

OVERVIEW OF THE SOUTH AFRICAN SAND AND AGGREGATE INDUSTRY, 2008

DIRECTORATE: MINERAL ECONOMICS



mineral resources

Department:
Mineral Resources
REPUBLIC OF SOUTH AFRICA

**OVERVIEW OF SOUTH AFRICAN SAND AND AGGREGATE INDUSTRY,
2008**

DIRECTORATE: MINERAL ECONOMICS

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PUBLISHED IN 2008.

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ISBN: 1-919927-44-1

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1. INTRODUCTION

What is sand and aggregate?

Aggregate refers to the different sizes of stone that are used in the building, construction and road-making industries while sand is the collective name given to finer grain size components. Ninety percent of sand will pass through a square sieve with an aperture size of 4,75mm, whilst at least ninety percent of the coarse stone will be retained by such a sieve.

The widespread use of aggregate results not only from its general availability but also from economic considerations. Aggregate of good quality is commonly available near the site of use at relatively low cost. Because the profitable exploitation of aggregate is very sensitive to transport costs, quarries were traditionally located on the outskirts of cities and towns. In numerous instances, these deposits have been depleted and new sources further away had to be found, often resulting in greater transportation costs. Urban development itself has, in recent times, been responsible for the rapid depletion of readily available deposits.

Hard rock aggregate quarries are often located on the slopes of hills and mountains, usually resulting in the defacing of areas of natural scenic beauty. Growing environmental awareness increasingly influences the exploitation of such resources in localities of this nature.

2. OCCURRENCE OF SAND AND AGGREGATE IN SOUTH AFRICA

Where are sand and aggregate deposits located? How much do we have?

In South Africa, various rock types are available for aggregates and concrete aggregate is usually found in abundance around most of the major centres of development. The three main groups of coarse aggregate are:

- Igneous rocks – Andesite, basalt, dolerite, felsite, gabbro, granite, granodiorite, norite, rhyolite and syenite.
- Metamorphic rocks – Granite-gneiss, granulite, hornfels, quartzite and slate.
- Sedimentary rocks – Quartzite, sandstone, greywacke, shale and tillite.

A good concrete aggregate must be clean, chemically inert, durable, hard, homogenous, and roughly cubic in shape after crushing and of a size grade suitable to make concrete of the desired physical qualities. Unlike many other countries, naturally occurring gravel suitable for use as aggregate is very rare in South Africa.

Natural sand consists of loose grains which result from the chemical weathering and/or physical breakdown of rocks. The range of particle sizes is dependent on the original texture of the source rock and the state and degree of weathering and breakdown. Sand accumulates in rivers, on beaches, in dunes and in valleys between mountains. Natural sands include alluvial/eluvial sands, aeolian/windblown sands and marine/beach sands. Each of these sands has its own characteristic properties which are determined by factors such as origin and mode of transport.

Manufactured sand is produced by the mechanical crushing or milling of rock and gravel. Mine-dump sand can also be classified as manufactured sand, being a waste product in the mining industry.

3. PRODUCTION PROCESS

How is aggregate and sand produced?

Most hard rock material used to produce coarse aggregate is sourced from open pit quarries and waste dumps. Quarrying usually requires drilling and blasting, after which the rock is extracted by means of bulldozers and draglines. The broken rock is transported to a processing facility and the material goes through several stages of crushing and sizing. In some instances, blending is necessary to produce a specific customer specification (Figure 1).

Natural sand is usually mined with conventional earth-moving equipment. The quality and final use of the sand usually determine the amount of processing necessary. Washing and screening are used in some instances to produce a better quality sand.

It is now a common practice to further beneficiate the aggregate into:

- Ready-mix concrete,
- Asphalt,
- Bricks and paving material.

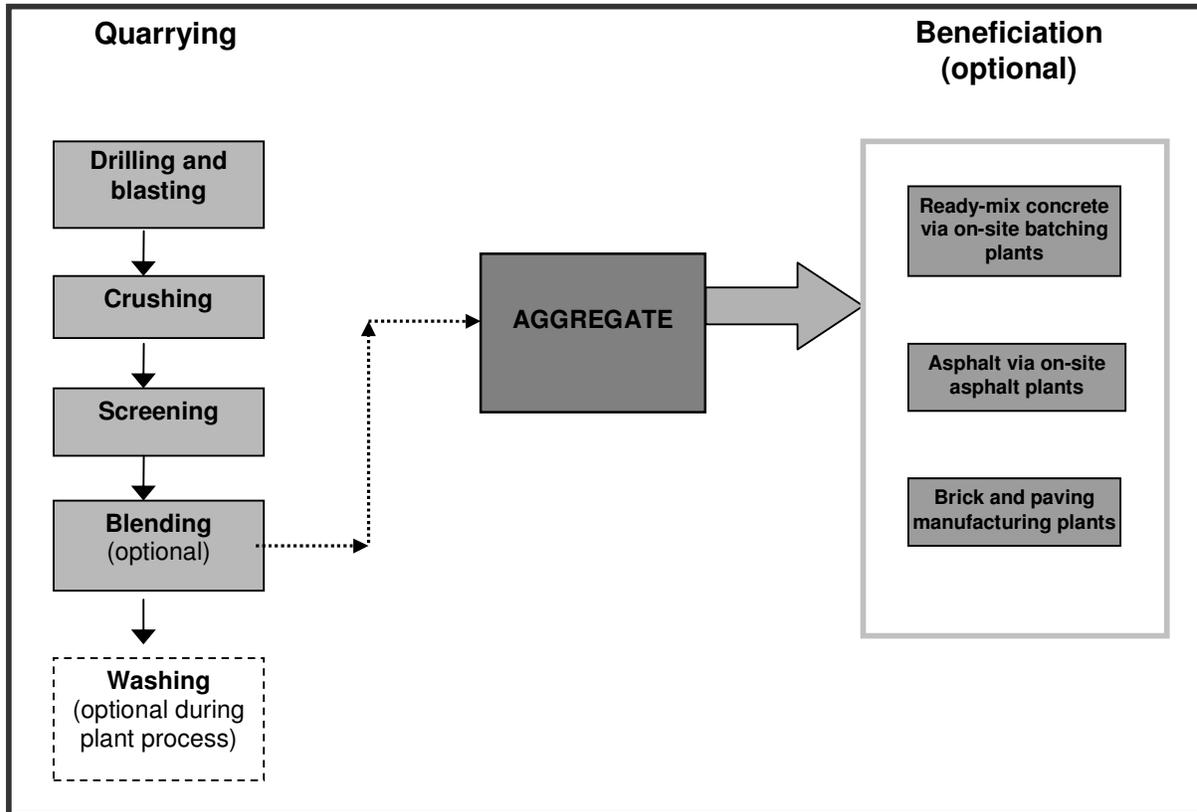


Figure 1: Basic flow diagram of the sand and aggregate industry

4. OWNERSHIP, BEE AND SMALL SCALE MINING

What is the structure of the industry, BEE compliance and opportunities for small scale mining?

The sand and aggregate industry comprises some 421 registered operating quarries in South Africa. About 335 quarry operators submit production returns to the DME. According to ASPASA the DME statistics represents approximately 50 percent of all sand and aggregate producers in South Africa, and about 75 percent of total volume. There are various reasons for the difference between the DME and ASPASA estimates and the DME is proactively engaging with ASPASA to address the issue.

The leading sand and aggregate operators are:

- **Lafarge** (subsidiary of Lafarge International, empowerment partner Sinako Consortium),
- **Holcim** (owned by a consortium of empowerment companies (85%) and Holcim International (15%)),

- **Afrimat** (empowerment partner Kwezi Mining, Mega Oils and staff trust),
- **Wearne** (empowerment partners Moseme, B Mkhonto and staff),
- **NPC** (Natal Portland Cement) Aggregate (subsidiary of CIMPOR - Cimentos de Portugal and empowerment partner National African Women's Alliance (NAWA))

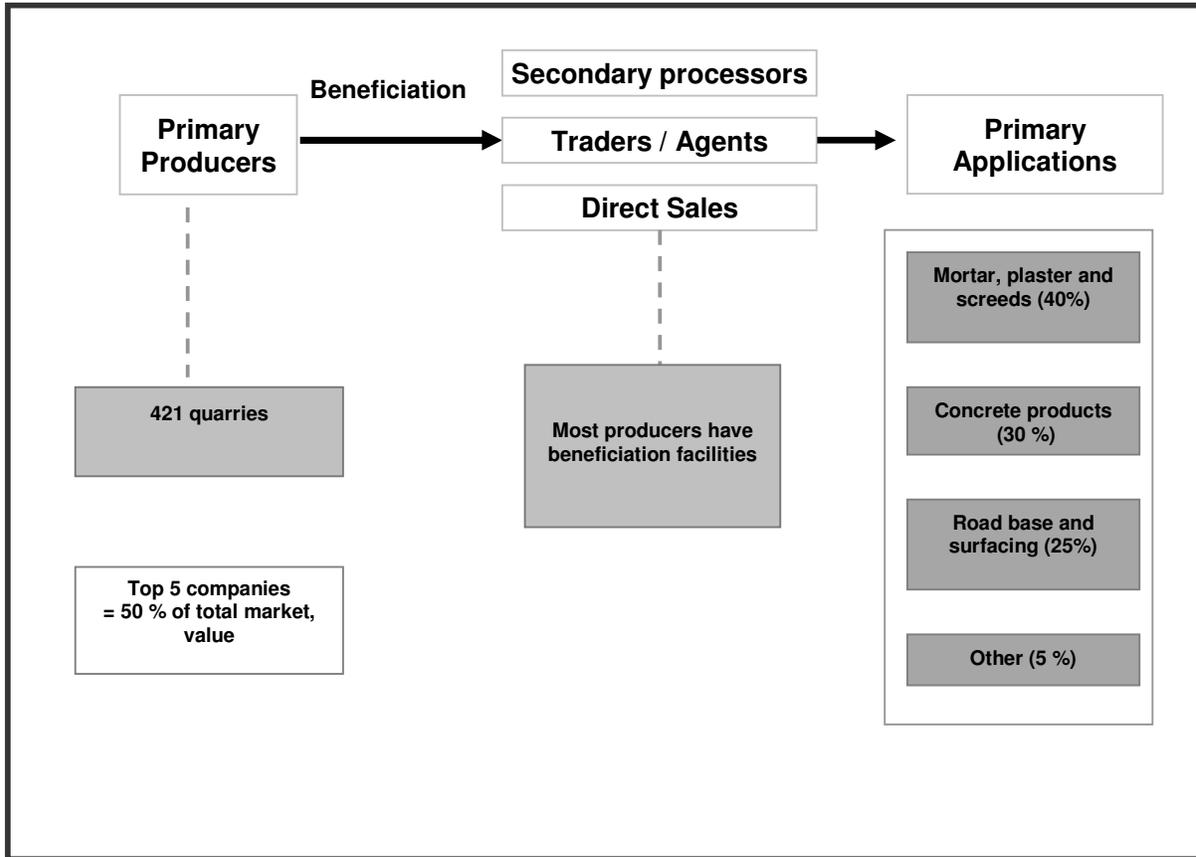


Figure 2: Industry and company structure

4.1. OPPORTUNITIES FOR SMALL SCALE MINERS

Potential opportunities for small scale miners exist in the following areas:

- **Waste from underground mining operations** e.g. gold and platinum mines, are suitable for beneficiation into good quality aggregate and sand for concrete and roads,
- **Slag and ash** formed as by-products from power generation, the iron and steel and petroleum industries have potential for the provision of aggregate,
- **“Used” concrete and asphalt** can be recycled for use as aggregate in road building

5. SUPPLY, DEMAND AND PRICES

What are drivers for the industry?

Sales of sand and aggregate have increased exponentially from 2003 to 2007, both in volume and value terms (Figure 3 and 4). This was attributed to strong growth in the construction sector which showed double digit growth since 2004, driven by various projects around the country such as the:

- Unprecedented residential property market development,
- Gautrain project,
- Construction and refurbishments of stadiums for the 2010 World Cup,
- Eskom's new powerstations,
- Airports Company of South Africa (ACSA) upgrade,
- Upgrade of railway infrastructure,
- Coega Industrial Development Zone,
- N2 Gateway Project,
- Richards Bay – Durban corridor (including the Dube Tradeport),
- Construction of the King Shaka Airport.

Prices of coarse and fine aggregate have exhibited annual average growth of 8,5 percent and 12 percent respectively (Figure 5).

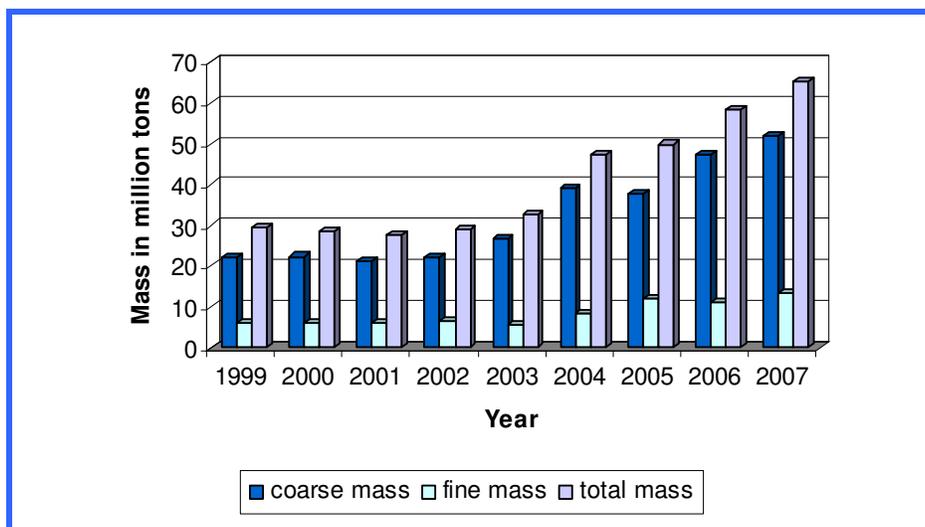


Figure 3: South African sales of sand and aggregate by volume, 1999 - 2007

(Source: Directorate Mineral Economics)

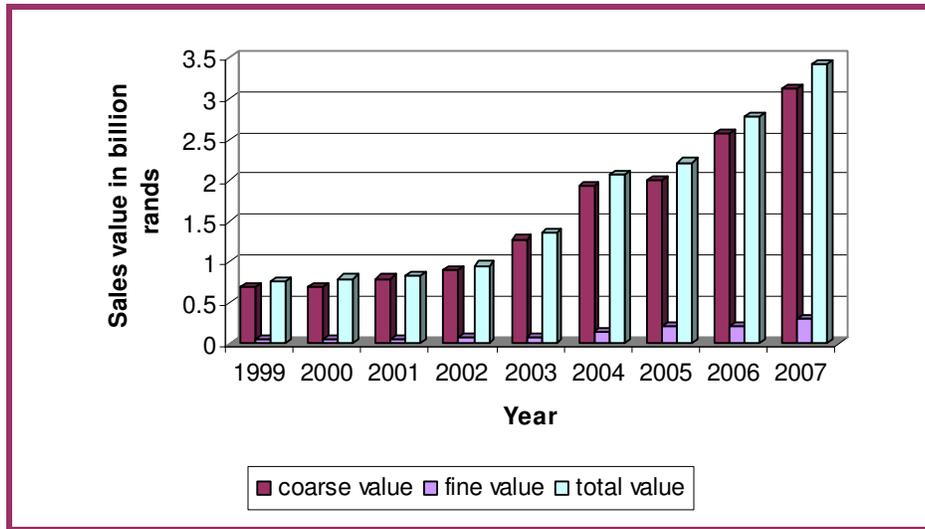


Figure 4: South African sales of sand and aggregate, by value, 1999 - 2007
 (Source: Directorate Mineral Economics)

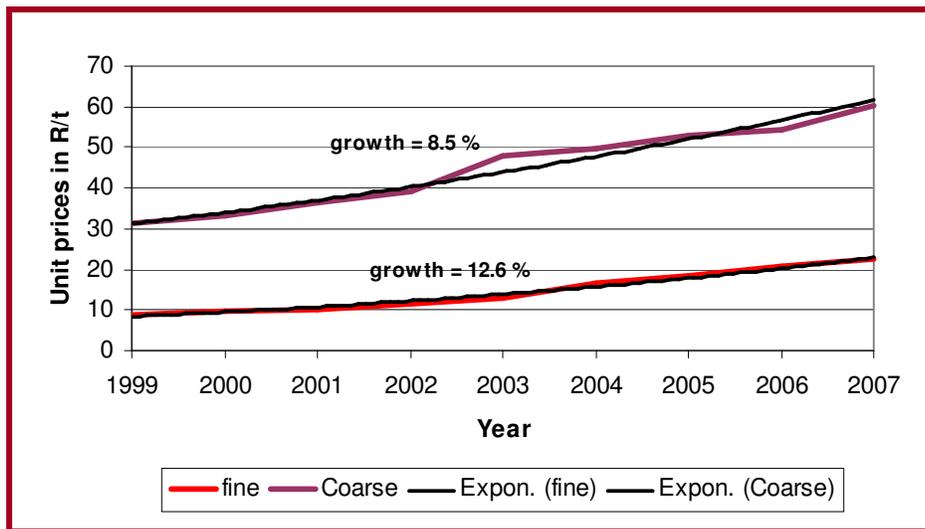


Figure 5: Average unit prices of sand and aggregate, 1999 - 2007
 (Source: Directorate Mineral Economics)

6. EMPLOYMENT

During the past five years, employment in the sand and aggregate industry increased by 11,3 percent and remuneration by 21,2 percent (Figure 6), attributed to improved data collection and the boom in the construction sector.

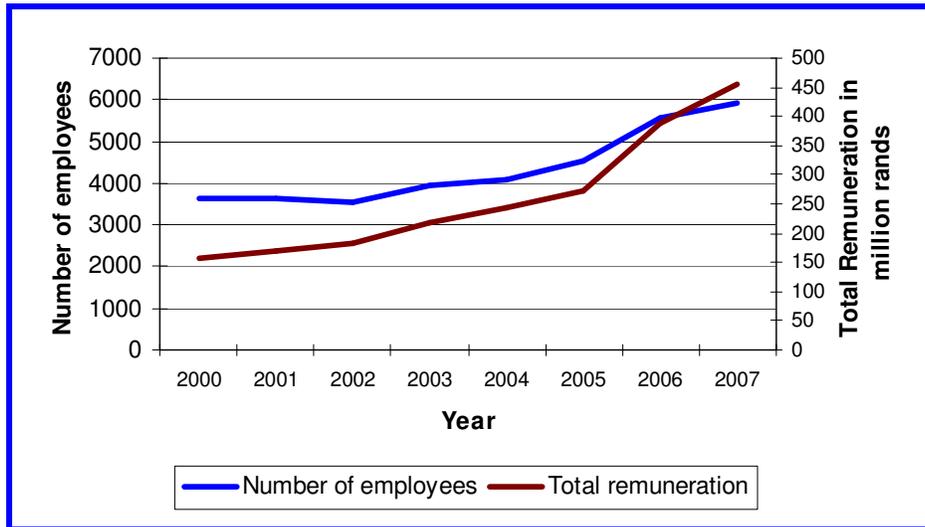


Figure 6: South Africa's aggregate and sand employment and remuneration, 2000 – 2007

(Source: Directorate Mineral Economics)

6. ENVIRONMENTAL IMPACT

What are the environmental impacts?

Some of the environmental disturbances created by quarrying is caused directly by engineering activities during aggregate extraction and processing. The most obvious impact of quarrying is a change in geomorphology and conversion of land use, with associated change in visual scene. The major impact may be accompanied by loss of habitat, noise, dust, vibration, erosion and dereliction of the mined site. Some of the impacts are short lived and most are easy to predict and observe. Most engineering impacts can be controlled, mitigated, kept at tolerable levels and restricted to the immediate vicinity of the aggregate operation by employing responsible operational practices that use available engineering techniques and technology.

The Aggregate and Sand Producers Association (ASPASA) is an industry association that represents affiliated sand and aggregate companies, with the purpose of setting standards and guidelines with regard to health, safety and environment, technical, transport and health

issues, and to promote the sector. ASPASA employs an auditing process that ensures that member companies comply with their standards.

7. LICENSING PROCESS

What is the procedure to start a quarry?

All mineral and mining operations in South Africa are regulated in terms of the Mineral and Petroleum Resources (MPRDA), Act 28 of 2002, with health and safety aspects being regulated by the Mine Health and Safety Act (MHS-A), Act 29 of 1996. These Acts are administered by the Regional Managers and Principal Inspector of Mines in the respective Regional Office.

Before a quarry can be established, all the regulatory procedures as laid out in the aforementioned Acts must be followed. These include securing the rights to the minerals (rock source), completing an Environmental Impact Assessment (EIA) and Environmental Management Programme (EMP) to mitigate or minimise the resultant environmental impacts. The EMP will include a rehabilitation plan for the mine on closure and detail as to how this will be funded. All the necessary EIA and EMP documentation is submitted to the authorities in support of the application for the mining license. If a license is granted the recovery of the mineral/rock through mining can begin.

All applications for prospecting/mining rights/permits must be addressed to the Regional Manager in the Province where the prospecting/mining operation is located.

8. OUTLOOK

Where to for the industry?

The South African economy is projected to grow at 4,5 percent in 2008, 4,2 percent in 2009 and 4,6 percent in 2010. Forecasts have been revised downwards on the back of the downturn in the global economy, Eskom's energy supply challenges in the short term and rising inflation in South Africa. However, government has put in place measures to address the electricity situation and this is likely to be solved when new power stations are brought on stream. Although the robust growth of the economy, over the last five years is expected to be tempered in the short term the country has a solid platform to grow beyond this period which presents opportunities for small scale miners.

Growth in the construction sector is expected to continue in the short term, albeit at decreased rates compared to that over the last 5 years, with more than R1,2 trillion flowing through construction and linked sectors (2007 – 2009). Total demand for cement in the construction sector, from 2007 to 2015 is expected to compound to 55 146 kt, with an annual peak of 11 474 kt in 2008. An average ratio of 9:1 can be used for estimating the sand and aggregate to cement sales ratio. A considerable amount of aggregate is used on its own, for example in asphalt and road base layers.

The Aggregate and Sand Producers Association (ASPASA) predicts that annual supply capacity of sand and aggregate used in construction projects from 2006 to 2016 to grow at an average annual rate of 1,5 percent from 2008 to 2016

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