

UNIVERSITY OF KWAZULU-NATAL

**Strategies for stimulating socio-economic growth from small-scale
mining operations in Qwaqwa (South Africa)**

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DECLARATION

I Isaac Tebogo Tshabalala declare that

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ABSTRACT

The socio-economic importance of small-scale mining in a developing country such as South Africa cannot be overstated. Millions of rural people trapped in abject poverty and disappointingly high unemployment, where the availability and accessibility to natural resources like sandstone is at their doorstep should never be allowed to remain poor and starve if job creation and poverty alleviation take precedence in both local and national agendas. It is against this backdrop that this pilot case study was initiated, the primary objective of which was to recommend tailor-made strategies for developing and stimulating socio-economic growth from small-scale mining operations in Qwaqwa. In order to do this a literature review was conducted, strategically aiming at establishing what was already known and in place on the subject through prior research. The process that ensued entailed designing a systematic blue print on the process of collecting, analysing and interpreting data about small-scale mining in the area. The study used multiple sources of evidence in the form of statistical analysis of the questionnaires, personal interviews, site observations and various documents to indeed confirm the indispensable nature of small-scale mining in the socio-economic fibre of rural communities.

In order to stimulate socio-economic growth from small-scale mining, the formation of cooperatives for structured and coordinated assistance, favourable and encouraging regulations and policies, innovation, communication and publicity, product and market development strategies as well as the adoption and nurturing of small-scale mines by big conglomerates are some of the strategies postulated.

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TERMS AND ABBREVIATIONS

ASSM	:	Artisanal and Small-scale mining
BEE	:	Black Economic Empowerment
CSI	:	Corporate and Social Investment
DME	:	Department of Minerals and Energy
GDP	:	Gross Domestic Product
LED	:	Local Economic Development
JSE	:	Johannesburg Stock Exchange
MMSD	:	Mining, Minerals and Sustainable Development
MPRDA	:	Minerals and Petroleum Resources Development Act
MQA	:	Mining Qualifications Authority
NGO	:	Non-governmental organisation
RIDP	:	Regional Industrial Development Programme
RDP	:	Reconstruction and Development Programme
SAMDA	:	South African Mining Development Association
SMME	:	Small Medium and Micro Enterprise
SASSMC	:	South African Small-Scale Mining Chamber
SLP	:	Social and Labour Plan
SSM	:	Small-scale mining
SSMB	:	Small-scale Mining Board
UJ	:	University of Johannesburg
UKZN	:	University of KwaZulu-Natal

INTRODUCTION

1.1 INTRODUCTION

Unemployment in South Africa has for the last decade been and continues to be a serious impasse affecting almost everyone directly or indirectly (e.g. through its associated social ills such as crime). This situation is considered to be desperate in rural and remote communities that usually receive very little attention from the authorities because of their remoteness. In the case of the Qwaqwa community, the unemployment situation occurred in the context of vast reserves of natural resources in the form of sandstone and clay. The study explores this problem and its context, with the aim of recommending strategies to stimulate socio-economic growth from small-scale mining of sandstone in the area such that this mining sector contributes towards the alleviation of unemployment and poverty.

This chapter provides a background to the small-scale mining sector and the background to the problem. On the basis of understanding this background, a problem statement is outlined followed by the research objectives and questions before ending with highlights on the significance of the study.

1.2 BACKGROUND TO THE SMALL-SCALE MINING INDUSTRY

Small-scale mining refers to the non-mechanised, low technology and labour intensive activities of the mining sector. The sector's low cost, non-technical and in most instances environmentally unfriendly and sometimes even unsafe operations, coupled with its simple management techniques is what distinguishes it from large-scale

operations which commonly feature state-of-the-art machinery and skilled workers. All mineral types may be mined using small-scale mining regime.

In most publications on small-scale mining (henceforth referred to as SSM), academics, researchers, journalists, environmentalists and other interest groups tend to focus more on the negative impacts of SSM. This is done despite the many and varied benefits that this activity can offer. Whilst these negative impacts should obviously not be underestimated, overlooking the benefits of SSM could and has led to the introduction of policies and legislation aimed solely at addressing the undesirable effects of SSM, with little attention given to the wider and more indispensable consequences. It is after all the realizable and inferred benefits of SSM that should guide any policy formulation process and intent.

According to desktop studies conducted on the subject, SSM especially in a developing country must be viewed as a significant catalyst towards economic stimulation and development. It must be recognized as a generator of rural livelihoods, with great potentials for employment creation and poverty alleviation. About 40% of China's coal production comes from the SSM sector, thus demonstrating the value and essence of this sector to the economy of a country.

In South Africa, SSM operators are spread across all the 9 provinces, depending on the predominant minerals found in such provinces. To illustrate this point, the North West and Northern Cape provinces are ravaged by small-diggings scattered haphazardly throughout the provinces by small-scale diamond diggers. In some instances, roads in rural and farm areas had been re-routed by farmers as they continue to search for these mighty invasive stones. In Gauteng and the Free State provinces the focus by these diggers has predominantly been on gold, clay, sandstone, sand, and slate. Mpumalanga

and KwaZulu-Natal provinces are characterized by coal diggings, whilst the Eastern and Western Cape provinces produce sandstone, clay, slate and sand.

SSM operators are in most cases involved in this activity without a mining permit. Because the state is the custodian of all minerals in the absence of a legitimate claim by someone with a mineral right, SSM operators have a tendency to just start mining wherever they see the need, thus earning the title “illegal miners” in the process. However, a distinction must be drawn between people mining in most instances clay, slate or sand without a mining permit and the notorious illegal gold, platinum or diamond miners amassing wealth through all the possible illicit means. A case in point is the Barberton (Mpumalanga) and Welkom (Free State) illegal miners and resultant non-mining multiple death accidents, as well as the Potchefstroom (North West) largest diamond stone allegations, which all took place in 2007 and were highly publicized in all media forms.

SSM is a common denominator in developing countries throughout the world. This is so because rural people in developing countries have found solace and a means for survival in this prospective and low-cost activity. The number of SSM operations in the developing countries have a direct proportionality to the mineral prices (especially precious minerals such as gold, diamond, tanzanite etc) in that, as the mineral prices increase throughout the world, so does the number of SSM operations. This noticeable interest shown by all SSM communities of the developing world is a direct call for focus and attention needed in this field.

For somewhat obvious reasons, it will become difficult for any form of assistance (physical, financial, social, technical, and legal) to reach and benefit all the SSM operators if they are not known and also if they operate like silos. There is therefore a

pressing and fundamental need for SSM operators to arrange themselves into some organized structures or cooperatives so that assistance can be properly channeled to them.

1.3 BACKGROUND TO THE PROBLEM

According to figures released by Statistics South Africa for the Labour Force Survey conducted in March 2006, the official unemployment rate for the country was as high as 25.6%, with the number crunchers believing that the figure could well be above 40% if the discouraged work-seekers were also to be included. Furthermore, that research painted an even bleaker picture in rural areas where the level of unemployment was estimated to be in excess of 60%, with the majority being the youth.

Unemployment in Qwaqwa, the former Basotho homeland bordering Lesotho and KwaZulu-Natal in the eastern side of the Free State province has over the last decade been a matter of concern for the authorities. Qwaqwa was proclaimed a self-governing territory in 1974. The area subsequently experienced structural changes first as a result of the influx of the ex-farm workers from the then Orange Free State into the area after it became a self-governing Basotho homeland. The next structural changes came about as a result of industrialization of homelands under the Regional Industrial Development Programme (RIDP) of the old regime. The last structural changes were a result of de-industrialization and the subsequent increasing dependence on the informal sector and social welfare that came about with the new dispensation, Slater (2002)

Around the 1980s, Qwaqwa experienced an increasingly high influx of people seeking to take advantage of increased job opportunities brought about by the industrialization of the area. Industries that manufactured glass, ceramics, metalwork, plastics, clothing

and textiles were established in the area at the time, as postulated by Slater (2002). Industries locating into Qwaqwa received government subsidies which were aimed at slowing down the movement of blacks into the cities such as Johannesburg and Durban, by establishing local sources of employment in the homelands or on their immediate peripheries.

In later years, unemployment in Qwaqwa started to shrink rapidly as a result of de-industrialization that came about after the area was incorporated into the Free State by the new regime. The industrial development incentives and subsidies of the old government were stopped and many people found themselves jobless. As a consequence and also coupled with the major mine retrenchments during the late 1980s which were caused by high inflation, low dollar price of gold as well as unfavourable Rand/Dollar exchange rate at that time, unemployment reached a peak of 57% in 1996, as cited in the Thabo Mofutsanyana District Municipality report (2003).

According to Maluti-a-Phofung's Lekgotla report, (2005) the following statistics epitomized Qwaqwa at that time:

1. The area experienced negative growth rate of between 5 – 14% since 1990
2. In 2001, 31% of the total workforce was unemployed, 46% were not economically active, resulting in only 23% of the total workforce being employed.
3. 77.7% of household used other sources of electricity in 2000, but the figure had since dropped to 34.7% in 2003.
4. Access to sanitation improved from 64% in 2000 to 84% in 2003

5. 61% of the population did not have access to water on site in 2002, and the figure improved to 45% in 2003.

The report cited the following factors as possible reasons for this bleak picture about the area:

1. Uncertainty relating to the future constitutional position of the area after being incorporated into the Free State as part of the broader South Africa.
2. The phasing out of industrial establishment incentives
3. The reduction of central government support for development in Qwaqwa

Whilst the area had for many years been faced with high unemployment and consequential social problems such as poverty and crime, the community had been surrounded by vast reserves of economic natural resource in the form of sandstone. This resource is of sufficient quantity to bring about relief and economic emancipation, since the entire local mountain range, which forms part of the world renowned Drakensberg mountain range is made of sandstone.

For many years, the Qwaqwa community had continued to starve and fail to benefit from their surrounding wealth, probably because they did not know of today's many and varied economic benefits of sandstone, or probably because this was not appealing enough as a business opportunity. It was only in 2002 when the Department of Minerals and Energy (DME) and the Mining Qualifications Authority (MQA) started focusing on SSM with a view to identify those involved in it and legalize their operations (help them obtain mining permits), that SSM of sandstone in Qwaqwa started to be viewed by some community members as a potential business opportunity. Endeavours that ensued subsequent to that realization included a mining overview

training given to an identified group of SSM operators in the area by lecturers from the former Wits Technikon's school of mines (now part of the University of Johannesburg). This initiative was organized and sponsored by MQA. However, the community still remained in abject poverty despite such initiatives.

Sandstone is used largely today by property developers for various applications such as building and cladding. The desirable alkalinity and acidity characteristic of sandstone makes it ideal for flooring and wall-covering in chemical industries. At the time of this study unfortunately, only a few people were aware of these desirable benefits of sandstone exploitation, and therefore took the initiative to harvest it for their livelihood and sustainability. Evidence of the limited use of sandstone in the area can be seen in very isolate and rare instances (e.g. old structures such as government buildings, some churches as well as some residential properties).

Earlier inhabitants and migrants in the area built themselves simple mud houses with thatched roofs, according to Slater (2002). This was despite the above-mentioned abundance of sandstone in the area. In the modern day environment where housing has been and continues to be in the national agenda for the new regime, exploitation of sandstone by the community to accelerate the provision of housing under the government's so called Reconstruction and Development Programme (RDP) should have, under ideal circumstances been the solution to the many housing problems confronting the area's local and provincial government. This would have provided much needed jobs to alleviate poverty and stimulate socio-economic growth.

The mining of sandstone for domestic purposes such as exterior cladding is itself an old phenomenon that has been practiced by ancient communities for centuries, even though it was done on a small-scale. However, this exploitation was done for many years

without the attention, assistance and guidance that are now provided by the authorities such as the DME, and Mintek. According to Mintek (2007), the interest and the resultant efforts to stimulate economic activity from SSM were part of the government's national drive to ensure that mining was accessible and benefitted all South Africans. These matters are broadly expressed in various documents and the annual reports, posted on the web sites of these respective organizations.

1.3.1 Defining the term “Socio-Economic”

The term socio-economic is derived from a combination of two words, i.e. social and economic. In simple terms social refers to a way of living and interaction by a community or group, whilst economy is an abstraction referring to how that group or community uses the resources available to make wealth and a living for themselves. Thus, socio-economic delineates economic activity and social life of a given group or community, and it includes issues such as “community capacity development, health programmes such as human immunodeficiency virus (HIV), tuberculosis (TB), crime prevention and education and training”, according to Cronjé et al. (2005:392).

In order for a community to survive, develop and generate wealth from its available resources, it needs to develop and follow a particular game plan. Such a plan or plans are referred to here as socio-economic strategies.

1.4 AIM OF THE STUDY

The aim of this study is to develop and recommend strategies to stimulate socio-economic growth from SSM operations in Qwaqwa. In so doing, this study will also develop and recommend strategies to strengthen SSM in Qwaqwa. These will enable

SSM to contribute towards the alleviation of the area's unemployment and other socio-economic problems.

1.5 PROBLEM STATEMENT

Small-scale mining activity has for centuries been an important industry in Africa, providing rural and impoverished communities with inter alia, employment benefits and a means to survive. In Qwaqwa, the community has found itself surrounded by vast reserves of sandstone and clay, which could be exploited for the economic and social benefit of this poor community that is so ravaged by high unemployment and related social ills. However, despite this rich mineral wealth, the community has continued to starve as a result of their failure to take advantage of the surrounding wealth. Therefore this study will develop and recommend strategies to stimulate socio-economic growth from SSM in Qwaqwa. In so doing, this study will also develop and recommend strategies to strengthen SSM operators in Qwaqwa. These will enable SSM to contribute towards the alleviation of the area's unemployment and other socio-economic problems.

1.6 RESEARCH OBJECTIVES

The research objectives of this study are to:

1. Describe small-scale mining in the area
2. Uncover the challenges faced by SSM operators in Qwaqwa
3. Uncover the challenges faced by the Qwaqwa community
4. Make recommendations on strategies to develop or stimulate SSM in the area

5. Make recommendations on strategies which will enable the Qwaqwa community to benefit from their surrounding environmental wealth.

1.7 RESEARCH QUESTIONS

Questions that this research will in the end seek to provide answers to include the following:

1. How do SSM operators in Qwaqwa currently operate?
2. How do SSM operators react to the challenges that face them?
3. Why does the Qwaqwa community receive no benefit from its environmental wealth?
4. How can the Qwaqwa community and the SSM operators work together for mutual benefit?

1.8 SIGNIFICANCE OF THE STUDY

According to desktop studies conducted on SSM in areas such as Brazil, this activity was started as a means of alleviating poverty by rural communities, a view that is shared by many researchers including Kligerman et al. (2001). This notion is also shared by Kambani (2002:142), who looked at the phenomenon of “rising levels of poverty and unemployment in Zambia, coupled with the opening up of the mining industry to the private sector before concluding that such a situation created opportunities for the rapid development of SSM”. The relationship between poverty alleviation and employment creation opportunities to the extent of wealth creation and

economic stimulation in SSM is well illustrated in a Global report on Artisanal and SSM compiled by Hentschel et al. (2002).

The start of SSM in Qwaqwa is believed to have followed worldwide trends, which were as a result of people seeking relief from high unemployment and poverty, according to studies conducted on the subject. Available evidence from such studies suggests that the SSM sector had become an important source of livelihood for many thousands of rural communities. It created opportunities for the emergence of entrepreneurs in the community, as well as the development and stimulation of the small business sector.

Common views shared by many researchers, including but not limited to Babut et al. (2001), and Amankwah & Sackey (2004) on the benefits of SSM and hence the significance of the study to the community include the following:

1. It transforms unskilled labour into semi-skilled and skilled workers
2. It provides entrepreneurial skills in rural areas, which can then restrain urbanisation and its undesired consequences
3. It provides tax revenue in remote rural regions with few economic alternatives
4. It plays a pivotal role in poverty alleviation of the developing community

To the SSM operators, this study helps to highlight potentials for starting a small business, without major capital injection. It introduces opportunities for the creation of

entrepreneurs, which takes away the common tendency to want to work for and depend on others. The study gives the SSM operators an opportunity to benchmark their operations with similar operations elsewhere, which would help them become both effective and efficient, whilst at the same time giving them free marketing and publicity opportunities.

Because SSM is not technically complicated, does not require heavy and sophisticated machinery, is labour intensive and uses rudimentary processes, it creates a world of opportunities for local operators to become entrepreneurs and notable business operators.

The study of SSM in Qwaqwa also plays a significant role in terms of contributing to the body of available knowledge on the activity. Research work done by many researchers including Kambani (2002), Aryee et al. (2002) and Ghose (2002) in SSM activity in other parts of the globe has focused predominantly on the mining of precious minerals such as diamonds and gold in many parts of Africa, Chile, Bolivia and Brazil or tanzanite in Tanzania. Such studies also focused greatly on the negative aspects of this activity such as environmental degradation, mercury related problems and other social ills. This study looks at a non-precious mineral, which is of sufficient quantity and is easily accessible unlike in most instances involving precious minerals. It therefore adds to the body of knowledge in the mining aspects of large non-precious mineral deposits, whilst also adding to the body of knowledge in strategic management literature.

1.9 OVERVIEW OF THE DISSERTATION CHAPTERS

This dissertation consists of six chapters, all strategically arranged such that it starts with the identification of a research problem, states the research objectives as well as research questions. The research methodology then outlines the process of data

collection before discussing the evidence collected in light of a literature review and research process. To conclude, strategies for stimulating socio-economic growth from SSM are postulated.

Chapter 1:- (INTRODUCTION). It provides a background to the study and the area to constitute a problem statement. Both the objectives of the study and its significance in the area are also outlined in this chapter.

Chapter 2:- (LITERATURE SURVEY). Both the interpretation of what SSM is and an overview of this practice in other areas are provided in this chapter. Issues of importance are identified and highlighted in the concept matrix, the aim of which is to narrow the literature to such critical issues only. Furthermore, a critical look at strategies to develop the SSM sector and strategies used by big businesses to uplift their communities are also outlined.

Chapter 3: (METHODOLOGY). An outline of the research design and process are provided in this chapter, and the rationale for the choice of the research methodology is provided. The chapter also provides a background on the sources of evidence used to conduct the study, before it concludes with the limitations of this study.

Chapter 4:- (ANALYSIS OF DATA). It provides an analysis of the case study evidence collected in the form of statistical analysis of the survey questionnaires, analysis of the observations as well as personal interviews.

Chapter 5: (DISCUSSION, RECOMMENDATIONS AND CONCLUSION). This chapter outlines who the target audience for the case study are, and also provides a rationale for making such a determination. In the end a case overview of the research findings is outlined, where a link between the findings and literature review is provided. This last chapter also provides answers to the research questions, before outlining the recommended strategies for stimulating socio-economic growth from the SSM sector in Qwaqwa.

1.10 CONCLUSION

The last decade has been a fruitful one for the majority of South Africans, as we have experienced continued economic growth, marked by a shift from an economic deficit to a surplus position, a steady increase in GDP, as well as a 3 – 6 % inflation rate. Whilst our economy continued to grow, it unfortunately did not create jobs at the same pace. The growth was never translated into meaningful opportunities and economic benefits shared by the people on the ground, so the gap between the rich and the poor continued to widen further and skills shortage became a norm rather than an exception. This forced the government to change its micro-economic policies towards a more social orientation by increasing the social spending and advocating for people to become entrepreneurial and create their own small businesses, as opposed to hoping to get employed somewhere sometime in future.

The above-mentioned structural and social deficiencies are believed to have translated into the emergence and mushrooming of SSM operations throughout the country, as people grappled to use natural resources to make a living. Destitute South Africans residing in areas characterised by the abundance of mineral resources thus found relief in these and started exploiting them sometimes recklessly, causing a spiral of other social and environmental problems in the process.

LITERATURE SURVEY

2.1 INTRODUCTION

The theoretical issues discussed in this section are largely those that have been identified in the concept matrix, designed by Klopper & Lubbe (2005), as well as literature on the general management aspects of SSM. The concept matrix (Appendix C) is a research tool that was designed for use by research students at the University of KwaZulu-Natal (UKZN) to identify references to be used in the literature survey, from the institution's electronic resources. It is constructed by scanning the abstracts and conclusions of references obtained through searches of the UKZN's electronic databases such as Nexus, Sabinet Consortium's SACat and Science Direct. The people who designed it, Professor Rembrandt Klopper and Professor Sam Lubbe were lecturers at the Graduate School of Business at UKZN when they introduced this tool as part of their research development aides.

Whilst this project is on SSM, it is largely this activity's management aspects that are critically looked at and evaluated, with a view to ultimately recommend strategies for stimulating socio-economic growth from the sector.

A considerable effort is made in the literature survey to eliminate reinvention of the wheel through duplication of work that has already been completed. Whilst this is done, extreme caution is exercised at the same time so as to avoid compromising the ultimate purpose of this research, being to contribute to the current body of knowledge and to solve identified problems, specifically for SSM in Qwaqwa.

The literature survey conducted in this project was done with the understanding that it would assist this research to:

1. Refine a theoretical framework for the study of SSM
2. Establish connections between different research projects on the subject or its related fields
3. Familiarise the researcher with the latest developments in the field of SSM
4. Determine gaps in the available body of knowledge on SSM as well as
5. Determine the research methods that have been used previously on the subject, problems that were encountered and how these were solved.

2.2 INTERPRETING THE CONCEPT OF SSM

There are currently as many definitions of SSM as there are authors on the subject. However, many researchers and organisations involved in the subject are of the same opinion regarding the understanding of the concept as it generally refers to “small digging”. Scott et al. (1998), Castro & Sanchez (2002) and Kambani (2002) have proposed a generic definition of SSM, which is informed by placing defining limits on the number of employees (1 – 99), annual tonnage produced (1 – 249 999), annual turnover (R0 – R9 999 000) as well as capital expenditure (R1 000 – R4 999 000).

In their definition for SSM, Shen & Gunson (2004) summed it up as using very rudimentary processes (e.g. picks, shovels and pans) to extract valuable minerals from primary and secondary ore bodies. Prominent characteristic features of many small-

scale operations include illegal and informal operations, encompassing everything from individual operators (pottery makers, gold panners, diamond diggers, brick makers) to medium scale operations on the one hand, with lack of long-term mine planning/control on the other. What make this activity somewhat unique are its operations and management techniques, which are different from large-scale operations that commonly feature state-of-the-art machinery and skilled workers.

Lastly, SSM is largely a poverty-driven activity, typically practiced in the poorest and most remote areas of a country by a largely nomadic, poorly educated populace with little or no skills, and thus faced with few employment alternatives. Owing to its rudimentary methods of exploitation, SSM can thus only exist where mineralization occurs near or on the surface.

2.2.1 Critical Analysis and Evaluation of SSM

Many researchers on the subject of SSM seem to have grappled with the interpretation of SSM, as it has been the case in all publications consulted. Whilst SSM may literally be taken to mean small relative to big scale mines employing capital intensive machinery and producing high tonnages, there are still some grey areas in terms of agreeing on the definition of SSM. It is for this reason that, even though there seem to be some degree of consensus on the interpretation of SSM especially on issues of level of technology used, capital employed and turnover, there is ongoing work currently by the involved South African institutions to have a universally accepted definition of SSM. The problem currently pertains to the amount of research work that has already been done on the subject but yet there are some grey areas regarding the interpretation.

Whilst the ability of SSM to employ big numbers of people as seen on page 21 below cannot be disputed, the activity seldom contributes to government revenue and its undesirable environmental footprints cause social problems and sometimes irreparable damage, according to Hoadley & Lempitlaw (2004). The benefits ensuing from SSM must always be measured against the activity's environmental degradation credentials and this decision is never an easy one to make. This matter has led to fierce battles and bad blood between business enterprises and environmentalists. A case in point in South Africa is the establishment of Richards Bay Minerals and St. Lucia wetlands protection groups in the late 1970s. This matter was resolved by a court ruling.

SSM is a very nomadic activity and this is viewed as a benefit by Shen & Gunson (2004), in that the operators are not stuck in an area where they are unable to make money and sustain themselves. However, the nomadic nature of the business is considered to be a serious matter of concern by Crispin (2002), who contends that families are broken, prostitution is promoted and deaths increase all as a result of the nomadic nature of the business. The SSM operators are considered ruthless people, especially where precious minerals are involved. The South African situation where illegal SSM operators hold big mines hostage (President Steyn Mine in the Free State, and Barbeton mines in Mpumalanga) by mining minerals belonging to big mines through the barrel of a gun is a typical example of this ruthlessness.

2.3 SMALL-SCALE MINING IN OTHER AREAS

In South Africa, the high level of illiteracy cuts through all the colour barriers, race divides, various business sectors, big and small, including SSM. Research conducted in the management and regulation of SSM at Osizweni (Newcastle, KwaZulu-Natal) by Moholo (2001), concluded that the low level of education among SSM operators was the inhibiting factor for the development of this sector from that of being a mere survivalist mechanism to being an efficiently run business enterprise. Moholo contends

that the success of the SSM sector is dependent upon the development of coherent strategic structures for basic skills development, exposure to valuable resources and training concerning business skills and regulations governing the industry in general.

The findings of Moholo on matters of concern pertaining to SSM in South Africa are shared by Tyler (1997), who adds that access to mineral rights, access to capital, access to skills, red tape and environmental issues remain the greatest obstacles facing SSM. He insisted that a concerted and unified effort by the government, mining houses and the entrepreneurs was required in order to overcome the above-mentioned obstacles.

Shen & Gunson (2004) successfully argued that contributions of SSM in China outweighed its negative impacts, especially since the central government of China took concerted efforts to regulate, guide and encourage the development of this industry as well as create a sound environment for its operators.

A well-regulated SSM industry is seen as a cornerstone of future rural economic development, especially for the underprivileged communities in poor regions.

In the conduct of their business operations, SSM operators in various parts of South Africa, including the North West, Limpopo and Gauteng Provinces are usually confronted by many but similar challenges. The latter include:

1. Securing a mining permit
2. Financial limitations in securing equipment to be used for digging through to producing a final product

3. Lack of mining, processing, management (operations, finance, project, general etc) marketing and sales skills.
4. Lack of continuity, caused by unrealizable profit margins

Unlicensed and thus unrecorded SSM business is in most instances in South Africa and the rest of the world the rule rather than the exception. This problem clearly highlights the need for access to information and empowerment for SSM operators. Their illegal conduct of business is not always by choice but rather a direct result of lack of information and guidance by authorities and non-governmental organizations. Good work done by the South African non-profit organizations such as South African Mining Development Association (SAMDA), efforts by the South African Small-scale Mining Chamber (SASSMC), the education and empowerment strides of the MQA as well as institutions of higher learning clearly does not seem to be reaching all concerned and a lot more should be done to ameliorate this impasse.

SSM has become an indispensable part of the socio-economic fabric of the developing world. Not only has this industry provided employment opportunities to rural inhabitants, it has also contributed significantly to the countries' mineral export base and foreign exchange earnings, as is the case with most of the mineral rich African countries like Zambia, Ghana and Ivory Coast. This foreign exchange earnings phenomenon is also very prevalent in South Africa, where all our minerals such as gold and platinum are sold in Dollars. Hilson (2002) and Hentschel et al. (2002) estimate about 13 million employees in the SSM sector worldwide, thus making this activity a significant contributor to worldwide employment and economic development. These interesting statistics can be seen in figures 2.1 and 2.2 below.

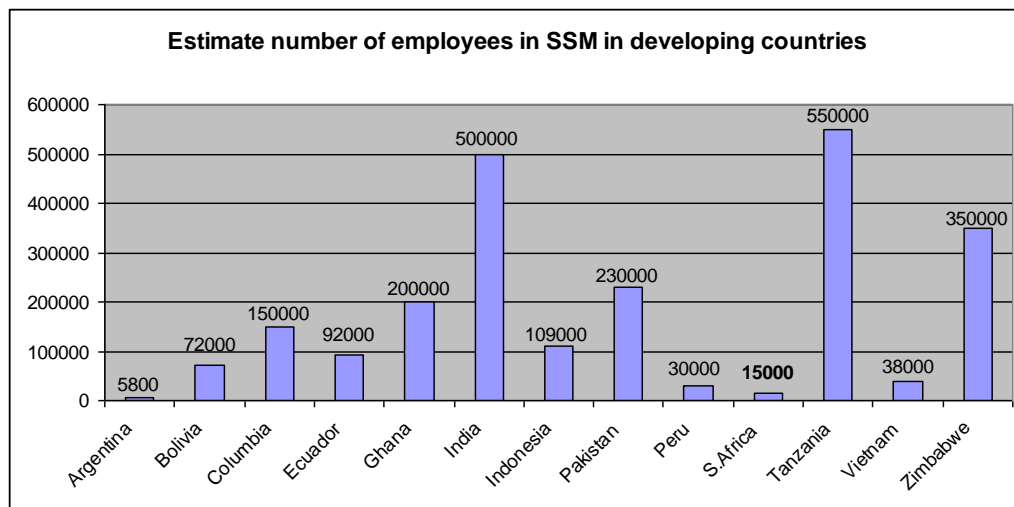


Fig. 2.1: Estimate number of employees in the SSM sector: adopted from Hentschel et al.

It is interesting to note that more than half a million people are employed in the SSM sector in Tanzania. This figure emphasises the importance of SSM as a significant contributor to employment creation in the most parts of the mineral rich but poor African countries.

It must also be noted that the above employment level estimates are based only on formal and licensed operations. So, if the informal, unlicensed and therefore illegal miners (commonly known as Galamsy in Ghana, or Zama-zamas in South Africa) were also to be included in the above statistics, the figures would increase substantially.

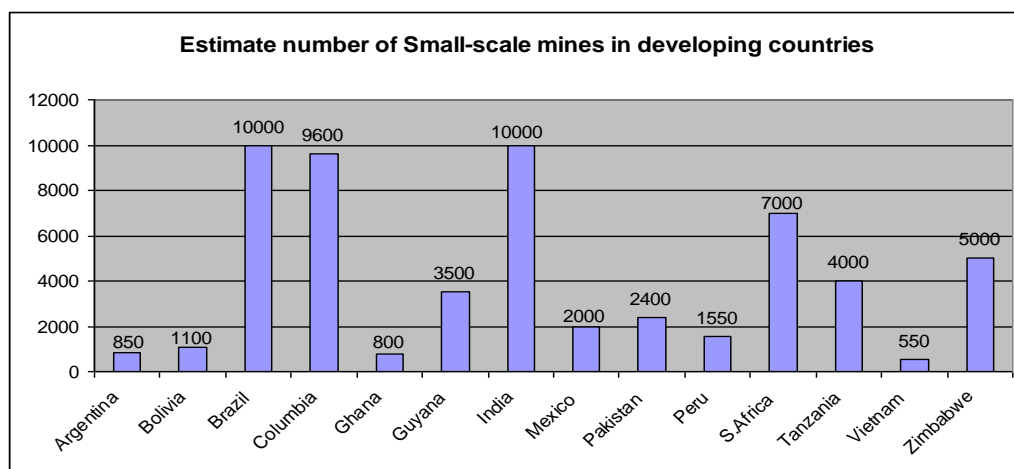


Fig. 2.2: Estimate number of SSM in the developing countries: adopted from Hilson

About 85% of all SSM operations are located in China and Indonesia, the countries with the highest number of mines, at 250 000 and 77 000 respectively. This picture represents a world of opportunities in the sector. China employs around 3 – 15 million people in the SSM sector, the majority of which (about 40%) are coal mines.

The need for tailor-made purchasing and marketing organizations ideal for the development of SSM can never be overemphasized. This is so because of the nature of SSM when compared with large-scale mining. A suite of effective development structures, services and products aimed at providing, promoting, and protecting the SSM sector should be thoroughly explored and exploited, in order to realize the entrenched value of this activity.

2.4 STRATEGIES TO DEVELOP AND STIMULATE SSM BUSINESS

Thompson & Strickland (2005:3) define strategy as “the competitive moves and business approaches that managers employ to attract and please customers, compete successfully, grow the business, conduct operations, and achieve targeted objectives”. In a nutshell, a strategy is viewed as a game plan for growing the business and staking out a market position.

In the backdrop of the above understanding of strategy, there is a compelling need to have sound and visionary management-leadership in place to execute such strategy, if the latter were to mean anything at all. Furthermore, there is also a compelling need for management-leadership to proactively shape and craft how a company’s business will be conducted. The bottom-line of such an execution will impact positively on revenue growth, earnings and return on investment. Small-scale miners need to have some form

of a game plan in place if they want to grow their operations and compete successfully in the market place. To do that, they may choose among the following most commonly used approaches:

1. Being the industry's low-cost provider
2. Differentiation strategy (where emphasis is on features such as higher quality)
3. Market niche strategy (where a competitive edge is won through serving the special needs and tastes of niche buyers)
4. Developing expertise and resource strengths which cannot easily be imitated by rivals.

According to Amankwah & Sackey (2004) the need to develop SSM in a sustainable manner is a fundamental aspect that cannot and should not be ignored. Whilst this industry's many benefits are clearly noticeable throughout Ghana where their study was focused, they equally took cognizance of the undesirable effects associated with this noble activity. It is as a result of these undesirable effects that continuous dialogue; monitoring and enforcement of responsible mining and exploitation should be practiced and observed by all stakeholders to mitigate the negative effects of SSM. Furthermore, as proclaimed by Amankwah & Sackey (2004), "sustainable development of minerals and other natural resources need to be endorsed as a global management and development strategy, whilst environmental, economic and social development need to be highlighted as the three pillars of such sustainable development". They argue that the establishment of a legal framework for small-scale mining, technical and financial support for the sector as well as the realisation and enhancement of socio-economic significance of SSM remains the strategies for sustainable development of SSM industry in Ghana.

In their strategies for improving environmental performance in the SSM industry, Aryee et al. (2002) proposed a number of policy options available to address the environmental impacts in this industry. Such policy options included:

1. Regulation, mainly through enforcement of legal requirements through monitoring and policing. However, because of the size of illegal SSM as well as the inadequacy of penalties to serve as a deterrent, this approach may be an ad hoc measure.
2. Moral suasion through the use of education, publicity and social pressure to bring about a change in behaviour.
3. Manipulation of market forces to ensure that funding is made available to meet the cost of environmental rehabilitation for sustainability. Raising such funds or determining who bears the burden of cost may be addressed through direct taxes or levies charged to the producer.
4. Investment in SSM, such that the activity provides assistance to small-scale operators to improve their operations to benefit a larger community.

2.5 STRATEGIES FOR SOCIO-ECONOMIC UPLIFTMENT BY BUSINESS ENTERPRISES

Business operations located in or around communities depend on those communities to function (i.e. to sell their products and services). The community in turn depends on the business to acquire products and services needed for their day-to-day running and sustainability. There is therefore a specific and interdependent interaction between the business and the community, which illustrates the so called systems theory of management as proclaimed by Cronjé et al. (2005).

According to the above theory, managers must take into account the downstream effects of their business decisions and actions as these have a profound effect on the community. They must therefore make business decisions that are deemed to be socially responsible towards the community that they serve. Such responsibility does not only call for the business to conduct its operations in a manner that is not harmful to the health and safety of the community as this usually happens in instances involving water and air pollution, deforestation, degradation of grazing land or even destruction of ancestral land or heritage sites. It goes beyond the community's matters of health and safety, as it requires the business to also put in place measures that uplift the community. This brings about the concept of corporate social responsibility.

Corporate social responsibility implies "that a manager, in the process of serving his own business interests, is obliged to take action that also protect and enhance society's interests", according to Smit & Cronje (1997:501). In its strides to demonstrate its corporate social responsibility, a business commit a certain portion of its resources, (e.g. financial, capital, labour or otherwise) in projects that are tailor-made for the socio-economic upliftment of its immediate community, with the community. This socio-economic commitment of resources to strategically enhance and uplift the community by business is commonly called corporate and social investment (CSI).

Whilst CSI is not legally enforced in most industries, mining companies are legally compelled to play a role in this regard, as compliance on the matter is a condition for the granting of the "new order mining rights", as required by the DME. However, there is also a global trend developing whereby businesses feel ethically and morally obliged to want to be seen to be taking part in the caring and development of their communities. In South Africa, businesses are required to submit Social and Labour Plans (SLP) annually, and all the projects where all the activities undertaken or to be undertaken by

business towards the development and advancement of its community are addressed in the SLP.

2.5.1 Examples of CSI by South African Businesses

Johannesburg Stock Exchange (JSE) listed and unlisted companies, Section 21 Companies, government and non-governmental organization (NGO), municipalities as well as all other institutions (e.g. Universities) commit themselves either in cash or kind towards reaching out and developing the community, in terms of CSI. Notable examples to this effect, randomly selected include Richards Bay Minerals (mining), Tiger Brands (food and healthcare) and Engen (petro chemical). More on these organizations's CSI may be obtained from their respective websites, as outlined in the bibliography section of this dissertation.

2.6 EARLY ENTREPRENEURSHIP IN QWAQWA

Entrepreneurship refers to a process of conceiving a business opportunity and then being bold enough as to take the initiative to realize the conceived business opportunity through the creation of a new venture. The term entrepreneurship is defined by Cronjé (2005) as a person who has innovative ideas, identifies opportunities, finds resources, takes financial risks, re-energizes economies and creates jobs to bring about change, growth and wealth.

Signs of entrepreneurial behavior in Qwaqwa started surfacing with the influx of people in the area after it was proclaimed as a self-governing territory in 1974. Some individuals started to identify community needs then, and looked at creative ideas to

meet those needs. Earlier entrepreneurs in the area include the development of a class of businessmen whose income was dependent on markets resulting from overcrowding and lack of services in new settlements, such as Thibella, Paballong and Lusaka. According to Slater (2002), such entrepreneurs included tuck-shop owners who bought their consumables (basic foodstuffs and household goods) from retail shops in nearby towns such as Harrismith for resale to the community, clothing merchants who bought their stock from Newcastle and sold them from house to house, and those who identified opportunities and took advantage of providing transport for people and goods. The relaxation of trading laws only made the situation worse as stalls selling anything from cooked meals to fruit and vegetables started to mushroom all over, especially where people converged.

During the above era of the emergence of entrepreneurs, SSM was not ventured into by the community, even though there were a few isolated incidents of people cultivating sandstone for building purposes. The only mining known to the community then was big scale coal mining like Sasol I and Sasol II, as well as gold mines in Johannesburg which employed a great number of people from Qwaqwa, as suggested by Slater (2002). Interest in SSM increased after the inception of the new regime, but still it did not receive the prominence and publicity that it received later on, especially after interventions by Mintek and Wits Technikon. SSM entrepreneurs like Mr. M. J. Kharafu of Lefika Le Moriti sandstone are beneficiaries of such interventions.

2.7 CONCLUSION

Current literature on SSM has been critically assessed in terms of its relevance on the subject as well as the extent to which it provided background and guidance to the research objectives outlined in chapter 1. In all issues identified in the literature

review, a deliberate effort was made to critically analyze and evaluate issues raised, in order to reflect on the neutrality of course and the unbiased approach taken.

Both primary and secondary literatures were conducted in this project. The former included all kinds of articles, books and reports (e.g. DME's annual report for 2005/6) in their original form, strategically put together to form secondary data delineated in this review. The process followed in searching both print and online bibliographic databases included selecting databases appropriate to SSM, constructing search queries for SSM problems, concerns and strategies, as well as supplementing the results found with information from other sources.

Whilst a thorough description of SSM had been provided in this research, cognizance is taken of the current work and attempts by other interested and involved South African stakeholders (DME, Mintek, SAMDA, and SASSMC) as well as research organizations to redefine the concept, in an effort to iron out current contentious issues pertaining to the current definition. It is for this reason that most researchers and commentators now use the term Artisanal and Small-Scale Mining (ASSM) and not just SSM in an effort to iron out discrepancies in the definition of SSM. However, SSM is used in this research project with the understanding that by definition, Artisanal miners are already included in its over encompassing definition.

METHODOLOGY

3.1 INTRODUCTION

This chapter outlines the rationale behind undertaking this research using case study methodology. It provides a general idea of what case study research is and what it strives to achieve. Included in the chapter are delineations on the research design. As part of the preparation work for data collection for the case study, the chapter also outlines the desired skills for doing the case study, the training required as well as the protocols that must be followed. What the researcher did in terms of meeting the demanding challenges of doing case study research is also provided in response to these skills and training requirements.

The chapter further delineates on the methodology regarding the collection of evidence for the case study, before concluding with deliberations on the limitations of the case study.

3.2 RATIONALE FOR THE STUDY

SSM had been practiced in South Africa for many decades without receiving any prominence and assistance from the authorities. The only time this subject was ever mentioned previously was when death was reported from these operations, or when SSM operators clashed with environmental enthusiasts who were readily available to complain in the interest of the environment. This is one of the reasons that prompted interest in the study, which was to elevate the unspoken good entrenched in SSM. Other reasons include the following:

1. The interest as well as the concerted efforts of the DME, through its Small Scale Mining Board (SSMB) established in 2005, SAMDA, MQA, as well as Mintek to assist and develop SSM nationally. The study becomes fundamental as it assists in providing groundwork for future coordinated assistance to the sector.
2. The “use it or lose it” or “use it and keep it” empowerment approach of the government, as outlined in the White Paper on Minerals and Mining Policy for South Africa (1998). This paper forms the basis of the Minerals and Petroleum Resources Development Act, abbreviated MPRDA (2002), whose mandate is to “provide for equitable access to and sustainable development of the nation’s mineral and petroleum resources”. Emanating from this Act, the government’s strategy towards access to minerals was to prevent stifling of the economy by big conglomerates that owned most of the mineral rights but could not mine them due to their low or non-existent margins. On the contrary, such deposits could have been profitably mined by SSM operators because of their low overhead cost structures. So, in the sense economic development from mining was held hostage. SSM started mushrooming in South Africa since the above approach was taken, thus prompting for increased research on the subject to provide for adequate understanding on the subject as well as guidelines for policy formulation and development strategies.
3. It is hoped that this study will demonstrate the significance of SSM as an important contributor to poverty alleviation and economic development to the Qwaqwa community, through its well documented employment creation potential.
4. Growth of SSM in Qwaqwa will impact positively to the greater Qwaqwa community and the province.
5. The study eventually adds to the available body of knowledge in the SSM sector, particularly as it pertains to the mining of non-precious mineral deposits.

3.3 THE RESEARCH DESIGN

Research design delineates a systematic blueprint regarding the process of collecting, analysing and interpreting data about a phenomenon. It is a blueprint that addresses at least four questions, being what to study, what data are relevant, what data to collect and lastly how to analyse the results, about a particular phenomenon. Research design is simply a plan for “getting from here to there, where here may be defined as the initial set of questions to be answered about a given problem or dilemma, whilst there could be some set of conclusions drawn, as indicated by Yin (2003). Such a blueprint must, in the case of this study provide answers to the research objectives of the project, which would ultimately provide a basis for recommending strategies to stimulate socio-economic growth from SSM operations in Qwaqwa. The fact that the research design has so much magnitude on the research results makes it a very essential element of the project.

Blumberg et al. (2005) outlined the following defining characteristics for research design:

- the design is an activity- and time-based plan
- it is always based on the research question
- the research guides the selection of sources and types of information
- it is a framework for specifying the relationship among the study's variables
- it outlines procedures for every research activity

In deciding on the appropriate research design for SSM in Qwaqwa, a number of alternatives were considered which included the more common quantitative and qualitative research designs. However, after a critical analysis and evaluation of all the

available research designs, it was decided to embark on this project following case study research protocol, for the following reasons:

1. Very little was known about SSM in Qwaqwa prior to doing this research, except for having the names and contact numbers of two people (courtesy of Mintek). Since a questionnaire was already designed and ready for use in collecting data on SSM, there would have been a need to administer such a questionnaire. It was therefore thought that direct observations via site visits would be the best method to do this, in addition to meeting the operators and seeing their operations.
2. Doing case study research would have helped to overcome shortcomings which are commonly encountered with questionnaires sent (by post, courier, email etc) to respondents. After all, it is a well known and sometimes accepted practice that targeted respondents are usually reluctant to cooperate in any research work, for possible and sometimes arguable reasons such as not seeing any value in participating, fear of consequences of participating or the perception that the questionnaire is just “an additional burden”, to mention a few. Cognizance was taken of the fact that both the quality and quantity of information eventually secured would ultimately depend on the ability and willingness of participants to cooperate, and it was the intention at the time not to compromise this through personal administering of the questionnaire.
3. Since very little was known about the targeted respondents, taking the questionnaires to them meant that issues relating to questionnaire misapprehension would be addressed as and when they are encountered. This approach was deemed vital, especially where language, literacy, attitudes and preconceived ideas have to be dealt with.
4. The case study is the preferred method of examining contemporary events because of its advantage over other techniques (i.e. direct observation of the events being studied and interviews of the persons involved in the events). The

case study's unique strength lies in its ability to deal with a full variety of evidence in the form of documents, interviews and observations.

5. The observation element of the case study was considered an ideal method to do the project, which was informed by the desire to investigate all aspects of SSM in the area, and then to measure these observed aspects for decision-making and subsequent strategy proposals later on. Secondly the communication element of the case study was deemed ideal mechanism to determine the attitudes, intentions and expectations of SSM operators in Qwaqwa.
6. The understanding of a definition of case study, as defined by Yin (2003) where he defines it as “an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between the phenomenon and the context are not clearly evident”. Considering the Qwaqwa community's decades-long unemployment and poverty problem, where the community had been surrounded by a “sea of wealth in the form of sandstone” it made the case study approach an ideal tool to study the problem.
7. For a student, case study method is a very popular approach for a thesis as it combines business practice with science and it also allows the student to supplement their thesis with gaining practical experience on the field or subject of interest.

3.3.1 Case Study Design

Case study design is deemed to be a very difficult part of doing case study research, simply because it does not have comprehensive guides and text books like other strategies. Nevertheless, because any research needs a logical plan to be followed, such

a plan can and should be equally developed for a case study research. Otherwise the researcher would go astray in the absence of such a plan, and the objectives of undertaking such research in the first place would not be met.

In designing this case study, three elements were very instrumental to the design, and these included the study's questions, its objectives and the criteria for interpreting the study's finding. These elements are briefly discussed below:

3.3.1 (A) Study Questions

The first protocol followed in this design was informed by the research questions asked in chapter 1. In the latter, the research questions asked were eventually aimed at providing answers to the research problem that existed in Qwaqwa. To recap, the research questions asked were:

1. How do SSM operators in Qwaqwa currently operate?
2. How do SSM operators react to the challenges that face them?
3. Why does the Qwaqwa community receive no benefit from its environmental wealth?
4. How can the Qwaqwa community and the SSM operators work together for mutual benefit?

3.3.1 (B) Study Objectives

According to Yin (2003), a study may have legitimate reason for not having any propositions, such as when the study is exploratory. Such a study should nevertheless have a purpose. This study is exploratory in nature and it has a clear purpose, as indicated by the research objectives. The latter indicate a clear criterion by which an exploration would ultimately be judged. The research objectives of this project are to:

1. Describe SSM in the area
2. Uncover the challenges faced by SSM operators in Qwaqwa
3. Uncover the challenges faced by the Qwaqwa community
4. Make recommendations on strategies to develop or stimulate SSM in the area
5. Make recommendations on strategies which would enable the Qwaqwa community to benefit from their surrounding environmental wealth.

3.3.1 (C) The Criteria for Interpreting the Findings

Data collected via the questionnaires is interpreted using frequency and percentage responses on questions asked, and the latter are then statistically analysed via SPSS statistical analysis software. It must also be noted at this stage that not all the questions are analysed and discussed, because some related to clay operations whilst a decision had been taken during data collection to exclude such operations.

Further interpretation of the findings is sourced from an analysis of the salient issues emanating from interviews with owners of SSM operations, the Inspector of Mines responsible for the area as well as the Local and Economic Development (LED)

Manager. The interviews are augmented by an analysis of direct observations made at the various SSM sites. All these issues are delineated in chapter 4.

3.4 PREPARATION FOR DATA COLLECTION

Successful and cost-effective research methodology is governed by the identification of clear-cut objectives for the research and effective planning and utilization of available resources, according to Leedy & Ormrod (2005). Otherwise the researcher finds him/her self lost in the process of research work, and this should be avoided at all costs. It must be remembered that research work costs a lot of money and takes a considerable amount of time to execute, and should therefore be conducted optimally to minimize these constraints.

A good preparation for data collection can be a very complex and difficult process to undertake, but it remains a very fundamental aspect on any research work. This is because failure to prepare or poor preparation may ultimately lead to poor research being conducted or even failure to research the object of such research. According to Yin (2003), a good preparation for data collection requires certain requirements or conditions to be met. These include having the desired skills, training for a specific case, the development of a protocol for the investigation and the screening of case study nominations. A brief discussion of these, and how they were applied in this case study is outlined below.

3.4.1 (A) Desired Skills

The skills required on one's intellect, emotions and tempo on case study designs are much greater than those required of any other type of research. This is because a case study does not have a kind of routine to be followed, as is the case with laboratory experiments. As such, a good case study researcher needs to be able to ask good questions whilst being a good listener at the same time, must be adaptive and flexible, and must be unbiased by preconceived notions.

As part of the preparation for this task, this researcher attended a two-day course at the University of Johannesburg in September 2007, and was also engaged in a one day SSM seminar hosted by Mintek on Friday 24th July 2007. At this course, emphasis was placed on the need for a high degree of flexibility required during data collection phase of the research, as well as the need to be a good listener. From discussions generated at this course, the need for an investigator to be able to adapt to unplanned conditions was as good as completing the research itself. This is because case study research was not conducted under controlled conditions such as in a laboratory experiment.

Knowledge acquired in Research Methodology subject as a student at the University of KwaZulu-Natal in 2006, coupled with attending a research methodology class offered by Professor Mulaba to the B-Tech degree mining class of 2007 at the University of Johannesburg, are some of the knowledge enhancing activities that forms part of the preparation work for undertaking this research. During these classes a lot of discussion on dealing with unexpected changes and negotiating non-events was thoroughly explored and alternatives were proposed.

The flexibility, adaptability and listening skills and knowledge acquired from the above-mentioned sources were largely tested during the data collection phase of this project, when the researcher had to negotiate bad weather conditions, lower than expected levels of illiteracy, some hostile interviewees and other unbecoming conditions during site observations. The challenges were manageable, and this was made possible by the training received.

3.4.1 (B) Training for a Specific Cases Study

To enhance the skills required for a good case study research, one may need to undergo a proper training for a specific case study, attend a seminar covering all aspects of that particular case study and also engage in formal discussions on the matter.

Time spent at the mine undertaking particular assignments such as rock fall accidents, time-and-motion studies, machinery breakdown analysis and many others have provided good training background in the early days of the researcher as a young undergraduate on the mines. Experience gained from doing such specific assignments helped a lot in terms of providing the required skills for doing this project. It became reasonably easy to negotiate issues and to deal with scepticisms by some of the SSM owners both during the interviews and site visits (i.e. some owners were reluctant to be interviewed or to accommodate a visit to their sites as they thought that the researcher was actually a potential competitor in disguise).

3.4.1 (C) The Case Study Protocol

The last but most important element of enhancing skills entails following a case study protocol, which entails having a research instrument as well as the procedures and general rules to be followed in using the protocol. Having and following a protocol has the benefit of increasing the reliability of case study research. As a guide, a case study protocol must contain case study overview and questions, field procedures to be followed during data collection phase as well as a guide for the case study report.

As indicated above, the skills acquired from the above-mentioned two-day course, as well as experience gained doing assignments or projects on various issues at the mines, provided a good foundation for undertaking this study. During the data collection phase (six full days in Qwaqwa), a form of routine procedure was established as early as the first day and this was followed for the rest of that week. This routine entailed:

1. interviewing the owner at his or her place of choice (office, plant, at the mining site, or over a drink/ meal)
2. site visits (to view the operations, see how mining was being done, take pictures and videos)
3. administer the questionnaires to the employees (on site)
4. at the end of the day review that day's activities, check the gaps on the data collected, sort out the collected data and then plan for the following day's activities

3.4.1 (D) Screening Case Study Nominations

Screening case study nominations is a very important part of the preparation work as it helps focus on the subject of interest. In the SSM case, the initial approach was to study small scale mining as a broad subject. On arrival at the site the researcher was confronted by a mix situation of clay and sandstone SSM operators, as well as sandstone operators with permits and those without. The case study had to be screened to discard all operators without permits and this meant cutting off all clay operators and some of the sandstone operators. Eventually the study was focused only on the small-scale mining of sandstone by legal operators.

3.4.2 Other Aspects of the Preparation Work

A research project of this nature and magnitude had been both challenging and time consuming at the same time, as it required spending a considerable amount of time in the library in the early stages of the project. This (spending time in the library) was done with the objective of focusing the research work explicitly to the answers provided in the literature to the research questions formulated for SSM.

A thorough search was also conducted at the various electronic databases of the University of KwaZulu-Natal's library using "small-scale mining" as search words. These electronic databases contained journal publications, papers presented at international conferences as well as on-going or completed dissertations, of both local and international content. Databases searched include Nexus, Science Direct, Opac and Sabinet. These databases were searched in order to obtain references that related to the project at hand, guided by the following headings or key words:

- The most appropriate research methodology for conducting the research and
- Previous research on the problems faced by SSM

These electronic databases, as well as mining literature available at both the University of Johannesburg's School of Mines proved to be very resourceful in terms of providing guidance.

3.5 RESEARCH PROCESS

Research process delineates clearly defined steps to be followed in the process of doing research. Such steps may be taken one after the other, jointly or parallel of each other. What is important is that a particular pattern of steps is followed starting at one point (point A) and ending at another (point Z).

The outline of a research process followed in SSM started with the discovery or realisation of a research dilemma (problem) in Qwaqwa, which was characterised by unemployment and poverty ravaging a community that was surrounded by a wealth of sandstone. The first question that came to mind was “why” the community was suffering as a result of unemployment and poverty given so much freely available sandstone at their disposal. The situation did not make sense at all, and it called for certain assumptions which had to be made to try and make sense of the situation. Such assumptions included the possibility that the community was not aware of the economic benefits of the sandstone, or that it was just not appealing or attractive enough to them as a possible way of alleviating their plight, or it was just a matter of pure ignorance on their part.

In light of the above assumptions, the research aim was outlined (being to develop and recommend strategies to strengthen SSM operations in Qwaqwa to enable them to contribute towards the alleviation/ eradication of unemployment). Informed by the research aim, the process that followed called for the formulation of research objectives that would lead to the achievement of the research aim. The achievement of research

objectives (and hence research aim) was dependent on providing answers to pertinent questions about the problem (i.e. research questions) which were asked.

It must be understood that whilst the above steps may have been taken one after the other or simultaneously, a well defined protocol would ensue from the research proposal onwards. Such a protocol called for the development of a research design. A properly constructed research design entailed developing a strategy on the time frame, scope, purpose and methodology for data collection and analysis. The remainder of the work would then be to analyse the collected data and then put together a comprehensive report in which a solution to the problem or dilemma is outlined.

The entire research process outlined above may be summarised schematically as seen below:

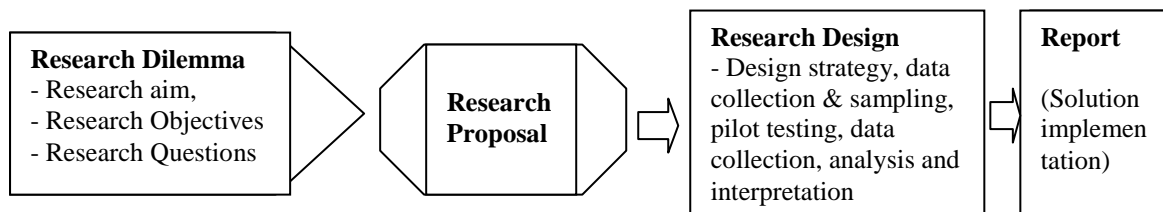


Fig. 3.1: Schematic representation of the research process

3.5.1 Collecting the Evidence

One of the prominent and distinguishing characteristics of case study research is its multi pronged sources of evidence. These include documents, personal interviews, direct observation, archival records, physical artifacts and participant-observation. It is

important for a case study researcher to know how to use these sources if any value was to be derived from them. Whilst these sources are all valuable, only those that have been used in this research are discussed below.

3.5.1 (A) Direct Observations

A week-long (six days) site visit was undertaken, during which the various operation sites were visited. During these site visits the researcher had the opportunity to see how (method) sandstone was being mined, what tools and equipment were used, how many people worked at a site, how big was a typical mining site and the gender mix at the various sites. Also, site visits provided an opportunity to understand how the rock was cut into the various size specifications as dictated to by the customer needs.

Site visits were the most enjoyable part of this research. Workers at the sites were very friendly and it was easy to conduct interviews there. Many pictures and video footages were taken at these various sites, including the areas where rock was cut into various shapes and sizes. Where machinery and equipment was not used for either mining or beneficiation, the labour intensiveness and associated hardship were observed. On the other side the benefits of using technology were equally appreciated.

3.5.1 (B) Personal Interviews

Personal interviews are essential sources of case study information. Because they were conducted informally at the sites, they appeared to be more like guided conversations rather than interviews as it is commonly experienced. Six of the seven legal owners of

the SSM operations were personally interviewed during the direct observation period, and they freely participated. In fact, they appeared more willing and calmer to be interviewed as opposed to completing the questionnaires (perhaps they felt intimidated by the latter). Nevertheless, the interviews were very fluid and the line of questioning used was more open-ended questions than the somewhat intimidating “why” questions.

A Local and Economic Development (LED) Manager was also interviewed, on behalf of the local municipality. Whilst this interview was actually not planned and not part of the protocol, it proved to be very relevant and necessary. This interview was prompted by responses from interview questions posed to the owners of the various operations, thus demonstrating the adaptability and flexibility skills mentioned above. Also interviewed was the Inspector of Mines responsible for the SSM sector in the Free State, again emanating from interviews of the owners of SSM operations. The suggestions by the SSM owners to interview other people like the LED Manager and the Inspector of Mines made the respondents to be viewed as “informants” rather than “respondents”.

An attempt was also made to interview Dr. T K Mopedi, the former ruler in the area during the time of the area’s independence, but an appointment could not be secured.

3.5.1 (C) Documentation

A number of various documents about the area were collected or consulted in the process of collecting the evidence for the study. These included administrative documents, status and progress reports about the area, reports on formal studies conducted by other researchers from the University of the Free State on social problems as a result of unemployment, as well as other documents that are put in the public domain at times (internet, radio and television). Such documents were deemed very

helpful in terms of verifying the facts, supporting propositions and also providing other specific details to corroborate information from other sources.

3.5.1 (D) Archival Records

Archival records consulted include survey data and census records conducted by Statistics South Africa, maps detailing the geographical characteristics of Qwaqwa and local municipality records. All these became very important elements in the process of collecting evidence.

3.5.1 (E) Physical Artifacts

A visit to the Qwaqwa cultural village was also undertaken, during which the rich history of the area was explained. Numerous artifacts made of sandstone, clay and other natural resources found in the area were conspicuously displayed both outside and inside the cultural village.

3.5.2 Consolidation of Data Collection Process

Various mining sites were visited and workers made to complete the questionnaires on site during the process of data collection. By the end of the research period in Qwaqwa, the following had been achieved:

1. 13 sandstone-mining sites, 3 sandstone cutting plants and 2 clay mining and brick-making sites were visited

2. Interviews were held with all the owners of SSM, the LED Manager (on behalf of local municipality) As well as the SSM Inspector of Mines responsible for this sector and area
3. A meeting was held with small, medium and micro enterprise (SMME) representatives, made of quarry rock, river sand, brick making, sandstone as well as arts and craft business representatives
4. Administered and collected a total of 33 completed questionnaires

3.6 LIMITATIONS OF THE STUDY

When considering the limitations of the study, it is expected of the researcher to report with complete frankness, any flaws in procedural design, and also to estimate their effect of such flaws on the research findings. It is a known fact that all research work is not immune to flaws, and that there are few perfect research designs. It is therefore expected and accepted that any research will have flaws. However, some of these imperfections may have little effect on the validity and reliability of the data, whilst others may actually invalidate the data entirely.

Limitations of the study of SSM in Qwaqwa include the following:

1. The study was only limited to sandstone (whilst there were other minerals mined under the small-scale umbrella)
2. Only SSM operators with permits were considered (whilst excluding those without permits)

3. It may have been more preferable to construct the questionnaire in local language (Southern Sotho)
4. Some questions asked in the questionnaire played a very insignificant role in terms of making a meaningful contribution to the research.

3.7 CONCLUSION

The single biggest challenge that surfaced whilst collecting data was the administration of the questionnaire itself. Had it not been for the fact that both the researcher and the respondents spoke a common language, then it would have been paramount to redraft the research instrument in Southern Sotho. Giving the research instrument to the respondents and then collecting them at a later time (i.e. the following day) would not have yielded desired results either.

The five sources of evidence used in the project assisted the project in terms of the weight, verification and validation of the facts, as well as supporting propositions postulated. Sufficient pictures for use in the form of a photo gallery, consolidating and complementing lesson plans on SSM have been collected during data collection period. These, together with available video footages on mining and beneficiation processes remain very fundamental elements of the case study.

A sufficiently representative sample was collected in the end, comprising of men and women, as well as the youth. Whilst the sample size studied might be perceived to be small, the importance of other sources of evidence in the case study should not be underestimated.

ANALYSIS OF DATA

4.1 INTRODUCTION

One of the key objectives of designing a research instrument is that the latter should be directly linked to the research questions of the study, and that at the end it should eventually provide answers to such questions. This objective can only be achieved if the goals of the study are both clear and well defined. Ideally the goals must specify what is to be achieved, must be such that they can be measured and achieved, be realistic enough such that the researcher is able to envisage or visualize achievement thereof, and lastly they should have a target time frame. If the goals of the research do not measure up to this criterion, then the research instrument used will make an insignificant contribution to the research itself.

4.2 ANALYZING CASE STUDY EVIDENCE

Data analysis consists of “examining, categorizing, tabulating, testing or otherwise recombining” evidence to address the initial propositions of the study, according to Yin (2003). However, this process is deemed to be very difficult in case of case studies, because of the lack of well defined strategies and techniques. At the same time, the absence or lack of well defined strategies and techniques does not therefore mean that one can go ahead and analyze data without any approach at all as this will definitely have devastating effect on the results. An analysis strategy and technique is a fundamental element of data analysis which may help the researcher to treat the evidence fairly and produce compelling analytic conclusions. The first two of the three general strategies postulated by Yin (2003) for data analysis (i.e. relying on theoretical proposition, thinking about rival explanation and developing a case description) have

been very helpful in analyzing data for this project. The two are further discussed below.

4.2.1 (A) Relying on Theoretical Propositions Strategy

The research objectives or propositions of this project as outlined on page 9 have been very instrumental in outlining the type of questions to be asked and then in providing guidance on the literature review that followed. These propositions further played a very important role in shaping the data collection plan pertaining to the questionnaires, observations, interviews as well as documents consulted. According to Yin (2003), the propositions provide a good example of a theoretical orientation guiding the case study analysis, as they help to focus attention on certain data whilst ignoring other data.

4.2.1 (B) Thinking about Rival Explanation

As a general analytic strategy, thinking about rival explanation tries to define and test rival explanations. Whilst the original proposition regarding why the Qwaqwa community continued to suffer due to poverty and unemployment may have been as a result of lack of knowledge regarding the economic benefits of sandstone, the rival explanation plausible could be the fact that they did not view sandstone mining as an alternative solution to their problems. Another credible explanation could be the fact that they preferred to be employed and not create employment, as this required a particular type of people (which they probably and admittedly were not).

4.2.2 Techniques for Analyzing Case Studies

Five specific analytical techniques to be used as part of and along with any of the three generic strategies mentioned above have been proclaimed by Yin (2003). They include pattern matching, explanation building, time series analysis, logic models and cross-case synthesis. Whilst all these techniques are applicable to case study data analysis, not all of them were used on this project. As such, only explanation building and logic models have become central to the analysis of data pertaining to SSM, and are delineated further below. It must also be emphasised at this stage that even these two techniques were not easy to use as neither one “could be applied mechanically following any simple cookbook procedure” (Yin, 2003).

4.2.2 (A) Explanation Building

Analysis of this case study with the explanation building technique has been both a challenging and troublesome experience, especially given some of the limitations mentioned earlier. However, the experience gained definitely provided a solid foundation for improved performance in future case study research projects.

With explanation building technique, the goal had been to analyse the SSM case study data through building an explanation about the case. This explanation building had been in the form of narratives on the responses by the SSM operators to the questionnaires, as explained below in (4.3).

4.2.2 (B) Logic Models

The logic models are essentially a very valuable technique in the analysis of SSM case study data, especially because of their cause-effect-cause-effect pattern about the history of Qwaqwa and the chain of events that ensued since the area became a self-governing territory. The use of the logic model as an analytical tool consists of matching empirically observed events to theoretically predicted events.

To explain the logic model further, consider the influx of people from the neighbouring farms into Qwaqwa after the area became a self-governing state. Such an influx could probably have led to lack of adequate land, water, sanitation and other infrastructure requirements to deal with the increased populace. However, the influx of people into the area subsequently led to the mushrooming of entrepreneurs who saw opportunities to exploit in the midst of all this, as well as due to industrialisation of the area. When the area later became part of the greater South Africa after being incorporated into the Free State province, de-industrialisation took place and many people lost their jobs. As a result, all the entrepreneurs lost a potential to make a living, resulting in abject poverty faced by the greater Qwaqwa community. This repeated cause-and-effect sequence of linked events explains a logic model as used to analyse the Qwaqwa case study data.

Yin (2003) identified four types of logic models, being:

- individual-level logic model:- based on an individual person
- firm or organisational-level logic model:- based on an individual organisation

- an alternative configuration for an organisational-level logic model:- following a linear sequence
- program-level logic model: - based on a particular programme of action.

4.3 STATISTICAL ANALYSIS OF SURVEY QUESTIONNAIRES

It is befitting at this stage, to contextualize the data collection process before actually analyzing the collected data. This will serve as a reminder of the when, where and how data was collected. This will also provide further clarity on the population of SSM operators that participated in this survey process.

The process of collecting data on SSM happened over a period of 6 full days in the various SSM sites in Qwaqwa, during the second week of October 2007. During this period, 13 sandstone mining sites and 3 sandstone cutting plants were visited. Whilst 2 clay mining and brick-making sites were also visited, this proved to be a futile exercise as the decision was later taken to exclude clay operations (because they were all illegal miners). Interviews were also conducted with the owners of the various SSM operations, the LED Manager and the Inspector of Mines responsible for the area. More details on these interviews are provided later on in this chapter.

Statistical analysis is the crux of any quantitative research work. The process entails analyzing the collected data (using SPSS 15 in this case study) with the aim of obtaining critical information (e.g. characteristics, opinions, previous experiences etc) from a randomly selected and representative sample of a specified population of sandstone SSM operations in Qwaqwa. In this study, the analysis was done so as to

identify patterns and make comparisons for future decision-making purposes pertaining to SSM.

Frequency tables are used in this statistical analysis, purely based on personal preference. Cognizance should be taken of the numbering sequence followed in the statistical analysis, since not all questions were analyzed and discussed. This was caused by the fact that some of the questions were subsequently deemed irrelevant.

The following statistical analysis is supported by statistical tables generated through SPSS 15.0 software:

Table 4.1: Gender of the respondents

	Frequency	Percent	Cumulative Percent
Male	25	75.8	75.8
Female	8	24.2	100.0
Total	33	100.0	

In contrast to large-scale mining in South Africa whose female labour force can barely make 3%, the involvement of women in small-scale mining is fairly high (24%). This should be seen as a positive development, because the participation of women may bring direct benefits to household finances through better control of family revenues and expenses.

Whilst the first question actually asked about other things as well (i.e. nationality and marital status), these were not answered by the majority of the respondents, and are thus not analyzed either or discussed further. However, it must also be stated that these issues equally bear little reference to the objectives of this study as well.

Table 4.2: Age of respondents

	Frequency	Percent	Cumulative Percent
16 - 25	1	3.0	3.0
26 - 35	7	21.2	24.2
36 - 45	10	30.3	54.5
46 - 55	14	42.4	97.0
56 and more	1	3.0	100.0
Total	33	100.0	

Only about 24% of the respondents were youth (16 – 35 age range), whilst the rest (76%) were adults (36 years old or more). It would be interesting to determine in future research the rationale for low interest and little involvement by the youth in SSM. However, probable explanations may include perceptions that SSM is a dirty and low-level job, commonly for the destitute and old people with low levels of education and technical expertise. It is a well-accepted and common belief in South Africa today that today's youth are more interested in the latest technological developments and advances (e.g. latest cell phone, flat-screen TV, MP3 player etc.). There is a tendency for the youth as such to pursue careers that are technologically inclined.

Table 4.3: Type of product mined

	Frequency	Percent	Cumulative Percent
Clay	1	3.0	3.2
Dimension Stone	30	90.9	100.0
Total	31	93.9	
Missing Values	2	6.1	
Total	33	100.0	

Whilst one respondent indicated that he or she was mining clay, this was clearly an error by that respondent as none of the clay miners were given questionnaires to complete. Thirty respondents were sandstone miners (indicated as dimension stone in the questionnaire), and two respondents did not indicate their type of mineral.

Table 4.4: Type of mining operation

		Frequency	Percent	Cumulative Percent
	Open Cast (above ground)	30	90.9	96.8
	Underground and Open Cast	1	3.0	100.0
	Total	31	93.9	
Missing	Values	2	6.1	
Total		33	100.0	

Consistent with the field observations, all sites visited were surface or above ground operations. No underground operations were visited and there was no knowledge of any underground mining operation in Qwaqwa at the time either. Two respondents did not indicate the type of operation that they were involved in.

Table 4.5: Type of mining equipment used

	Frequency	Percent	Cumulative Percent
Basic (Pick and shovel)	5	15.2	15.2
Machinery	1	3.0	18.2
Mixture (basic and machinery)	27	81.8	100.0
Total	33	100.0	

About 82% of the respondents indicated that they were using a mixture of basic tools (pick, shovel, hammer and chisel) as well as machinery (compressed air drilling machines and electric cutting equipment) for mining and cutting processes. Fifteen percent (15%) indicated that they used only basic methods, whilst 3% were using only machinery. This was also consistent with field observations.

Table 4.6: Number of years in operation

	Frequency	Percent	Cumulative Percent
Less than 1 year	2	6.1	6.1
1 - 3 years	7	21.2	27.3
4 - 5 years	5	15.2	42.4
More than 5 years	19	57.6	100.0
Total	33	100.0	

Almost 60% (57.6%) of the SSM operators had been involved in the sandstone mining business for more than 5 years. That figure rose substantially to about 73% if those that had been involved in this business from 4 years and more were included. Only 6% had been in the SSM business for less than a year.

Table 4.7: Estimated life of the mining operation

	Frequency	Percent	Cumulative Percent
Less than 3 years	2	6.1	6.3
More than 10 years	30	90.9	100.0
Total	32	97.0	
Missing Values	1	3.0	
Total	33	100.0	

The abundance of sandstone in Qwaqwa should not be underestimated. In fact, the entire local mountain range (which forms part of the Drakensberg range) including the habitat area consists largely of sandstone. It is for this reason that 91% of the sample size believed that SSM operations have a lifespan that goes beyond 10 years.

Table 4.8: Number of people employed by the operation

	Frequency	Percent	Cumulative Percent
1 - 30	24	72.7	72.7
31 - 60	8	24.2	97.0
61 - 99	1	3.0	100.0
Total	33	100.0	

Most of the respondents (73%) indicated that their operations employed between 1 and 30 workers, whilst 24% indicated that theirs employed 31 – 60 employees. Contrary to the above figures, averages of five employees were seen at each site visited.

Table 4.9: Method of pay for SSM employees

	Frequency	Percent	Cumulative Percent
Fixed salary or wage	3	9.1	9.1
According to earnings generated	30	90.9	100.0
Total	33	100.0	

Only 9 % of the miners indicated that they were paid a fixed salary, whilst 91% were actually paid according to earnings generated. This was deemed to be consistent with general norms worldwide where SSM was practiced, as postulated by Hentschel et al. (2002).

Table 4.10: Salary ranges in SSM operations

	Frequency	Percent	Cumulative Percent
R0 - R2000	18	54.5	54.5
R2001 - R4000	14	42.4	97.0
R4001 - R6000	1	3.0	100.0
Total	33	100.0	

Whilst the question on earnings was rather ambiguous as it did not separate the salary earners from wage earners, it became clear during the questionnaire administering that all the miners were salary earners (i.e. were paid on a monthly basis). Almost all the miners (97%), bar one owner, indicated that they earned up to R4 000 per month. This is considered to be on the lower side of the salary scales.

Table 4.11: Type of employees (permanent or temporary)

		Frequency	Percent	Cumulative Percent
Valid	Permanent	2	6.1	6.1
	Temporary	28	84.8	90.9
	Both permanent and temporary	3	9.1	100.0
	Total	33	100.0	

The majority (84.8%) of SSM operators were employed on a temporary basis, whilst only a few (9.1%) indicated that their operations had a mixture of both permanent as well as temporary employees. Only two respondents (6.1%) were employed on a permanent basis.

Table 4.12: Annual turnover (income) of the operation

		Frequency	Percent	Cumulative Percent
Valid	R0 - R50000	1	3.0	3.0
	R51000 - R250000	21	63.6	66.7
	R251000 - R500000	7	21.2	87.9
	More than R500000	4	12.1	100.0
	Total	33	100.0	

Twenty-one respondents or 63.6% indicated that their operations had an annual turnover of between R51 000 – R250 000, whilst seven (21.2%) and four (12.1%) worked in operations with annual turnovers of R251 000 – R500 000 and more than R500 000 respectively. This was a good indication of earnings generation confidently showing potential investors what levels of returns and profitability were probable in those kinds of operations.

Table 4.13: Capital investment levels in SMM

		Frequency	Percent	Cumulative Percent
Valid	R0 - R50000	1	3.0	3.0
	R51000 - R250000	16	48.5	51.5
	R251000 - R500000	11	33.3	84.8
	More than R500000	5	15.2	100.0
	Total	33	100.0	

There was a reasonable amount of money invested in the SSM operations. Five respondents (15.2%) indicated that the capital invested in their operations exceeded R500 000, whilst 81.8% put the figure between R51 000 and R500 000.

Table 4.14: Desired capital investment levels for optimum production

		Frequency	Percent	Cumulative Percent
Valid	R51000 - R250000	5	15.2	15.2
	R251000 - R500000	13	39.4	54.5
	More than R500000	15	45.5	100.0
	Total	33	100.0	

All the respondents indicated that some level of capital investment was needed if their operations were to reach optimum production levels. Five respondents believed that the desired level of investment was R51 000 – R250 000, whilst thirteen and fifteen of them put the figure at R251 000 – R500 000 and more than R500 000 respectively.

4.3.1 The value or essence of small-scale mining operations

This question was aimed at establishing how important SSM was to those involved in it. The objective of such a determination was to establish if the people were not just involved in SSM because they had no better things to do or had no alternatives. This entire set of ten close ended dichotomous questions (i.e. provided with a YES

or NO choice of answers) was also aimed at determining if the people involved were aware of the risks involved (both financial and safety), their level of safety training as well as whether their conviction to this course could convince a potential investor to invest in SSM operations. More details of financial and safety risks are provided in the analysis of observation.

Table 4.15: SSM business is a source of income for me

	Frequency	Percent	Cumulative Percent
Valid YES	33	100.0	100.0

All the respondents indicated that SSM was a source of income to them. It could be safely deduced therefore that without SSM they would not have income to provide for their basic necessities for themselves and their dependents.

Table 4.16: I am willing and capable of investing my time, money and effort into this operation

	Frequency	Percent	Cumulative Percent
Valid YES	33	100.0	100.0

Sandstone SSM operators clearly indicated that they were 100% committed to this practice, and were willing to invest their time, money and effort into SSM operations to make it work.

Table 4.17: I know the risks involved in this business

	Frequency	Percent	Cumulative Percent
Valid YES	33	100.0	100.0

All the miners (100%) knew about the financial risks in the form of loss of capital invested or loss of earnings, or even safety risks such as hand and body injuries

arising from the use of basic tools, which can be encountered in the business of SSM.

Table 4.18: I am aware of the potential for physical harm in this operation

		Frequency	Percent	Cumulative Percent
Valid	YES	32	97.0	100.0
Missing	Values	1	3.0	
Total		33	100.0	

Thirty-two respondents (97%) indicated that they were aware of the potential for physical harm such as hand and finger injuries which could be caused by chisel and hammer cutting practices, eye injuries from rock fragments, or snake bites, which they could suffer from whilst involved in SSM activities. One respondent was not aware or did not know of the potential for physical harm in these operations.

Table 4.19: I have been trained to identify the risks relating to this job

		Frequency	Percent	Cumulative Percent
Valid	YES	30	90.9	93.8
	NO	2	6.1	100.0
	Total	32	97.0	
Missing	Values	1	3.0	
Total		33	100.0	

Two respondents indicated that they had not been trained to identify the risks involved in SSM, one person did not vote whilst the rest (91%) had been trained.

Table 4.20: I am aware of structures that can offer me financial and technical assistance

		Frequency	Percent	Cumulative Percent
Valid	YES	20	60.6	60.6
	NO	13	39.4	100.0
	Total	33	100.0	

Twenty respondents (60.6%) indicated that they were aware of the structures and institutions that could offer them financial and technical assistance. This question was followed up with questions on financial institutions (question 18 of the survey questionnaire) and support structures (question 20). However, these were not analysed because of the manner in which these questions were asked versus allowable and possible limits on using SPSS software. The method of answering these questions posed serious challenges during questionnaire analysis with SPSS.

Table 4.21: This operation has a potential to grow, make profit and employ more people

	Frequency	Percent	Cumulative Percent
Valid YES	33	100.0	100.0

All the respondents were unanimous regarding the growth and profitability prospects of their respective operations (and SSM in general).

Table 4.22: There is a definite need to invest in this operation

	Frequency	Percent	Cumulative Percent
Valid YES	33	100.0	100.0

All respondents explicitly indicated that there was a definite need to invest in their respective operations (and SSM in general).

Table 4.23: The community stands to benefit once the operation reaches optimum production

	Frequency	Percent	Cumulative Percent
Valid YES	33	100.0	100.0

All the respondents unanimously indicated that the community would benefit once their respective operations reached optimum levels of production.

Table 4.24: The risks are low and the returns are high in this operation

		Frequency	Percent	Cumulative Percent
Valid	YES	33	100.0	100.0

All the miners unequivocally agreed that the risks in SSM were low, and that the returns were high.

Table 4.25: Do you believe that in general small-scale mining sector has sufficient access to financial assistance?

		Frequency	Percent	Cumulative Percent
Valid	YES	14	42.4	45.2
	NO	17	51.5	100.0
	Total	31	93.9	
Missing	Values	2	6.1	
Total		33	100.0	

Seventeen respondents (51.5%) did not believe that SSM sector had sufficient access to financial assistance, whilst fourteen (42.4%) thought the sector had. Two respondents (6.1%) did not respond to this question.

4.3.2 Level of Commitment versus assistance (financial or otherwise)

This question considered those aspects that were deemed crucial and had to be done by SSM operators if they were to be assisted financially or otherwise. It looked at issues such as collateral and other forms of guarantee that were considered prerequisites for assistance in any operation where assistance, usually in the form of finance was being sought after. In other words, they (SSM operators) put themselves in the shoes of people with the potential to render assistance to SSM operators and stipulated the kind of prerequisites that would need to be in place prior

to rendering such assistance. These were close ended questions, where respondents had to choose between three possible answers (i.e. Very important, Less important and Not important) on the given statements, as discussed below.

Table 4.26: The operation should show strong evidence of future profitability

	Frequency	Percent	Cumulative Percent
Valid Very important	33	100.0	100.0

The operation under consideration for assistance should definitely show strong evidence of future profitability for it to be assisted, as all the respondents indicated.

Table 4.27: The operation should show growth potential and create sustainable jobs

	Frequency	Percent	Cumulative Percent
Valid Very important	33	100.0	100.0

All respondents were of the view that the operation being considered for assistance needed to show growth potential and also be in a position to create sustainable jobs.

Table 4.28: The owner/ manager should have proven experience in the field

	Frequency	Percent	Cumulative Percent
Valid Very important	31	93.9	93.9
Less important	2	6.1	100.0
Total	33	100.0	

Two respondents believed that it was less important for the owner/ manager to have proven experience in SSM whilst the rest (93.4%) thought it was very important.

Table 4.29: The owner should provide security or guarantee against the loan

		Frequency	Percent	Cumulative Percent
Valid	Very important	23	69.7	69.7
	Less important	6	18.2	87.9
	Not important	4	12.1	100.0
	Total	33	100.0	

In conformance with general norms of being risk averse, twenty-three respondents thought it was very important for the owner to provide security against the loan. Six and four respondents indicated that it was less important and not important respectively.

Table 4.30: The operation should be in a position to pay back the loan capital

		Frequency	Percent	Cumulative Percent
Valid	Very important	33	100.0	100.0

Given the above situation of being risk averse, all the respondents believed that the operation needed to be in a position to repay the loan if such had been received.

Table 4.31: The owner should demonstrate a strong willingness to succeed

		Frequency	Percent	Cumulative Percent
Valid	Very important	33	100.0	100.0

The entire sample unanimously agreed that the owner of a SSM operation needed to demonstrate a strong willingness to succeed, if he or she were to be assisted financially or otherwise.

Table 4.32: The operation should have a clear strategy for growth and development

	Frequency	Percent	Cumulative Percent
Valid Very important	33	100.0	100.0

It was considered very important for the SSM operation to have a clear strategy for both developing as well as growing the business. All respondents shared this sentiment.

Table 4.33: The operation should meet the minimum BEE requirements

	Frequency	Percent	Cumulative Percent
Valid Very important	26	78.8	78.8
Less important	7	21.2	100.0
Total	33	100.0	

A mixed response was observed in the question on minimum Black Economic Empowerment (BEE) requirements, despite the fact that all the six licensed operations were black owned and controlled, with a 24 % female representation in the industry. Twenty-six respondents indicated that it was very important for the operation to meet minimum BEE requirements whilst the rest (seven) thought it was less important.

4.3.3 Training

Training deals with the design and delivery of learning to improve performance, skills as well as knowledge about a given job. The rationale behind this close-ended question on training was to identify those areas of job performance, skills as well as knowledge development and then determine from SSM operators how important, less important or not important such issues were to them. Their responses to the different training areas would therefore impact on the strategies to be delineated later on. The formulation of this question was done on the premise that the respondents

understood what a given training (e.g. environmental management) was all about before deciding on whether such training was very important, less important or not important. The five types of training are analysed below:

Table 4.34: Technical training for general mining

		Frequency	Percent	Cumulative Percent
Valid	Very important	31	93.9	93.9
	Less important	1	3.0	97.0
	Not important	1	3.0	100.0
	Total	33	100.0	

Thirty-one respondents (93.9%) believed that technical training for general mining was very important to the SSM operators. One respondent did not think so, whilst the other one actually thought this training was less important.

Table 4.35: Basic business skills training

		Frequency	Percent	Cumulative Percent
Valid	Very important	33	100.0	100.0

All the respondents thought that training in basic business skills was very important.

Table 4.36: Environmental management and protection training

		Frequency	Percent	Cumulative Percent
Valid	Very important	30	90.9	90.9
	Less important	3	9.1	100.0
	Total	33	100.0	

Three respondents indicated that training in the management and protection of the environment was less important whilst the rest actually thought this training was very important.

Table 4.37: Health and safety standards and controls

		Frequency	Percent	Cumulative Percent
Valid	Very important	32	97.0	97.0
	Less important	1	3.0	100.0
	Total	33	100.0	

Health and safety standards and controls were thought to be very important by thirty-two respondents, with one considering it to be less important.

Table 4.38: Mining legislation

		Frequency	Percent	Cumulative Percent
Valid	Very important	29	87.9	87.9
	Less important	4	12.1	100.0
	Total	33	100.0	

Training in mining legislation was considered very important by twenty-nine respondents (87.9%) whilst four respondents thought it was less important. The response to this question presented a very interesting scenario, considering that the SSM operators experienced difficulty in applying for mining permits. One would have expected all the SSM operators to demonstrate a willingness to know and understand the laws that governed their industry.

Table 4.39: How easy/ difficult is it to sell your products?

		Frequency	Percent	Cumulative Percent
Valid	Easy to sell products	3	9.1	9.1
	Eventually able to sell, but it takes a lot of effort	17	51.5	60.6
	Very difficult to sell	13	39.4	100.0
	Total	33	100.0	

Thirteen of the respondents indicated that it was very difficult to sell their products whilst three actually thought it was very easy. With a lot of effort, seventeen respondents believed that selling was eventually possible.

Table 4.40: Do you have single or multiple customers?

		Frequency	Percent	Cumulative Percent
Valid	Single Customer	4	12.1	12.1
	Multiple customers	29	87.9	100.0
	Total	33	100.0	

Most of the respondents (87.9%) indicated that they were selling their sandstone to multiple customers whilst four were selling consistently to a single customer. It could not be established at the time of collecting data as to whether this single customer or multiple customers actually referred to the middle-men or not.

Table 4.41: Where/ who is your market?

		Frequency	Percent	Cumulative Percent
Valid	Local only	30	90.9	90.9
	Local and International	3	9.1	100.0
	Total	33	100.0	

Sandstone was sold mostly locally, according to thirty respondents (i.e. 90.9%); with three respondents indicating that they were selling to both local and international customers. The buyers were mostly property developers (golf estate developers) and builders, many of which came from major cities and towns such as Johannesburg, Durban and Cape Town, as was indicated by Mr. Kharafu.

Table 4.42: Do you believe that you are getting a market related price for your product?

		Frequency	Percent	Cumulative Percent
Valid	YES	9	27.3	27.3
	NO	24	72.7	100.0
	Total	33	100.0	

Only nine respondents indicated that they were getting a market related price for their product, which was above R300/m² of cut sandstone. Twenty-four respondents believed otherwise.

4.3.4 Strategies

The six strategic choices discussed below were provided as a guide from which the SSM operators were to choose and then decide if they were very important, less important or not important. This was based on the assumption that they had some strategic approaches that they employed to conduct their businesses, which could have been among the six provided and commonly used in business activities. However, provision was also made for them to provide for other strategies that were not among those listed, which they probably were using or considered very important. A brief description of each strategy was also provided in the questionnaire to provide further clarity and understanding on such a strategy.

Table 4.43: Innovation strategy

		Frequency	Percent	Cumulative Percent
Valid	Very important	32	97.0	100.0
Missing	System	1	3.0	
Total		33	100.0	

With the exception of one respondent who did not indicate their choice, the majority considered an innovation strategy to be very important in terms of assisting their organizations to perform at optimum levels. Constantly changing and developing new sandstone products was certainly considered to be an essential element for growing their business.

Table 4.44: Joint venture strategy

		Frequency	Percent	Cumulative Percent
Valid	Very important	22	66.7	68.8
	Less important	5	15.2	84.4
	Not important	5	15.2	100.0
	Total	32	97.0	
Missing	System	1	3.0	
Total		33	100.0	

Joining forces with other SSM operations so as to handle big projects that would have been difficult to handle alone was considered to be not important by five respondents, less important and very important by five and twenty-two respondents respectively. The difference in opinion on this question clearly demonstrated how some operators wanted to run their businesses as independent entities versus those that actually saw value in joining forces.

Table 4.45: Concentration strategy

		Frequency	Percent	Cumulative Percent
Valid	Very important	3	9.1	9.7
	Less important	12	36.4	48.4
	Not important	16	48.5	100.0
	Total	31	93.9	
Missing	System	2	6.1	
Total		33	100.0	

Focusing all your resources and skills on producing a single but profitable product in a single market was seen as being very important by only three respondents, with sixteen actually considering this to be not important. The others actually thought this was less important.

Table 4.46: Product development strategy

		Frequency	Percent	Cumulative Percent
Valid	Very important	32	97.0	100.0
Missing	System	1	3.0	
Total		33	100.0	

The strategy of developing new sandstone products for the existing market was thought to be very important by the majority (97%). One person failed to indicate their choice on this question. This response was consistent with observed practices and information gathered from interviews.

Table 4.47: Market development strategy

		Frequency	Percent	Cumulative Percent
Valid	Very important	32	97.0	100.0
Missing	System	1	3.0	
Total		33	100.0	

Establishing or finding new customers for the existing range of sandstone products was also seen as a very important strategy by thirty-two respondents (97%), with one person once again not indicating their choice.

Table 4.48: Horizontal integration strategy

		Frequency	Percent	Cumulative Percent
Valid	Very important	22	66.7	68.8
	Less important	8	24.2	93.8
	Not important	2	6.1	100.0
	Total	32	97.0	
Missing	System	1	3.0	
Total		33	100.0	

Twenty-two respondents considered taking over or acquiring other sandstone operations very important. Eight and two respondents thought it was less important and not important respectively, with one person electing to remain silent.

An additional statistical analysis from SPSS is provided as appendix E at the end of this report.

Whilst SPSS could provide different types of analyses, not all of them were essentially used, and every researcher makes an informed choice regarding which statistical results to use and which not to use. It is for this reason that the other analysis is provided as an appendix, to try and satisfy different audiences. However, it may be of great value to at least consider the following two statistical values from the additional statistical analysis provided:

- Mean: a measure of central tendency. One of its key properties is that all the respondents are included in its computation

- Standard deviation: the most commonly used measure of dispersion or spread. The larger this value the more spread out are the values around the mean, indicating a higher variety. A smaller standard deviation is desired as it indicates a lesser spread of the values around the mean.

4.4 ANALYSING OBSERVATIONS

Initially, all the sandstone miners used picks, hammers, shovels and wheelbarrows to mine, cut and transport their product. In cases of big orders, the mined and cut sandstone was accumulated at a central point near the mining area (figure 4.2) for ease of loading into a big transport mechanism. These primitive mining methods (seen in figures 4 and 5 below), offered the following challenges and concerns:

1. Very laborious
2. Very low level of productivity
3. Health concerns of bending for prolonged periods (back problems)
4. Low level of occupational safety and health care (hammer & chisel)
5. Rock fragments getting into the eyes as safety goggles were not always available and used
6. Dangers of being bitten by snakes in the rocky mountains
7. Mining scars, sometimes of great extent and depth left in habited areas

8. Dangerous pits and trenches near homesteads, posing drowning dangers for children and animals



Fig. 4.1: Initial sandstone mining method used (08/10/2007)



Fig. 4.2: Initial rock transportation and cutting methods used (08/10/2007)

At the time of doing this research, some of the six SSM operators who had been assisted with applications for mining permits had just received these. Three of them (M.J Kharafu, F. Mazibuko and M. Motaung) had also been assisted with capital equipment, through the help of the SSM Directorate of the DME, in conjunction with SASSMC. The assistance received included:

1. Erection of a corrugated iron shelter / store for housing the cutting equipment and even the finished product at times

2. Fencing around the shelter
3. Provision with infrastructural needs for the shelter (water & electricity)
4. Mining equipment (diesel compressor for rock drilling purposes), pinch bars, hammers and chisels
5. Some also received a once off issue of personal protective equipment

The new mining method employed subsequent to receipt of capital equipment entailed employing mechanical rock drilling and breaking practices, as well as machine cutting of the rock to its final dimensions at a cutting shelter provided. Holes were drilled into the sandstone using a compressed air jackhammer (similar to the one that is widely used at the South African underground gold and platinum mines). The compressor used was a mobile diesel powered unit, which was pulled to various sites via a tractor. The drilling pattern comprised about ½ m deep holes, spaced about 1 m apart and also about 1 m from the free face (area of free breakage). Once the holes had been drilled, two steel wedges were then put into each drilled hole, and a chisel hammered between these wedges. Small quantities of oil would then be applied between the steel wedges and the chisel, to provide for lubrication and easier penetration of the hammered chisel. All the chisels were hammered once from the first to the last one (usually 4 – 5 in a row at a time), before repeating this cycle. This caused the rock to crack along the line of the chisels, as seen in figures 4.3 and 4.4 below. The dislodged rock would then be removed using pinch bars.



Fig. 4.3: Compressed air rock drilling method (10/10/2007)



Fig. 4.4: Modern rock-breaking method (10/10/2007)

The broken rock from the mining sites would both be cut on site and kept in one bundle for onsite loading and transportation to various customers, or it would be transported to the shelter where it would be machine cut to final specifications, before being dispatched to various customers. The approach used was purely dictated to by customer needs and intended applications of the cut sandstone.

Once the rock had been delivered to the processing shelter (plant), an electric cutting machine would then be used to cut the rock specimen according to customer needs. Two cutting machines were readily available, and only one was used at any time whilst the other remained on standby. Some operators indicated that they at times used both

cutting machines simultaneously, one for cutting big rocks and the other for trimming the cut rocks to final dimensions. A typical electric cutting machine is displayed in figure 4.5 below:



Fig. 4.5: Electric sandstone cutting machine (11/10/2007)

4.5 ANALYSING PERSONAL INTERVIEWS

Face-to-face communication is a two-way conversation initiated by an interviewer to obtain information from a participant. The two are typically strangers to each other, and the interviewer generally controls the topics and patterns of discussion. Whilst the consequences of the event are fundamental to the interviewer, they are usually insignificant for the participant who typically has no hope of receiving any immediate or direct benefit from his or her cooperation.

As mentioned above, interviews were held with various SSM operators, the LED Manager as well as the Inspector of Mines responsible for the area. Also, the researcher attended a meeting with the Small Medium and Micro Enterprise (SMME) operators which was also attended by representatives of the SSM sector. The following

commentary delineates the salient issues raised or noted from some of the above-mentioned interviews and meeting.

4.5.1 (A) M.J Kharafu: - Lefika le Moriti Sandstone

Motsamai John Kharafu joined the sandstone SSM sector in 2000, after being unemployed for about 8 years. Motsamai alleges that he was prompted into joining the SSM sector by the entrepreneurial potential embedded in the practice. At the time of the interview, Motsamai was also operating a small dairy farm in Bethlehem where he produced milk and vegetables that were sold to the locals as well as the adjacent communities (Kestell, Qwaqwa etc.). He had been running the farm for some time but without really making a success, before he decided to venture into SSM as well. Motsamai's business (Lefika le Moriti) was 7 years old when this case study was conducted.

As an entrepreneur, Mr. Kharafu is the most successful of all the SSM operators in the area. As such, all the organizations that wanted to reach or access the SSM community in the area involved him a great deal, to get the process going. He knew all the other operators, including the illegal operators. Organizations such as Mintek, MQA, the DME as well as Wits Technikon (now called University of Johannesburg) had on numerous occasions interacted with him in as far as sandstone mining was concerned. He had been trained by Wits Technikon and Mintek on SSM activities. As a matter of fact, when SSM in Qwaqwa was discussed in formal or informal discussions to people like Mr. N Baartjies of Mintek and some other associates at MQA or the DME, Motsamai's name was always mentioned. A great deal of what was achieved during this research (i.e. all site visits, access to and meeting other SSM operators, meeting with the Inspector of Mines) was through the involvement of Mr. Kharafu.

Lefika le Moriti is one of the beneficiaries of the DME's grant to the SSM sector in Qwaqwa. The beneficiation area, with its cutting machines was two months old when the research was conducted. Four people worked at the beneficiation area, whilst the other workers worked at the mining sites, according to Motsamai. All workers were full time employees, but were paid according to earnings generated as indicated by Motsamai.

The biggest challenges that the SSM sector was faced with, according to Mr. Kharafu included:

1. Marketing: - only a few people knew about the SSM of sandstone in Qwaqwa and as such access to the markets was very limited. He believed that if their products were well marketed then the orders would increase, thus leading to more profitable operations.
2. The middle-man syndrome: - most people who bought the sandstone were middle-men who eroded the profits of the SSM operators by forcing/ convincing the operators to sell the sandstone at a lower price than the one eventually paid to them by the end-user. Profits were therefore squeezed for the SSM operators in this way.
3. Theft: - because mined sandstone was usually left at the mining site ready for sale to any potential or actual buyer, often this sandstone got stolen. This meant that mining of the sandstone had to start all over again upon receipt of an order, resulting in lost opportunities in terms of time, money and effort.
4. The difficulty/ bureaucracy or being sidelined for unknown and probably unfair reasons when it comes to securing a government tender for the "supply-and-fit" sandstone contracts.

Mr. Kharafu rated innovation, joint venture, product and market development strategies as being very important methods/ approaches to assist his organization to achieve optimum production and sales.

As part of his strategy to empower others in the community, and perhaps also his corporate social investment Mr. Kharafu mentored and assisted a fellow sandstone operator (who used to be an employee of his) to establish his own business as well as to apply for a mining permit.

4.5.1 (B) Flora Mazibuko: - COSBECODE

Flora Mazibuko is the owner of Community Stone Bricks and Economic Development (COSBECODE), formed in 1996. This entity came about as a result of a need for sandstone and bricks by the community, in the context of the available and abundance of sandstone. COSBECODE worked for 10 years unregistered. It only got registered as a Close corporation (Cc) in 2006, after it was approached by the DME in 1998 to register and apply for a mining permit. The entity did not do any work from 1998 to 2003. As a result, many of its one hundred original members deserted.

Considering her age at the time of this research (36 – 45), and the fact that she had been involved in SSM for more than 10 years already, Flora Mazibuko entered the SSM sector as a very young woman. During the period between 1998 and 2003, she received informal training from Lesotho people who were involved in the sandstone business in the area at that time.

COSBECODE started operating again from 2004/5, and it was granted a mining permit in 2006 though the permit was only received in 2007. At the time of doing this

research, the entity employed fifteen workers and it had just been assisted with capital equipment by the DME. The assistance entailed:

1. R100 000 for the Environmental Impact Assessment (EIA)
2. R100 000 provision made available for rehabilitation work after mining had ceased.
3. Equipment valued at R250 000 was secured for the business, which included big and small cutting machines, corrugated iron structure to house the equipment, electricity connection costs as well as personal protective equipment (PPE) for the employees.

According to Flora, the challenges that COSBECODE was faced with were similar to those mentioned above, but also included the following:

1. Competition among SSM operators: - this was at times unhealthy, fierce and sometimes dangerous tactics were used in competing for the same buyer.
2. Value destruction by greedy middle-men: - Whilst the SSM operators were forced to sell cut sandstone for R100/m², the middle-man was selling for up to R400/m², to the end-user.
3. Jealousy among the SSM operators, which was seen as very destructive by Flora.

Whilst recognizing the need to stand together and negotiate operating conditions, pay structures and pricing protocols together as a group, Flora indicated that a Cooperative was signed about two weeks prior to the interview. The Cooperative included only

those SSM operators who had a mining permit (i.e. Lefika le Moriti sandstone, COSBECODE, Bathembu sandstone, Boiteko sandstone, Bataung sandstone and Ipopeng sandstone).

Flora rated innovation, joint venture, product and market development strategies, as well as horizontal integration strategies as being very important methods/ approaches to assist COSBECODE to achieve optimum production and sales.

4.5.1 (C) Mpho Motaung: - Bataung Sandstone

Mpho Motaung regarded himself as the number 1 producer and supplier of sandstone in the area, because he paid his thirteen workers (six women and seven men) every Friday. Mpho attributed the success of his business to the fact that he was selling a unique and much sought after type of sandstone. He indicated that he was in constant fights with other sandstone operators over customers, or because they stole his sandstone. Also, Mpho indicated that he was constantly being approached by other operators (including white sandstone operators outside Qwaqwa) to form a joint venture with him.

With thirteen years of experience to his credit, Mpho supplied sandstone to both local customers as well as customers as far away as Johannesburg, Pretoria and Cape Town. Like Flora and Motsamai above, Mpho's operation (Bataung sandstone) had been assisted with capital equipment by the DME.

Mpho cited jealousy and sandstone theft as his primary concerns in the SSM business. He believed that employee satisfaction was a fundamental element of running a

business successfully. Like the other operators, he rated innovation, joint venture, product and market development strategies, as well as horizontal integration as very important strategies to assist his business to achieve optimum production and sales.

4.5.1 (D) Mr. T Makhele: - LED Manager (Local Municipality)

The SSM sector in Qwaqwa was deemed by the local municipality as an integral element of socio-economic development. To this effect, four areas of economic development were identified by the municipality, according to the Local Economic Development (LED) Manager. Such areas included:

1. Sandstone mining
2. River sand mining
3. Clay brick making and
4. Quarrying

In order to accelerate economic development in the area as well as to tackle unemployment where it was hurting the most, the local municipality had identified youth development and empowerment as key drivers of its integrated development programme (IDP). According to this strategy, the youth were encouraged to start their own businesses or to take a formidable position in businesses related to the above-mentioned four areas.

In one of its poverty alleviation projects, the local municipality made available to a youth project a R600 000 brick making machine, which could make 60 000 bricks per day. Whilst there were difficulties experienced by this project of which the LED Manager was not at liberty to discuss, the project nevertheless demonstrated a strategic commitment on the part of the municipality to address poverty and unemployment amongst the youth. According to Mr. Makhele, securing a municipality building or construction tender was going to be granted only on condition that the contractor secured his or her supplies (i.e. bricks, sand, and stones) from a youth project.

4.5.1 (E) Inspector of Mines (DME – Free State Province)

The Inspector of Mines for SSM in the area agreed to be interviewed on SSM and related activities in Qwaqwa, but indicated that she would not like for her details to be publicized in the subsequent report. Nevertheless, she confirmed the following:

1. that all clay operators were operating illegally (without permits)
2. the land where clay operators were digging the clay did not belong to them, and that they were in the process of being moved to another site
3. plans were at an advanced stage to assist a Cooperative of clay operators to get a mining permit
4. the DME had assisted legal sandstone operators with capital equipment and other financial needs, to the tune of about R5 million.

4.5.2 Meeting with SMME operators

One common characteristic feature of all the local SSM operators is that they all somehow had hope that the research would solve their problems and assist their businesses somehow. This aspect was more prevalent in the meeting with SMME operators, who used the platform as a medium to raise their concerns and problems. They were concerned that they were being marginalized in strategic interventions such as those that were organized by Mintek and MQA previously, as well as the University of Johannesburg's outreach programme. They were subsequently assured by the meeting convener that they would also be included in future interventions.

Many of the operators who attended the meeting were very vocal about the difficulties they experienced in applying for a mining permit, whilst others were frustrated by the unacceptably long period of waiting for the permit. There were people who had sent their applications as far back as 1999, and had not received a response from the authorities at the time of this research. As a result of this and other problems, many SMME operators found themselves running their operations from hand-to-mouth, and not growing in the process. Despite all these challenges, the SMME operators remained optimistic about the future prospects of their businesses.

4.5.3 Declaration based on evidence collected and applied

After critical analysis of all the case study evidence, and following the four principles that underlie all good social science research, it can now be safely declared that:

- all evidence collected had been attended to in the analysis

- all major interpretations had been addressed
- the most significant aspects of the case study have been addressed
- limited prior knowledge and expertise have been sufficiently applied

4.6 OVERALL INTERPRETATION AND INFERENCES

The increasing involvement of women in SSM in recent years has become a noticeable and pleasing phenomenon in South Africa. This move is seen as a balancing act that promotes equality in mining. Seeing women out in the field digging and cutting rock with picks, hammers and chisels was considered quite an achievement considering the unwritten roles that society had for many years defined for women. Not only were they employed as blue-collar workers, but some were supervisors whilst one operation was owned and run by a woman (COSBECODE).

There is a definite need to invest in SSM operations in the area. The people involved demonstrated a high level of commitment in this activity, which was a source of income for all of them. They were clearly aware of the risks involved (safety and financial), but were adamant that such risks were low with high returns. Seventy-three percent (73%) of them had been in the business for four years or more, and they believed that SSM operations had a life of mine of well beyond ten years. However, because SSM operators were in most instances not selling directly to their consumers they thought that they were not getting a market related price for their product, thus indicating value erosion by the middlemen.

A clear game plan for growing the business and staking out a market position is necessary in SSM. The majority considered constantly developing new sandstone products for their existing markets as well as innovation, joint venture and developing new markets as very important business strategies going forward. Other business tactics proposed were employee satisfaction and training (basic mining, technical training as well as general management).

It was also evident that middle-men were clearly killing the business of SSM operators through their greediness. Dealing directly with the end-user was clearly a solution to this impasse.

Modern property development has no doubt reshaped and redefined the sandstone mining business. Many affluent, middle age black people (sometimes referred to as black diamonds) have been exposed to the various appeals of sandstone use and have thus shown tremendous interest in this natural mineral. The recent property boom in South Africa bears testimony to this. There is no doubt that South Africa will see an increase in the number of SSM operations in future, if the currently stretched regulatory arm of the DME can cope with the increased number of applications for mining permits.

4.7 SANDSTONE USES

Sandstones are used for many useful domestic purposes, ranging from paving, and flooring through to building. They are also used for making windowsills, making beams, pillars as well as wall facing. Because sandstones are resistant to salty air, they are commonly used for exterior cladding of seashore buildings. The desirable alkalinity and acidity characteristic of sandstone makes it ideal for flooring and wall-covering in chemical industries. One is also likely to see it commonly used for making fireplaces

and firewalls, owing to its good thermal resistant characteristics. Typical sandstone uses are depicted in figures 4.6 and 4.7 below:



Fig. 4.6: Sandstone used for building and other applications (12/10/2007)



Fig. 4.7: Interior and exterior cladding (12/10/2007)

With its natural earthy appeal, sandstone is available in many colours (light creams to deep red) and sizes. Because of its excellent anti-slip properties, sandstone is used on patios and pool surrounds. It is used in its rough natural finish, through to honed (smooth and matt) and polished appearance (figures 4.6 and 4.7). Additional sandstone pictures are provided as appendix D at the end of this report.

The architectural properties of sandstone make it a suitable medium used to make a wide range of handcrafted artefacts such as garden ornaments, sculptures and other decorative items. Modern housing developments are today characterised by various appealing applications of sandstone, thus making it easy for developers to charge exorbitant fees for their properties.

4.8 CONCLUSION

There is money invested in SSM of sandstone in Qwaqwa, and a lot more that can and should be invested in order to grow this sector. The minerals reserves are in abundance, there is a demand for this commodity and there are people who are committed to this course. The people involved indicated an unwavering commitment towards the development of the SSM business. They demonstrated this commitment when they all (100%) indicated that they were willing and capable of investing their time, money and effort into SSM operation. This is despite the fact that it was very difficult to sell their product (39.4% of respondents), and that they were eventually able to sell their products though it took a lot of effort (51.5% respondents). It must be noted at this stage that about 73% of them had been in the SSM business for four years or more.

The need for training and skills development in the sector cannot be overemphasized. This aspect has been raised over and over in previous SSM research. Whilst the people involved in SSM did not have a clear production and sales strategy, they all viewed innovation, product and market development strategies as very important strategies for growing their business and the sector.

Because the majority of the people were employed on a part-time basis and therefore only paid according to earnings generated, this translated into a need to develop and

implement specific sales and marketing strategies so that more product could be sold and more work created for employees for increased earnings and sustainable livelihoods.

DISCUSSION, RECOMMENDATIONS AND CONCLUSION

5.1 INTRODUCTION

Qwaqwa is a very mountainous area, all of which consists of sandstone. These mountains form part of the Drakensberg mountain range, one of South Africa's world-renowned tourist destinations and distinguished landmark. The abundance of the sandstone in the area lends itself to erratic, unstructured, uncoordinated and even illegal mining by everyone everywhere, including in habitat areas. Whilst this is totally wrong and should not be allowed to happen, it seemed to be motivated by the many desirable domestic uses of sandstone, which included building, tiling and paving purposes, among others. Inhabitants of the area therefore found it easy to "just dig" where they deem it fit, thus causing a spiral of social problems and conflicts between the community and the miners.

5.2 TARGET AUDIENCE

As it was the case with case study design, reporting case study results is also one of the most challenging aspects of doing case studies. This is true because the case study report does not follow any stereo-typic form. Despite this deficiency, composing a case study report remains a fundamental aspect of this type of research. Failure to compile a compelling case study report may put the entire research in jeopardy.

Compiling this case study report was done with the objective of reaching and convincing a multitude of particular target audience comprising of (a) policy makers and regulatory bodies; (b) community leadership structures; (c) investors; (d) research funders; and (e) dissertation committee. The motivations for this variety of audiences include the following:

1. Policy makers and regulatory bodies: - these include MQA, SASSMC, DME and other organizations that are from time to time engaged in drafting policies and regulations specifically formulated for the SSM sector. This matter is further delineated under the recommendations outlined later in this chapter.
2. Community leadership structures in the form of Chiefs, Councilors, Municipal Managers, church leaders and others are often embroiled in dispute resolution procedures on matters involving community resources. It is hoped that this report will provide them with guidance so as to make informed decisions.
3. Investors: - whilst no financial project evaluation criterion such as internal rate of return (IRR), return on investment (ROI) and many others were never applied on the economic evaluation of this project, it is believed that the dedication and unyielding commitment of the SSM operators, coupled with the abundance of the much sought after sandstone, in the context of the ever increasing housing needs in South Africa makes for a convincing case for investment in this business.
4. For the research funders, the findings of the research as it pertains to the level of SSM in Qwaqwa, the challenges that the operators have to grapple with as well as the recommended strategies for stimulating socio-economic growth from this sector play a very important part in as far as general research is concerned.

5. Dissertation committee: - the mastery of the research methodology and the theoretical issues explored in this research were executed with the objective of meeting a criteria set by the dissertation committee.

5.3 CASE OVERVIEW

The mining of sandstone by a few operators in Qwaqwa presents a very unique but significant factor in the economic rejuvenation of the area, and this demonstrates the significance of this case study to the Qwaqwa community, the SSM operators, SSM researchers, government institutions as well as to the potential investors. This case study has combined all the sources of evidence in the form of interviews, observations, documents consulted as well as data collected through the use of questionnaires to highlight first the dilemma, then to design an appropriate research methodology that eventually aided in the proposition of the research solutions to the dilemma.

5.3.1 Description of SSM in Qwaqwa

It has been established through the multi sources of evidence used in this study that most (82%) of SSM in the area used a mixture of basic (pick, shovel, hammer and chisel) as well as machinery (compressed air drilling machines and electric cutting equipment) to mine and cut the sandstone. Whilst the study only focused on the six legal operators, it also became evident that there were other operators who were also involved in this activity albeit without permits. The size of this population could not be ascertained at the time of doing this case study.

The size of the sandstone in the area posed a challenge of its kind at the time of doing this research, in that it could not be accurately estimated. Nevertheless, it could be safely estimated that the available sandstone in Qwaqwa has a life span that could extend well beyond a century, even if the current mining rate could be doubled. This estimate is based on the fact that the entire local mountain range, which forms part of the Drakensberg range, including the habitat area consists of sandstone. This view was also shared by many of the respondents who also believed that sandstone SSM had a lifespan that would extend well beyond 10 years.

5.3.2 Challenges faced by SSM operators

The business of sandstone SSM in Qwaqwa has proved to be a very challenging task to those involved in it. Whilst it was considered a given that one would require capital equipment and tools to start this kind of business, the latter also offered entrepreneurs a host of other challenges, some of which included:

1. Health risks of bending for prolonged periods whilst cutting the stones
2. Mining safety risks of being bitten by poisonous and dangerous snakes in the mountains
3. Marketing challenges for the sandstone, which also translated into lack of sales opportunities
4. Value erosion by the greedy middle-men
5. Sandstone theft, which represented lost opportunities
6. Not being considered for municipality tenders

7. Unhealthy and sometimes dangerous competitive practices
8. Jealousy among the SSM operators, which was considered destructive
9. Red tape regarding securing a mining permit
10. Lack of mining, processing and management skills
11. Lack of continuity due to unrealizable profit margins

5.3.3 Challenges faced by the Qwaqwa community

SSM in Qwaqwa was done by local miners for their local community. As indicated in the statistical analyses, sandstone was sold mostly locally, according to thirty respondents (i.e. 90.9%). The miners and the community had a mutually dependent relationship in that the miners depended largely on the community as their primary market, whilst the community also depended on the miners for job opportunities. It will therefore be safe to deduce that the challenges that the SSM sector had to contend with directly affected the community as well. Other challenges faced by the community included:

1. Dangerous excavations left near homesteads by SSM operators, which posed drowning and maiming risks for both human and animals
2. Environmental degradation and displacement of protected species as a result of mining
3. Limited employment opportunities and poverty
4. Dangerous pits and trenches near homesteads, which also destroyed the scenery and prime land for future development

5. A wide range of social ills such as prostitution and ill health which are commonly associated with the nomadic nature of SSM business.

Considering the magnitude of the above-mentioned challenges, the recommended strategies to address these were equally many and varied. The recommended strategies to develop and stimulate SSM in Qwaqwa such that the community benefit from its environmental wealth are outlined later in this chapter.

5.4 DISCUSSION OF DATA IN LIGHT OF LITERATURE REVIEW

Problems usually associated with child labour in SSM as was indicated by Hentschel et al. (2002) were not observed at all in all the sandstone or clay mining sites as well as the cutting areas visited. This issue was equally never raised as a problem in all the discussions on SSM. However, the level of involvement in SSM by the youth is worryingly low and the rationale behind this should be investigated. After all, the youth are future managers and leaders and should therefore be seen to be taking over from their predecessors for continuity and sustainability in all business fronts, SSM included.

Whilst work on the mining sites appeared to be very labour intensive and needing more masculinity in nature, 24% of women involved in this activity seemed to be handling the job demands quite well. They could and were seen to be doing anything that their male counterparts were doing. Given the latest developments in South Africa where women are being empowered and fast-tracked into the mainstream economy (and deservedly so), there is no doubt that we should be able to see more and more female

participation in SSM in future. After all, these trends are already at an advanced stage in other countries like Guinea, Madagascar, Malawi and Bolivia.

5.4.1 Environmental problems and mining method employed

Environmental problems in SSM as declared by Kambani (2002) can never be completely eradicated, for as long as appropriate and adequate punitive measures or incentive schemes are not put in place. Whilst the majority of the operators indicated that training in the management and protection of the environment was very important, some site observations did not concur with that view. Problems regarding the mismanagement of the environment were very prevalent in the various sites visited, including clay-mining sites. This problem still exists even today.

Small-scale mining method used to mine sandstone was consistent with universal trends of using low technology and being labour intensive, as inferred by Shen & Gunson (2004). The rudimentary mining and processing methods used were motivated by factors such as surface deposits and the relatively soft characteristics of sandstone.

5.4.2 Level of employment and investment

SSM is an important employment generating sector in rural communities, according to Hentschel et al. (2002), despite its environmental concerns mentioned above. In most cases, employees were employed on a part-time basis and therefore only reporting for duty only when there was a need. This practice offered a degree of flexibility in that the employer did not have to keep employees at work and pay them if there were no

orders. As a result, the practice had low overheads and low entry barriers as pronounced initially by Amankwah (2004).

Apart from the capital equipment and machinery that was granted to some SSM operators by the DME, no evidence of own capital could be seen or produced. However, all the miners indicated that they were willing and capable of investing their money, time and effort into their operations to make them profitable. It is therefore a considered opinion that this commitment should be seen as a motivating factor in cases where investment in SSM of sandstone in the area is being considered. After all, there is abundance of sandstone in the area and a bunch of highly motivated and committed miners who are willing and capable of ensuring that good returns are realized from such an investment.

Many of those miners knew very little if anything at all about SSM initially but had since been transformed into very promising entrepreneurs who played a pivotal role in local employment creation and poverty eradication.

5.4.3 Training and Communication

Illiteracy, shortage of skills and the need for training to empower SSM operators as declared by Moholo (2001) are just but a few of the impediments facing sandstone mining in Qwaqwa. Where training is eventually provided, it should preferably be tailor-made to suite the target population. It would be ideal to even consider using local language to offer such training. This would prevent a situation similar to the one experienced by Wits Technikon mining staff in 2003 where a mining training programme that was organized for and given to the SSM operators in Qwaqwa ended up in limbo because it was not suitable both in content and language, to the local SSM sector. As it later surfaced, the lecturing staff that was tasked by MQA to offer a

mining overview to the local SSM operators knew nothing at all about SSM in Qwaqwa. Such a situation represented a communication gap between the training organizers, the training providers as well as the target recipients of such training.

The above-mentioned communication gap continues to prevail, where it has been established from this research that people on the ground do not know of or have not heard of institutions such as Mintek (which subsequently assisted some operators to apply for mining permits). The people on the ground did not know of institutions such as the South African Small-scale Mining Chamber (SASSMC), the umbrella body mandated to represent their interests on various SSM forums. This omission is considered to be a serious matter that needs urgent attention from all involved. For this purpose, SSM operators should adopt the slogan “nothing about us without us” if such a communication gap were to be closed.

5.5 ANSWERING THE RESEARCH QUESTIONS

Providing answers to the research questions is the last leg of a research undertaking. The technique uses the research design to draw answers to the research questions, thereby concluding the research journey in terms of process and methodology. Whilst an endeavour is made to answer all questions as adequately as possible, cognizance should be taken of the fact that not all questions may actually be answered. In fact, an attempt to answer research questions of any study sometimes opens up other questions for future and further studies. This indicates the continuous and evolving nature of research.

Notwithstanding the above stance, tremendous strides had been made in this study to provide answers to the research questions asked earlier. These are outlined below.

5.5.1 How do SSM in Qwaqwa operate?

Sandstone SSM operators in Qwaqwa may be defined as small business men and women who operate their mining sites with an average of about five to six workers for both mining and cutting of sandstone. Most of them use predominantly a mixture of rudimentary equipment and modern machinery in their conduct of SSM business. They are characterized by lack of sales and marketing skills, which adversely affected their earnings' potential, thus making them run their business on a sustained hand-to-mouth basis. Their lack of appropriate skills is aggravated by the high level of illiteracy (one in every seven) prevalent in the sector.

The business of operating sandstone mining is operated without clear-cut strategies employed in the business. The eventual sales made largely depended on the middle-men to whom the SSM operators paid high premiums in order to sustain their businesses. However, despite their lack of sales and marketing strategies the sandstone miners at Qwaqwa unanimously agreed that they needed to constantly develop new sandstone products and also needed to constantly look out for new markets for their products. Their lack of business and management strategies did not in any way dampen their spirited commitment towards making a success of sandstone SSM business. Similarly, sandstone theft, jealousy and sometimes unhealthy competitive tactics evident in this business did not dent their unyielding commitment to the business of SSM.

Whilst there was no evidence of own capital invested in the SSM business in any one of the operations, the SSM operators remained optimistic that investment in this business was needed in order to grow this business and earn better returns.

5.5.2 How do SSM react to challenges?

The absence of clear-cut business strategies to run the SSM operations would seem to suggest that the owners/ operators did not have a plan to address the many challenges that prevalent in this sector. In fact, choices seemed to be very limited for those who were involved in this survivalist business. Whilst some operators at least provided personal protective equipment to their employees to safeguard them against injuries, many operators still worked without these if not provided by the employer. This notion supported the lack of choices inherent in this business.

Even though the SSM operators had to contend with a magnitude of safety and health risks, they still demonstrated an unwavering commitment to this course. Even though the majority had not realized meaningful growth returns from SSM, their willingness to invest their time, money and effort in this business, which was a source of income to all of them was unquestionable. They remained committed and convinced throughout their period of involvement in the practice that there was a lot of value still to be realized from SSM.

It is probably the above lack of clear-cut strategies and choices to deal meaningfully with challenges that the SSM division of Mintek had been so involved in assisting the SSM sector in general throughout South Africa. This assistance has mostly been in the form of applying for mining permits, conducting test-work required to draw up feasibility studies and sometimes even commissioning plants for these miners.

5.5.3 Why does the community receive no benefit from SSM?

Reasons as to why the Qwaqwa community did not benefit from the massive sandstone in the area presents a very interesting field of future research that should be aimed specifically at the community. However, because there were only six licensed operators servicing the entire area, it is highly possible that they were just too small to make a meaningful contribution to the entire community in terms of job opportunities and poverty alleviation. These six operators were just too small a size to effect sufficient extraction of sandstone to service the community's building needs.

The absence of a notable and sizeable market for the sandstone is factored as one of the reasons why the community received no benefit from the sandstone in the area. Whilst the potential existed for using sandstone for many building applications in Qwaqwa, this was actually not the case on the ground. Possible reasons why this was the case may have to do with the higher costs of sandstone when compared to the more common building methods, or not really appreciating the full benefits of sandstone by both the community and local municipality.

The current level of investment in sandstone SSM business is discouragingly small to benefit the entire community. Much more investment is needed by the private sector, government, the community as well as other interested stakeholders to produce and use more sandstone for both local as well as outside the area consumption. With this in mind, it must also be noted that increased demand for sandstone should first be stimulated.

The counter proposition that the authorities would prefer not to destroy the beautiful mountain scenery through increased extraction of sandstone cannot and should not be annulled.

5.5.4 Working together between the SSM operators and the community for mutual benefit

SSM in Qwaqwa was done by local miners for their local community. As indicated in the statistical analyses, sandstone was sold mostly locally, according to thirty respondents (i.e. 90.9%). The miners and the community had a mutually dependent relationship in that the miners depended largely on the community as their primary market, whilst the community also depended on the miners for job opportunities. In spite of the above assertion, the scope exists for further development of this working together for mutual benefit between the Qwaqwa community and the SSM operators.

5.6 RECOMMENDED STRATEGIES TO DEVELOP SSM

A lot of work continues to be done locally and internationally behind the scenes on SSM by organizations such as SASSMC, MMSD, International Labour Organisation (ILO) and many more, the aim of which is to encourage responsible and sustainable mining. However, many of these desirable strides happen remotely from the intended recipients, and sometimes even without their knowledge. It is for this and many other concerns that the following strategies and tactics for stimulating socio-economic growth from SSM are postulated:

1. **Communication:** Much of the good work done by regulatory and other interested bodies should be made to eventually reach the SSM operators.

Writing, calling or traveling to them (SSM operators), or even advertising information for their consumption on print, electronic media, local radio stations and others are just but a few of the tactics through which communication could take place.

2. **Innovation, product and market development strategy:** SSM operators should look for opportunities to continuously change and develop new sandstone products for both existing and new markets. Also, they should continuously look for new markets for their products.
3. **Marketing of sandstone SSM:** The good work of the six licensed operators needs to be marketed across the length and breadth of the country, so that others may also begin to appreciate the value of sandstone. There is a lot of good work that can be derived from this natural resource, and many more people need to be made aware of this. The potential spin-offs of such activities may be increased sales, increased mining activity, increased revenue and economic activity.
4. **Publicity:** Current good work being done by SSM worldwide is unknown or seldom heard of. All that is heard is the ever-increasing voice of environmentalists who are always objecting to mining activities, especially of a small-scale in nature. This has often hampered potential economic growth and development. There is a dire need to publicize success stories, so that others could learn from this and be motivated in the process. The public needs to be informed of good work too.
5. **Cooperatives:** The need for cooperatives in SSM has been identified through numerous researches as a key driver towards coordinated and structured assistance, be it financial, technical, legal or otherwise. A case in point is the clay miners in Qwaqwa who could have benefited

from such a formation and been legal eventually, like their sandstone counterparts.

6. **Regulations and policies:** Specific, favourable and user-friendly regulations and policies should be put in place for the SSM sector. The regulations should be seen to be encouraging the development of SSM as opposed to current perceptions. The fact that Mintek is currently playing a pivotal role in assisting SSM operators with applications for mining permits is indicative of the unfriendliness and somewhat onerous regulations and policies governing SSM.
7. **Elimination of bureaucracy:** Bureaucracy and burdensome compliance requirements in the SSM sector need urgent and strategic overhaul, so that the many aspirant and illegal miners can benefit from some of the good strides by some government and non-governmental institutions.
8. **Better environmental management:** Environmental enthusiasts should not always be allowed to impose their interests over other economic development needs. An objective and balanced evaluation of mineral extraction versus environmental preservation should always be sought after, because overlooking the benefits of SSM due to pressure by environmentalists may lead to the introduction of policies and legislation that solely addressed the undesirable effects of SSM, whilst remaining silent about the wider and more indispensable consequences of it.
9. **Adoption and nurturing:** Big mining conglomerates should be encouraged to adopt and nurture SSM operators. A practical example would be for a big mine (e.g. mining gold) to assist and support its nearby small-scale clay mining operation technically and financially, for the latter to grow meaningfully. This can be done by buying bricks only from the small operator. Appropriate incentives and punitive measures

should be put in place by the authorities to make this happen. After all, this kind of assistance could be a drop in the ocean for big companies, whilst it is actually a growth catalyst and job creator for the SSM sector in the process.

10. Skills training and development: The fact that 21% of the SSM sample was illiterate is as indictment of the training and development needs that must take place in SSM. South Africa is currently experiencing a high shortage of skills, thus making skills training and development a national priority. Good work done by SSMB division of Mintek is not adequate to address the current impasse.

11. Renaissance and Investment: In the same manner that South Africans have seen the revitalization of the old era African thatch roof as a trendy and “must have” element in the property market, the renaissance of sandstone should take place in a similar manner through appropriate sandstone marketing and branding strategies. However, such a renaissance will need to be supported by aggressive and strategic investment to make it realizable.

5.7 CONCLUSION

Small-scale mining of sandstone has the potential to become a gateway to economic emancipation and poverty eradication in Qwaqwa. A lot of work needs to be done by local and national authorities to empower SSM operators and encourage entrepreneurship through the promotion of small, medium and micro enterprises (SMME) in this business sector. Promotion and lobbying for meaningful investment in the sandstone mining business should be done sooner rather than later.

The communication gap between SSM operators and training providers, policy formation structures and other important and concerned role players should no longer be allowed to exist, given the current SSM situation in the area.

There are re approximately 30 000 SSM operators in South Africa, who provide a living for well over 150 000 dependents. Not only do these operators provide for their basic necessities, but rather contribute towards the creation of employment opportunities that may not be considered economically attractive to the larger mining conglomerates. Efforts by SSM directorates of the DME throughout the nine provinces, the SASSMC, non-profit organisations like SAMDA, Mintek and other interested and involved parties that are aimed at promoting, developing and assisting SSM should be appreciated and encouraged by all.

Work done by the above-mentioned organisations is one of the fundamentals of ensuring that all South Africans have a meaningful share in the country's wealth. If these efforts are not speedily promoted, then the ideals of the Freedom Charter, which are categorically "aimed at restoring the national wealth of the country, as well as transferring the mineral wealth beneath the soil to the ownership of the people as a whole" will remain a fallacy and the dreams of the country's fallen struggle heroes, will remain just that (dreams). Mineral rich communities like Qwaqwa will continue to remain poor and not benefit from their surrounding wealth if such communities are not empowered through the above strategic interventions.

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UNIVERSITY OF KWAZULU-NATAL

**Strategies for stimulating socio-economic growth from small-scale
mining operations in Qwaqwa (South Africa)**

**By
Isaac Tshabalala
203511867.**

**A dissertation submitted in partial fulfillment of the requirements
for the degree of
MASTER OF BUSINESS ADMINISTRATION**

Graduate School of Business

**Supervisor: Professor Antoine F. Mulaba-Bafubiandi
Co-Supervisor: Dr. K.K Naidoo**

2008

**SUPERVISOR'S PERMISSION TO SUBMIT FOR
EXAMINATION**

Date: December 2008

Student Name: Isaac Tshabalala

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Dissertation Title: Strategies for stimulation socio-economic growth
from small-scale mining operations in Qwaqwa (South Africa)

As the candidate's supervisors we agree to the submission of this
dissertation for examination.

Name of Supervisor: Professor Antoine F. Mulaba-Bafubiandi

Signature:

A handwritten signature in black ink, appearing to read 'A. F. Mulaba-Bafubiandi', with the date '20/11/09' written below it.

Name of Co-Supervisor: Dr. K.K Naidoo

Signature:

DECLARATION

I Isaac Tebogo Tshabalala declare that

- (i) The research reported in this dissertation/thesis, except where otherwise indicated, is my original research.
- (ii) This dissertation/thesis has not been submitted for any degree or examination at any other university.
- (iii) This dissertation/thesis does not contain other persons' data, pictures, graphs or other information, unless specifically acknowledged as being sourced from other persons.
- (iv) This dissertation/thesis does not contain other persons' writing, unless specifically acknowledged as being sourced from other researchers. Where other written sources have been quoted:
 - a) then their words have been re-written but the general information attributed to them has been referenced:
 - b) and their exact words have been used, then their writing has been placed inside quotation marks, and referenced.
- (v) This dissertation/thesis does not contain text, graphics or tables copied and pasted from the internet, unless specifically acknowledged, and the source being detailed in the dissertation/thesis and in the references or bibliography section.

Signature:

Appendix A

QUESTIONNAIRE

VOLUNTARY QUESTIONNAIRE

RESEARCHER: Isaac T Tshabalala

SUPERVISOR: Prof. Antoine Mulaba

SCHOOL/ PROGRAMME: Graduate School of Business: MBA

UNIVERSITY OF: KwaZulu-Natal

NOTE TO THE RESPONDENT:

- ❖ The information provided in this form will be treated as strictly confidential
- ❖ You are under no obligation to participate in this project and you may exercise your right to withdraw at anytime during the project
- ❖ The purpose of this survey is to obtain statistical and appropriate data on small-scale mining operations in Qwaqwa, Free State Province, South Africa
- ❖ Your identity may never be publicised anywhere in the published reports emanating from this survey, unless with your prior consent

HOW TO COMPLETE THE QUESTIONNAIRE:

- ❖ Make a tick or cross on your correct answer, or encircle your correct answer.
- ❖ Fill in your correct answer where this is provided.
- ❖ Please do not leave blank answers, unless this option is given

SECTION A: DEMOGRAPHIC DETAILS

Each answer/ option below must be answered with a tick. If the questionnaire is completed electronically, simply copy and paste the tick (✓)

1. Please indicate your Sex, Nationality and Marital status

Male	Female	Black	White	Coloured	Indian	Single	Married	Divorced	Widowed

2. Age

16 – 25	26 - 35	36 – 45	46 - 55	56 and more

SECTION B: NATURE OF THE MINING OPERATION, EQUIPMENT USED AND OPERATION SIZE

3. Product being produced

Clay	Dimension Stone	Other

4. If clay is being produced, what is the type?

Porcelain	Stoneware	Earthenware	Recycled White	Refractory	Pottery	Bentonite	Kaolinite	Other

5. Type of operation

Underground	Open Cast (above ground)	Underground & Open Cast	Other

6. Type of equipment used to extract the mineral

Basic (Pick & Shovel)	Machinery	Mixture (basic & machinery)	Other

7. Number of years in operation

Less than 1 year	1 – 3 years	3 – 5 years	More than 5 years

8. Estimated life of the operation

Less than 3 year	3 – 5 years	5 – 10 years	More than 10 years

9. Number of people employed

1 - 30	31 – 60	61 – 99	Other

10. How do you pay your staff?

Fixed salary/ wage		According to earnings generated	

11. Salary/ wage range

R0 – R2000	R2001 – R4000	R4001 – R6000	R6001 – R8000	> R8000

12. Are they permanent employees or temporary employees?

Permanent		Temporary	
------------------	--	------------------	--

13. Annual turnover (income) of the operation

R0 - R50 000	R51 000 – R250 000	R251 000 – R 500 000	> R500 000

14. Annual tonnage produced

0 - 50 000 tons	51 000 – 250 000 tons	251 000 tons or more

15. Capital invested in the operation

R0 - R50 000	R51 000 – R250 000	R251 000 – R 500 000	> R500 000

16. Desired investment to reach optimum (best possible) production

R0 - R50 000	R51 000 – R250 000	R251 000 – R 500 000	> R500 000

17. The value or essence of small-scale mining operation

Statement	YES	NO
1) This business is a source of income for me		
2) I am willing and capable of investing my time, money and effort into this operation		
3) I know the risks involved in this business		
4) I am aware of the potential for physical harm in this operation		
5) I have been trained to identify the risks relating to this job		
6) I am aware of structures that can offer me financial and technical assistance		
7) This operation has a potential to grow, make profit and employ more people		
8) There is a definite need to invest in this operation		
9) The community stands to benefit once the operation reaches optimum production		
10) The risks are low and the returns are high in this operation		

SECTION C: FINANCING INSTITUTIONS

18. In the following matrix, indicate if:

- you know of the said financial institution
- you believe that the said institution can assist you financially
- you would like to get financial assistance from the said institution
- you do not know of the said financial institution

FINANCIAL INSTITUTION	a	b	c	d
Industrial Development Corporation (IDC)				
Small Business Development Corporation (SBDC)				
Khula Enterprise Finance Agency				
Other:				

19. Do you believe that in general the small-scale mining sector has sufficient access to financial assistance?

YES		NO	
-----	--	----	--

SECTION D: SUPPORT STRUCTURES (technical or otherwise)

20. In the following matrix, indicate if:

- a. you know of the said support structure
- b. you believe that the said support structure can assist you
- c. you would like to get technical or other support from the said structure
- d. you do not know of the said support structure

FINANCIAL INSTITUTION	a	b	c	d
Mintek				
Ntsika Enterprise Promotion Agency				
Council for Geosciences				
Mining Qualifications Authority (MQA)				
South African Mining Development Association (SAMDA)				
Department of Minerals and Energy (DME)				
Other:				

21. If your operation was to be assisted financially or otherwise, indicate or rate the following statements as follows:

- 1 = Very important
- 2 = Less important
- 3 = Not important

OBJECTIVES		RATING
1	The operation should show strong evidence of future profitability	
2	The operation should show growth potential and create sustainable jobs	
3	The owner/ manager should have proven experience in the field	
4	The owner should provide security or guarantee (e.g. house or other assets) against the loan	
5	The operation should be in a position to pay back the loan capital	
6	The owner should demonstrate a strong willingness to succeed	
7	The operation should have a clear strategy for growth and development	
8	The operation should meet the minimum BEE requirements	

22. How important are the following training related concepts?

1 = Very important

2 = Less important

3 = Not important

CRITERIA	RATING
Technical training for general mining (e.g. excavation, support, processing, etc.)	
Basic business skills training (viz. Sales and Marketing, Business Management skills, etc.)	
Training in environmental management protection procedures	
Training in health and safety standards and controls	
Training in mining legislation (i.e. laws relating to mining and mineral extraction in South Africa)	

SECTION E: ENVIRONMENTAL IMPACT AWARENESS

23. Is Small-scale mining environmentally friendly?

YES		NO	
-----	--	----	--

24. Do you rehabilitate (restore) your site on completion of your project/ work?

YES		NO	
-----	--	----	--

25. How important is it to conduct an environmental impact assessment (EIA) before actually starting with your operation?

Very important	Not so important	Depends on size of the operation	Not important at all

SECTION F: HEALTH AND SAFETY

26. Do you start your work by conducting safety inspections first?

YES		NO	
-----	--	----	--

27. Do you stop and withdraw if the conditions become unsafe whilst working?

YES		NO	
-----	--	----	--

28. Do you have a safety kit in ready-for-use condition to administer any first aid?

YES	NO

29. Do you have trained safety personnel to administer first aid on site?

YES		NO	
-----	--	----	--

30. State the kinds of Personal Protective Equipment (PPE) that is used for safety on your site?

.....

SECTION G: BENEFICIATION

31. In what form is your product sold?

Raw (as produced)		After further processing	
-------------------	--	--------------------------	--

32. How easy/ difficult is it for you to sell your products?

Easy to sell products/ there is always a market to sell	
Eventually able to sell, but it takes a lot of effort	
Very difficult to sell	

33. Do you have a single or multiple customers?

Single Customer		Multiple Customers		Total no. if multiple	
-----------------	--	--------------------	--	-----------------------	--

34. Where/ who is your market?

Local only	Local and international	Only international	Other

35. Do you believe that you are getting a market related price for your product?

YES		NO	
-----	--	----	--

SECTION H: POSSIBLE STRATEGIES FOR OPTIMUM PRODUCTION & SALES

36. Which of the following strategies (methods/ approaches) do you believe could assist your organization to achieve optimum production and sales?

Rate as follows: 1 = Very important

2 = Less important

3 = Not important

STRATEGIES FOR OPTIMUM PRODUCTION & SALES	RATING
1. Innovation strategy (constantly changing and developing new products)	
2. Joint venture strategy (join forces to tackle or take on a big project that is difficult to handle alone)	
3. Concentration strategy (focus all resources and skills on producing a single but profitable product in a single market)	
4. Product development strategy (developing new products for existing market)	
5. Market development strategy (establish or find new customers for existing products)	
6. Horizontal integration strategy (acquire or take over similar operations)	
7. Other strategies:	
8. Other strategies:	

APPENDIX B

LETTER OF INFORMED CONSENT

RESEARCHER: Isaac T Tshabalala : 011 559 6178

SUPERVISOR: Prof. Antoine Mulaba : 011 559 6215

SCHOOL/ PROGRAMME: Graduate School of Business: MBA

UNIVERSITY OF: KwaZulu-Natal

NOTE TO THE RESPONDENT:

- ❖ The information provided in this form will be treated as strictly confidential
- ❖ You are under no obligation to participate in this project and you may exercise your right to withdraw at anytime during the project
- ❖ The purpose of this survey is to obtain statistical and appropriate data on small-scale mining operations in Qwaqwa, Free State Province, South Africa
- ❖ Your identity may never be publicised anywhere in the published reports emanating from this survey, unless with your prior consent

I (full names of participant)

hereby confirm that I understand the contents of this document and the nature of the research project, and consent to participating in the research project.

I understand that confidentiality and anonymity will be exercised and maintained as far as it is reasonably practicable, and that I am free to withdraw from the project at any time, should I so desire. I also declare that I was given sufficient time to understand and complete the questionnaire, and that I was not forced in any way to complete the questionnaire.

SIGNATURE OF PARTICIPANT

DATE

.....

.....

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Appendix C

Small Scale Mining:

[illegible]

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The management and regulation of small-scale mining in South Africa : a case study of Osizweni, Newcastle, KwaZulu Natal	Moholo BR	Completed	<input checked="" type="checkbox"/>	More
The viability of small scale coal mining in the Witbank area	Struthers HE	Completed	<input checked="" type="checkbox"/>	More
Gender and indigenous technology in small-scale diamond mining in the North West Province. Cases : Welverdiend	Tiro GJ	Completed	<input checked="" type="checkbox"/>	More
An analysis of the economic climate for foreign investment in Uganda post 1986	Griessel W	Completed	<input type="checkbox"/>	More
Flotation as a separation technique in the coal gold agglomeration process	Moses LB	Completed	<input type="checkbox"/>	More
A mineral rights policy framework for promoting the small-scale mining industry in South Africa	Chitsike T	Completed	<input checked="" type="checkbox"/>	More
Microbial sulfate reduction as a method of passive treatment of acid mine drainage using undefined carbon sources	Zdyb L	Completed	<input type="checkbox"/>	More
An investigation into the barriers facing the small-scale mining sector, with specific reference to the proposed ANC Mineral and Energy Policy	Tyler M	Completed	<input checked="" type="checkbox"/>	More

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Computer simulation of transport and sorting of heterogeneous size-density sediments over a movable bed for the prediction of heavy mineral distribution patterns	Van Niekerk AW	Completed	<input checked="" type="checkbox"/>	More
DROUGHT, ECONOMIC STRESS AND FOOD SECURITY AMONG LIVESTOCK KEEPERS IN LEBOWA: A STUDY OF POST-STRESS RECOVERY	SICHONE OB	COMPLETED	<input type="checkbox"/>	More
Dewatering of fine and ultra fine coals by using/modifying the conventional equipment (dewatering screen)	Eklund MC (nee Tsai)	Completed	<input type="checkbox"/>	More
Small-scale gold mining in Southern Africa	Joubert BD	Completed	<input checked="" type="checkbox"/>	More
THE BLACK MINEWORKER IN THE SOUTH AFRICAN GOLD- MINING INDUSTRY	BAURISTHENE CR	Completed	<input checked="" type="checkbox"/>	More
TREATING THE PERCEPTUAL-MOTOR PROBLEMS OF ADULT MALES	RENDU KM	Completed	<input type="checkbox"/>	More
Small-scale mining : the situation in Namibia	Speiser MAA	Current	<input checked="" type="checkbox"/>	More
Indigenous African mining and metals production, archaeometallurgy, and modern small scale and informal mining in southern Africa. Development of novel platinum alloys. Trends in technology transfer	Miller DE	Current	<input checked="" type="checkbox"/>	More

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Current and Completed Research Projects Report

Project	015229
Researcher(s)	McGill JE
Title	Technical risk assessment techniques in mineral resource management, with special reference to the junior and small-scale mining sector
Language	English
Purpose	11 MSc
Status	Completed Year of completion :- 2005
Institution(s)	University of Pretoria (UP) Dept of Geology
Subject	Mining engineering Geology
Intended publication	Dissertation

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Project	994782
Researcher(s)	Moholo BR
Title	The management and regulation of small-scale mining in South Africa : a case study of Osizweni, Newcastle, KwaZulu Natal
Language	English
Purpose	11 MBA
Status	Completed Year of completion :- 2001
Institution(s)	Milpark Business School General
Subject	Business administration / Business leadership Business management and policy
Intended publication	Dissertation
Abstract	<p>Small-scale mining in South Africa has achieved prominence in the Department of Minerals and Energy (DME)'s policy making process. This is because the small-scale mining sector has historically operated outside the government's regulations of the mining industry. Since 1994 there has been developments in terms of both research and policy aimed at trying to develop the sector. This interest was stimulated by the realisation that if developed, small-scale mining could serve as a vehicle for poverty alleviation and job creation. This research was aimed at evaluating and assessing the strategies used by the DME and other government subsidised interested stakeholders for developing the sector. In foregrounding this aim, the research began off by understanding the profile of the small-scale miners, using Osizweni small-scale miners as a case study. It looked at the problems and challenges inhibiting for the development of the sector from that of being a mere survivalist mechanism into an efficiently business-oriented enterprise. The research found that the majority of small-scale miners in Osizweni have low levels of education. This emerged as an inhibiting factor for these miners to develop relevant entrepreneurial skills. Secondly, through their existing sources of information and financial support, these services remain unutilised either because of unfamiliarity with the availability of these services by small-scale miners or misunderstandings between the small-scale miners and these support-providing institutions. For the sector to be developed there has to be coherent strategic structures for basic skills development, exposure to available resources and training concerning business skills and regulations governing the mining industry in general. These will be helpful in ensuring that small-scale mining is developed and professionalised.</p>

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Project	977638
Researcher(s)	Tyler M
Title	An investigation into the barriers facing the small-scale mining sector, with specific reference to the proposed ANC Mineral and Energy Policy
Language	English
Purpose	11 MBA
Status	Completed Year of completion :- 1997
Institution(s)	University of Cape Town (UCT) Graduate School of Business
Subject	Business administration / Business leadership Business management and policy
Intended publication	Dissertation
Abstract	<p>This study ranks the eight most significant barriers facing small-scale miners and investigates the role that government, the mining houses and the mining entrepreneur can play in overcoming these. The research revealed that red tape, access to mineral rights, access to capital, environmental issues and access to skills were the five greatest obstacles facing the small scale miner. A unified effort is required from all three players for these to be overcome. Government should streamline the authorization process, provide better records and access to mineral rights, maintain the present institutions that provide capital and technical advice; and play a significant role in environmental, health and safety issues. The most important action that the mining houses can take is to voluntarily release mineral deposits suitable for small-scale mining. This would create growth in the sector and provide black entrepreneurs with an opportunity to own and operate mines. The mining entrepreneurs should risk their own capital, where possible, and seek innovative solutions to limited capital, technical problems and the marketing of the products.</p>

Project	501103
Researcher(s)	Miller DE

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Title	Indigenous African mining and metals production, archaeometallurgy, and modern small scale and informal mining in southern Africa. Development of novel platinum alloys. Trends in technology transfer
Language	English
Purpose	Non-qualification
Status	Current Year of commencement :- 1997
Institution(s)	University of Cape Town (UCT) Dept of Archaeology
Subject	Material science, engineering and technology Archaeology General



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Strategies for sustainable development of the small-scale gold and diamond mining industry of Ghana

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Received 22 November 2002; received in revised form 25 June 2004; accepted 7 July 2004

Abstract

The small-scale gold and diamonds mining industry is of great importance to Ghana. Since its regularization in 1989 the sector has produced and sold over 1.5 million troy ounces of gold and 8.0 million carats of diamonds. During the same period the sector also provided direct employment to over 100,000 people and improved the socioeconomic life of many individuals and communities. However, these were largely achieved at a cost to the environment in areas where mining is carried out and there is the need to develop the industry in a sustainable manner. This paper looks at the developments in the small-scale gold and diamonds mining industry in Ghana and proposes some strategies on how the concepts of sustainable development could be applied to the industry.

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Keywords: Ghana; Small-scale mining; Gold; Diamonds; Sustainable development

Introduction

minerals has been at a cost to the environment and there is

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Abatement of mercury pollution in the small-scale gold mining industry: Restructuring the policy and research agendas

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Received 15 July 2005; received in revised form 2 September 2005; accepted 9 September 2005

Available online 27 October 2005

Abstract

This paper critiques contemporary research and policy approaches taken toward the analysis and abatement of mercury pollution in the small-scale gold mining sector. Unmonitored releases of mercury from gold amalgamation have caused considerable environmental contamination and human health complications in rural reaches of sub-Saharan Africa, Latin America and Asia. Whilst these problems have caught the attention of the scientific community over the past 15–20 years, the research that has since been undertaken has failed to identify appropriate mitigation measures, and has done little to advance understanding of why contamination persists. Moreover, the strategies used to educate operators about the impacts of acute mercury exposure, and the technologies implemented to prevent further pollution, have been marginally effective at best. The mercury pollution problem will not be resolved until governments and donor agencies commit to carrying out research aimed at improving understanding of the dynamics of small scale gold mining communities. Acquisition of this knowledge is the key to designing and implementing appropriate support and abatement measures.

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Keywords: Mercury; Small-scale gold mining; Pollution; Research

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Journal of Cleaner Production 11 (2003) 141–146

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Small-scale mining and cleaner production issues in Zambia

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Received 6 December 2001; received in revised form 20 February 2002; accepted 22 February 2002

Abstract

Small-scale mining (SSM) has had unprecedented growth in Zambia during the past decade. The sector now produces a variety of commodities, especially gemstones, building and industrial minerals. From a structural and technical perspective, SSM is conducted on a very rudimentary level using basic tools such as picks and shovel, and occasionally, mechanized equipment. The environmental degradation caused by SSM is also growing with the intensification of activities in the country. Meanwhile, institutions responsible for managing the environment are unable to effectively carry out regulatory and monitoring mandates due to inadequate resources. Although current legislation appears to be adequate in many respects, time has now come to amend the Mines and Minerals Act (1995) so that it becomes mandatory for all mining activities, including small-scale mines, to submit environmental impact assessment reports before a license to mine or explore can be granted. Strategies to eliminate illegal mining, enhancement of miners' technical skills, and mine responsibly must also be placed high on the agenda. This paper focuses on the major issues affecting cleaner production in the Zambian SSM sector including, environmental complications, pertinent mining environmental legislation, and the institutions involved. It concludes by suggesting possible interventions to minimize environmental impacts in the sector.

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Keywords: Small-scale mining (SSM); Zambia; Cleaner production; Environmental impacts

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Journal of
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The role of artisanal and small-scale mining in China's economy

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Received 7 July 2004; accepted 1 August 2004

Available online 26 April 2005

Abstract

The last decades have seen increased international attention paid to a number of features of artisanal and small-scale mining (ASM). The beneficial roles of ASM in society and the economy in many countries, however, are often overlooked, while its negative impacts dominate official press coverage and scholarly publications of the sector. Through a review of the available literature and statistics, this paper works toward building a balanced picture of the overall role of ASM in China. First, the positive and negative impacts of ASM internationally are reviewed, followed by a short review of suggested and actual international policy responses. Then an examination of the impacts and role of ASM in China is undertaken. The authors argue that the contributions of ASM outweigh its negative impacts, but the central government needs to make more effort to regulate, guide and encourage the development of ASM and to create a sound environment for its operations.

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Keywords: Role; Artisanal and small-scale mining (ASM); China; Policy



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Trends in the small-scale mining of precious minerals in Ghana: a perspective on its environmental impact

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Received 5 December 2001; received in revised form 26 February 2002; accepted 27 February 2002

Abstract

Small-scale mining in Ghana is defined to include both the exploitation of mineral deposits (1) using fairly rudimentary implements and/or (2) at low levels of production with minimal capital investment. While the large-scale mining—of particularly gold—has become predominant, small-scale mining, which predates such operations, has continued to be an important economic activity, particularly within the remote and poorer areas of the country. The environmental impacts of such small operations have, however, varied, depending on methods and the scale of operation. The factors that have contributed to aggravating these environmental impacts are economic, technical, legal, and operational in nature. Although mitigation efforts have had a limited impact, it is expected that the measures now being considered for adoption will improve the efficacy of the Government of Ghana's drive towards improving environmental management in resident small-scale precious metal mining operations.

This paper examines the environmental impacts of small-scale mining in Ghana—with particular emphasis on precious minerals and metals extraction—and outlines a series of initiatives for improving environmental performance in the industry.

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Keywords: Small-scale mining; Ghana; Environmental impacts; Environmental friendliness or soundness; Sustainable development

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Journal of Cleaner Production 11 (2003) 159–165

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Indian small-scale mining with special emphasis on environmental management

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Received 13 December 2001; received in revised form 16 February 2002; accepted 19 February 2002

Abstract

Although small-scale mining provides a wealth of socioeconomic benefits to the rural inhabitants of developing countries, there is often total disregard for the environment industry-wide. This paper focuses upon some of the key environmental issues in the Indian small-scale mining industry. The geo-environmental factors constraining the mining of the Himalayan limestone, magnetite, phosphate, and polymetallic sulphur ore deposits are discussed, and the environmental impacts of small-scale operations working prospective deposits are detailed. The paper further examines the schematics of the Environmental Management Plan (EMP) adopted for small-scale mines in India. It is concluded, however, that widespread environmental improvement can only be achieved industry-wide if additional mining cooperatives are formed, and the Indian Government, through their Department of Environment, oversees the implementation of effective mitigation practices for small scale-mines, particularly at the university level.
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Keywords: Economic development; Geo-environment; Opencast; Waste dump; Soil erosion; Landslides; Deforestation



Environmental management in small scale mining in PNG

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40 Whiteman Creek Road, Via Grafton NSW 2460, Australia

Received 1 February 2002; received in revised form 13 February 2002; accepted 14 February 2002

Abstract

Although small-scale mining has developed rapidly in Papua New Guinea (PNG), it is only recently that formal recording has been carried to gain insight on employment and production totals, and environmental difficulties. This paper examines the state of small-scale mining in PNG, with special emphasis on its environmental impacts. In recent years, the PNG Department of Mining has become a proactive source of educational activities and information gathering for small-scale mining, its effort directed at devising a comprehensive development plan for the sector. The result has been a tripartite program with active participation from a number of donor agencies and the private sector that promotes integrated rural development and takes into account the important economic and environmental aspects vital for effective poverty alleviation.

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Keywords: Small-scale mining (SSM); Mercury; Environmental effects; Integrated rural development; Tripartite development project

1. Introduction

Small-scale mining is a vital source of rural income generation in many countries around the world. Such is the case in Papua New Guinea (PNG), where small-scale gold mining has become an indispensable part of the

tools such as gold pans and sluice boxes does not cause significant environmental damage individually, when people are agglomerated within small areas, the potential for major problems is multiplied enormously. On the other hand, if small-scale miners opt to use equipment such as water cannons and dredges (both floating and on



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Environmental management in the Brazilian non-metallic small-scale mining sector

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Instituto de Geociências, Universidade de São Paulo, São Paulo, Brazil

Received 15 February 2002; accepted 1 March 2002

Abstract

Non-metallic mineral resources, albeit very important to meet the needs of the Brazilian population and for exportation, are ill-favored by governments and ignored by the public. Most of this mining is performed by small-scale companies and informal operations that cause extensive and widespread environmental damages. In addition to examining the current state of the industry and its environmental impacts, this paper outlines a series of initiatives for improving (environmental) performance. The suggestions made include improved coordination among public entities responsible for the control of the mining sector; the undertaking of environmental management and reclamation initiatives; research and diffusion of mining and environmental technology; the development and implementation of appropriate licensing procedures for small-scale mines; and the reviewing of environmental impact evaluation and enforcement procedures, and improved regional planning. It is concluded, however, that the proposals will only become a reality if the necessary political actions are taken, and are supported by adequate financing and technical assistance.

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Keywords: Small-scale mining; Environmental management; Brazil; Non-metallic resources

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Environmental viewpoint on small-scale copper, gold and silver mining in Chile

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Received 21 December 2001; received in revised form 1 March 2002; accepted 4 March 2002

Abstract

This paper analyses the importance and environmental impacts of metallic small-scale mining in Chile. This sector is characterized by the exploitation of primarily artisanal copper (Cu), gold (Au), and silver (Ag) deposits, which are dispersed throughout (Chilean) Regions I through VI, with heaviest concentrations in Regions III and IV. In 2000, Chilean small-scale mines employed some 1700 workers (5.1% of total mining workers), and plants with a production capacity of less than 50 tpd accounted for 0.97% (44,603 t) of Cu; 6.5% (3,484) of Au; and 1.1% (13,665 kg) of Ag output in the country. High-grade ore extraction, flotation, gravity concentration, acid leaching–cementation, and mercury amalgamation, are the main metallurgical technologies employed. Following an overview of Chilean small-scale mining, the paper examines the environmental impacts of its production processes, and discusses the legal support and regulatory framework in place for operations.

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Keywords: Small-scale mining (SSM); Environment; Copper, gold and silver production; Mining pollution

Management Challenges on Small-Scale Gold Mining Activities in Brazil

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Received January 29, 2001

This article presents a focused study of environmental management in small-scale gold mining, called garimpo, at the Tapajós River in the Amazon basin (Brazil). Environmental management is necessary in this very important area not only for Brazil but for the general world welfare. The fact that this is a very dispersed area, with a very low economic and education level, complicates the issues. Added to these factors are legislation, administration, and control processes which are shown in their historical, technical, health, and economic aspects. Using systemic integration, the article describes how the inherent interests of each part directly or indirectly involved may be articulated to result in self-control. The same approach reveals also the potential conflicts. Some existent proposals are analyzed with regard to the extent to which they can work, given the described aspect. © 2001 Elsevier Science

Key Words: environmental management; small-scale gold mining; systemic integration; self-control; mercury pollution; garimpo.

In fact, it is known that large-scale activities bring pressures against control, but sparse and multiple small-scale activities also create enormous difficulties for the implementation of control. This is the case for small-scale gold mining in the Amazonia, a local activity that does not devastate the forest, but may cause serious environmental problems if inappropriate procedures are used.

Amazonia is the region around the Amazon River, the largest river in the world in volume of water carried and 6280 km long. The complete Amazonia is 7.8 million km² in area, comprising 60% of the combined areas of Bolivia, Brazil, Colombia, Ecuador, Guyana, Peru, Suriname, and Venezuela. The Brazilian part of the Amazonia is called "Legal Amazonia," and its greatest part is located in the north region of Brazil, spread in nine states: Acre, Amapá, Amazonas, Mato Grosso, Pará, Rondônia, Roraima, Tocantins, and Maranhão.

This area is one of the remaining repositories of planetary biodiversity and an important part of the Brazilian culture. Because of its being a huge source



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The future of small-scale mining: environmental and socioeconomic perspectives

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Abstract

Although small-scale mining provides innumerable benefits to the rural inhabitants and governments of the developing world, its operations have been responsible for a wide range of environmental and socioeconomic complications. This article examines the impacts of small-scale mining, and provides a perspective on the future of the industry. It first describes small-scale mining activity, emphasizing key definitional and locational characteristics. Next, it examines the socioeconomic impacts of the industry, along with its environmental problems. The article concludes by discussing the future of small-scale mining in developing countries. © 2002 Elsevier Science Ltd. All rights reserved.

Keywords: Small-scale mining; Developing countries; Environment; Future

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Prof. Rembrandt Kloppe and Prof. Sam Lubbe© 2005. Any researcher may use this matrix with acknowledgement to the authors.



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Note from the field

Improving the environmental management of small-scale gold mining in Ghana: a case study of Dumasi

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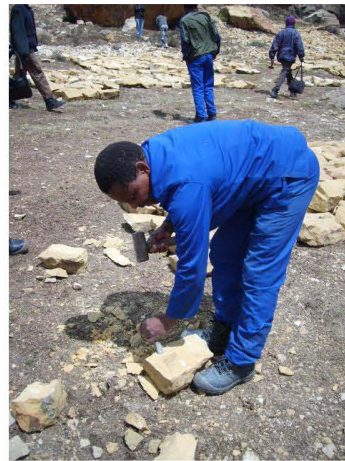
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Abstract

In April 2000, a UNIDO study was carried out in Dumasi, Ghana, the purpose of which was to determine the environmental impacts of mercury prior to the introduction of (mercury) retorts. The sampling program was intended to identify mercury transfers to rivers, soil systems and groundwater. Results show a diffuse contamination of all environmental media in the village. Although there is no evidence of groundwater contamination, sediments are significantly contaminated, and most fish fillets have mercury contents exceeding the United States Food and Drug Agency (US-FDA) action level, and are therefore unfit for human consumption. Mercury losses mainly occur during amalgamation, and have resulted in widespread pollution of soils and sediments throughout the village. Transparent retorts have been introduced and environmental training is ongoing but these efforts have only partially addressed the mercury problem in Dumasi.

Appendix D



Appendix E: Statistics

		Sex, Nationality, Marital status	Age	Product being produced	If clay is being produced, state the type
N	Valid	33	33	31	1
	Missing	0	0	2	32
Mean		1.24	3.21	1.97	1.00
Median		1.00	3.00	2.00	1.00
Mode		1	4	2	1
Std. Deviation		.435	.927	.180	
Variance		.189	.860	.032	
Skewness		1.260	-.452	-5.568	
Std. Error of Skewness		.409	.409	.421	
Range		1	4	1	0
Minimum		1	1	1	1
Percentiles	25	1.00	2.50	2.00	1.00
	50	1.00	3.00	2.00	1.00
	75	1.50	4.00	2.00	1.00

Appendix E: Statistics

		Type of operation	Type of equipment	Number of years in operation	Estimated life of the operation
N	Valid	31	33	33	32
	Missing	2	0	0	1
Mean		2.03	2.67	3.24	3.81
Median		2.00	3.00	4.00	4.00
Mode		2	3	4	4
Std. Deviation		.180	.736	1.001	.738
Variance		.032	.542	1.002	.544
Skewness		5.568	-1.873	-.922	-3.795
Std. Error of Skewness		.421	.409	.409	.414
Range		1	2	3	3
Minimum		2	1	1	1
Percentiles	25	2.00	3.00	2.00	4.00
	50	2.00	3.00	4.00	4.00
	75	2.00	3.00	4.00	4.00

Appendix E: Statistics

		Number of people employed	How do you pay your staff?	Salary or wage range	Are employees permanent or temporary?
N	Valid	33	33	33	33
	Missing	0	0	0	0
Mean		1.30	1.91	1.48	2.03
Median		1.00	2.00	1.00	2.00
Mode		1	2	1	2
Std. Deviation		.529	.292	.566	.394
Variance		.280	.085	.320	.155
Skewness		1.553	-2.983	.614	.297
Std. Error of Skewness		.409	.409	.409	.409
Range		2	1	2	2
Minimum		1	1	1	1
Percentiles	25	1.00	2.00	1.00	2.00
	50	1.00	2.00	1.00	2.00
	75	2.00	2.00	2.00	2.00

Appendix E: Statistics

		Annual turnover (income) of the operation	Annual tonnage produced	Capital invested in the operation	Desired investment to reach optimum (best possible) production
N	Valid	33	31	33	33
	Missing	0	2	0	0
Mean		2.42	1.94	2.61	3.30
Median		2.00	2.00	2.00	3.00
Mode		2	2	2	4
Std. Deviation		.751	.442	.788	.728
Variance		.564	.196	.621	.530
Skewness		.980	-.352	.442	-.547
Std. Error of Skewness		.409	.421	.409	.409
Range		3	2	3	2
Minimum		1	1	1	2
Percentiles	25	2.00	2.00	2.00	3.00
	50	2.00	2.00	2.00	3.00
	75	3.00	2.00	3.00	4.00

Appendix E: Statistics

		The value or essence of small-scale mining operation	FinMatrix	Do you believe that in general small-scale mining sector has sufficient access to financial assistance?	SuppStruc
N	Valid	0	0	31	0
	Missing	33	33	2	33
Mean				1.55	
Median				2.00	
Mode				2	
Std. Deviation				.506	
Variance				.256	
Skewness				-.204	
Std. Error of Skewness				.421	
Range				1	
Minimum				1	
Percentiles	25			1.00	
	50			2.00	
	75			2.00	

Appendix E: Statistics

		If your operation was to be assisted financially or otherwise, rate the following statements	How important are the following training related concepts?	Is small-scale mining environmentall y friendly?
N	Valid	0	0	31
	Missing	33	33	2
Mean				1.45
Median				1.00
Mode				1
Std. Deviation				.506
Variance				.256
Skewness				.204
Std. Error of Skewness				.421
Range				1
Minimum				1
Percentiles	25			1.00
	50			1.00
	75			2.00

Appendix E: Statistics

		Do you rehabilitate your site on completion of your project/work?	How important is it to conduct an EIA before actually starting with your operation?	Do you start your work by conducting safety inspections first?	Do you stop and withdraw if the conditions become unsafe whilst working?
N	Valid	31	32	33	33
	Missing	2	1	0	0
Mean		1.39	1.38	1.03	1.00
Median		1.00	1.00	1.00	1.00
Mode		1	1	1	1
Std. Deviation		.495	.492	.174	.000
Variance		.245	.242	.030	.000
Skewness		.487	.542	5.745	
Std. Error of Skewness		.421	.414	.409	.409
Range		1	1	1	0
Minimum		1	1	1	1
Percentiles	25	1.00	1.00	1.00	1.00
	50	1.00	1.00	1.00	1.00
	75	2.00	2.00	1.00	1.00

Appendix E: Statistics

		Do you have a safety kit in ready-for-use condition to administer any first aid?	Do you have trained safety personnel to administer first aid on site?	State the kinds of PPE that is used for safety on your site	In what form is your product sold?
N	Valid	33	33	12	28
	Missing	0	0	21	5
Mean		1.33	1.52	1.83	2.00
Median		1.00	2.00	2.00	2.00
Mode		1	2	2	2
Std. Deviation		.479	.508	1.115	.000
Variance		.229	.258	1.242	.000
Skewness		.741	-.064	2.276	
Std. Error of Skewness		.409	.409	.637	.441
Range		1	1	4	0
Minimum		1	1	1	2
Percentiles	25	1.00	1.00	1.00	2.00
	50	1.00	2.00	2.00	2.00
	75	2.00	2.00	2.00	2.00

Appendix E: Statistics

		How easy/ difficult is it to sell your products?	Do you have single or multiple customers?	Where/ who is your market?	Do you believe that you are getting a market related price for your product?
N	Valid	33	33	33	33
	Missing	0	0	0	0
Mean		2.30	1.88	1.09	1.73
Median		2.00	2.00	1.00	2.00
Mode		2	2	1	2
Std. Deviation		.637	.331	.292	.452
Variance		.405	.110	.085	.205
Skewness		-.349	-2.433	2.983	-1.070
Std. Error of Skewness		.409	.409	.409	.409
Range		2	1	1	1
Minimum		1	1	1	1
Percentiles	25	2.00	2.00	1.00	1.00
	50	2.00	2.00	1.00	2.00
	75	3.00	2.00	1.00	2.00

Appendix E: Statistics

		Which of the following strategies do you believe could assist your organisation to achieve optimum production & sales?	Name	Rank of Sex Nationality Maritalstatus	Rank of Age
N	Valid	0	33	28	28
	Missing	33	0	5	5
Mean				14.50000	14.50000
Median				12.00000	12.50000
Mode				12.000	22.000
Std. Deviation				5.460294	7.810250
Variance				29.815	61.000
Skewness				1.775	-.119
Std. Error of Skewness				.441	.441
Range				14.000	27.000
Minimum				12.000	1.000
Percentiles	25			12.00000	5.00000
	50			12.00000	12.50000
	75			12.00000	22.00000

Appendix E: Statistics

		Rank of Product	Rank of Claytype	Rank of Operation	Rank of Equipment
N	Valid	26	1	26	28
	Missing	7	32	7	5
Mean		13.50000	1.00000	13.50000	14.50000
Median		14.00000	1.00000	13.00000	17.50000
Mode		14.000	1.000	13.000	17.500
Std. Deviation		2.549510		2.549510	5.873670
Variance		6.500		6.500	34.500
Skewness		-5.099		5.099	-1.501
Std. Error of Skewness		.456		.456	.441
Range		13.000	.000	13.000	14.500
Minimum		1.000	1.000	13.000	3.000
Percentiles	25	14.00000	1.00000	13.00000	17.50000
	50	14.00000	1.00000	13.00000	17.50000
	75	14.00000	1.00000	13.00000	17.50000

Appendix E: Statistics

		Rank of Operyears	Rank of Operlife	Rank of Employees	Rank of Paymethod
N	Valid	28	27	28	28
	Missing	5	6	5	5
Mean		14.50000	14.00000	14.50000	14.50000
Median		19.50000	15.00000	10.00000	16.00000
Mode		19.500	15.000	10.000	16.000
Std. Deviation		7.018494	3.602883	6.708204	4.409586
Variance		49.259	12.981	45.000	19.444
Skewness		-.800	-3.447	.867	-2.686
Std. Error of Skewness		.441	.448	.441	.441
Range		18.000	13.500	18.000	14.000
Minimum		1.500	1.500	10.000	2.000
Percentiles	25	6.00000	15.00000	10.00000	16.00000
	50	19.50000	15.00000	10.00000	16.00000
	75	19.50000	15.00000	23.50000	16.00000

Appendix E: Statistics

		Rank of Salary	Rank of Jobtype	Rank of Turnover	Rank of Tonnage	Rank of Capital
N	Valid	28	28	28	26	28
	Missing	5	5	5	7	5
Mean		14.50000	14.50000	14.50000	13.50000	14.50000
Median		8.50000	15.50000	9.50000	14.00000	13.50000
Mode		8.500	15.500	9.500	14.000	8.000
Std. Deviation		7.141428	5.000000	7.338382	5.253570	7.637626
Variance		51.000	25.000	53.852	27.600	58.333
Skewness		.399	-1.077	.441	-.330	.214
Std. Error of Skewness		.441	.441	.441	.456	.441
Range		19.500	26.000	25.500	23.500	25.000
Minimum		8.500	2.000	1.000	2.000	1.000
Percentiles	25	8.50000	15.50000	9.50000	14.00000	8.00000
	50	8.50000	15.50000	9.50000	14.00000	13.50000
	75	22.00000	15.50000	21.00000	14.00000	19.00000

Appendix E: Statistics

		Rank of Investment	Rank of Essence	Rank of FinMatrix	Rank of AccessFin
N	Valid	28	0	0	26
	Missing	5	33	33	7
Mean		14.50000			13.50000
Median		15.75000			13.50000
Mode		21.500			7.000 ^a
Std. Deviation		7.526496			6.628725
Variance		56.648			43.940
Skewness		-.339			.000
Std. Error of Skewness		.441			.456
Range		18.500			13.000
Minimum		3.000			7.000
Percentiles	25	10.00000			7.00000
	50	15.75000			13.50000
	75	21.50000			20.00000

Appendix E: Statistics

		Rank of SuppStruc	Rank of Important	Rank of Training	Rank of Envirom	Rank of Rehab
N	Valid	0	0	0	26	26
	Missing	33	33	33	7	7
Mean					13.50000	13.50000
Median					9.00000	10.00000
Mode					9.000	10.000
Std. Deviation					6.307139	5.880476
Variance					39.780	34.580
Skewness					.687	1.105
Std. Error of Skewness					.456	.456
Range					13.000	13.000
Minimum					9.000	10.000
Percentiles	25				9.00000	10.00000
	50				9.00000	10.00000
	75				22.00000	23.00000

Appendix E: Statistics

		Rank of EIA	Rank of Safety	Rank of Unsafe	Rank of Firstaid
N	Valid	27	28	28	28
	Missing	6	5	5	5
Mean		14.00000	14.50000	14.50000	14.50000
Median		9.50000	14.00000	14.50000	11.50000
Mode		9.500	14.000	14.500	11.500
Std. Deviation		6.485190	2.645751	.000000	5.849976
Variance		42.058	7.000	.000	34.222
Skewness		.749	5.292		1.473
Std. Error of Skewness		.448	.441	.441	.441
Range		13.500	14.000	.000	14.000
Minimum		9.500	14.000	14.500	11.500
Percentiles	25	9.50000	14.00000	14.50000	11.50000
	50	9.50000	14.00000	14.50000	11.50000
	75	23.00000	14.00000	14.50000	11.50000

Appendix E: Statistics

		Rank of Safetypers	Rank of PPE	Rank of Prodsale	Rank of Easofsale
N	Valid	28	9	23	28
	Missing	5	24	10	5
Mean		14.50000	5.00000	12.00000	14.50000
Median		8.00000	3.00000	10.00000	9.50000
Mode		8.000	3.000	10.000	22.000
Std. Deviation		7.110243	2.449490	4.456864	7.453560
Variance		50.556	6.000	19.864	55.556
Skewness		.151	.525	1.843	-.181
Std. Error of Skewness		.441	.717	.481	.441
Range		14.000	6.000	11.500	20.000
Minimum		8.000	3.000	10.000	2.000
Percentiles	25	8.00000	3.00000	10.00000	9.50000
	50	8.00000	3.00000	10.00000	9.50000
	75	22.00000	7.00000	10.00000	22.00000

Appendix E: Statistics

		Rank of Customers	Rank of Marketloc	Rank of Marketpric	Rank of Strategies
N	Valid	28	28	28	0
	Missing	5	5	5	33
Mean		14.50000	14.50000	14.50000	
Median		16.00000	13.00000	19.00000	
Mode		16.000	13.000	19.000	
Std. Deviation		4.409586	4.409586	6.658328	
Variance		19.444	19.444	44.333	
Skewness		-2.686	2.686	-.809	
Std. Error of Skewness		.441	.441	.441	
Range		14.000	14.000	14.000	
Minimum		2.000	13.000	5.000	
Percentiles	25	16.00000	13.00000	5.00000	
	50	16.00000	13.00000	19.00000	
	75	16.00000	13.00000	19.00000	

a. Multiple modes exist. The smallest value is shown

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30 JULY 2007

MR. IT TSHABALALA (203511867)
GRADUATE SCHOOL OF BUSINESS

Dear Mr. Tshabalala

ETHICAL CLEARANCE APPROVAL NUMBER: HSS/0446/07M

I wish to confirm that ethical clearance has been granted for the following project:

“Strategies for stimulating socio-economic growth from small-scale mining operations in Qwaqwa”

PLEASE NOTE: Research data should be securely stored in the school/department for a period of 5 years

Yours faithfully

Phumelele Ximba

.....
MS. PHUMELELE XIMBA
RESEARCH OFFICE

- cc. Post-Graduate Office (Christel Haddon)
cc. Supervisor (Prof. A Mulaba)
cc. Dr. K Naidoo