy services in legal,	100	Small, IMMMA	0	
Consultancy fiscal, accountancy and economic issues	100	Medium, Delloite	0	

Source: Compiled by MTL Consulting Company Limited from data collected from WDL.

Table 4.12 shows WDL's purchases of electricity, water, security and fuel from large-scale firms. Most are public utility companies. This suggests that if public utilities improve their efficiency, there is scope for local content supply to increase. For example, if TANESCO increases hydropower/gas-generated electricity supplies to large-scale mining firms, then this will reduce the use of thermal power and the costs of energy associated with imports of fuel. A good example is the supply of electricity to Bulyanhulu Gold Mine managed by Barrick Tanzania where Barrick paid TANESCO to erect a power line of more than 100km to supply power to the mine. Other mining companies are considering similar arrangements. These include around 200km of power lines to supply power to Kabanga Nickel and power lines to Williamson Diamonds Mine. Williamson Diamonds Mine is already connected to the national power grid but is considering increasing its production, which will result in increased power consumption. With these investments, TANESCO will also reach other industries and individual consumers in the respective areas.

Backward and forward linkages

The forward and backward linkages between artisanal mining and the agriculture sector seem to be strong as indicated by Table 4.13. The findings suggests that 65% of the sample population interviewed finds a very strong link between artisanal mining activities and the agriculture sector and 35% feels that the agriculture sector is not linked with /benefiting in any way from artisanal mining activities. The artisanal diamond mining and agriculture linkage comes from the fact that a large number of participants switch between the two activities depending on the weather conditions in the area.

Table 4.13: Backward and forward linkages between ASM and other socio-economic sectors

	Not linked		Very much linked	
	Frequency	Percent	Frequency	Percent
Agriculture	117	35	215	65
Trade	236	71	96	29
Livestock	286	86	46	14
Tourism	317	95	15	5
Fishing	322	97	10	3
Infrastructure	305	92	27	8
Other Mining	322	97	10	3

Source: MTL Consulting Company Limited

Section Five: The Tanzanite Mining Industry

5.1 Introduction and background

Tanzanite is a rare gemstone variety of the mineral *zoisite*, discovered in the Simanjiro district in Manyara Region. With its exquisite violet-blue hues and incomparable rarity, tanzanite is recognized as a mainstream gemstone, competing with the likes of ruby, emerald and sapphire. As testimony to this, tanzanite was rated fourth most popular coloured gemstone in the US in 2002 and 2003; the American Gem Trade Association named tanzanite a December birthstone, adding to a list previously unchanged since 1912. Some of its unique features are associated to:

Rarity - Tanzanite's only known source in the world is a 5 km strip of land near Mount Kilimanjaro, in Simanjiro district, Manyara region in northern Tanzania. This single and limited source renders tanzanite at least a thousand times rarer than diamonds.

Colour - Tanzanite is uniquely trichroic, which means that in its rough form, it radiates three different colours from each of its crystallographic axes: blue, violet and burgundy. Once cut and polished, tanzanite ranges from electric violets and pale blues to deep royals and rich indigos.

African mystique - Tanzanite's exclusively African heritage and the alluring narrative of its discovery have proved to be a unique selling feature.

Relative price and investment value - Quality for quality, tanzanite is currently about a third of the price of sapphire. This, compounded by its exceptional rarity, has made tanzanite an investment stone of choice in Africa.

The discovery and emergency of the Tanzanite mining industry at Mirerani in Arusha, Tanzania is summarized in Box 5.1 below.

Geology

The Mirerani tanzanite mining area is the only known source of tanzanite in the world. Tanzanite is located within a relatively complex geological environment and is found in bounding structures, typically located in the hinges of isoclinal folds (folds dipping in the same direction), (MEM, 2005). The ore body extends across the mining licence area in the southwesterly to northeasterly direction on a dip of approximately 41°. Geological investigations carried out during the feasibility study by AFGEM in 2000 indicates that multiple folding is present in the ore body and that the structure contains significantly more bounding than previously anticipated, (MEM, 2005). Efforts continue to focus on improving predictability and yields through surface exploration, trenching, minor excavation and comprehensive mapping and logging of geological data.

Box 5.1: The Story of Tanzanite

Tanzanite is mined in the vicinity of the Mirerani village in Simanjiro District of Manyara Region. Although Mirerani lies in Manyara Region which is a new region, a lot of tanzanite business is conducted in Arusha which has become synonymous to tanzanite.

The mining area is situated southeast of Kilimanjaro International Airport (KIA) and is accessed via a 24km rough road. The nearest towns are Arusha and Moshi that are respectively located to the west and east of KIA and they are each accessed by approximately 45 km of tar road. Access from KIA using the rough road in two-wheel drive vehicles may be difficult during the rainy season although the site can be reached at all times in four-wheel drive transport. In general, access and availability of other infrastructural facilities, e.g. electricity and water, is good. The two rainy seasons are from November to December and from April through June.

Although the story of tanzanite is peppered with discrepancies, the most common narrative suggests that in July of 1967, at the site that is now Block C, a Masai tribesman discovered a chunk of translucent rock at the foothills of Mount Kilimanjaro. Fascinated by its blue-purple hue and believing it to be sapphire, the tribesman allegedly took this crystal to a gemologist. Gemological tests revealed that the rock was not sapphire for its colour was more violet and its composition different.

As word of discovery of the exquisite new gemstone became public, prospectors and tribesmen filled their pouches with the mystical stones and began to lay claim to the mining areas. Between 1967 and 1972, an estimated two million carats of gem quality tanzanite was produced from open-cast mining operations on what is now Block C.

In 1971, private-owned businesses in Tanzania were nationalized and mining activities were taken over by the State Mining Corporation, STAMICO. STAMICO's production records for the first five years indicated a decrease in grades, mainly due to haphazard mining and theft. In 1978, The Tanzanian Gemstone Industries, a gemstone mining company established by STAMICO, published a report indicating the viability of full-scale mining of gemstones. No meaningful action was taken. During the next ten years, production decreased and there was also an increase in informal artisanal mining. By 1989, an estimated 30 000 artisanal miners were working in the area.

In 1990, the Tanzanian Government organized artisanal miners and demarcated the area into Blocks A, B, C and D. Block A was awarded to Kilimanjaro Mines Limited, a local firm, Blocks B and D to small-scale miners and Block C to TGI. TGI later failed to manage the project and during the Government's economic reforms it was forced to sell its interest to a private investor. The mineral rights were then transferred from TGI to Graphtan, a graphite mining company.

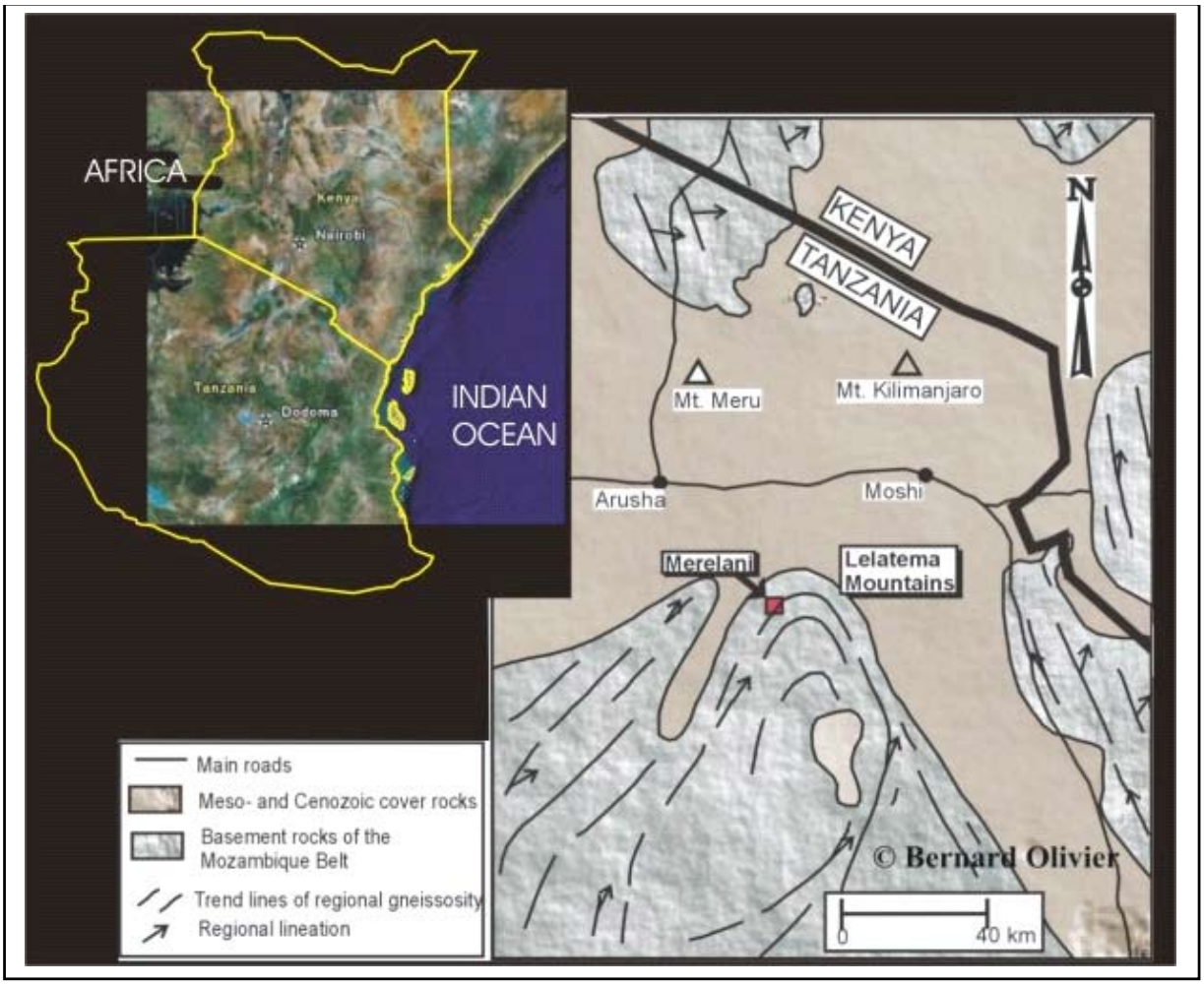
Graphtan ceased mining activities in 1996 due to poor prices of graphite and African Gem Resources Limited (AFGEM) acquired the mining licence for Block C. In 2000, AFGEM completed a feasibility study for commercial mining of tanzanite and mine development commenced in 2001. In May 2004, AFGEM tanzanite business and assets were acquired by TanzaniteOne (SA) Limited. AFGEM has been listed in the diamond sector of the JSE Securities Exchange South Africa since August 2000 and had been involved in the tanzanite industry since 1993. Prior to the sale of the tanzanite business and assets to TanzaniteOne (SA) Limited, AFGEM had invested approximately US$20 million in its tanzanite mining and marketing operations.

On 20 August 2004 TanzaniteOne Limited was admitted to trading on the Alternative Investment Market (AIM) of the London Stock Exchange raising £5 million (GBP) and with an initial listing price of GBP 0.42 per ordinary share. TanzaniteOne Limited is listed under the share code TNZ.

5.2 Large-scale tanzanite mining and processing

The TanzaniteOne Group is the only relatively large-scale tanzanite mining company in the world. The company owns a Special Mining Licence (SML), for a significant portion of the world's only known tanzanite producing resource, as well as extensive prospecting licences over potential tanzanite-producing areas adjacent to its licence area.

Figure 5.1: Location and geology of the Tanzanite deposits at Mirerani



Source: From a paper presented at the Tanzania Chamber of Minerals and Energy meeting on 3rd September 2007 by Wessel Marais - SHE and Logistics Manager, TanzaniteOne.

TanzaniteOne Special Mining Licence (SML No. 08/92) that covers an area of 8 km^2 entitles the company the exclusive right to carry out mining operations for tanzanite and other minerals and gemstones in the area (Block C).

Mining activities in Block C, started by equipping and developing inclined shafts in September 2000. The average monthly production rate to date has been in the region of 3,000t of waste and 2,000-2,700t of mined material, which is processed through the Dense Media Separation ("DMS") plant. Access and mining is carried out through a series of shafts that links the surface to the mineralized areas.

To develop the mine shafts or winzes were sunk or excavated to access the mineralized zones. There are currently six shafts or winzes located along the strike, which are from south to north: Bravo, CT, Shaft 1, Main, Askari and Delta. Production has historically been mainly from Shaft 1 and Bravo Shaft, with emphasis having been placed on developing CT, Main and Askari shafts down to areas where pay zones occur in order to secure future production.

The TanzaniteOne processing plant was originally designed to process both graphite and tanzanite ore. It consisted of a three stage crushing circuit, DMS modular plant, milling, flotation, filtering, drying, bagging,

tailings disposal and water reticulation sections. Of these, only the crushing, DMS, tailings disposal and water reticulation sections are required for tanzanite concentration.

Trading

Whilst the mining of tanzanite is of prime importance to the company, rough tanzanite is also purchased from small-scale miners and dealers through TanzaniteOne Trading Limited, a 75%-owned business unit. It is the company's intention that such open-market purchasing will assist the process of supply continuity and price stability of tanzanite, whilst also yielding useful information on general mining, supply and price trends.

The TanzaniteOne Group operates a cutting and polishing facility in Tanzania. The intention is to expand this facility, invest in training and technology and continue to improve quality and recoveries (yield from rough to polished tanzanite).

Sales and marketing

The company's primary objective is to increase demand for tanzanite through a demand-driven 'push-pull' strategy (Box 5.2), driving consumer awareness about tanzanite through advertising and promotion and educating the industry through trade education initiatives and incentives at the retail level.

Box 5.2: Developing the Tanzanite brand

Rough tanzanite that is procured from the Group's mine and its trading operation, TanzaniteOne Trading Limited, is sold by tender to about 9 Sight-Holders or representatives of the world's leading gemstone houses and jewellery manufacturers. The sale of branded, polished tanzanite and branded tanzanite jewellery is conducted via the Tanzanite Company – a wholly owned subsidiary of the Group.

The Group has pioneered the Tanzanite Foundation, a non-profit industry supported organization that is dedicated to creating, nurturing and growing the tanzanite market. The Tanzanite Foundation provides educational and promotional services to retail jewellers and disseminates information about tanzanite to consumers. The Tanzanite Foundation strives to ensure that tanzanite makes its journey from mine to market with complete integrity and with due consideration for the people and environment of Tanzania.

The Mark of Rarity is the icon of the Tanzanite Foundation and stands for quality, rarity and distinction of a tanzanite purchase. A portion of the proceeds of sale of tanzanite accompanied by the Mark of Rarity is given to support sustainable upliftment projects developed by the Tanzanite Foundation in harmony with the communities at tanzanite's source

Source: TanzaniteOne Trading Limited, 2006

5.3 A growing Tanzanian presence in tanzanite mining and processing

Local Tanzanians own all the medium and small-scale operating tanzanite businesses. There are around 60 licensed small and medium-scale local Tanzanite mining and processing firms with at least 35 firms having been licensed to process and export gemstones by 2007. The medium-scale tanzanite producers include Kilimanjaro Mines, which has been in the area since the government demarcated it in 1990. Other players include Tanzanite Africa Limited, J.S. Magezi Company Limited, and Interstate Company Limited.

Despite being in the area for a longer time, Kilimanjaro Mines only made substantial improvement in their operations during 2006. This included equipping one of the three operating shafts with a mono rope winch for pulling material from the mine. This has improved their daily (12 hrs) output from 4 tonnes in 2004 to 30 tonnes in 2006. In the same year, Kilimanjaro Mines started exporting tanzanite and the exploration programme was intensified.

On the other hand, the other players are newly established and registered firms in the tanzanite business and there are very limited data and information on their production and trade capacities. Production technology and operation of these medium-scale firms are simple but formalized. Some of them use different mining arrangements, such as sub-letting areas to small-scale operators. However, this has been problematic since small-scale operators are mostly chaotic and disorganized. General compliance levels of small-scale mining operators on mine health and safety standards are very low, e.g., 20 % for 2006 (ARM, 2006).

J.S Magezi and Tanzanite Africa Ltd are two new medium-scale mining firms that are currently operating as Joint Venture (JV) partners. The JV partners operate two shafts on GML 138/2002 outside the traditional tanzanite mining blocks. The JV partners erected a processing plant with the capacity of 20 tonnes per hour (tph), which was on trial during 2006 operating at 10tph.

Although, still a small player in tanzanite mining, Interstate Mining (Tanzania) Company Limited (IMTCL) is an experienced gemstone mining company with interests in other mining related businesses, e.g., supply of explosives, equipment and spares. The company has a workforce of around 55 people comprising of mining engineers, experienced gemstone cutters, dealers, accountants and mining plant operators etc. The company's core business includes mining of gemstones i.e. Tanzanite, Tsavorite (Green Garnet), Ruby, Tourmaline, Alexandrite, Emerald, Sandstones, Rhodolite and other minerals like Platinum. In Mirerani, the company has three licences acquired through outright sale by the previous ASM owners.

IMTCL brings into the tanzanite business a lot of gemstone processing for export to the upper-end markets of the Far East, USA and Western Europe. The company recognizes the great potential of gemstone mining and processing business that is supported by a strong global market for Tanzania's fine gemstones. This was found to be one of the few local mining companies that is motivated and has clear strategies for success in the gemstone business. The company's objectives include:

- Becoming an internationally recognized gemstones dealing company that is capable of providing customer-tailored gemstone cutting and exports for the upper and middle-class of USA, Europe and the Far East markets;
- Creating a "niche" market for cut gemstones, mainly Tanzanite and Sapphire to meet downstream demand tastes in gemstones business by way of blending the gemstones on jewelry, earrings, rings and beads, just to mention a few;
- Invest in "state of the art" technology, setting-up a gemstone cutting and exports unit, a strategy for increased capacity in exports of gemstones;
- Building motivated human resources capacity of staff that are trustworthy, have sound skills with extensive experience in a lapidary operations as well as exports of the gemstones; and
- Way Forward "Venture into World-Class Lapidary".

In addition to engaging in tanzanite and other gemstones mining and processing, the company also buys rough gemstones from ASM producers. IMTCL views the purchasing of rough tanzanite from artisan

miners as a significant business prospect margins, achievable between rough and cut tanzanite are profitable opportunities for IMTCL to beneficiate the rough stones.

5.3 Artisanal and small-scale Tanzanite mining

ASM represents the largest organizational category in terms of number of units in the tanzanite market. Most of small-scale tanzanite firms are formal entities, registered, licensed and are in the government taxation network. However, the majority of artisanal mining participants are informal and work in collaboration with small-scale mining firms. Unlike the large and medium scale firms, this category has been in the business for quite some time, is politically sensitive and it is wholly owned, managed and operated by local Tanzanians.

Table 5.1 shows the number of Primary Mining Licences (PML), registered employees and employees per PML in Mirerani tanzanite mining area by major blocks (Blocks B and D are ASM blocks). The number of PMLs owned by artisanal and small-scale miners are used as proxy for the number of ASM firms operating in the area. In total, there were about 513 PMLs in 2006 owned by ASM firms. There are no artisanal and small-scale tanzanite activities in Block C and A. About 331 PMLs are located in Block D and about 178 are in Block B.

Table 5.1 also shows that about 8,800 people are formally registered as employees in the artisanal and small-scale tanzanite mining activities. On average, there are about 12 people engaged in one PML.

Table 5.1: Artisanal and small scale mining firms (2006/07)

Name of the Block	Number of PML	No. of workers
Block B	178	4,300
Block D	331	4,500
Block D Extension	0	0
Total	509	8,800

Data Source: Ministry of Energy and Minerals, Northern Zone, 2007

Mining processes

Most miners do not usually conduct any exploration work and as such most discoveries are made by sheer luck (Box 5.3). Following the discovery of tanzanite in the area in the 1960s, most miners were allocated blocks on which they work based on experiences of other miners who have been in the area longer. The experienced miners also known as “Wajoro”, an acronym for a geologist, are believed to have developed expertise for identifying tanzanite bearing geological features.

Although most of the ASM operations are carried out through underground workings, there are also a few (<5%) surface operations dictated by the location and shape of the ore body. The PMLs issued for small-scale mining within Block B and D cover an area of 50mx50m. When the government demarcated the blocks, the 50mx50m area was allocated to people who, at the time, were working there. As such, more than one owner owns most of the small blocks. In such a case, it is possible to find more than one shaft sunk inside the block. Once underground, each group develops an underground drift in a direction believed to contain mineralization. As such, the underground space has been turned into a “honey comb” structure with excavations holing into each other. Miners have established their own rules to control the excavations.

The rules require that the person who has holed into another excavation should go back 2m and head in a different direction. Whilst the system helps to maintain order, uncontrolled diggings have compromised the stability of the ground in the area.

Box 5.3: ASM in Mirerani, a question of luck?

Most small-scale mining shafts are relatively narrow measuring around 2m x 1.5m and are deep, most reaching around 100m. From the shaft, drifts were excavated to trace mineralized zones. The length of the drifts which are usually narrow measuring sometimes less that 1mx1m (just enough to allow one to crow through), reach up to 200m – 500m long. Ventilation in these narrow diggings is very poor and most of them use compressed air which is delivered to the face via plastic tubing. The shafts are equipped with wooden and sometimes chain ladders that are used for ascending and descending to the mine. The waste rock is usually removed from underground in bags and in most cases it is piled down and only removed on a particular day, e.g., once per week. It was noted however, that a few developers have now invested in proper hoisting equipment, ventilation fans, drilling jackhammers and other equipment. All mining activities at Mirerani use low energy explosives to break the hard rock. Once the mineralized zone has been detected, miners use hand tools to slowly dislodge the rocks without causing destruction to the gemstones. Traditional mining tools such as picks, shovels and moil points are used to extract rock and ore.

There are few explosive storage facilities for managing acquisition and disposal of explosives. Main dealers of explosives are Nitro Explosives Ltd (foreign), Mzinga Corporation (local – part of the Military) and Malarex Agencies Ltd (local) who are all based in Arusha. The bulk of the explosives sold by these companies are used at Mirerani, where 865 licences to purchase explosives were acquired by miners in 2006 alone. Overall compliance with regard to acquisition, storage and disposal of explosives is satisfactory.

The lack of exploration and mining techniques amongst the tanzanite miners means that production is also erratic and most of the time it is a game of luck. A few experienced miners have developed knowledge of the local geology. These experienced individuals are usually hired by the pit developers to guide their developments. Due to the unique geological nature of gemstone deposits, whereby mineralization is localized in small pockets, both prospecting and mining are carried out concurrently. The deposits mined may either be primary in the host rocks or adjacent to the primary deposits.

Tanzanite trading and markets

The mining of tanzanite, like that of diamonds, relies on financiers, who provide the working tools and meet all out-of-pocket expenses for a group of miners. Most of the financiers in Mirerani are based in Arusha and they include mainly mineral dealers and business people in the city. Most of the financiers do not stay at the mine, but maintain their security personnel to monitor all the mining progress. When news goes around that there are signs of hitting the tanzanite pocket, the financier would then camp at the mine until production has been achieved. The miners, through their group leader, receive a percentage of the production minus the value equated to the support received during the period. The production taken by the miners would either be sold to the financier or the more experienced group would seek to sell it to the open market mainly in Arusha city. In addition, there are brokers who also buy directly from the miners at the mine site. Brokers also buy the smaller gems that are collected by groups of people sifting through the waste rocks.

The brokers group also has a subgroup of "small-brokers" that either work independently or as agents, informers and bodyguards of the main brokers. In the Mirerani area alone there are 2500 to 3000 such small brokers, (MEM North, 2007). Among the small brokers there are fulltime operators and part time ones who are also engaged in mining or small trading activities. Because of this, it is not possible to assess the exact number of small brokers for a particular mining area.

Mineral brokers provide a reliable major market for materials produced by artisanal miners. Brokers can strongly influence export channels of the purchased minerals as they can sell their products either to official

dealers or to smugglers. They operate in mining areas and then travel to Arusha, Dar es Salaam and Nairobi/ Mombassa to sell their mineral collections. Normally, the broker's market selection is influenced by the price offered and the credit facilities available. Mineral brokers can be full time or part time traders. This is the case with most of the licence holders or "claim holders".

Within the mineral dealers group there are those who are licensed and those who operate illegally including some foreign dealers mainly from neighbouring countries. The number of licensed mineral dealers has been changing over time. There were a total of 85 licensed mineral dealers in the Northern Zone during the year 2006. Three dealers were based in Moshi, Kilimanjaro region and one dealer was based in Babati in Manyara region. There were also 60 brokers. 69% of the dealers had at least one cutting and polishing machine. Dealers with the most cutting machines included Classic Gems (28), Crown Lapidary (20) and Blue Jewels Ltd (16). These represented about 38% of the 170 machines present amongst the licensed dealers.

Recent consultations with dealers in Arusha suggest that many tanzanite dealers were out of business for most part of 2006 and 2007. Many pointed that tanzanite production levels were relatively low to meet local market demands. Thus, the price of tanzanite was comparably high for most part of the year. Overall, only 50 out of the 85 dealers traded during the year.

Mineral dealers have varying financial capacities and mineral trading knowledge depending on their trading preparations and degree of co-operation with foreign partners/buyers. There are both locally owned companies and joint ventures. Local companies have been complaining of unfair business practices conducted by foreign owned companies, especially the tendency to invite foreign buyers to utilize the dealer's licences to buy directly at mine site. As a result of this practice, part of the volume of tanzanite purchases is not reflected in the official gem export figures. This has led the government to institute new procedures limiting foreign gemstone dealers to regional centres only.

5.5 Tanzanite mining and the economy

Production and exports

In general, tanzanite is the third largest contributor to national mineral export earnings in Tanzania. Table 5.2 shows the tanzanite mineral production from 2000 to 2006, total weight in grams and value in USD. The table shows that there are three major tanzanite grades, i.e., Grade A, B and C, according to the value of the stones with A being the highest and C the lowest. According to Table 5.2, production of Grade A has been low and unstable. On the other hand, production of Grade B has been stable and that of Grade C has been increasing over time and dominating. Overall, production of tanzanite minerals increased from 99,299 grams total weight in 2000 to about 389,919.73 grams total weight in 2006. Tanzanite was one of the five most valuable minerals traded in the Northern Zone in 2006, (MEM North, 2007). Others included garnet, ruby, phosphate and spinel. The five mineral dealers with the highest trading turnover (by value) were TanzaniteOne Trading Ltd, Prima gems (T) Ltd, Classic Gems, Crown Lapidary Ltd and Colourline International Ltd.

The increase in tanzanite production in Tanzania has been a function of an increase in the number of tanzanite mining firms as well as changes in the marketing approach. There is only one large-scale operator; about three medium-scale and many organized ASM firms. There are also many formal and informal artisanal mining firms; all these are in one area, in Mirerani. Production data from small-scale mining is difficult to obtain due

to the lack of record keeping by the miners and illegal trading. However, the recorded production for 2006 is shown in Table 5.3.

According to Table 5.3, the total tanzanite production from ASM for the year 2006 reached 420,087.7gm. However, the small-scale miners' production is usually not sorted and hence difficult to valuate it. Royalties from the ASM production are estimated on the basis of the value prior to export and the difference settled after sales. This is based on the exporter declaring the actual value of sales to the government once revenues have been received.

The contribution of the tanzanite to exports is quite substantial if compared to other gemstone exports. In 2006, the value of tanzanite produced by TanzaniteOne alone accounted for US $26.28 million compared to the total gemstone exports of US $31.01 million or 84.7% of the total. However, according to Tables 5.2 and 5.3, the small-scale mining production of tanzanite by weight is much larger than that of TanzaniteOne, i.e., in 2006 artisanal miners produced 420,087.7gms compared to 389,919.7 produced by TanzaniteOne. If one assumes that the production from blocks B and D is equivalent to that in Block C, then the export value should also be around US $26 million. The government official export value for all gemstones in 2006 was only US$31.01million, which points to a large discrepancy between official and potential tanzanite export earnings.

Table 5.2: TanzaniteOne tanzanite production and values for the period 2000 - 2006

Year	2000	2001	2002	2003	2004	2005	2006	Total
Weight (gm)								
Grade A	15,469	10,345	5,559	4,616	38,469	8,709	11,670.02	94,837
Grade B	52,744	94,129	61,692	62,311	792	49,195	65,922.85	386,786
Grade C	31,086	133,360	162,346	220,025	157,549	224,111	312,326.86	1,240,804
Total wt. Gm.	99,299	237,834	229,597	286,952	196,810	282,015	389,919.73	1,722,427
Value USD	173,955	1,460,000	3,249,706	3,249,706	5,988,476	16,526,003	26,276,569.76	56,924,416

Source: Tanzania Chamber of Mines and energy, 2007

Table 5.3: Recorded tanzanite production for ASM from blocks B and D for 2006

Operators	Licence type	Number of workers	Reported production
Block B	PMLs	4,300	413,509 gm
Block D	PMLs, GMLs	4,500	32,894 carats (6,578.8 gm)
Totals		8,800	420,087.7 gm

Source: Ministry of Energy and Minerals, Northern Zone Office, Arusha, 2007

Table 5.4: Tanzanite production from Block A - Kilimanjaro Mines Ltd for 2006

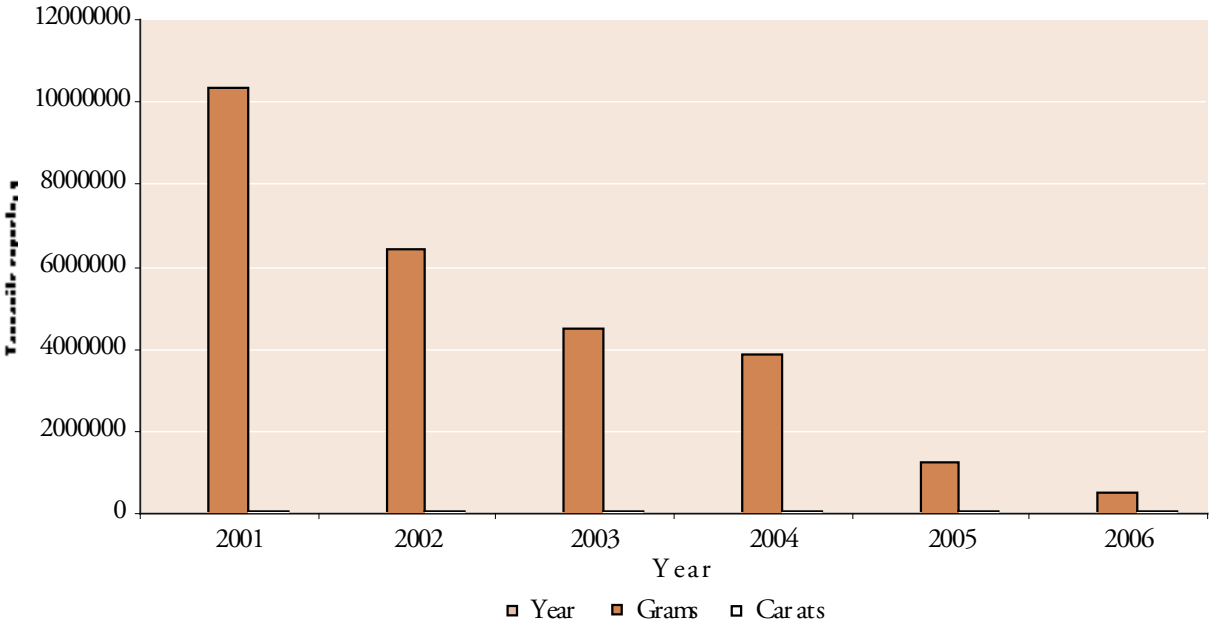
Operators	Licence type	Number of workers	Reported production, gm
Kilimanjaro Mines Ltd	GML	115	3,120.12

Source: Ministry of Energy and Minerals, Northern Zone Office, Arusha, 2007

The Zonal Mines Office and the Tanzania Revenue Authority (TRA) in Arusha jointly manage the administration of tanzanite mineral exports. It was noted that while production from the large-scale mining firm has been increasing during the last five years, exports coming from other producers have decreased during the same period. There was a significant drop in the amount of mineral exports in 2006 compared to 2005. Exports of rough gemstones fell from 1,056,015gm to 710,684.97gm, whereas cut and polished

stones fell from 29,751cts in 2005 to 8,521.79cts in 2006. Figure 5.2 depicts the trend of tanzanite exports between 2001 and 2006.

Figure 5.2: Tanzanite exports between 2001 and 2006.



Source: Ministry of Energy and Minerals, Northern Zone Office, Arusha, 2007

Although the official export earnings from small-scale mining have been dropping substantially over the last six years, most of the exporters who are mainly local have been investing heavily in Arusha, an indication of increased earnings. Through these investments in hotels, restaurants, tourist businesses, and other sectors, the government still gets its share of revenue indirectly.

Statutory taxes and other contributions paid to the government

Although there are many players in the tanzanite mining sector, the only data that could be readily accessed as a proxy to estimate the level of the sector's contribution to statutory taxes was that of TanzaniteOne. Whereas data on royalty payments could be established from the mines offices in the zone, other taxes and contributions were difficult to evaluate, especially those from the small-scale mining sector, which is responsible for almost 50% of the total production. As shown in Table 5.5, a total of US$ 6,963,187 was paid between 2000 and 2005 as statutory taxes and contributions. Of this, payment of income tax, which was only made in 2005, represents the highest contributor at US$ 2,058,439 followed by royalty, at US$ 1,474,314. The income tax paid by TanzaniteOne represents 82% of the total income tax paid by the whole mining sector, including gold mining. Given the relatively small size of TanzaniteOne, this can be linked to the fact that most of the gold mining larger operators have not yet started paying income taxes.

However, given the fact that TanzaniteOne produces less than 50% of the total tanzanite production by weight, the contribution of the tanzanite sector to the economy is much higher, though indirectly, than indicated by these figures.

Table 5.5: Statutory taxes and other contributions paid to the government

Name	2000 US $	2001 US $	2002 US $	2003 US $	2004 US $	2005 US $	Total US $
PAYE on-Expatriate Salaries	45 500	480 448	366 124	79 993	83 903	73 983	1 129 952
Payroll Levy-Expatriates	2 370	28 827	21 967	34 687	34 808	33 729	156 388
PAYE ON Expatriate Gratuity	-	-	275 919	41 589	40 219	73 873	431 600
Withholding Tax-minesite	-	-	-	-		28 715	28 715
Payroll Levy	1 304	2 855	18 052	28 327	37 598	48 746	136 882
Veta Levy	-	12 314	14 919	-	-		27 233
NSSF	55 158	93 195	58 111	99 392	187 357	274 470	767 683
PPF	-	-	-	-	-		-
PAYE	7 124	80 155	75 827	50 227	69 159	65 299	282 492
Stamp Duty	-	-	150 000	-			150 000
Donations	7	42 841	5 099	-	429	6 910	48 376
Road Toll	-	-	-	-			-
Mining Lease	-	-	-	-	12 000	12 000	24 000
Royalty	40 591	60 564	83 946	175 907	231 805	881 501	1 474 314
Import Duty	-	-	14 946		722	90 499	106 167
Income Tax					-	2 058 439	2 058 439
Others	-	-	-		18 006	50 732	68 738
TOTAL	152 053	801 200	1 084 910	510 122	716 006	3 698 896	6,963,187
Tax as % of value	87.41	54.88	33.38	15.70	11.96	22.38	23.12

Source: Ministry of Energy and Minerals and Tanzania Chamber of Minerals & Energy, 2007

Large-scale mining contribution to community development

TanzaniteOne is a founding member and primary fund provider of the Tanzanite Foundation. As such, most corporate social investments made by TanzaniteOne are channelled through the Tanzanite Foundation.

The Tanzanite Foundation is committed to making a meaningful and sustainable difference to the social, economic and environmental upliftment of the area. The Company has contributed in a number of projects ranging from construction of a community centre, renovation of a village clinic, upgrading and maintenance of rural roads, contribution to the establishment of the Mirerani controlled area by government, funding of a police station, provision of water to villagers and their cattle, contribution to construction of a secondary school and refurbishment of a village primary school.

Table 5.6: Amount spent for community projects

	2000	2001	2002	2003	2004	2005	Total
Education	-	-	1 800	27 851	33 560	12 824	76 035
Health	-	4 400	-	-	-	5 000	9 400
Water	3 800	4 700	5 000	7 000	500		21 000
Roads	65 000	5 400	5 400	8 500	32 400	42 000	158 700
Micro finance scheme	-	-	5 000	-	-		5 000
Others	-	115 976	84 824	15 704	17 520	79 593	313 617
TOTAL	68 800	130 476	102 024	59 055	83 980	139 417	444 335
Tax+community expense as % of value	126.96	63.81	36.52	17.51	13.36	23.23	26.26

Source: Ministry of Energy and Minerals and Tanzania Chamber of Minerals & Energy, 2007

Direct employment

The tanzanite mining sector is a major employer, especially in the organized small-scale mining sector and trading and lapidary areas of the business. TanzaniteOne had 158 employees at the start of operation in 2000 and the number has increased to 599 in 2005(Table 5.7). Out of these, the expatriates were 8 in 2000 and in 2005 the number increased to 20, which seem to have been maintained since 2003. This indicates that the number of local employees were 97% of the total. The medium scale operators are still in the process of establishing themselves and hence the numbers of employees have not stabilized.

The employment figures obtained from the mines office in Arusha indicate that Kilimanjaro Mines Limited, which operates in Block A of the Mirerani four blocks, employs a total of 115 workers. The joint venture between Tanzanite Africa and J.S. Magezi employs a total of 310 workers. Figures for the other new operators were not available during the study.

Table 5.7: Employment by TanzaniteOne between 2000 and 2005

	2000	2001	2002	2003	2004	2005	Total
Foreign Employees	8	11	16	20	20	20	95
Tanzanian Employees	150	185	207	400	460	579	1 981
On site Contractors	-	-	-	-	-	-	-
Professionals	-	-	-	84	84	-	168
Other Cadres	33	67	83	316	316	-	815
Total Employees	158	196	223	420	480	599	2 076

Source: Ministry of Energy and Minerals and Tanzania Chamber of Minerals & Energy, 2007

According to the Northern Zone Office in Arusha, 4,300 miners were officially employed in the small-scale mining Block B and 4,500 in Block D. However, despite the almost equal number of employees, production from Block B represents almost 98.43% of the total small-scale tanzanite production. This can be associated with the fact that mining started in block D and the pits have gone very deep and thus affecting the overall production of the poorly equipped small-scale miners.

Training

Training figures were only available for TanzaniteOne. Accordingly, TanzaniteOne spent a total of US$ 17,500 in 2005 to train 15 people.

Table 5.8: Training of local employees by TanzaniteOne between 2000 and 2005

	2000	2001	2002	2003	2004	2005	Total
Professionals:							
People Trained	3	4	2	15	1		25
Amount spent USD (*)	-	-	-	-			-
Other Cadres	91	84	114	130	91	15	525
Amount spent USD (*)	-	-	-			17 500	17 500
Total trained people	94	88	116	145	92	15	550
Total Amount Spent $	-	-	-	-	-	17 500	17 500

Source: Ministry of Energy and Minerals and Tanzania Chamber of Minerals & Energy, 2007

Procurement of goods and services

The figures for procurement of goods and services for the tanzanite mining sector were available from TanzaniteOne for the years 2004 and 2005. According to Table 5.9, TanzaniteOne spent US$ 4,215,092 for the two years to procure goods and services. Out of that, US$ 2,042,294 was spent procuring goods and services from foreign markets while US$ 2,172,798 was spent on the local markets.

Although the figures are not available, the figures for the medium-scale and small-scale mining operators would reflect a much higher percentage of procurement for goods and services on the local market. This is attributed to the fact that most of their inputs are not based on sophisticated technology and can hence be procured locally.

Table 5.9: Procurement of goods and services by TanzaniteOne for 2004 – 2005

	2004	2005	Total
Goods: Foreign USD	952 525	1 089 769	2 042 294
Local USD	954 825	981 314	1 936 139
Total	1 907 350	2 071 083	3,978,433
Services: Foreign USD	-	-	-
Local USD	140 031	96 628	236 659
Total	140 031	96 628	236,659
Goods & Services:			
Foreign	952 525	1 089 769	2,042,294
Local	1 094 856	1 077 942	2,172,798
Total Goods & Services	2 047 381	2 167 711	4,215,092

Source: Ministry of Energy and Minerals and Tanzania Chamber of Minerals & Energy, 2007

Economic significance of Artisanal and Small-scale Mining

The more direct economic benefits of tanzanite ASM include increased income to miners, contribution to the local economy, increased foreign exchange earnings from mineral exports and other local benefits.

The emergence and growth of the Mirerani township that has a wide range of businesses ranging from shops, garages, bars and restaurants, guest houses, food vendors and others is mostly due to tanzanite mining. Many in the Maasai community, who live around the mining area, are tanzanite brokers. Their standard of living, as reflected by the quality of housing, is better than other Maasi villages outside Mirerani. The population of Mirerani village is estimated to be over 50,000 – 75,000 people. Of these, 8,800 miners work in the mines and a large number in mining supportive activities.

5.6 Downstream activities

Lapidaries

Enhancing lapidary activities in Tanzania has been a clear mining policy objective of the country, as illustrated by the establishment of the Arusha Gemstone Cutting and Stone Carving Centre (Box 5:4). Most mineral dealers have started to own, manage and operate small-scale lapidaries. However, most of these lapidaries are facing problems and constraints related to limited supplies of good quality rough gemstones because most producers of good quality stones prefer to export them rough rather that sell it locally.

Lapidaries in the tanzanite sector use generic light equipment and machinery and production technology originated from India, Thailand and USA. Local manufacturing firms in the country can fabricate most of these equipment and machinery.

Box 5:4 Arusha Gemstone Cutting and Stone Carving Centre

The Arusha Gemstone Cutting and Stone Carving Centre was set-up by the government in collaboration with a private partner with the objective of training young Tanzanians in the art of stone carving and gemstone cutting. The initiative is part of the government's efforts to transform the artisanal and small-scale sub-sector into an organized economic activity, capable of generating income by adding value to minerals, particularly low value gemstones and industrial minerals. The Centre has been established to serve as a gemstone carving and fabrication facility in Tanzania. The Centre, which opened its doors in 2005, is also being used as a training ground for imparting knowledge and skills in gemstone cutting, stone carving and fabrication techniques. Furthermore, the Centre markets the products and promotes the development of a local gemstone carving and fabrication industry in Tanzania.

A project manager, who is based in Dar-es-salaam, coordinates the activities of the Centre. The Zonal Mines Office located in Arusha assists with promotional activities as well as with the collection of raw material for the Centre. The Centre has 15 trainees who, between December 2005 and December 2006, made 424 finished products, which are on display at the premises of the Centre. The current production output by the trainees is about 60 pieces per month. Further training is required to bring the trainees to competitive world standards.

Gemstone shows/auctions

The Tanzania Mineral Dealers Association (TAMIDA) and the Mineral Marketing Division of the Ministry of Energy and Minerals have been organizing international gemstone shows since 1992. They are normally held in Arusha in May every year. The aim of the gem-shows is to promote the gemstone business and the image of local dealers in the eyes of international gem buyers. TAMIDA show organizers made several trips to attend and learn from major gem-shows in Europe, America and the Far East. Some of the developments associated with staging gem-shows in the country are: -

- An improvement of business relationships between local dealers and foreign gem buyers;
- Mineral dealers normally secure reliable purchase orders at the show; and
- A rare opportunity to exchange information about supply and demand of various types of coloured stones.

Despite these developments, the Arusha gem-show is still very young in comparison with other international gem-shows in Europe, Asia and America. There is need to organize a variety of gem-show gatherings at intervals convenient to the participants, especially the international traders, who normally plan their foreign trips to be able to attend simultaneously several gem centres and shows. TAMIDA is planning to further the idea of having regional gem-shows, to pull in sufficient merchandise and numbers of buyers, as well as having frequent smaller gem exchanges to allow small foreign gem-traders and miners to participate in an open trading floor.

Gem-shows also help to reduce smuggling practices. The frequency of gem exchanges should take into account the peaks of gemstone production in the year and the ability of gemstone brokers and dealers to purchase goods from miners. It was also observed that the successful gem-shows are those which traders were involved in organizing, and where government institutions were present to provide essential services such as, security, sealing, banking, custom clearance and immigration services. Gemstone traders' associations organize all the major gem-shows in USA, Germany, Israel and Thailand, a practice worth emulating.

Section Six: The Mtwara Corridor: Coal, Uranium, Iron, Carbonatites, Gold and Natural Gas

6.1 Introduction and background

This section presents information regarding the potential cluster located within an area already identified for development by the government of Tanzania as the "Mtwara Corridor". This area includes the six administrative regions of Rukwa, Mbeya, Iringa, Ruvuma, Mtwara and Lindi and the southern parts of Morogoro and coast regions. Also included in the Mtwara Development Corridor (MtDC) are neighbouring districts in Malawi, Mozambique and Zambia. The common feature of the southern Tanzania regions and the northern regions of Mozambique, Malawi and Zambia is that they are all endowed with abundant and economically viable natural resources that are undeveloped and they all lack the necessary infrastructure for their development.

In Tanzania, these include Mbeya (gold, coal, marble and carbonatites), Rukwa (coal), Iringa (coal, iron ore, uranium, marble), Ruvuma (coal, gemstones), Mtwara (natural gas, marbles) and Lindi (gemstones). For most of these resources there are feasibility studies and hence their viability has been established. However, development has been hindered by poor infrastructure in the region. For example, the viability of coal reserves in Mchuchuma in Mbeya Region and their associated use for the processing of the iron ore at Katewaka in Iringa Region have been known since the 1950s. The Uranium resources in Iringa and southern part of Morogoro Region have also been known since the 1950s. However, lack of adequate roads, air transport, telecommunications, power supply and other infrastructure has rendered the development of these resources almost impossible.

In the last five years, there has been a drive to improve the infrastructure in the southern part of Tanzania. This has rekindled interest in the development of natural resources in the regions. In addition, the discovery of natural gas in the offshore Songo Songo Islands and recently at Mnazi Bay in Mtwara has improved the potential of power supply to the region and Tanzania in general. The Songo Songo natural gas wells are already in production. A pipeline supplying gas to Dar-es-Salaam where it is used for power generation and by a number of industries was completed in 2005. A 200MW power plant is under construction at the Kiwira Coal Mine through expansion of the old 11MW plant and the 150,000t coal mine. In addition, a 400MW coal fired power plant is planned in Mchuchuma where the National Development Corporation (NDC) has just completed a feasibility study for the project. The feasibility study for the development of a niobium mine was completed in 2006. A mining license has been issued by the government to the developers, EUROMET (Tanzania) Limited. The government is also in the process of selecting an investor through a tendering system for the investment into the iron project at Katewaka, in Iringa region. The Katewaka iron ore is planned to be developed in parallel with that of the Mchuchuma coal mine, which will produce coal for both power generation and for smelting of iron. Mchuchuma is the only known source of coking coal in the country. A number of applications for the exploration of uranium resources that are known to exist in Iringa and Morogoro regions have been made to the government.

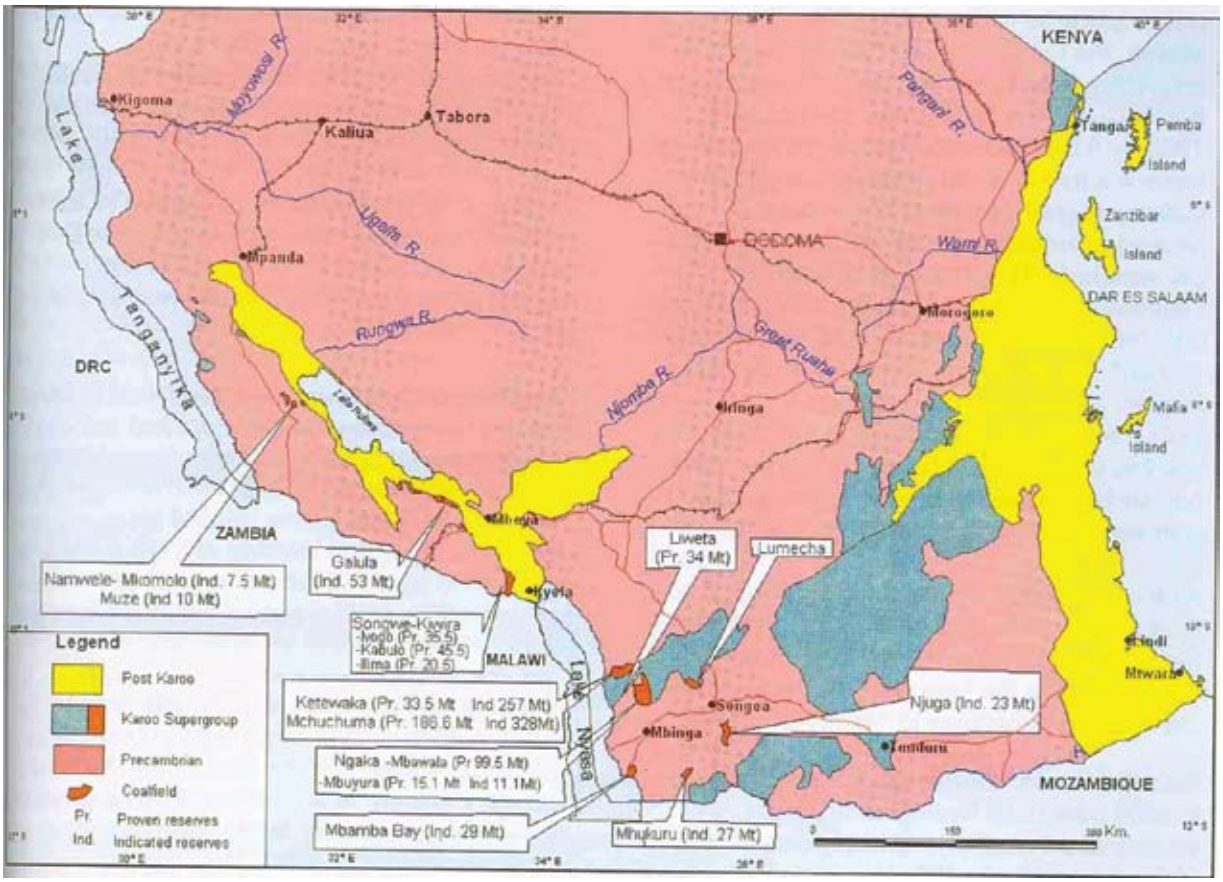
The developments described above are expected to stimulate establishment of other industries in the area, including in the surrounding four countries. Tanzania is already building an international airport in Mbeya

as part of the infrastructure development in the region. The region also enjoys a railway link through Tanzania Zambia Railways (TAZARA) that links the port of Dar-es-salaam to Kapiri Mposhi in Zambia. A bridge across Ruvuma River has already secured funding and is expected to provide a reliable crossing between Tanzania and Mozambique. Further development across the four countries includes the electricity interconnection between Zambia and Tanzania, which is already in advanced stages of implementation.

6.2 Tanzania coalfields

In southern Tanzania, there are at least 10 known coalfields and the reserves are estimated at 1.5 billion tonnes. However, only 950 million tonnes of the estimated reserves have been explored to proven and inferred reserves. Out of the explored coalfields, only two, Kiwira and Mchuchuma-Katewaka coalfields have been explored to a level of detail required for project development. The other eight coalfields (Ngaka, Liweta, Mhukuru,Njuga, Mbamba Bay, Namwele,Muze and Galula) have limited data on quality and quantity of reserves. However, most of these coalfields are currently the subjects of intensive exploration by both local and foreign companies. Fig 6.1 and Table 6.1 provide information about the location and reserves of some of the coalfields listed above.

Figure 6.1: Tanzanian Coalfields



Source[4]*:*

4 "Coal Resource as an Alternative Renewable Source of Energy for Tanzania", Paper presented by A.C. Mwakibolwa, at the Annual Engineers Day, August, 2007.

The Kiwira Coalfield

Detailed summaries of the early geological investigations of the Songwe-Kiwira Coalfield are given by Harkin (1955) and McKinlay (1965). In 1896, Bornhardt, who surveyed the area and described the general succession of the Karoo strata, as well as several coal measure successions observed from outcrops, carried out the earliest recorded geological investigations. Only sporadic investigations were subsequently carried out in this coalfield between 1900 and 1950. The first recorded exploitation of the coalfield occurred in 1953, following granting of a mining lease for part of the Ilima Hill. This was granted to Mr. A. Von Voithenberg, who discovered coal in the Lema stream at the bottom of Ilima Hill. Coal from this mine was sold to tea estate factories and other local enterprises, e.g., for lime burning, and brick burning.

The Colonial Development Corporation (CDC) undertook, between 1955 and 1957, a detailed investigation of the area. Extensive field mapping, trenching, diamond drilling and analysis of samples were carried out. In all, 16 boreholes with a total of 2,327m were drilled. The CDC subdivided the coal-bearing sequence (K2) into sub-units designated K2a at the base to K2e at the top.

Table 6.1: Summary of coal reserves and quality data for local coalfields

Coalfield	M	Ash	FC	VM	S	CV	Reserves (Million Tonnes)	
	(%)	(%)	(%)	(%)	(%)	Kcal/Kg	Proven	Inferred
Ngaka-Mbalawala	3.2	12-20	54.7	26	1.2	6,691	60.4	141
Ngaka-Mbuyura	2.7	14-40	56.9	23	-	-	15.5	11.1
Kiwira-Ivogo	3.6	20-30	51.8	26	1.2	6,382	35.5	-
Kiwira-Kabulo	4.3	20-40	49.3	27	1.2	6,247	-	45.5
Kiwira-Ilima	5.5	14-30	50.2	29	1.1	6,387	20.5	-
Liweta	-	28.4	-	32	0.7	-	-	34
Mbamba Bay	10.8	13-25	53.4	23	0.3	7,101	-	29
Mhukuru	2.8	15-30	42.6	33	0.2	5,776	-	27
Njuga	5.7	32.9	46.9	33	0.5	5,720	-	23
Namwele-Nkomolo	5.0	22-40	40.5	21	-	6,665	-	18.7

Key: *M - Moisture Content, Ash - Ash Content, FC - Fixed Carbon Content, VM - Volatile Matter, S - Sulphur Content, CV - Calorific Value*

Source[5]

Mchuchuma Katewaka Coal to Electricity Project

This project will establish a 1.5 million tonnes per annum open cast coal mine and a 400MW mine mouth thermal power station, (Mwakibolwa, 2007). The establishment of the power generation plant is intended to stabilize the reliability and security of the power supply in the country and thus allow investments in various economic sectors. Under the Mtwara Development Corridor, which is a SADC Regional Spatial Development Initiative (SDI), the MtDC is one of the anchor projects aimed at unlocking the economic potential of the southern regions of Tanzania to adjoining regions of Malawi, Mozambique and Zambia.

The Mchuchuma/Katewaka Coal Mine and Power Station in the Ludewa district in southern Tanzania will involve investments of US$ 100 million for a 1.5 million tonnes a year of coal, US$ 360 million for a 4 x 100MW power station and US$ 110 million for a transmission systems for connection into the national grid

5 "Coal Resource as an Alternative Renewable Source of Energy for Tanzania", Paper presented by A.C. Mwakibolwa, at the Annual Engineers Day, August, 2007.

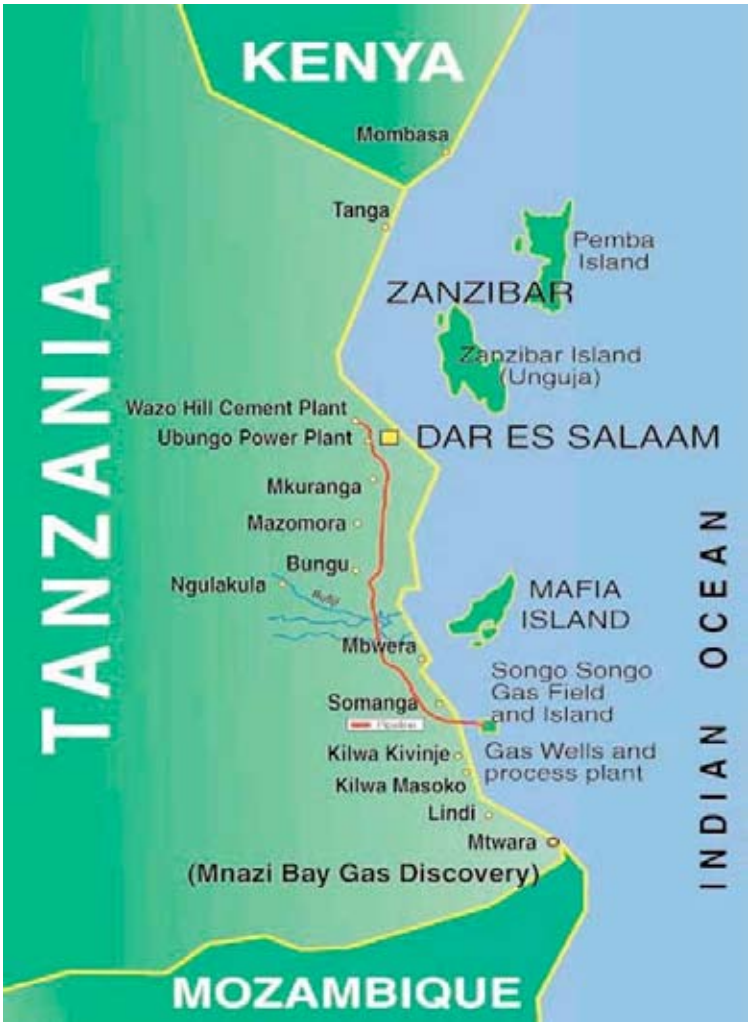
system (2001 figures), at Mufindi. The proven reserves of 159 million tonnes of coal is enough to fuel the generation of 1600 MW of electricity for 30 years or 400MW for 120 years. The development of the project will also include a township that will also provide the infrastructure for employees and those supplying the essential services.

Currently, the National Development Corporation is preparing a Request for Pre-Qualification (RFQ) and a Request for Proposal (RFP) to attract investment to the project.

6.3 Natural gas resources in Tanzania

Natural gas was first discovered in Tanzania in 1974 at Songo Songo Island about 250 km south of Dar es Salaam. Since July 2004, following intensive drilling and construction of the required extraction infrastructure, the gas is currently processed at Songo Songo and then transported by pipeline to Dar es Salaam. The current uses of natural gas in the country are for power generation and conversion from liquid fuel for heat generation by a number of industries including breweries, cement mills and others. Figure 6.2 shows the pipeline which supplies natural gas from Songo Songo to Dar-es-Salaam.

Figure 6.2: The gas pipeline route from Songo Songo to Dar-es-Salaam, (*Source*[6])

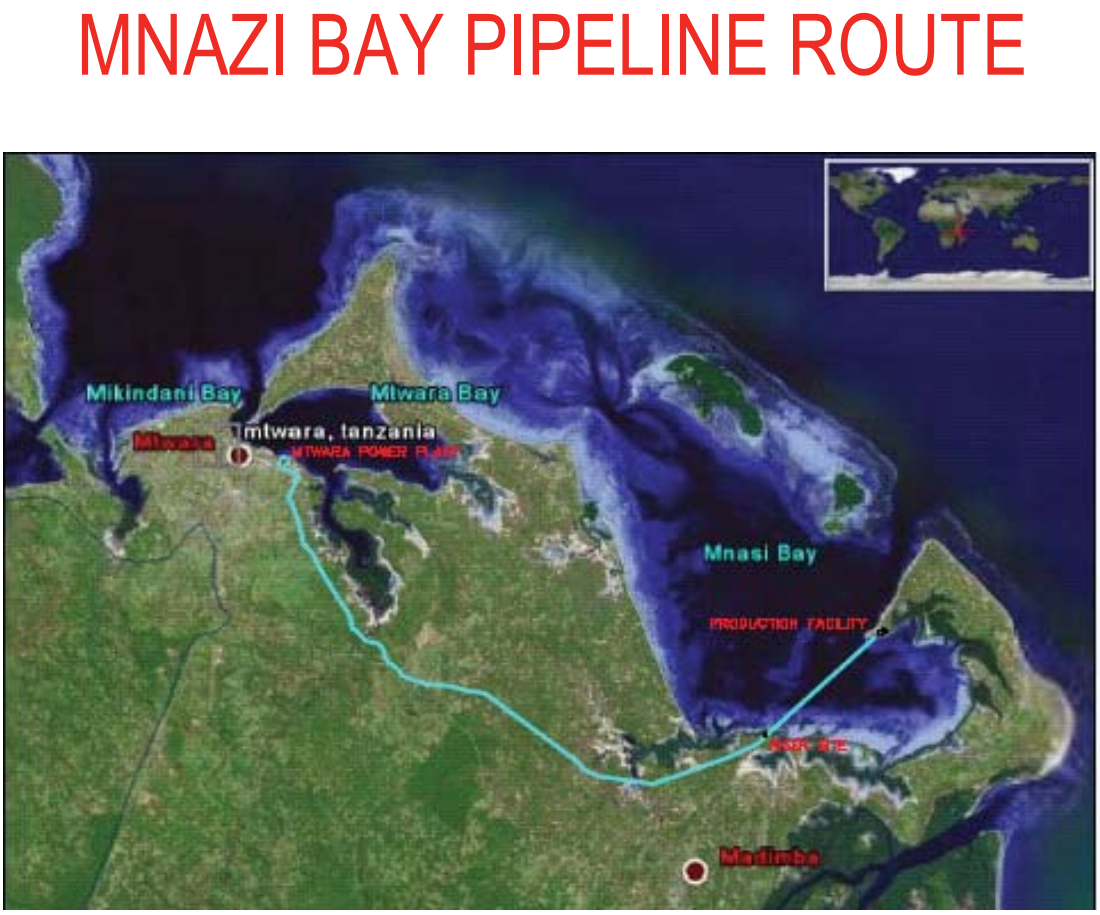


6 "Natural gas as an alternative energy source in Tanzania" Bujulu, G.N & J.E. Kisamo, Proceeding of the Engineers Day, Engineers Registration Board, August 2007.

Recently (2006), and following intensive exploration activities, another gas discovery has been made at Mnazi Bay located about 40 km south east of Mtwara Municipal. The gas field at Mnazi Bay is in the early stages of development.

The newly discovered natural gas will be delivered through a pipeline to a power station due for construction in Mtwara town. Figure 6.3 shows the planned gas pipeline route to Mtwara power station.

Figure 6.3: Gas pipeline route from Mnazi Bay to Mtwara power station

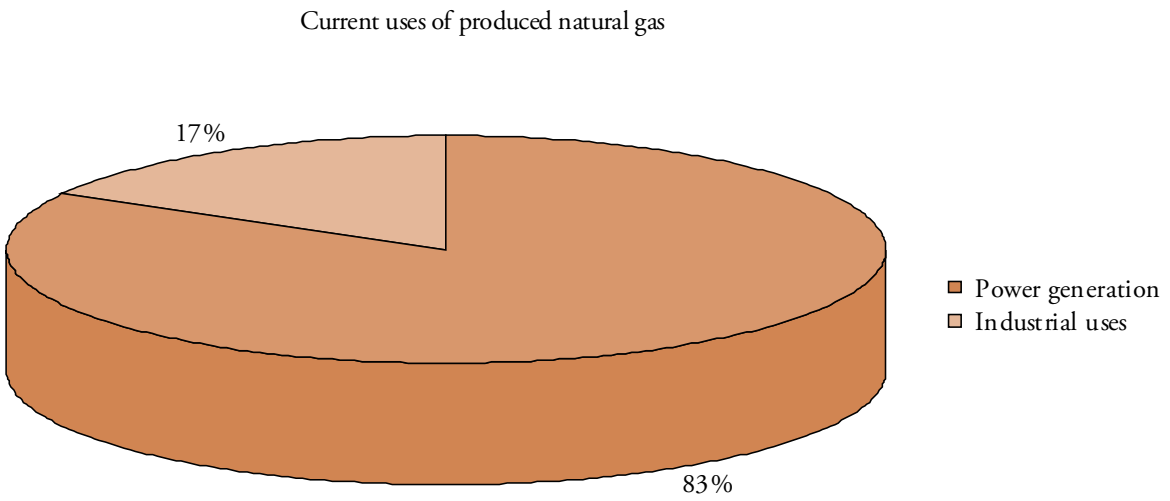


Source:[7]

As shown in Figure 6.4, the current use of natural gas in Tanzania is mainly for power generation, replacement of liquid fuel in various industries and for domestic use. The country has a power plant located at Ubungo in the suburbs of Dar-es-Salaam with the capacity of 190MW. The power generation plant is owned by the state owned Tanzania Electric Supply Company (TANESCO). It has six turbines that use natural gas. The Ubungo power station generates about 30% of the total national grid power. It was initially built to run on jet fuel as an emergency plant operated during power shortages caused by persistent droughts.

7 "Natural gas as an alternative energy source in Tanzania" Bujulu, G.N & J.E. Kisamo, Proceeding of the Engineers Day, Engineers Registration Board, August 2007.

Figure 6.4: Current uses of the produced natural gas[8]



The country also has other power plants that are using or are in the process of conversion to use natural gas. These include the Aggreko 40MW leased power plant that started generation in October 2006 and is used as an emergency plant. There is also another emergency plant that was originally built by Richmond Development Company and now is owned and operated by Dowans. The emergency generation plant has the capacity to generate between 100 – 120MW. The plant is expected to consume about 20 mmscfd of gas at 80% load factor (Bujulu et. al, 2007). At the moment the plant is generating 20MW and installations for the 80 – 100MW generation is underway.

A 45MW plant located 30km north of Dar-es-Salaam at Tegeta is under construction and is expected to be operational at the end of 2007. The Tegeta plant is expected to consume about 9 mmscfd of gas at 80% load factor (Bujulu et al, 2007). In addition, 100MW Watsila plant is under construction in Dar-es-Salaam and is expected to be operational by the end of 2008. The plant consumption is estimated at 20 mmscfd of gas at 80% load factor. The existing 100MW Independent Power Tanzania Limited (IPTL) plant is also planned for conversion to gas. Currently, the 100MW Wartsila 38s reciprocating plant is operating on diesel and is expected to convert to gas in 2007/08.

In addition to power generation, the natural gas that is pumped to Dar-es-Salaam from Songo Songo is already being consumed by a number of industries. Many more have indicated interest to convert from liquid fuel to natural gas. According to the Minister of Energy and Minerals budget speech to the Parliament in July 2007, there were 17 industries in Dar-es-Salaam that were consuming 8.8 million cubic feet of natural gas per day (Table 6.2). The conversion of these industries to gas as the main source of energy has resulted in the replacement of around 7.2 million litres of Heavy Fuel Oil (HFO) or an equivalent of 6.9 metric tonnes of liquid fuel per month. In financial terms, the conversion saves these companies and the country around US$ 3.8 million per month. Although not quantified, the replacement of HFO and other liquid fuels with natural gas will also contribute to the reduction of carbon dioxide emissions.

8 Source: Part of the Minister of Energy & Minerals budget speech to the 2007/08 Parliament Session – "Taarifa na takwimu muhimu kuhusu sekta za nishati na Madini"

Table 6.2: Average industrial consumption of natural gas and estimated savings per month

Industry	Quantity (ft3)	Daily consumption (ft3)	Gas value charged to Company	Equivalent Litres of HFO displaced	Equivalent MT (Liquid Fuel)	Amount payable by industries ($/MT)	Savings (US $)
Kioo Limited	1,826,074.50	624,718.15	168,713.97	575,390.78	540.78	471.71	48,177.56
Tanzania Breweries Ltd	19,610.333.33	653,677.78	175,202.85	602,063.77	565.85	533.15	130,996.31
Aluminium Africa Ltd	3,366,188.89	111,206.30	31,085.09	102,425.51	96.26	4,630.93	455,238.31
Karibu Textile	22,909,888.99	763,662.96	209,737.87	703,364.59	661.05	3,210.87	1,377,747.96
Yuasa Batteries	286,364.10	9,545.47	2,637.55	8,791.77	8.60	432.39	935.80
Bora Industries	514,916.33	17,163.88	4,877.91	15,808.63	15.30	2,683.38	36,254.53
NIDA Textile	21,807,808.89	726,926.96	197,607.39	669,529.24	629.29	594.73	192,415.59
Tanzania Cigarette Co.	889,168.44	29,638.95	8,313.69	27,298.67	25.65	471.07	4,291.19
Mukwano	3,639,080.44	121,302.68	34,688.94	111,729.69	105.00	566.26	24,595.28
Lakhani	4,797,942.86	159,931.43	36,021.33	147,303.34	138.44	510.44	15,871.46
Wazo Hill	131,709,438.31	4,390,314.61	413,740.52	3,142,729.74	3,064.80	440.18	890,257.71
Murzah 1	7,705,190.38	256,839.68	64,837.70	210,275.35	222.33	583.30	60,176.03
Murzah 2	7,765,643.56	258,854.79	71,657.37	238,415.77	224.07	570.98	59,019.18
Murzah 3	2,551,389.78	85,046.33	23,713.14	78,331.12	73.62	591.88	20,258.20
Nampak Tanzania Ltd	760,917.40	25,363.91	3,783.55	23,361.19	18.17	487.58	3,973.52
East Coast Oils & Fats	1,826,074.50	60,869.15	23,327.01	79,548.86	74.76	4,301.81	458,036.13
Tanzania-China Textile (Urafiki)	16,297,476.89	543,249.23	156,395.84	500,354.59	470.25	459.20	16,855.855.73
Total	248,233,897.59	8,838,312.26	1,626,341.72	7,236,722.61	6,934.19	21,539.87	3,795,100.49

6.4 Uranium resources

Although Tanzania is not a uranium producer, several authors, e.g., Harris, (1961), Geosurveys (1981 and 1982) have documented the existence of uranium resources in the country. There are also a number of unpublished reports that are found at the Dodoma Geological Survey of Tanzania which make reference to the existence of uranium resources.

According to the government's report on the opportunities for mineral resource development (MEM, 2005), uranium prospects are found in two major geological environments namely; in sandstones, mainly of the Karoo and Bukoban systems and in carbonatite complexes of the Mesozoic to recent age. In addition, the report notes that the minor occurrences of uranium and thorium are known in pegmatites, river and beach sands, calcrete and mbuga soils, and phosphate rocks.

Prior to 1955, small amounts of hand-sorted uraninite were shipped from the pegmatites of the Uluguru Mountains in Morogoro region. The region extending from the Uluguru Mountains in the south of Morogoro region to Iringa, Nachingwea and Songea regions, form part of granulite terrains that have shown potential for uranium deposits. A large part of this region lies within the largest game reserve in the country, the Serous Game reserve. The combination of poor infrastructure of this area and the limited access within the game reserve has restricted the development of these resources. However, now that the area has been included in the Mtwara Development Corridor, there is renewed interest for development of these uranium resources. In addition, the need to improve and diversify the country's power supply, has rekindled the debate, up to the parliament level, regarding the development of uranium resources.

6.5 Iron ore resources

Iron ore resources are known in Liganga in Iringa region and close to the Katewaka-Mchuchuma coalfields. The closeness of the iron ore and coal reserves that are semi-coking has generated a lot of interest in the area. Titanferous magnetite resources are known to occur in other parts of the Njombe District, in Iringa region although those at Liganga are known to be the largest, (MEM, 2005).

The iron ore bearing rocks at Liganga are dominated by a groundmass of intimately intergrown magnetite and ilmenite, subhedral crystals of magnetite spinel, and veinlets of chlorite, (MEM, 2005). According to the government's report on "Opportunities for Mineral Resource Development", by volume the rock is typically 55% magnetite, 22% ilmenite, 10% spinel, and 13% chlorite. According to the results of the drilling carried out in the area and analysed in 1973, the proven resource at the time was 45 million tonnes grading 52% iron. Pilot tests on the ore that was carried out at the time indicated that the ore can be smelted by the Elkem or Krupp-Renn processes in order to produce an acceptable low titanium iron.

Liganga is located in the region earmarked for the Mtwara Development Corridor and despite the remoteness of the site, it is within 120km from the Tazara Railway line that provides access to the port of Dar-es-Salaam and Lake Nyasa on the border with Malawi is 30km towards the west. The National Development Corporation (NDC) in a bid to secure project investment is currently promoting the project. The government is at the moment analysing the bids for selection of the development partner.

6.6 Carbonatite resources

Tanzania is host to considerable carbonatite resources mostly concentrated along the eastern and western arms of the East African Rift System. The carbonatites are a valuable potential source of a wide range of commodities, especially rare earth metals. Classical examples globally include Mountain Pass in California, an important producer of rare earths, Parabola in South Africa, a producer of copper, phosphate and vermiculite, and Araxa in Brazil, which produces niobium, (MEM, 2005). In Tanzania, at least 44 carbonatites have been identified some of which are shown in Figure 6.5.

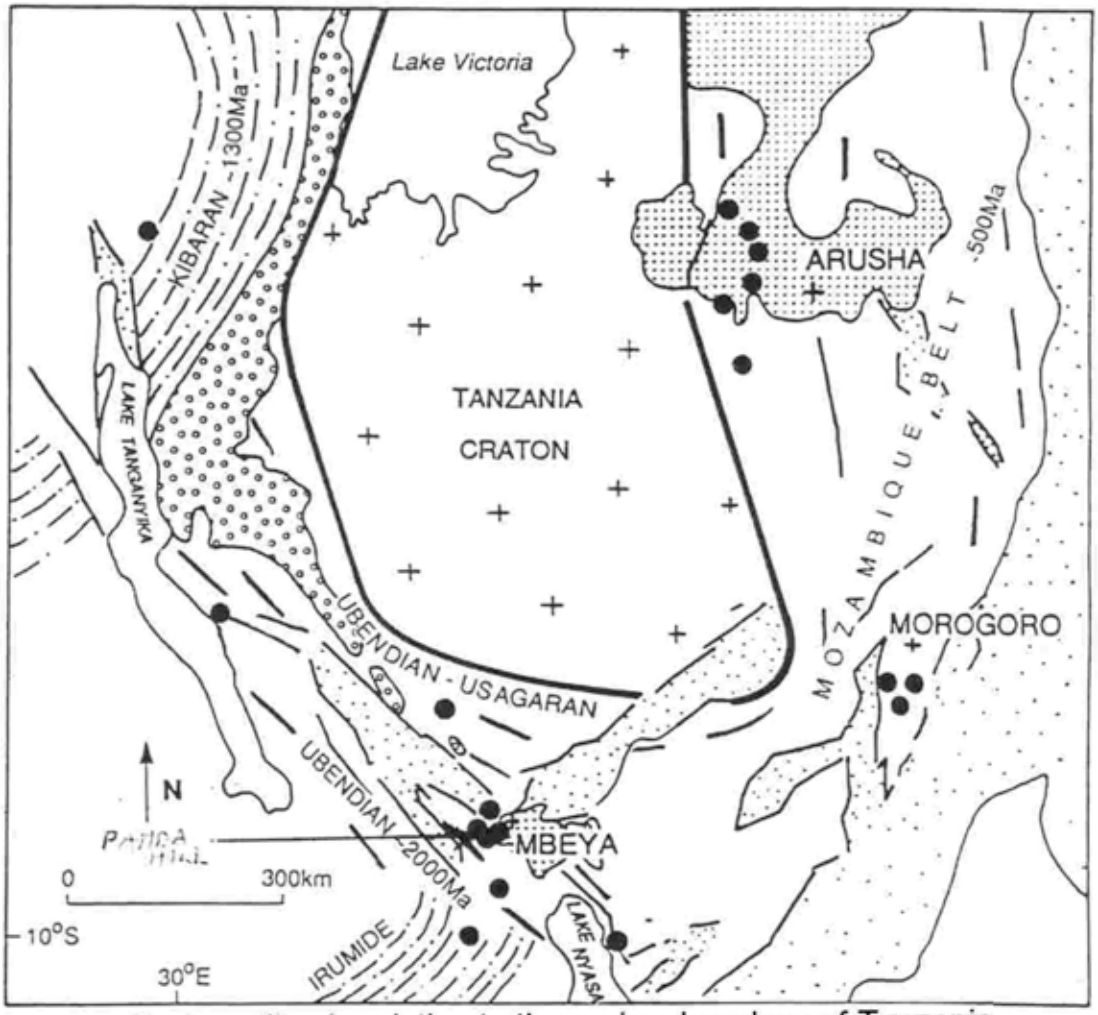
As shown in Figure 6.5, all the carbonatites occurrences are found around the East African Rift system and the most important occurrences have been found in the following areas around the rift system (MEM, 2005):

- Morogoro District (East-central of the rift system);
- Near the northern end of Lake Nyasa and the edge of the Rukwa Trough; and
- Along the northern part of the Eastern Rift, associated with recent volcanic activity.

Within these locations, the better-known carbonatites are found at Wigu Hill in the Uluguru Mountains, which contain rare earths oxides as high as 16.3% including a high component of cerium and low content of phosphates. At Mbalizi, in Mbeya region, a carbonatite deposit with a strike length of 1.1km and thickness of about 400m has been identified. The deposit consists mainly of coarse-grained soviet (calcium carbonate rock) with the centre of the exposed carbonatite rich in apatite with phosphate values of up to 9%. Also in Mbeya region, 42km west of Mbeya town is the Musensi Hill carbonatite deposit, which has been subject to exploration of niobium, precious and base metals. Although it has low values of phosphate, rare earth oxide values of 0.35% and barium values of 0.3% have been reported (MEM, 2005). In addition to these

carbonatite deposits, the occurrence at Panda Hill south of Mbeya town at Songwa area is probably one that has been extensively studied.

Figure 6.5: Carbonatites in relation to the region geology of Tanzania



Carbonatites in relation to the regional geology of Tanzania

The Panda Hill carbonatites

The Panda Hill pyrochlore bearing carbonatite was discovered in 1952 and since then, over 18,000 feet of diamond drilling have been completed to evaluate the tonnage and the grade of the carbonatite and of the associated fenite, and residual soils through which pyrochlore also occurs finely disseminated.

Several prospectors and prospecting companies have been engaged in exploration in the area beginning with A. A. Spurr who, in 1950, observed that the crystalline limestone of magmatic origin having been injected into the surrounding rocks of the Panda Hill. In 1952, C. B. Bisset, from the Colonial Geological Survey, Dodoma identified the rocks as pyrochlore - bearing carbonatite. H. Bisset, identified crystals of pyrochlore in some samples and together with T. C. James and Spurr carried out a geological survey of the Panda Hill in 1953 and confirmed the rocks as being carbonatites.

T.C. James conducted detailed mapping of the area from November 1953 to March 1954. This was followed by drilling in February 1954, which was undertaken by the Geological Survey. Approximately, 1400m of drilling were completed and several small pits of 10m depths were sunk. Thereafter, a small open pit mine was opened and samples were washed, sieved and manually sorted for extraction of pyrochlore. By the end of 1954, approximately 10 million tons of carbonatites, with an average grade of 0.31% $Nb_2O_{5,}$ were delineated indicating the potential of the carbonatites as an ore for pyrochlore.

RUDIS Engineering (1980) reported the reserves within the central part of the carbonatite as 90 million tonnes within the ore from surface to 1450m. Also, 200 million tonnes as indicated reserves from 1450m to 1400m, 140 million tones as inferred reserves from 1400m to 1350m and 140million tones as potential reserves from 1350m to 1300m, were reported. Mean grade of niobium in carbonatite is 0.35% Nb_2O_5.

Other overseas and local companies have been engaged in exploring the Panda Hill carbonatites and they included, among others:

(a) Mbeya Exploration Company (MBEXCO), a company formed by N.V. Billion Maatschapij of Holland and the Colonial Development Corporation of London;
(b) Canadian National Geological Exploration Limited (CINGEX) under the Canadian International Development Agency;
(c) RUDIS Engineering of Ljubljana Yugoslavia who in collaboration with the State Mining Corporation of Tanzania;
(d) The Tanzania-Canada Agrogeology Project, funded by the Government of Tanzania and the International Development Research Centre (IDRC) of Canada; and
(e) MTL Mining and Geological Services Company Limited (now MTL Consulting Co. Ltd.) on behalf of EUROMET.

Since 2000, the Panda Hill deposit has been explored by EUROMET (Tanzania) Limited, a locally registered company with its base in the United Kingdom. The Company, which started by reconciling the various data existing on the project from various explorers since the 1950s, also carried out bulk sampling for use in process design. Based on the reconciliation of data carried out and the bulk sampling and testing, the company was able to conduct a feasibility study of the project. As part of the feasibility study, an Environmental Impact Assessment (EIA) was conducted and an Environmental Management Plan for the project was prepared and approved by the government. In 2006, following the approval of the project's feasibility study, the company was issued with a Mining Licence (ML) for the exploitation of the deposit.

Section Seven: Nickel Resources

7.1 Introduction

Nickel in Tanzania is found in the same geological environment as platinum, chromium, cobalt and other associates of platinum group metals (PGM) namely platinum, palladium, rhodium, rhenium, osmium and iridium. The typical environments for these occurrences include layered mafic igneous intrusives such as gabbros and anorthosites and in ultramafic rocks such as peridotite, dunite, and serpentine (MEM, 2005). Occurrences of nickel in these geological environments have been identified in a number of locations in Tanzania though none have been proven to be an economic resource. According to Harris, 1961, nickel in sulphides are known to occur at Kapalangula near Kungwe Bay in Kigoma District on the shore of Lake Tanganyika, Western Uluguru Mountains south of Morogoro region and in Kimamba near Kilosa in Morogoro region. Nickel occurring in silicates have also been identified in several parts of the country including those at Kabulwanyele in Mpanda District south west Tanzania where systematic sampling by the Geological Survey indicated nickel reserves of 5 million tons at 0.72% nickel to 10m depth (Harris, 1961). Occurrences of nickel were also identified at Twamba near Sango in Mpanda District were grades of up to 0.9% nickel were calculated through soil samples collected from the area. Other areas with nickel occurrences include Mwahanza in Dodoma District and Ngasano area in Mwanza and Maswa Districts. However, none of these occurrences have resulted in the discovery of any economic nickel reserves.

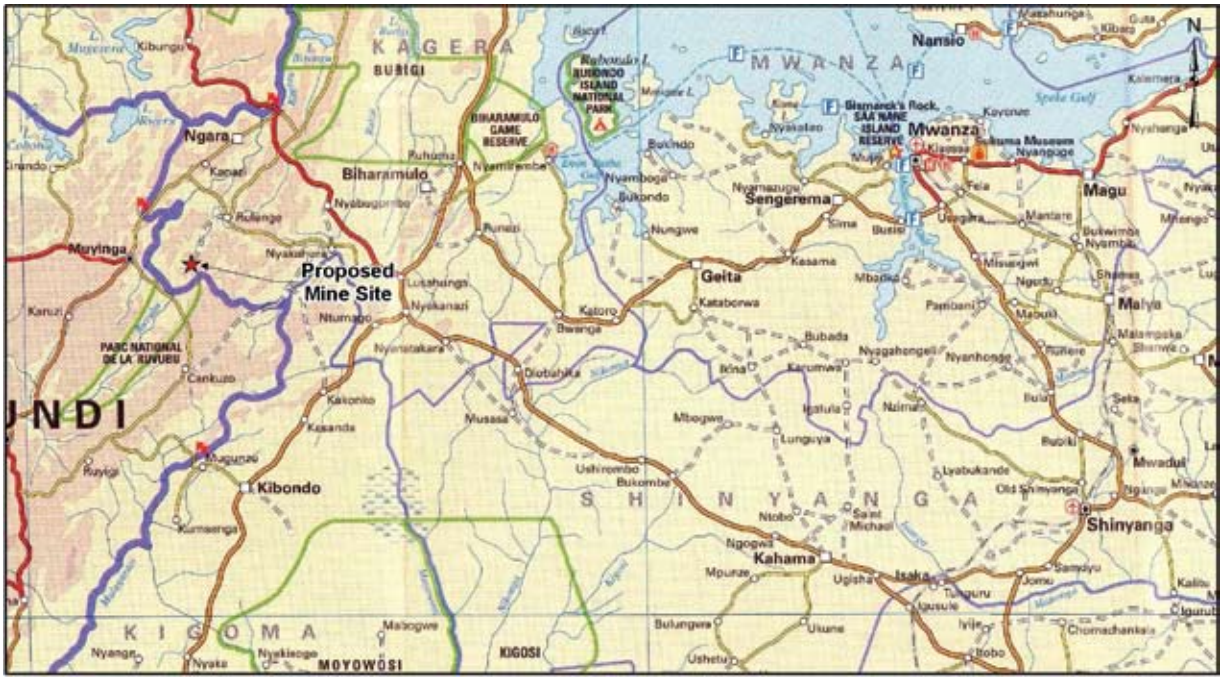
Exploration work, which was carried out by the UNDP in collaboration with the Tanzania Geological Survey team in Ngara District in the second half of the 1970s, has resulted in the discovery of what is now regarded as the world's most attractive undeveloped nickel sulphide deposits. Over more than 30 years, different companies and government departments (e.g., State Mining Corporation) carried out exploration in the area which is currently being developed by a 50:50 joint venture between Barrick Corporation of Canada and Xstrata PLC of Switzerland. The current development is centered at an area locally known as Kabanga and is hence known as Kabanga Nickel project.

7.2 Kabanga nickel resources

Potential resources of nickel sulfides with minor values of PGMs have been discovered at Kabanga, Ngara District in north-western Tanzania, within the Karagwe-Ankolean metasediments. These resources are now in early stages of pre-feasibility study. Xstrata manages the project.

Xstrata Nickel which has completed over US$ 50 million in expenditure to update the resource model for the Kabanga project and preparation of an extensive scoping study, announced a further investment of US$ 95 million in February 2007 aimed at commencement of a pre-feasibility study of the project (Market Wire, February, 2007). Following the announcement of further investment was also an update of the preliminary resource estimate which confirmed Kabanga as among the world's most attractive undeveloped nickel sulphide deposits, with a total estimated indicated resource of 9.7 million tonnes grading 2.37% nickel and a total estimated inferred resource of 36.3 million tonnes grading 2.8% nickel. These revised estimates represent a notable increase from the project's previous estimate on the inferred resource of 26.4 million tonnes at 2.6% nickel.

Fig. 7.1. Kabanga Nickel Resources



Source: Ministry of Energy and Minerals, 2007

Currently, intensive diamond drilling is ongoing at Kabanga site with 10 drill rigs aimed at:

- Continuing to upgrade the resource to measured and indicated categories in North Zone to provide sufficient quality data to support a feasibility study on the project;
- Further expand and upgrade the inferred resource at Tembo Zone, a new zone discovered in June 2006 located 2 km north along strike of North Zone;
- Progressing the systematic exploration of the under-explored Kabanga licences, evaluate and select regional targets for new discoveries in the proximity of the Kabanga deposits; and
- Undertake geotechnical investigations for potential infrastructure sites.

The most recent (December, 2006) Kabanga Nickel Project resource estimate is as follows:

Table 7.1: Kabanga Nickel Project resource estimates

Category	Tonnes	Ni %	Cu %	Co %	Au gm/t	Pt gm/t	Pd gm/t	Ag gm/t
Main Indicated	2,420,000	1.68	0.25	0.13	0.02	0.04	0.07	0.31
North Indicated	7,280,000	2.59	0.35	0.21	0.04	0.08	0.09	1.28
Total Indicated	9,700,000	2.37	0.32	0.19	0.04	0.07	0.09	1.04
North Inferred	26,300,000	3.0	0.4	0.2	0.1	0.4	0.3	1.6
Tembo Inferred	9,300,000	2.4	0.3	0.2	0.1	0.2	0.2	1.2
MNB Inferred	700,000	1.5	0.2	0.1	0.1	0.1	0.1	0.7
Total Inferred	36,300,000	2.8	0.4	0.2	0.1	0.3	0.3	1.5

Source: Market Wire, February, 2007

The project has now engaged a number of independent consultants to undertake various components of the feasibility study. An EIA which is a conditional requirement for the issuance of a mining licence in Tanzania is already undergoing. According to the announcement made by the government on the 11th of July 2007

through the Commissioner for Minerals, the construction of the mine is envisaged to start in 2009 with the project becoming operational in 2011.

The project, which is planned to be an underground mine, faces a number of challenges because of its remote location in the north western corner of Tanzania and within a kilometer from the Burundi border. The project is expected to produce a 1,000 tonnes of nickel – copper – cobalt concentrate per day at full production which must be transported to the Dar-es-Salaam port for shipment. The nearest railway terminal is located at Isaka, nearly 500km away and linked through earth roads that could prove a challenge during the wet seasons. Location close to Burundi border poses its own challenges; in-migration and security issues. The area is not linked to the national grid power and hence will need construction of a powerline of almost 300km.

The Kabanga nickel project's location on the north western corner of the country and close to the Burundi and Rwanda borders provides unique prospects for resource-based spatial development. As indicated above, the project will lead to the extension of a power line over a distance of around 300km and thus accord access to electricity to that part of the country. There are also plans to construct a railway line linking the Tanzania inland port of Isaka in Shinyanga to Kigali in Rwanda, which will pass within the project area. Road transport will be improved so as to support transportation of nearly 1000 tonnes per day of the produced nickel concentrate from the mine to Isaka railway station in Shinyanga. These infrastructure developments will create an environment for the development of supportive industries in the area. The potential market provided by the demand for inputs in the nickel mining and processing and the population of nearly 2,000 employees, will also provide further incentives for development.

The nearest town of Ngara which is also the administrative district headquarter has no industrial or commercial base apart from few small shops that can hardly meet the demand for the mine inputs and the 2000 employees. However, the town is served with an airport and a tarmac highway linking Tanzania to the neighbouring countries of Burundi and Rwanda. Ngara town is also linked by a tarmac road to the neighbouring town of Biharamulo in the north and with an all-weather and well-maintained gravel roads to the neighbouring towns of Geita in Mwanza region to the east, and Kibondo (Kigoma Region) in the south. Easy linkage to these neighbouring towns would also stimulate business development due to easy access to markets. On the Burundi side and nearly 60km from the project location, there is the town of Muyinga, which has a bigger population than the entire district of Ngara. This town could also provide a market for the developed cluster and may also provide the industrial linkages that are needed for an effective cluster development in the area.

Section Eight: The Potential for Minerals Cluster Development in Tanzania

8.1 Introduction

The "Minerals Cluster Policy Study in Africa: Pilot Studies of South Africa and Mozambique" undertaken by ECA in 2004 (UNECA, 2004) revealed that the sustainability and success of minerals clusters depend on several favourable external and internal factors such as natural resources endowment and proactive and deliberate actions from key stakeholders, particularly governments. Specifically, action is required to:

- Improve the quality of the business environment, increase private sector confidence and participation, and reduce entry barriers and operating costs to achieve external economies of scale;
- Establish the requisite enabling markets and common platforms for services (raising capital, commodity exchanges, legal and regulatory support, marketing support and know-how);
- Provide supporting infrastructure including roads, rail ports, energy and water and telecom;
- Encourage the establishment of strong instruments of collaboration (industry/professional associations, Chambers of Mines, cluster councils, incubator/technology packs) and foster agglomeration effects and learning processes by the establishment of a critical mass of key similar, ancillary, related and associated industry players that share information, collaborate and compete to improve the initial factor advantages, enhance competency, reinvention, innovation, technology evolution and spillovers, and diversification;
- Facilitate and nurture human resources development and skills formation in tandem with the development of resources technological clusters through the facilitation of research and development (R&D) and the building of knowledge networks and niches involving academia, industry, the government and other players;
- Promote local beneficiation and value addition of minerals to provide manufacturing feedstock;
- Establish an industrial base through backward and forward linkages;
- Encourage and support small and medium-scale enterprises to enter the supply chain;
- Harness the potential of Public Private Partnerships (PPPs); and
- Promote regional integration and harmonization to facilitate factor flows.

Continued innovation and human resources development are key to reducing the dependence on the initial factor endowment (natural resources) and to building and sustaining a competitive and diversified economy, locally embedded. Conversely, where there are underdeveloped human, knowledge, physical and institutional capital, governance deficiencies, insufficient innovation systems and technology awareness and progress, inefficient economic and business organization, it is impossible to turn the initial factor endowment into a platform to build successful clusters and diversified economies.

Undoubtedly, Tanzania has considerable natural resources endowments. However, the mining sector in the country is still relatively new. As a result, there is no developed mineral cluster to mention. Incipient clusters are developing in the gold and tanzanite mining areas, with some backward linkages and visible multiplier effects in the local economy. Despite the existing potential, the same cannot be said of the other mining districts described earlier. As with any nascent or youthful mineral economy (Auty, RM, ….), characterized by increased mineral investment flows and rapid expansion of the mineral sector, most government efforts

in Tanzania have been directed at establishing the appropriate policy, legal and regulatory frameworks for mineral wealth creation and optimal retention of mineral rents. Efforts to promote sectoral diversification are more typical in early-mature mineral economies.

Auty suggests that policy responses should be formulated with consideration to the stage of development of the economy in a minerals cycle, that is, whether the economy is at a nascent, youthful, early mature or late mature stage of the cycle (Table 8.1). To this, one should add the local context, capacity to manage and restructure the economy, and the learning curve process followed by a country. Larsen (2005) indicates that while policy features might be replicable, institutions to implement them require time to build. In addition, he argues that even when institutions can be mimicked and replicated, there is no universal recipe.

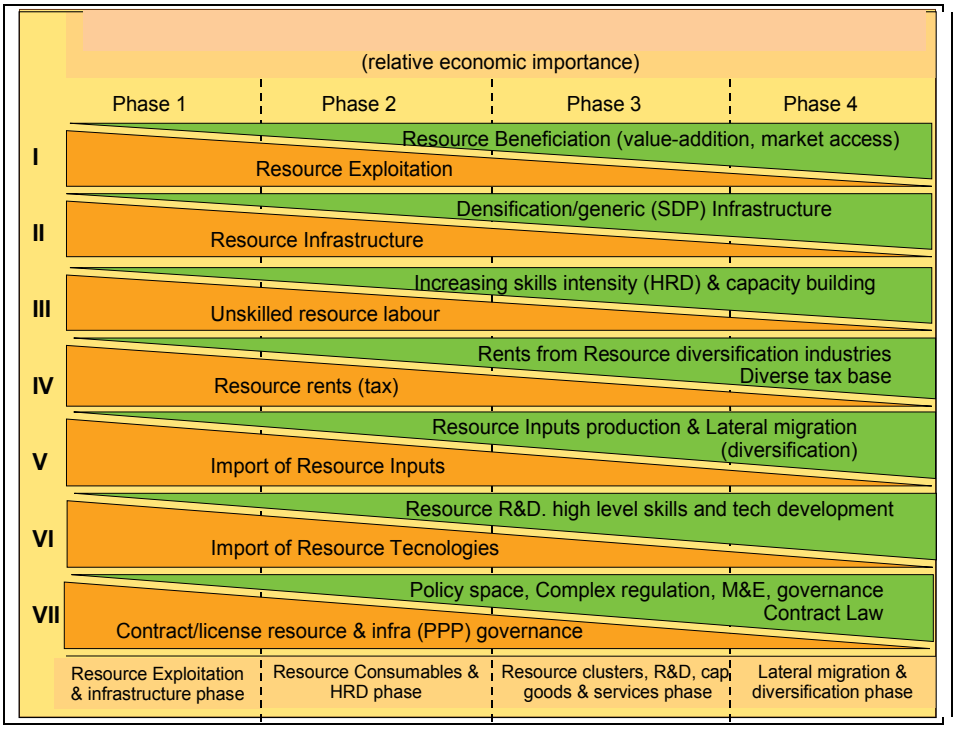
Table 8.1: Policy responses to a minerals-driven cycle

Stage	Character	Macro effects	Policy response
Nascent	Mineral investment flow	Exchange rate pressure	Create rent tax Build capital funds Establish revenue stabilization funds Grant central bank independence
Youthful	Rapid mineral expansion	Exchange rate appreciation Dutch disease effects	Sterilize windfall Rents. Expand domestic Absorptive capacity
Early-Mature	Slowdown of output mineral	Growing tax and Foreign exchange. change constraints	Substitute new tax sources. Encourage domestic saving Promote sectoral diversification
Late-Mature	Decline in mineral Output	Persisting tax and Foreign exchange shortages Rising unemployment	Depreciate real exchange rates Boost skills acquisition

Source: Richard Auty

The draft Africa Mining Vision discussed during the First African Union Conference of Ministers Responsible for Mineral Resources Development held in Addis Ababa, Ethiopia, from 13 to 17 October 2008, proposes a phased (but not mutually exclusive) approach to resource-based development and industrialization of the continent. In the early stages of this development strategy (Fig 8.1), revenue streams play an important role. Tanzania seems to be at that stage.

Fig. 8.1 Schematic Resource-based African Industrialisation Phasing



Source: Africa Mining Vision (ECA, 2008)

In the section below, the key drivers for mineral cluster development in Tanzania are identified. This is followed by a SWOT analysis of the potential clusters. The section concludes with a discussion of policy development implications.

8.2 Key drivers for mineral cluster development

Factor Conditions

- **Political stability:** Since obtaining independence in 1961, Tanzania has enjoyed political stability and is one of the few countries in Africa that has seen smooth transition from one leadership to another. The country is a multi-party democracy with an open door policy to embrace globalisation.
- **Unexplored mineral resources:** Intensive exploration work started in Tanzania following the enactment of the new Mining Policy of 1997 and the new Mining Act of 1998. Most exploration works have concentrated on high value minerals like gold, leaving most of the industrial minerals and base metals unexplored. A recent discovery of a world-class nickel prospect in the Lake Victoria area is testimony of this. In addition, small-scale miners have discovered new gold and gemstone resources in non-traditional areas that have now become subject to intensive exploration.
- **Availability of large scale, low quality coal resources:** The southern regions of Tanzania are known to contain more than 2 billion tonnes of low quality resources of coal most of which have not been explored in detail. At the moment, only two reserves are under development for power generation of up to 600MW. The bulk of the resources have not been explored. Thus, there is great energy generation potential in the country. This will be key for sustaining growth in the mining sector.
- **Availability of large resources of natural gas:** Exploration work that started in the mid 1970's has resulted in the discovery of two deposits of natural gas at Songo Songo and Mnazi Bay in south east

Tanzania. This discovery has stimulated more exploration in the area. The discovery of more gas would assure Tanzania of a cheap and clean source of energy that is a prerequisite for industrial development.

- **Sustained economic growth:** The country has experienced sustained economic growth of around 6% for the last 10 years. The ongoing reforms aimed at marketing Tanzania internationally will lead to increased economic growth. This growth can also stimulate the growth of clusters around mining areas to sustain an increase in the demand for mining inputs.
- **Human resources development:** The government and mining companies have made important investments to train local mining professionals and technicians. Although the pool is still limited, this bodes well for the future of the sector.
- **Critical mass:** The development of the large-scale operations is geographically concentrated, e.g., the gold mines around the Lake Victoria area, base metals in the south west of the country and nickel in the north west. These concentrations of large mines are sufficient to create a large demand for goods and services and can potentially stimulate cluster development (of mining inputs firms).

Demand Conditions

- **Sustained growth in the demand for mineral products:** Until recently, commodity prices were experiencing a boom characterized by a consistent increase of prices and demand for mineral products, particularly during the period of 2002 to early 2008. Currently, there have been recent blips and inevitable corrections in the uptrend, mainly fuelled by the credit crunch and financial meltdown, economic slowdown in the United States, and the spectrum of a global economic recession. This has dampened demand for commodity and push prices down. On the medium to longer term though, there is a good possibility that demand for mineral resources will pick up. Key to this will be the economic growth of China and India. This is consistent with Malembaun's model of structural change at different economic levels (Auty, RM…), where the underlying driver of mineral demand is the metals intensity of global GDP growth. Accordingly, the rise in the importance of services in an economy with a high GDP/capita reduces the resource intensity of GDP. At that stage (around US$16000/capita), as economies pass the industrial transition, expenditure shifts away from capital goods and consumer goods towards services. Conversely, emerging economies experience expanding materials intensity because of their need to build-up physical infrastructure and accommodate consumption, as the middle class expands and income levels improve. These fundamentals will most likely remain robust in China and India. Thus, provided that these two countries continue to grow and unless there is a serious worldwide recession, demand for minerals could accompany this pace. Growth in Brazil and other emerging economies and global population growth would make the argument stronger and supportive of commodity prices. The long gestation periods of mining investments, production problems, rising prices for inputs and shortages of skilled labour can generate supply side problems. This and low inventories could underpin price increases. If the current credit crisis prolongs and would restrict capital access, fewer new mining projects would be developed and supply expansion programmes would be slowed down, postponed or abandoned. This, in turn, could affect production, squeeze supply of commodities, tighten inventories and push prices up. Even if prices would not reach the peaks experienced in early 2008, they will not return to the historical lows observed in the late 1990s (World Bank, 2008).

Firm Strategy, Structure and Rivalry

- **Strong industry institutions:** The establishment of the Chamber of Minerals and Energy of Tanzania has provided the mining industry with a strong voice for lobbying the government and influencing policy. The Chamber provides the industry with an effective body to coordinate the activities of the

industry, particularly with respect to building of good relationship with government and its institutions, the diffusion of technology, labour and community issues. The Chamber has also been influential in ensuring that the right information is communicated to the public and expectations on mining-driven development are managed appropriately. These efforts need to be scaled-up.

- **Relations with small-scale miners:** Mining companies came together in August 2007 and decided to form a committee that will be responsible for improving and cementing relations between small and large-scale mining operators. The newly formed committee, which operates through the Chamber of Minerals and Energy, has already produced and submitted to the government a position paper to improve relationships between large-scale operators and assisting artisanal and small-scale miners as well as render them technical and managerial assistance to improve their operations. A compact between large and small–scale mining operators is crucial for the future of mining in Tanzania.
- **Training and education:** Mining companies have for the last five years been instrumental in supporting the Mining Engineering and Mineral Processing degree programme at the University of Dar-es-Salaam. They provide support individually through the supply of computers, laboratory equipment, training personnel and other inputs. Lately, the companies have also started establishing linkages with the Vocational Education and Training Authority (VETA) in support of the training programmes for mining artisans. Two VET institutions have been identified through which some mining companies plan to support and develop training programmes that target the mining industry. More investment would be needed to raise the standards of the training programmes to world-class level. Efforts at SADC level to standardize curricula of mining and energy course in the region are a step in the right direction. The same applies to measures to standardize professional accreditation.

Government

- **Government commitment to building a strong mineral sector:** Since the second half of the 1980s, the Tanzanian government has demonstrated its intent to make the mineral sector one of the major economic sectors in the country. The mineral sector is declared in the country's investment policy as a "priority sector" for economic development.
- **Tanzania government investment policy:** The mining sector benefits from speed incentives to encourage investment.
- **Security of tenure:** The current mining regulatory systems guarantee security of tenure to mineral rights owners. The security over those rights is guaranteed over the tenure period and the mineral rights are transferable and can be mortgaged for both small and large-scale mineral rights holders. These guarantees have been influential for the continued interest to invest in the Tanzania mineral sector by both local and foreign investors.
- **Infrastructure development:** This is still an area of concern. However, the government has made a significant effort to build and upgrade roads, railway, water, and power infrastructure in the last 10 years. All regional roads in the country have been asphalted. The railway system, which was managed by the government, has now been placed under a public private partnership. The government is building a water pipeline from the Lake Victoria to the mining regions of Mwanza and Shinyanga. A natural gas pipeline has been built from Songo Songo Islands to Dar-es-Salaam with 600MW.

The discovery of natural gas in the south of the country, in addition to the availability of large reserves of low quality coal, has set in motion the construction of new power infrastructure aimed at boosting Tanzania's power generation capacity. Already a 200MW coal fired power plant is under construction and a 400MW plant is also planned. A total 475MW of electricity generated from natural gas is at different stages of development with 190MW already added to the national grid.

- **Restructuring of the fiscal regime:** Since the start of the economic restructuring programme in the second half of the 1980s, the government has been keen to restructure the country's taxation legislation to meet the needs of the mineral sector. The fiscal regime for the mineral sector is regarded as the best in the country and competitive internationally.
- **Regional cooperation:** Tanzania is a member of two regional blocks, i.e., SADC and East African Cooperation (EAC). This membership provides access to a larger sub-regional market. The EAC has just created a custom union and consultations are ongoing for the creation of a political union. Other EAC members are Kenya, Uganda, Rwanda and Burundi, providing a market of more than 80 million people.
- **State supported training programmes:** The government run institutions have initiated training programmes aimed at addressing the needs of the mining industry. In this respect, a mining and mineral processing engineering programme was established at the University of Dar-es-Salaam as well as a mining technicians training programme at the Dar-es-Salaam Institute of Technology and at the Dodoma Institute. The Vocational Education and Training Authority (VETA) is in the process of establishing a mining vocational training programme.

Related and Supporting Industries

- **TANESCO:** The state run Tanzania Electric Supply Company (TANESCO) has been investing in the construction of infrastructure for power supply to mining companies. Collaboration between individual mining companies and TANESCO has resulted in joint venture infrastructure development for the supply of power to remote areas of the country.
- **Tanzania Railways Corporation (TRC):** The formerly government operated railway company has recently entered into a public-private partnership with the railways corporation of India. Most of the gold mines in the Lake Victoria region transport their bulk goods from the Dar-es-Salaam port via the railway system. The country through the NEPAD infrastructure development programme is looking into extending the railway line to Kigali, Rwanda and thus facilitating access to the Kabanga Nickel project in Ngara.

8.3 SWOT analysis

The SWOT analysis has been undertaken for all the mining districts described in this report, i.e., the overall mining sector, the gold industry, the diamond and tanzanite sectors, the Mtwara Development Corridor and the Kabanga nickel projects. The results are summarised in a table form below.

The Overall Mining Sector

Strengths	Weaknesses
• Great potential and large variety of mineral resources;Large baseline data on available resources from as far back as 1884 that is available to investors; Efficient and transparent mining policy that has been key to attracting local and foreign investment; • Adequate, certain and predictable legal and regulatory framework;	• Poor infrastructure particularly transport, telecommunication, water and power supply; • Shortage of local skilled and experienced labour due to limited formalised skills training and newness of the sector; • Lack of R&D facilities in the country which limits innovation and development of technology; • Weak manufacturing sector to meet the demands of mining projects;

Strengths	Weaknesses
• Functioning small and large-scale sectors through participation of local and foreign investors; both being crucial for sustainable economic growth and linkages engendering; • Largest export earner for the country with direct contributions to government revenues through taxes and other contributions; • Indirect contribution to the economy through expenditure on domestic goods and services; • Direct and indirect contributions to communities surrounding the mining area; • Increased capacity of the Geological Survey Department to undertake exploration and mineral discover new deposit ;and • Efficient management of mineral rights using the cadastral system.	• Limited access to capital markets by local entrepreneurs and mining companies; • Negative public perception of the sector due to poor access to information and negative reporting; • Long lead times to bring project to profitability leading to accusation of non-tax payments; • High production costs for most mining projects because of excessive reliance on imports; • High rate of illegal artisanal mining activities leading to conflicts with the surrounding communities; • Current R&D programmes are fragmented; and • Weak organisational and institutional set up to engender backward and toward linkages between mining and other sectors of the economy.
Opportunities	**Threats**
• Unexploited known large diversity and extent of mineral deposits; • Potential new exploration areas; • Competitive and transparent mining legal and regulatory framework; • Considerable potential for manufacturing units for value added products; • Development of mining related training and R&D programmes based on well established institutions; • Development of competitive sectoral laws & regulations, environmental and social programmes as a result of the surge in investment; • Increased local investment as a result of the growth of the economy and specifically the financial sector; • Increased participation in mining investment by the local and international financial sectors due to an improved and attractive fiscal regime; and • Increased access to power through new gas developments & regional inter-connectivity; • The Nepad Spatial Development Programme (SDP); • Potential offered by the Northern and Central corridors; and • Credit crunch may restrict funding for new mining projects and expansion of existing ones, thus generating production shortages, which can fuel an increase in the price of mineral commodities.	• Impacts of the credit crunch and global financial meltdown; • Global economic recession, which could hamper demand for minerals and reduce investment appetite for the sector; • High volatility in commodity prices, which can increase the risk perception levels about the sector and lead to sub-optimal levels of investment; • Regulatory uncertainty created by the Government initiative to re-examine the current development agreements; • Limited understanding and appreciation of specific community values, customs and beliefs by some project developers; • Lack of strategies for targeted development of mining related infrastructure limits the development of new resources and increases cost of project development; • Increased dependence on mineral exports could threaten the country's economy; • Continued exports of semi-processed minerals limits the development of value adding sector and the overall industrial development; • Tariff and non-tariff barriers from developed countries which can restrict efforts to develop local processing facilities and value-addition; • Increased illegal artisanal mining likely to dilute the effectiveness of the companies' corporate social responsibility impacts to communities; and • Forceful eviction of illegal miners by government from large-scale operations increases negative perception of the community about the mining sector.

The Gold Sector

Strengths	Weaknesses
• Role of gold as financial safe haven of last resort which can make the sector attractive and sustain investment in the future; • Financial capacity of the gold mining companies; • Very high-grade gold deposits; • Increase in the number of new discoveries outside traditional the Lake Victoria Gold Fields areas; • Increase of skilled and experienced local labour force; • Increased capacity of mining related training institutions supported by gold mines; and • Large number of operations to support sustained demand of goods and services.	• Limited geological knowledge of gold deposits hosted in non-traditional gold mining areas; • Speculation of mining tenements due to weaknesses in the licensing system; and • Lack of participation of companies in the local stock market.
Opportunities	**Threats**
• Potential discoveries in non-traditional gold mining areas; • Development of beneficiation systems; • Extension of current opencast operations to underground mining; • Development of an inputs industry to meet demand of gold mines; and • Experienced small-scale gold miners through which a stronger gold mining sector can be developed.	• Sustained negative perception by communities resulting from limited feedback on gold mining activities; • Continued export of semi-processed gold limits the development of beneficiation; • Continual use of mercury by small-scale gold miners; • Marginalization of ASM through transfers of mineral rights to LSM; • Increased tensions between ASM and LSM due to limited mining areas for ASM; • HIV/AIDS and Malaria; and • Out migration of skilled labour to neighbouring countries.

The Diamond Sector

Strengths	Weaknesses
• Long diamond mining history; • Largest kimberite pipe in the world; • Skilled and experienced labour force; • Extensive diamond mining experience; • Expansion and modernization of the processing facilities; and • In-house extensive training facilities	• Decreasing diamond grades; • Increased cost of production with mining depth; and • Aging infrastructure.
Opportunities	**Threats**
• Potential for reprocessing of the old tailings; • Exploitable alluvial diamonds within the lease; and • Improved community relation through ongoing Mwadui Community Diamond Project.	• Increased illegal mining activities within the lease; • Competition for water resources with other users; • Limited access to power for expansion programme, and • HIV/AID and Malaria.

The Tanzanite Sector

Strengths	Weaknesses
• Good brand name; • Strong market and product demand; • Large number of local investors; • Growing value adding sector; • Limited competition as only found in Tanzania; and • Government built gemstone cutting & polishing school in Arusha.	• Limited geological knowledge on available tanzanite resources; • Limited tanzanite cutting skills to meet international market demands; • Large number of untrained workers; and • Application of rudimentary ASM technology.
Opportunities	**Threats**
• Potential for new discoveries outside traditional blocks; and • Expanding market supported by strong tourism sector in region.	• Poor mining methods by SSM threaten stability of current workings; • Acrimonious relationship between ASM and LSM; and • Regional economy dependence on tanzanite.

The Mtwara Development Corridor

Strengths	Weaknesses
• Wide range and extensive mineral resources; • Regional market; • Regional power interconnectivity; and • Membership to the SADC regional economic block.	• Limited regional experience in exploitation of some resources; • Lack of supportive infrastructure; and • Limited skilled and experienced labour force.
Opportunities	**Threats**
• Regional development of infrastructure; and • Integration to SADC and NEPAD industrial development strategies.	• Political will among the member states; and • Credit crunch.

The Kabanga Nickel Project

Strengths	Weaknesses
• Extensive and high grade nickel resources; and • Extensive nickel mining experience from proprietors.	• Remote location; • Limited access to power & communication infrastructure; • Poor transport infrastructure; and • Limited skilled and experienced labour force.
Opportunities	**Threats**
• Development of railway link to Kigali through the project area; • Construction of a 300km power line from Shinyanga to Ngara; and • Upgrading and maintenance of a road linking the project site to the Kahama – Ngara highway.	• Instability in the Great Lakes region; • Nickel fundamentals shaken by prospect of global economic recession; and • Credit crunch.

Section Nine: Conclusions and Way Forward

This study supports the argument that Tanzania's mineral sector has a great potential to engender broad-based growth and development in the country. This is underpinned by the diversity, quantity and quality of its resource base. However, to unleash this potential, the country would have to take proactive actions in several fronts, including: continued investment to improve the level and the quality of the country's geological and mineral inventory data; deploying resource rents smartly into the expansion of physical, human and social infrastructure; unbundling the sector to identify entry points for maximizing local participation, boosting employment of local labour and increasing local procurement of goods and services; operationalizing development corridors (Appendix 1) to open up other sectors of the economy and maximize resource sector linkages by improving the mapping and identification of potential areas and anchor projects and establishing the required institutions to manage the corridors; developing specialized skills and upscaling research and development and technology innovation to transform the resource-based comparative advantage into a knowledge-based competitive advantage that facilitates economic diversification.

The quality of government institutions in policy making, strategy setting and monitoring and evaluation is key to maximizing the development and transformative potential that the mining sector in Tanzania offers. The country lacks an integrated resource-based industrialization and development vision and strategy. This should receive urgent attention. The Nordic countries provide ample good practices on how to use natural resources to build strong and competitive economies, which Tanzania can replicate, taking into account the local context, development trajectory and conditions.

Specifically, the following areas of concern should merit special attention by the government:

Infrastructure: Most infrastructure projects being currently implemented in the country, especially road infrastructure, have not targeted areas with mineral potential. As a result, investment in bulk minerals, especially industrial minerals and heavy metals that require an effective transport network, is being withheld. Furthermore, the development of the second most productive goldfield in the country, i.e., Chunya goldfield, has failed to attract large investments due to poor infrastructure. Equally, the lack of a railway linking southern Tanzania coal deposits to Mtwara port has hindered development of those deposits. Moreover, most operating mines self-generate power by using diesel-powered generators. This is more expensive than the power supplied by the national grid and increases mining production costs. Individual mining companies have also been forced to invest in the extension of the national grid power lines, adding additional costs to their projects. Limited water supply has forced some mines to construct pipelines over distances of up to 50 kilometers. Over the project life, these investments by individual companies limit the revenue that the government could collect. To promote mining cluster development in Tanzania, the infrastructure gaps discussed above need to be addressed. This could be done through spatial development initiatives, where the mining sector serves as the anchor project.

Skilled labour: The lack of skilled labour in the country limits the potential for developing mining-related industries and diversification of the economy. Foreign labour has to be recruited to fill the gap, thus limiting direct participation of locals in the mining sector. Most of the gold that is produced by small-scale miners and the large-scale operators are exported without any value addition. Similarly, most of the gemstones and diamonds produced in the country are also exported in rough form. In 2004, the government introduced regulations that are aimed at encouraging the development of the value-adding sector. The new regulations imposed a royalty of 5% for export of rough stones while the cut and polished gemstones can be exported without royalty. The impacts of these regulations have already been seen with the development of new

lapidaries in Arusha for gemstone cutting and polishing. Similar strategies are needed to encourage the development of value adding industries in the country. In addition, the development of skills would assist small-scale operators to extract and process lower grade ores and thereby extending the life of mines.

Environment for cluster development: Under the current dispensation, there is a lot of mistrust between small and large-scale mining operators, dealers, brokers, public officials and the public at large. Most of this mistrust is due to lack of accurate flow of information between mining operators, officials and the rest of the public. This also affects the development of businesses around mining areas as the local business community, producers, suppliers of various commodities and others are poorly informed of the supply needs of the mining companies. On the other hand, the mining sector operators, especially the foreign companies, are poorly informed about the capacity of the local businessmen to supply goods and services to their mines. In order to create an environment that will stimulate the development of clusters around mining areas, specific strategies aimed at promoting a better flow of information and building partnerships and good relations between mining companies and other stakeholders need to be put in place.

Promotion of local producers: Most inputs to the mining sector in Tanzania are imported. This is due to poor capacity of the local manufacturing industry. Certain consumer products that are found locally continue to be imported by mining companies due to the poor production methods, poor packaging, and quality control methods of local producers. The fiscal incentives accorded to mining investors, have also been found to encourage importation of consumer products even if they are found locally. Promotion of the local manufacturing sector to enable it adopt modern production techniques, improve quality in packaging, marketing and other techniques would strengthen and improve inter-linkages between the mining sector and the local economy. Producers of agricultural and animal products located close to mining companies, if promoted through training in business techniques, could play a big role in the development of clusters around the mining area.

Industry sector cooperation: Cooperation between mining companies is still limited. Most companies operating in Tanzania, although members of the Chamber of Minerals and Energy, still procure goods and services individually with limited sharing of information. In addition, interaction between the mining sector and other industry sectors is still limited. Similarly, there is no cooperation between suppliers of goods and services to the mining companies. This might be due to the infancy of the Tanzanian mining industry. The Tanzania Chamber of Commerce, Industry and Agriculture (TCCIA) needs to be an active player to address these shortcomings.

Research and development: Although the country is known to have abundant resources of industrial minerals, poor infrastructure and lack of research and development capacity for its utilisation results in the importation of most industrial minerals. This includes most processing inputs used by the large-scale mines, pharmaceuticals, paint and other industries. The government should aim to promote research and development through the existing local institutions on the use of locally available industrial minerals. Some of these industrial minerals, e.g., kaolin, gypsum, limestone, clay and others are mined by small-scale miners and target small-scale consumers. Research and development on the processing of these materials to meet quality demands of the mining sector would help to improve production of these materials and reduce importations.

Funding for small-scale miners: Lack of formal credit facilities for the small-scale mining sub-sector has greatly hindered the development of orderly mining and mineral trading activities. Most claim holders do not even think of seeking loans because they know they would not qualify. This needs to be addressed in an institutionalised manner if the ASM sector is to play its rightful role in promoting development, especially

in rural areas. Current available sources of funding, namely through informal channels, lock artisanal and small-scale miners into dependency because of the exorbitant terms on which the loans are provided. Formal financial institutions need to be educated about ASM. Government institutions and development partners have to step in to reduce risks on ASM areas by doing more exploration work. In addition, a savings and investment culture has to be promoted among the most successful ASM miners. The cases of successful tanzanite miners in Arusha testify the importance of this.

Legal framework for ASM-LSM cooperation: Although the current mining policy recognises the significance of improving cooperation between small and large-scale mining operators, the existing legal framework has provisions that inhibit certain levels of cooperation. According to the provisions of the Mining Act of 1998, a licence holder cannot tribute part of his/her lease to a third-part operator. As such, large-scale mining companies, which want to set aside part of their leases for ASM operations, have to request the government for special considerations. In order to foster easy assistance to ASM by the large mining companies, the legal framework should be reviewed so as to provide for easier and transparent cooperation whilst protecting the rights of the licensed operators.

Legal framework for local supply of goods and services: Although the Tanzania Mineral Policy, 1997 recognises the need to integrate mining into the national economy, the strategies laid out to date are mainly aimed at promoting value addition of mineral products. As mentioned earlier, the country needs a broader and integrated resource-based industrialisation vision and strategy. Initially (Phase 2 of Fig 8.1), this should be aimed at encouraging and developing the capacity of local suppliers of goods and services for the mineral sector and promoting local production of mining inputs, which are currently being imported. This has to be supported by an adequate legal framework and stimulus package.

Institutional set up and capacity: The current institutional set up for the management of the mineral sector in Tanzania aims at increasing outreach to licensed operators. As such, the Ministry of Energy and Minerals has offices located strategically in all areas with known mineral potentials. There are currently 8 Zonal offices through which there are also 14 district (Resident) offices. The number of Resident offices in a zone is related to the level of mining activities in that area. For example, the Lake Victoria Goldfields, which has the highest level of mining activities, has two Zonal office and four resident offices. Although the number of offices looks adequately located, they are not adequately staffed and equipped. Although all Zonal offices are managed by an experienced geologist or mining engineer, they lack supporting staff to carry out day to day monitoring and enforcement of the laws. Un-experienced engineers and geologists and sometimes technicians man the resident offices. As a result, the enforcement of the mining legislation is poor which causes a lot of complaints from the communities and mining companies alike. Strengthening of the Zonal and district offices should be prioritised.

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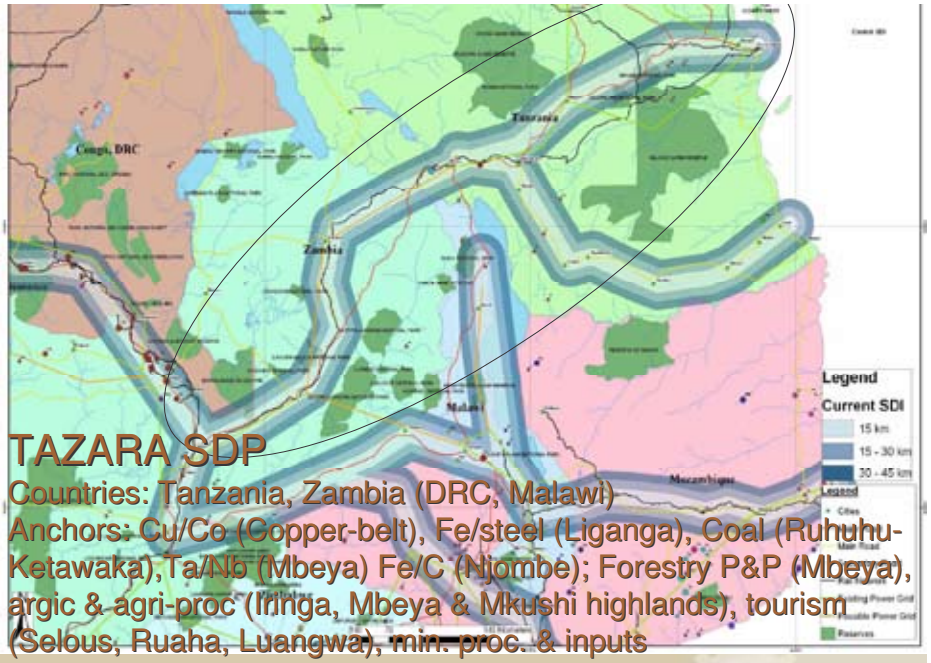
Appendix

The Central SDP

Central SDP: Dar to Kigali (Kisangani?) RSDIP
Countries: Tanzania, DRC,Rwanda, Burundi
Anchors: Nickel (Kabanga), Gold (Mwanza Au Belt), Ta/Nb (DRC), agriculture & agri-industries, fishing/aquaculture, tourism
Infra: rail upgrade & ext., port upgrade, road net., elec gen & grid

Source : Paul Jordan

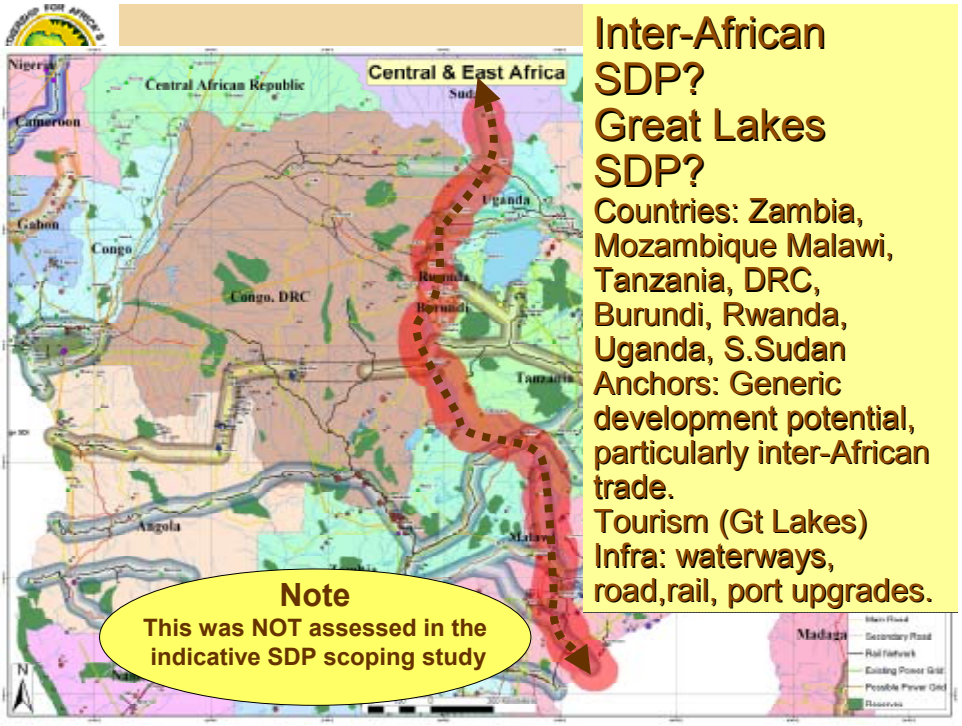
The Tazara SDP



TAZARA SDP
Countries: Tanzania, Zambia (DRC, Malawi)
Anchors: Cu/Co (Copper-belt), Fe/steel (Liganga), Coal (Ruhuhu-Ketawaka),Ta/Nb (Mbeya) Fe/C (Njombe); Forestry P&P (Mbeya), argic & agri-proc (Iringa, Mbeya & Mkushi highlands), tourism (Selous, Ruaha, Luangwa), min. proc. & inputs
Infra: rail, road net.

Source: Paul Jordan

The Inter-African SDP



Source: Paul Jordn