

The Proposed Gemstone Centre and its Likely Impacts on Small Scale Mining Industry in Taita Taveta County

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Abstract— Plans are at an advanced stage to build a Gemstone centre at Voi in Taita Taveta County by the National government. This is a major development that will transform the gemstone industry forever. This Gemstone Center will address the thorny problems of the industry that have been arresting its breakthrough once and for all. This Gemstone Center will provide a wide range of services including gemstone banking, state of the art gemstone laboratories, gemstone buying centre, gemstone cutting and polishing laboratory, among others. This will enable the Artisanal and Small-Scale Miners access international markets within their locality. Consequently, it is likely to eliminate a number of players along the value chain and cut out the current cartel of landlords and brokers ensuring more income to artisan miners. Since Artisanal and Small-Scale Miners (ASM) have been informal they often form partnerships with brokers who act as ‘supporters or sponsors’. This was evident at Mkuki, Kasigau and Alia gemstone mines. The brokers would provide the miners with food, water, mining equipment, contingency funds and any other relevant item critical to the process of mineral exploitation. Most of these brokers are exploitative as they get a large portion of the sales from the gemstones, since they are accorded the rights to sell the gemstone leaving only a small percentage to the actual hands-on miners. The benefit-sharing between the miners and the brokers in most cases is tilted towards the later. Hence this study seeks to examine the possible impacts of the Gemstone Center to the gemstone industry in the county with regards to the value chain and commercial interactions. The information provided was collected in the month of November 2014 which involved interviewing a number of the stake holders

Keywords: Gemstone Center, gemstones, brokers, landlords, laboratories, cutting and polishing, interventions, donor, ASM

I. INTRODUCTION

The management of extractive industries is one of the most critical challenges facing many resource-dependent developing countries today. Rather than stimulating broad-based economic development, reliance on resource extraction has tended to concentrate wealth and power in the hands of a few. It also exacerbates corruption and inequalities leading to environmental degradation and pollution, while doing little to reduce poverty, economic disparities and generate employment.

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According to government estimates, extractives currently contribute just 1% to Kenya’s GDP and in terms of total export revenues it is less than 2%. This contribution is set to grow significantly (current estimates suggest the sector may grow to 10% of GDP) and the opportunity to use the sector to catalyze transformational national development and economic growth requires careful planning at this critical and early stage [1, 2]

Kenya is well known for gemstone mining; however, the small-scale (artisanal) miners dominate the industry. Artisanal mining accounts for over 60% of annual gemstone production in Kenya; women and youth play a major role in artisanal mining. Artisanal and small-scale mining (ASM) directly and indirectly employs a number of people in Taita Taveta County (TTC) on temporary basis. This income generating activity by the ASM plays a very important role by providing vocational jobs that sustain the livelihood of the population. The economic impact on the county and the national economy at large is significant as a large proportion of national gemstone mining production comes from ASM sources. It is difficult to obtain accurate information on exact ASM numbers in the county, given that it is considered informal or illegal in nature. ASM population continues to grow in the county.

In 2002 Kenya had an estimated production of 10.9 tones of Ruby corundum (5.86 tones in 2001) and 61.4 tones of gemstones compared to 73.3 tons in 2001[1]. There has been a decline in Kenya's gemstone mining industry recently; with the same traditional players continuing to dominate the sector. It is this critical role played by the sector that necessitates a deeper understanding, analysis and appreciation of its socio-economic impacts in Taita Taveta County.

Conflicts over land endowed with minerals have been reported in the gemstone areas of TTC. The potential areas for gemstone mining are usually grabbed by prospectors who are large-scale miners (LSMs) to the detriment of the ASMs Trading relationships in ASM can be complex. Often a purchaser also fulfills the role of creditor and may have a degree of control over the workers through remoteness, indebtedness or threat. Alternatively, the purchaser may be the preferred trader based on loyalty and a value-adding relationship. Some interventions seek to remove the middlemen and traders from the ASM supply chain in order to improve the return to the miners; however, caution is required as supply chains such as these have evolved to operate within their context and attempting to change them may have

unintended negative consequences; may be resisted; or the change may be unsustainable. A weakness in ASM is the lack of technical facilities and organization within the sector. Formalization of ASM could improve representation to government and the market; strengthen price bargaining; allow pooling of resources for credit and development; and help to achieve economies of scale. Establishment of state-of-the-art gemological facilities will greatly improve the livelihoods of the population and increase revenue to both county and national government.

It is with this in mind that the County Government of Taita Taveta has allocated one (1) acre of land to the Ministry of Mining for the purpose of setting up a gemstone Centre for gemstone value addition before marketing.

The National Government through the Ministry of Mining has also set aside thirty (30) million shillings (\$333,000), in its 2015 annual budget, for the construction and equipping of the Gemstone Centre.

II. STUDY AREA

This scoping research which was funded by UNDP in collaboration with the Taita Taveta county government was carried out between August and October 2014 in the county.

Taita Taveta County lies in the south-western part Kenya's coast. It is bounded between longitudes 37° 30' 00" and 39° 30' 00" East and latitudes 2° 30' 00" and 4° 30' 00" South. It is approximately 200 km northwest of Mombasa and 360 km southeast of Nairobi. It borders Makueni, Kitui and Tana River Counties to the North; Kilifi and Kwale counties to the east; Kajado County to the Northwest and the Republic of Tanzania to the Southwest

The county has an undulating and rugged terrain with an altitude ranging from 500 m to almost 2,300m above sea level with Vuria peak being the highest. The rainfall varies according to the terrain with the lower zones receiving an average 440 mm of rain per annum and the highland areas receiving up to 1900 mm of rain

The population of the county 30 years ago was approximately 45,000 persons but this has shot up to well over 284,657 persons (2009 census) with population densities ranging from 3 persons per km² to more than 800 persons per km²

The county covers an area of 17,083.9 km² (6,596.1 sq mi) of which a bulk 62% or 11,100 km² is within Tsavo East and Tsavo West National Parks. The remaining 5,876 km² is occupied by ranches, sisal estates, water bodies such as Lakes Chala and Jipe in Taveta and Mzima springs, and the Hilltop forests which occupy less than 100 km² or approximately 10 km² out of 587.5 km².

The lowland areas of the county that do not belong to national parks are divided to ranches, estates and wild life sanctuaries. The county has approximately 25 ranches. The main land use in ranches is cattle grazing. The three operating sisal estates of the district are the Teita Sisal Estate, Voi Sisal Estate and Taveta Sisal Estate. The ranches are also used for wildlife conservation and tourism. The famous Taita Hills and Saltlick Lodges sanctuary are located in the county.

The economic activities practiced in TTC by the local communities are livestock keeping, small-and large-scale mining, small-scale subsistence farming and small- and micro-enterprises and/or businesses. Some of the people are employed in various public and private institutions in the County.

In 2007, the Taita-Taveta District was split into two districts: the Taita District and the Taveta District. The two were subsequently merged to form Taita-Taveta County. This consists of four constituencies namely, Voi, Mwatate, Wundanyi and Taveta. There are 20 county wards which include Mwanda/Mgange, Werugha, Wumingu/Kishushe, Wundanyi, Mwatate, Bura, Chawia, Wusi/Kishamba, Sagala, Kaloleni, Kasigau, Ngolia, Mahoo, Bomani, Mboghoni, Ronge, Mbololo, Marungu, Chala, and Mata.

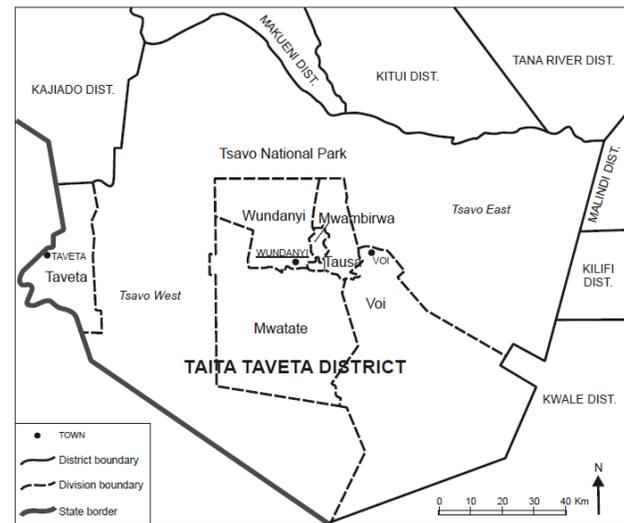


Fig. 1: Location Map of the Taita Taveta Districts

A. Geology of Taita Taveta area [4]

The Taita Taveta area is situated within the Mozambique Belt, a major structural/metamorphic unit which extends along the African east coast from Mozambique and Malagasy into the Sudan and possibly as far north as Egypt and Arabia; it represents one of the fundamental geological features of Africa [6]. The belt consists typically of high-grade metamorphic rocks, characterized by K/Ar-ages of 400-600 m.y. [5]. Three major units were recognized in southern Kenya [4].

Relics of older-metamorphic basement occur as wedges and slices of charnockites and granulites, tectonically emplaced within meta-sediments. Variegated mio - geosynclinal meta-sediments, consisting of marbles, quartzites, graphite and kyanite (-sillimanite) gneisses and schists, biotite (-hornblende) gneisses and amphibolites which were deposited as a sedimentary cover with volcanic intercalations upon the basement.

Eu-geosynclinal meta - sediments are considered to be represented by a thick suite of monotonous meta-greywackes (quartz-feldspar-biotite-hornblende gneisses) with bands of ortho-amphibolites, termed "Kasigau Series" immediately to

the east of the Taita area [3,6]. This unit probably was deposited on a continental margin.

Facies transitions between the two series suggest approximate time equivalence. The present contact between the two groups is apparently concordant. It is marked by lenses of meta-dunitites, peridotites and –basalts possibly representing dismembered ophiolites along a –regional thrust.

B. Economic Geology

Geological reports of surveys carried out at different times in this region show the presence of mineral deposits in the County and the neighboring areas. A report by Horkel [4] shows that parts of TaitaTaveta County has high and middle value gemstones including: Tsavorite (green garnets), red garnets, ruby, change colour, blue sapphire, pink sapphire, green tourmalines, yellow tourmalines, rhodolites and kyanites. The main gemstone mining area in Kenya is in the Tsavo region, which derived its name from tsavorite [3]. Many small mining operations are located along a fault system extending from the Taita Hills of Kenya to the Uмба Valley in northern Tanzania, passing through the Tsavo, Kasigau and Kuraze areas. This is where Campbell Bridges discovered tsavorite in 1971 and where his company continues to carry out mining. TaitaTaveta County is currently the main source of Tsavorite in the world.

Rubies are associated with ultramafic rocks while *greengrossularites* (“Tsavorite”) is strata-bound. Other gemstones include *blue zoisite* (“Tanzanite”), *andradite*, *Red spinel*, *turquoise*, and *Amethyst*. The production of graphite, particularly from the Chawia deposit may also prove economically feasible. Less promising mineralization, mainly with a potential for domestic markets, are magnesite and asbestos occurrences in ultramafic bodies or kaolin and magnetite deposits. The development of bulk commodities such as marble and structural stone depends mainly on an adequate local market potential.

Marble is available for quarrying east of Mwatate on a small scale. Owing to a high Mg (Magnesium) content, the rock is not suited for the manufacturing of cement, but merely for burning to produce lime, and as dimension stone or aggregate. Small quarries for basalt, gneiss and lapilli supply the local requirements for road metal and aggregate. Ample resources of these low-value bulk commodities are readily available for development if required by increased local demand. Building stones (tuffs) are currently being quarried near Taveta town and there is a potential for further expansion if more resources are invested and the demand is right. There is sufficient supply of sand to satisfy the needs of the area and even surplus to sell to the neighboring counties [4, 5].

Taita Taveta County is therefore endowed with one of the richest minerals deposits in Kenya and the Eastern Africa region [4, 7, 8] These include both industrial minerals and gemstones, which have the potential of generating considerable wealth to various mining prospectors and investors [9]. But this wealth does not trickle down to the local people. This wealth continues to benefit middlemen, brokers and other players along the supply chain while poverty in the

county continues to spread unabated [7]. Furthermore, the mining is often carried out without clear government regulations, support and control [7].

C. The Relevance of the Study

Due to its importance as a location of minerals, particularly gemstones [8], considerable information exists about mining in Taita Taveta County. However, most of the research and publications address the natural science and geological issues, since they are driven by prospector, investor and trade interests. Consequently, little has been published about the political, economic, social and environmental impacts of mining in the County. So this study was commissioned to analyze the dynamics and value chain of the gemstone industry with the main of assisting the stakeholders, policy makers and the donor community to formulate effective interventions where and when necessary.

This calls for further research focused on the, economic, social and environmental perspectives and the benefits that would be accrued from proposed developments in the sector. Critical here is the need to include the relationship between the people of the mining areas, the environment and the mineral resources. Such research would also sought to explore more cogently why local people continue to be losers in the exploitation of the mineral resources in their ancestral lands and how the proposed gemstone centre will help reverse this. Given that Taita Taveta County is endowed with abundant minerals it was important to find out the likely impacts of the establishment of this centre as major game changer in the area.

It is also important to estimate the benefits that will be accrued from an industry that is reputed to make billions of shillings in profits annually as revenue, and whether the current policy, regulatory and legislative framework in the Extractive Resources Industry (ERI) adequately address the issues of royalties and benefit sharing between the investors, communities and government, as compared to best-practices from other countries with natural resources. So there is need to determine why the industry and trade in minerals has not brought about the development of local communities around mining areas [9].

III. MATERIALS AND METHOD

The study materials and data were gathered in the period of September-October 2014 in the county. The empirical materials consisted of RPA (Rapid Rural Appraisal) and in-depth interviews, unstructured interviews, questionnaires and desk references, literature review of existing information, reports, journals and field observations as well as review of relevant Kenyan laws on mining. The field studies began by an excursion as part of the RRA. The interviews were carried out by a team of professionals. The study mainly focused on the areas where mining is taking place. These included Chawia, Mwatate, Kasigau, Alia, Kishushe, Mkuki, Buguta, Ongoni (Voi River), Bura, Taveta and Wundanyi areas.

Information derived from this study was gathered by expert interviews, more unofficial unstructured interviews (representing RRA-approach) and questionnaires, of which the

target groups were the administrative officers of Taita Taveta County, established miners and mining companies as well as the local civil society and whistle blowers.

In addition to these interviews, the research team held several informal discussions, or unstructured theme interviews of which the most valuable took place with the TaitaTaveta County governor H.E Eng. Mruttu, some members of the county assembly, mining committee especially the chairman Mr.Mwangola, experienced and long serving miners, brokers and opinion leaders. The Principal of TTUC Prof Boga and Chairman of Mining and Mineral Processing Engineering department TTUC Mr. Ndegwa added value to the study since the institution has been involved in providing solutions to the mining industry. The current government regional geologist, Mr. Omito, provided critical information and guided the research team in field excursions. The team also worked closely with the acting County Executive Committee (CEC) Member in-charge of the Ministry of Mining, Environment, Wildlife and Natural Resources, Ms. Pamela whose input and information regarding the industry was invaluable. The questions were open-ended to elicit broad insights from the respondents on the extractive industry in the county, the activities of their organizations, the challenges faced and their recommendations.

In total, over 150 (Table 1) artisanal miners were interviewed, 20 local brokers and 10 key small scale miners namely; Musa G. Njagi, Gabriel Mcharo, Miceni Musa, Edith Lewela, Joseph Mtwandei, Major Mtongolo, Jared Nzano, David to mention just a few, were also interviewed in-depth.

Table 1: Proportion of mining activities in study area

Miner category	Total interviewed (%)
Gemstone Miners	74
Building stone miners	20
Sand and other miners	6

This study attempted to use both probability sampling and non-probability sampling during selection of the artisanal and small-scale miners as well as brokers and other stakeholders.

The study involved both quantitative and qualitative methods. However, more emphasis was put on qualitative field data collection. The aim was to generate living data on mining in Taita Taveta by interviewing the stakeholders in the mining industry in the area.

The past media coverage of the mining activities in TaitaTaveta County and the associated political dynamics were also examined to highlight the socio-political nature of the industry and the ensuing conflicts.

The collected information from the questionnaires and interviews as well as the documents received from the key stakeholders were analyzed using standard statistical methods with the aim of presenting an accurate and unbiased assessment of the issues affecting the sampled population.

A. Numbers of ASM Workers and Dependents

It is notoriously difficult to collect accurate information on this sector given its informal and unregulated nature,

seasonality, migration, use of ASM as a supplementary or back-up income source, etc. However, it is generally agreed that ASM is growing and this is an invisible income generating activity. According to the national government's records there are 512 recognized mining allocations most of which are licensed and two operating on government leases namely Bridges Exploration Ltd and Rockland (K) Ltd. Of the 512 licensed miners a number of them are out of operation due to various reasons ranging from attrition, financial problems, conflicts and other personal problems.

Apart from government records we were able to get lists of members of a number of mining associations and self-help groups (Table 2). The estimated the number of dependants can be computed by using the 2009 population and household census which gave an average of 6 persons per household. Assuming each member of the associations identified below represents one household and that each has children, then the number of dependants can be estimated by multiplying the number of members by six.

Table 2: No. of people directly or indirectly dependent on mining

No.	Name of Association/Co.	Est. No. of Members	Est. No. of dependants(multiply 6)
1	Mkuki Mine	140	840
2	TaitaTaveta Women Mining Group-Alia	300	1,800
3	MuunganoGwaloli Mining Group-Buguta	150	900
4	TimboMlimani	400	2,400
5	TimboKubwa	150	900
6	Lukundo Mine	100	600
7	Alia Mining C.G	234	1,404
8	Licensed miners	512	2046
9	Rockland (K) Ltd	41	246
10	Bridges Exploration	6	36
11	Tsavolite Mine	41	246
12	Ongoni area-Voi River(sand)	50	300
13	Wanjala Mining-Kishushe	600	3,600
14	Mama Mercy Miners	200	1,200
15	Others	300	1,800
	Total	2,684	19, 344

This is a very rough estimation which excludes miners that do not belong to any association and operates on many assumptions. But even going by this alone, one can get an impression of the sheer size of people who directly or indirectly depend on this industry. This is considered an underestimation and therefore a much larger number of people are supported by the extractive industry in this area.

B. Stakeholders' Workshop

After the completion and compilation of this study a stakeholders' workshop was held between 15th and 19th December 2014 to disseminate the study findings and receive feedback from the participants. The mining communities were represented by different groups and/or individuals involved in the study.

C. The Current ASM Methods, Processing and the Value Chain

Artisanal and small-scale mining is carried out in many different ways depending on tradition, geology, geography, the nature of the minerals, and available resources. Prospecting and exploration are usually done in the most basic manner and uses a mix of tradition, opportunism, rumors, observation and luck, all these techniques being refined and perfected over a period of time. The main indicator of presence of mineralization is alluvial deposits which the miners first dig up and then follow underground.

Over time, artisanal miners have developed an understanding of the local geological formations in which these gemstones occur and this has acted as their guiding principle in the prospecting and digging operations. Very few if any, mostly small-scale miners with access to geological information, employ the use of formal prospecting in their mines. Lack of information and therefore a lack of in-depth understanding of the geology of these gemstone mining areas hinder the efficiency of mining as most operations essentially amount to trial and error, wasting a lot of time, effort and resource.

Mining operation of any Ore body can either be underground or surface, and it ranges from manual to mechanized. Gemstone mining also follows this trend, most of it beginning from alluvial deposits on the surface and then advancing underground depending on the mineralization. Alluvial deposits of gemstones were a common occurrence in the early days (60's, 70's, 80's) when the sector was budding with only a few people involved, but with more and more players coming into the picture, it is very rare to find alluvial gemstones these days. Most gem mining is done underground at present with mineralization tending to occur deeper and deeper in the ground as near surface deposits become exhausted.

Mining of these deposits is a tedious undertaking given the effort required to break rock and primarily involves the use of hammers, chisels, shovels and buckets and in some advanced cases drills, compressors, explosives and excavators. Artisanal miners usually apply the most basic of techniques to laboriously dig up box-cuts then tunnels underground as they follow mineralized reefs/zones.

Loose soil normally forms the overburden but this soon turns to hard host rock which requires immense effort to dig through. This is done manually using hammers and chisels, pneumatic rock drills and aided in some cases by prior blasting to loosen the rock. Tunnels dug out in this manner in some instances go more than 50 meters underground, with diameters large enough to allow crawling or crouching as one

goes in. Adequate space is, however, provided at the work front to allow for digging and movement of material. Waste rock is usually removed manually using shovels and buckets or sacks but as the tunnel gets deeper, removing waste becomes a tedious task; with most miners preferring to spread it on the tunnel floor or collecting it in one area.

Small-scale miners employ more or less the same method of mining, the only difference being that they are able to employ machinery such as excavators, generators, water pumps etc. This enables them to mine in a relatively more planned and structured manner as compared to artisanal miners owing to more information, better prospecting and a larger pool of resources. In both cases, support of the mined out areas is not of much concern to the miners as they deem the host rock to be competent enough to support itself, though few pay attention to the fact that it is dangerous especially during the rains.

Most of the gemstones once mined, usually do not undergo any form of processing or treatment. They are just separated from the surrounding rock which they are normally associated with and thereafter sold as just raw or uncut stones to brokers who frequent mine sites, or in nearby towns of Mwatate and Voi. However, few brokers or experienced artisanal miners attempt to add value to the gemstones. A simple process may involve: separation (sorting after extracting the gemstone) this is done by hand, washing (using water) and shining (using glycerin).

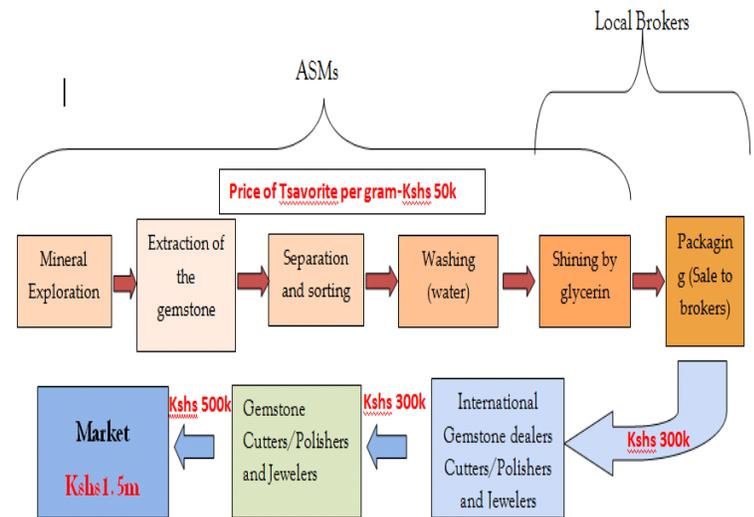


Fig 2: Estimated increase of Tsavorite prices up the value chain

(The prices stated are for a good quality Tsavorite per gram in Kshs just for illustration and are rough estimates)

The activities involved at every stage of the value chain may be presented as shown below.

D. Royalties

The law provides that royalties are paid for all minerals. The rates of royalties are negotiable within the commonwealth countries' rates.

From the mineral export data acquired from the Ministry of Mining, the gemstones from Taita Taveta County significantly

contribute to Kenya's foreign income earned from minerals - about 25%. Most of these gemstones are mined by ASMs. The royalties paid by the exporting companies, operating in Taita Taveta County, are noticeably small compared to the earnings as per the available data. Out of a total of Kshs115,851, 273 earned from gemstone exports only Kshs 5,125,485 or 4.42% was paid as royalty. These earnings do not trickle down to the county creating discontent and resistance to the mining activities within the local community.

IV. THE ESTABLISHMENT OF GEMSTONE CENTRE IN TAITATAVETA

A. Introduction

The idea of building a Gemstone in Taita Taveta County has been a subject of discussion by the stakeholders for a while now. The need to maximize on the benefits accrued from the mineral resources from the area has been the driving force behind this. The country's inability to process the gemstones has for long denied the industry commensurate earnings thereby benefiting foreign companies disproportionately.

The Ministry of Mining recently created the Directorate of Mineral Processing and Value addition and the first assignment for the department is to establish the Gemstone Centre. A number of stakeholder consultative meetings have been held and the program is ready to proceed.

The objective of this paper is to postulate the likely socio-economic, environmental, and political impacts of this proposed centre, given the number of people directly or indirectly depending on this sector. Based on the field study and experience in the industry, the paper will also endeavor to give recommendations on how best this critical program may be implemented for the realization of maximum returns. To do this we need to first appreciate the general organization, structure and services that will be provided by the centre

B. Objectives of the Gemstone Centre

The anticipated establishment of the Gemstone Centre in Taita Taveta has the objectives of:

- i) Ensuring value addition on the gemstones to increase income for artisanal Miners and revenue to the government
- ii) Providing avenue for marketing of cut gemstones to potential buyers
- iii) Providing training in gemology and academic research
- iv) Combating smuggling of gemstones across our Kenyan border
- v) Storing data and information on production and exports of gemstones in Kenya

C. Land Allocation

The County Government of Taita Taveta has donated close to one (1) acre land for the Gemstone Centre within the Voi Township to the Ministry of Mining for the establishment of the Centre.

D. Resources

The government of Kenya through the Ministry of Mining has provided in its budget thirty million (30,000,000/=) towards the establishment of this Centre in the Financial Year 2014/2015. Of this amount, twenty million is set aside for the building while ten million will be utilized for the purpose of buying equipment for the Centre.

The Ministry of Mining will provide contracted expertise and labour for the construction of the building and for equipping the Centre.

Personnel to manage the Centre on day to day basis will be provided by the Central Government through the Ministry of Mining. The County Geologist resident in Taita Taveta County will coordinate and oversee much of the activities relating to the operations at the Centre.

E. Design of the Building

It is envisaged that the building shall be storey type to save on the scarce land so that space may be available for other activities and future expansion.

A two storey building is ideal for such a Centre to cater for the anticipated high activity around the Gemstone Centre as it is set to attract regional participation (however for the start it will be one storey due to financial constraints). The Centre will be designed with features that depict the prominent gemstones in the area. (A draft design of the Centre is here attached for further inputs and adjustments).

The construction and landscaping of the Centre shall be done by a suitably qualified Contractor, who will be selected through competitive bidding. The building will comprise various compartments that are proposed to accommodate and serve key undertakings including;

a) Lapidary

This will be the section that will deal with value addition in the Centre. The lapidary will have equipment for cutting, polishing, faceting, sawing, drilling, jewelry making and may be at a later stage heat treatment.

b) Gemology Laboratory

The laboratory to be established in the gemstone Centre should have the capability of *issuing certificates* that are recognized worldwide. For this to happen, the laboratory should be affiliated with International bodies like the Gemological Institute of America (GIA), London Gemological Association (LGA), International Colored Gemstone Association (ICA) and other gemstone bodies

The laboratory should be manned by qualified gemologists given the sensitivity associated with gemstones worldwide. It should also be opened daily except on weekends and public holidays.

The equipment that will be initially based in the laboratory products are;

- Refractometers
- Polariscopes
- Dichroscopes
- Gemological Microscopes
- Specific gravity balance

- Electron balance
- Chelsea filters
- UV and Infra-red Spectrophotometers
- Laser Inscription Machine
- Diamond testers

c) Exhibition Hall

The gemstone Centre will have an exhibition hall that will be used for exhibition purposes. According to views from stakeholders, there should be days when an open market is conducted at the Centre and gemstone dealers invited to take up booths within the Centre. Government officials should also be on standby to offer Export Permits when they are required.

The Centre should be able to conduct one international gemstone fair once in a year to attract international dealers.

d) Administration offices

The gemstone Centre should have offices for government officials and people who will be running the Centre in conjunction with or on behalf of the Government. Government should also facilitate issuance of export permits within the Centre and any other service that should be offered by the Government.

Payment for gemstone processing by mineral dealers will enhance the Ministry’s revenue collection and create more employment to Kenyans. All payments at the Centre will have to be receipted.

e) Security

This Centre should be under 24 hour surveillance of CCTV to ensure that there is security.

There should be security safes where dealers can keep their gemstones for safe keeping especially during exhibition days when they are conducting business.

The area should be under 24 hour guard by the Kenya Police or any other Security providers that will be appropriate.

Barriers and special scanners will need to be installed at the main gate in addition to the above measures taken to ensure that the no one enters the Centre with any dangerous object.

f) Banks

Allowance will be made for banking facilities in the Centre to facilitate financial transactions. This will reduce the risk Mineral Traders are likely to be exposed to after selling their.

g) Restaurant

This will provide the people at the Centre with food and refreshments to cut down on time wastage in looking for eating places. It will also contribute to total revenue collection.

h) Infrastructure

Electricity and water will have to be connected to the as required. Road leading to the Centre will be upgraded. The Centre will have ample parking space to accommodate the influx of vehicles.

i) The Gate

A modern gate with electronically controlled barriers and scanners to detect dangerous objects and substances will be constructed. The gate must comprise a room for the guards to shelter and ensure they are always present.

j) Fencing

A perimeter fence will be constructed to improve the security and control unnecessary interference

F. Time schedule for the establishment of the Gemstone Centre

The Table 3 provides guidelines for the timing of activities to be accomplished at every stage of the project. Since this is one of the flagship projects of the Ministry of Mining and is captured in the Performance Contract for this year, it should be completed before the end of this year.

Table 3: Timing of activities

Activity/Duration 2014/2015	2014				2015					
	S	O	N	D	J	F	M	A	M	J
1.Acquisition of land										
2.Develop design for building										
3.Peparation of BQs, Flotation and Opening of tenders for construction and Awarding of Contractor										
4.Hand over of site to contractor and groundbreaking ceremony										
5. Tendering/Procurement of Lapidary and Laboratory Equipment.										
6.Construction of Centre										
7.Equipping the Centre with the procured equipment										
8. Commissioning of the Gem Centre by the Cabinet Secretary for Mining										

Some money will be set aside for training gemstone cutters who will operate the machines. A Master Cutter will be sourced from India or Thailand to come and train cutters in Kenya. This will ensure that the Centre is manned by qualified personnel.

G. Stakeholders

The gemstone Centre will be fully run by the Government but will meet the needs of various stakeholders including

County Government of Taita Taveta, Gemstone Miners and Dealers, Universities and other learning Institutions, etc.

H. Operation of the Centre

The Centre will be financed and supported initially by the Government through Ministry of Mining but it is expected to be self-sustaining in the long run.

Value addition will be done by qualified cutters who will be given terms of engagement appointed Officer in charge of the Centre and the percentage of revenue to be retained by the Centre will be determined by a Board to be established.

The gemology laboratory will be run by the Government and qualified gemologist trained to operate it. Currently, the County Government of Taita Taveta has four people with Diploma in Gemology from Madagascar. These are potential candidates to work in the laboratory under supervision of a Senior Geologist or Gemologist.

I. Benefits from the Centre

The completion of the Centre is expected to set a new lease of life to the gemstone mining fraternity in Taita Taveta County and regionally.

The cutting of the different types of precious stones at the Centre will definitely add value to the stones before selling locally or exporting across the borders. Proper utilization of the Gemstone Centre will eradicate the present scenario where uncut gems are smuggled for further processing and export at higher returns to middlemen.

The Gem Centre will provide assistance to local Miners by adding value and providing ready market for them. It will enable the Government to gather data on its mineral endowment and assist in regulating this promising industry.

The Gemstone Centre is also set to become a regional precious stone business hub for the entire East African Region. It is hoped that the Centre will develop to International standards in near future.

In summary the establishment of a Gemstone Centre is set to spur economic growth through Minerals' value addition and will benefit all stakeholders in the gemstone industry in TaitaTaveta County and the Country at large.

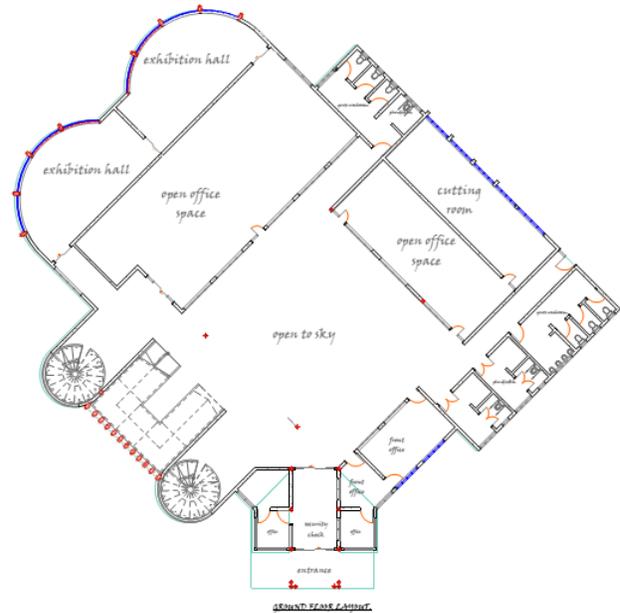


Figure 1: Ground Floor Plan of the Gem Centre



Figure 2: Second Floor design of the Gem Centre

V. THE ASSESSMENT OF THE IMPACTS OF THE PROPOSED GEMSTONE CENTRE IN TAITATAVETA COUNTY BASED ON FIELD DATA

The data under consideration was collected during fieldwork and involved approximately 150 ASMs that were actively involved in mining. The respondents were asked to indicate their knowledge and understanding of the ASM sector and how it relates to their day-to-day livelihoods and socio-economic activities. The key area of interest to this study was to assess the challenges faced by miners and their recommended mitigation measures and how the proposed

gemstone centre will help resolve these. To get the feedback the respondents were asked to give their opinion along the following guidelines: experience, education level, market access, training needs, environment, contribution to household income and equipment requirement. The respondents were asked to rank in order of priority the importance of the foresaid areas and indicate how the proposed centre will enhance improved returns. Most of the respondents interviewed had worked as miners for a period ranging from 1 year to 46 years. Most respondents were in the 10 years bracket.

After assessing the status of ASM in Taita Taveta County a number of challenges emerged, key among them; the lack of equipment and related facilities, lack of food at mining sites, lack of water, insecurity, lack of geological skills and knowledge, exploitation and lack of better alternative market, lack of credit facilities and mining conflicts.



Figure 3: Full view of the Gemstone centre

A. Lack of Equipment

The major stumbling block to the success of ASMs in Taita Taveta County is lack of mining equipment as identified overwhelmingly by a majority of artisanal miners. Hence this issue has been isolated for attention. From field observation it was noted that due to the unique geology, and hence rock type, of the area the appropriate machinery need to be used to avoid redundancy. A good example was observed at the TimboKubwa building stone quarry near Taveta. An investor came with a building stone cutter commonly used to cut volcanic tuffs for building at Thika area (Thika Tuffs). This machine could not work here as the rock material at Taveta is harder than the Thika Tuffs. So the machine was abandoned and is now rusting away in the bush

According to field observation very few ASMs groups had received any equipment support except those in Mkuki and Kasigau ranches. Each of the two groups had received a compressor donated by the Taita Taveta County government. So, most respondents (95%) felt that the Gemstone Center will enable them to earn more from their mining activities and enable them to purchase their own equipments. As has been

highlighted in the preceding discussion the Gemstone Center will provide banking facilities that will use gemstones as collateral for loans. The Gemstone Center will provided miners with safes for depositing their gemstones; these will be used as security for loan facilities.

B. Lack of geological skills and knowledge

The study investigated whether the respondents had received any formal training relating to mining. Of interest to the study was the type of training undertaken by the miners in, geological prospecting, business, mineral identification, or Machine operation. There was also need to identify the institution of training. The respondents who had some basic training indicated they had been trained on basic gemmology and geology at TTUC.

Results revealed that 98.5% reported they had received no training while 1.5% received training on geology and gemology. Apparently no training has been conducted in business, mineral identification and machine operation, among others.

The respondents identified their preferred areas of training as follows:

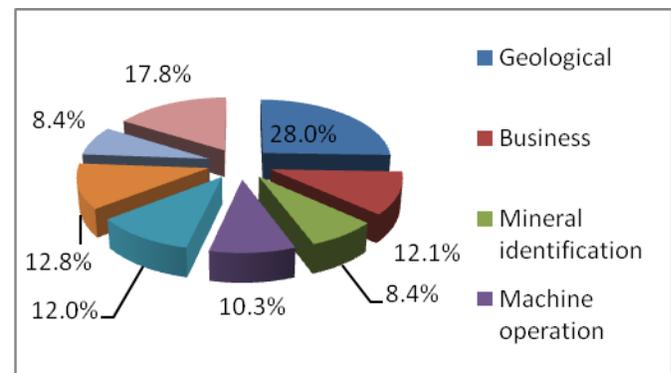


Figure 4: Preferred areas of training for ASMs, Source: raw field data

According to the findings, 28% of the respondents preferred to have training on geology, 18% opted to be trained in other areas (other includes Masonry, motor mechanics, agriculture, driving, carpentry, better sand harvesting methods, farming), 12.78% had preference for trainings in explosives and blasting, 12.14% preferred business, 12.03% preferred polishing and cutting, 10.28% preferred machine operation, 8.41% preferred gemstone and market access and 8.41% preferred being trained on mineral identification. An overwhelming (98%) majority of the respondent believe the Gemstone Center will provide all their training needs. Key among the objectives of the Gemstone Center is training. Because of its proximity to the miners this Gemstone Center will greatly enhance the capacity of miners.

C. Exploitation by Gemstone Buyers

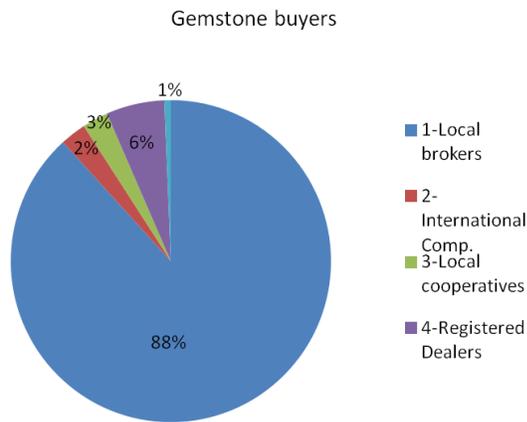


Figure 5: Gemstone buyers

From the pie chart below 92.9% of the respondents reported selling their gemstones to local brokers, 0.5% to international companies, 2.0% to local cooperatives, 4.1% to registered dealers and 0.5% to others. Most of the respondents expressed dissatisfaction with the local brokers who they felt were exploiting them due to their poverty and ignorance. In this regard the Gemstone Center was seen as a major development which will provide the ASMs direct and reliable market thereby eliminating the middlemen and brokers. Over 99% of the respondent welcomed the Gemstone Center and were very optimistic of its benefits and believed they'll not need to sell their rough gemstones to brokers

D. Miners' perception on return on value for their efforts

Table 4 represents proportion of constituencies that responded to this question

Differences were tested statistically with various indicators among constituencies at: ($p < 0.01$ ** $p < 0.05$ *** $p < 0.001$)

Table 4: Perception of value of effort based on constituency

Constituency	Is it worth the effort?		GC will improve income
	% Yes (N=15)	% No (N=162)	% Yes (N=162)
Taveta	54.3	80	98
Mwatate	35.8	20	96
Voi	9.9	0	99

*Difference between the constituencies had no significant difference at p value of 0.13

Table 4 above, shows that Taveta constituency had more miners dissatisfied with return on invested effort (80%), while 54.3%, reported value for their effort. Most respondents from Voi reported satisfaction with mining as a source of income. Statistically there was no significant difference between the constituencies in terms of return on effort from mining. In general, a high percentage across the constituencies expressed dissatisfaction with return on effort from mining. However a substantial majority (98%) felt that the establishment of the

Gemstone Center will totally reverse the sense of dissatisfaction with their mining activities. Since the Gemstone Center will give direct access to market

E. Why miners are not satisfied with mining as the main source of income

The data reveals that 53 respondents were dissatisfied with mining as the main source of income. Among these 68% expressed dissatisfaction due to low income from mining activities, 11.3% due to unpredictable markets and lack of support from the authorities while 7.5% attributed their dissatisfaction to poor working conditions.

Proportion of lack of satisfaction based on constituency

Table 5: Reasons for dissatisfaction with mining

Constituency	Why I'm not satisfied				
	% Low income	% Unpredictable markets	% Poor working conditions	% Risky	% No support
No.	36	6	4	1	6
Taveta	84.6	3.8	7.7	0	3.8
Mwatate	33.3	27.8	11.1	5.6	22.2
Voi	88.9	0	0	0	11.1
Total	68	11.3	7.5	1.9	11.3

The Gemstone Center will help motivate the miners as they will realize more returns on investment and will put more efforts in production.

F. Gemstone Prices appreciation along the value chain

Table 6: Gemstone price variations (estimates)

Gemstone Prices in Kshs	Sale of Rough stone by ASMs	Sale price by brokers	Sale price by dealers	Price of final product (to customers)
Tourmaline(1Kg)	20,000	70,000	100,000	300,000
Tsavorite(1g).	50,000	300,000	500,000	1.5m
Blue Zoisite(1g)	35,000	100,000	300,000	500,000
Zoisite(1g)	2,000	6,000	20,000	100,000
Ruby(1g)	40,000	200,000	500,000	1m

From the change in prices along the value chain it's evident that common ASMs will benefit greatly by accessing competitive prices for their rough gemstones. This means there will be an exponential growth in income to ASMs and hence increased productivity.

VI. CONCLUSION AND DISCUSSION

The introduction of this Gemstone Centre at the heart of a major gemstone region will be an historic event. This single move will transform the lives of the locals who depend on

mining for a living for ever. If managed properly the centre will change the face of Voi town as well as the entire Taita Taveta County. This centre will do to TTC what Coffee did to Kisii County in the 70s or what Mohoroni sugar factory did to famers in Kisumu County.

One of the key outcomes of the establishment of the centre will be the elimination of some key players currently controlling the market in the value chain. The local brokers stand to be the greatest losers in the new ball game. Equally affected will be the dealers whose international networks and connections have been their secret weapon. These two groups of players have been benefiting from the lack of geological and marketing knowledge on the part of ASMs so with the arrival of this centre their strategic advantage will be seriously weakened.

The demand for quality products and introduction of international best practice will improve and enhance gemstone cutting and polishing skills and craftsmanship besides increasing geological and gemological knowledge. The centre will provide facilities for training and research in gemology for the Taita Taveta University College's school of mining and engineering.

The centre will be having sections for safe keeping of the gemstones. This will provide the much needed security and hence reduce the robberies and other crimes related to gemstones.

VII. RECOMMENDATIONS

For maximum returns on investment the following are the recommendations based on the field study and lessons from other countries:

1. The centre be managed as a parastatal to avoid the pitfalls associated with government run institutions such as the government chemist, Mines and Geology Department and Materials Laboratory to mention a few. Alternatively a public-private partnership format be adopted to avoid the inefficiencies and mismanagement in the public sector. The fore mentioned institutions or laboratories were set up with very well intended, ambitious and visionary motives but over time were run down due to poor management and corruption. The institutions often fail to offer critical services to the public due to lack of require chemicals or reagents. Expensive equipment are left in a state of disrepair for years, or the personnel manning the laboratories are not motivated and hence are inefficient or the lengthy bureaucratic procurement process holds decisions and work progress at ransom.
2. Give more emphasis on training of ASMs. This has been mentioned in the program but not much seems to be in the pipeline regarding training. It's suggested that a space be set aside for training and demonstrations only within the centre. This is urgent as observed from the field study. Top in the ASM wish list is a training to identify gemstones they come into contact with on their daily activities.
3. Establish a gemstone cottage industry to make use of discarded gemstone by-products. Along with this, build superior craftsmanship culture to make the quality of the

gemstone products from the area stand out in the international market.

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