FEASIBILITY STUDY FOR DOLOMITE PROCESSING, WALL PUTTY MANUFACTURING AND DISTRIBUTION PROJECT IN TANZANIA – AFRICOAT WALL PUTTY

Overview of the Mining Sector in Tanzania

Tanzania is endowed with a rich variety of mineral resources, which play a significant role in its economy. The mining sector in Tanzania is categorized into five main groups: metallic minerals, gemstones, industrial minerals, energy source minerals, and construction minerals. Here's a detailed overview of each category and the notable regions where these minerals are found:

1. Metallic Minerals

These include:

- **Gold**: Tanzania is one of Africa's largest gold producers. Significant gold mining regions include the Lake Victoria Goldfield, particularly in Geita.
- **Iron Ore**: Found in various regions, with significant deposits in Liganga.
- **Nickel, Copper, and Cobalt**: Notably present in the Kabanga nickel project.
- **Silver**: Often a by-product of gold mining activities.

2. Gemstones

Tanzania is renowned for its gemstones, particularly Tanzanite, which is unique to the country.

- **Tanzanite**: Found exclusively in the Mererani Hills near Arusha.
- **Diamonds**: Mined primarily from the Williamson diamond mine at Mwadui.
- **Ruby, Garnets, Pearl, Sapphire, Emerald, Amethyst, Chrysoprase, Peridot, and Tourmaline**: Various deposits found throughout the country. A significant alluvial occurrence has been discovered in the southern regions of Ruvuma, Mtwara, and Lindi.

3. Industrial Minerals

These minerals are essential for various industrial processes.

- **Dolomite**: Extracted from several regions including Mahenge District (Morogoro), Monduli District (Arusha), Pugu Hills (Pwani), and others.
- **Limestone**: High-purity deposits in the Morogoro Region's white marble deposits.
- **Soda Ash, Gypsum, Salt, Phosphates**: Various deposits across the country, with significant potential for development.

4. Energy Source Minerals

These are critical for energy production.

- **Coal**: High-quality deposits similar to those in Southern Africa are found in the Ruhuhu and Songwe-Kiwira basins.
- **Uranium**: Significant reserves in the Bahi, Manyoni, and Mkuju River areas.

5. Construction Minerals

Used extensively in building and infrastructure projects.

- **Aggregates, Gravel, Sand, and Dimension Stones**: Abundant across various regions, supporting the construction sector.

Dolomite Mineral Resources and Locations

Dolomite extraction takes place in several key areas:

- **Morogoro Region**: Mahenge District.
- **Arusha Region**: Monduli District.
- **Pwani Region**: Kisarawe District (Pugu Hills) and Msata District.
- **Geita Region**: Lake Victoria Goldfield, Geita Mine.
- **Kilimanjaro Region**: Moshi Rural District.
- **Manyara Region**: Babati District (Minjingu Quarry).
- **Mbeya Region**: Mbeya (Panda Hill).

Dolomite: Properties & Uses

Dolomite, named after the French mineralogist Déodat Gratet de Dolomieu, is a naturally occurring stone that consists of a double carbonate of calcium and magnesium with the chemical formula ($CaCO_3.MgCO_3$). It forms through the process of dolomitization, where magnesium-bearing solutions such as sea water, underground water, or hydrothermal solutions interact with calcite.

Physical Properties of Dolomite

1. **Compressive Strength**:
    - **Range**: 2,000 to 37,000 psi.
    - **Influencing Factors**: The strength of carbonate rocks, including dolomite, is influenced by their interlocking grain fabric and mineralogy. Over geologic time, recrystallization reduces porosity and increases strength, making older carbonate rocks generally stronger than younger ones.
2. **Optical Properties**:
    - **Purity and Color**: $MgCO_3$ in dolomite is pure white.
    - **Refractive Index**: Average refractive index is 1.5.
    - **Anisotropy**: Optically anisotropic, meaning the refractive index changes with the orientation of the crystals. This property makes $MgCO_3$ derived from dolomite useful in pharmaceuticals.
3. **Bulk Density**: 83 gm/cc.
4. **Specific Gravity**: 0.84 gm/cc.
5. **Color**: Typically white, but can vary to reddish or greenish white depending on impurities.
6. **Hardness**: 3.5-4.0.
7. **PH**–Dolomite is basic in nature with a PH of > 9

Stock image of mined dolomite

Wall Putty Overview

Introduction Wall putty is a white cement-based fine powder that is blended with water or water-based paints to form a smooth mixture. It is applied before the final coating of paint to enhance its lifespan and improve the finish. Wall putty serves as a base coat, suitable for both dry and wet walls, and can be used for interior and exterior wall finishing.

Functions and Benefits The primary function of wall putty is to even out and level the surface in preparation for further coats of paint. It fills minor pores and cracks, removes surface undulations, and provides a protective smooth base. Additionally, wall putty acts as a filler for cracks and patches, enabling the application of any paint color afterward. It is available in various colors and consistencies and is applicable to both new and old surfaces.

Advantages Wall putty offers numerous benefits in construction:

- **Moisture Resistance:** It protects the walls from moisture damage.
- **Smooth Finish:** Provides a smoother surface for paint application.
- **Multi-Purpose Application:** Suitable for various wall types and finishes.
- **Durability:** Resistant to damage, enhancing wall longevity.
- **Paint Longevity:** Extends the lifespan of wall paint.
- **Tensile Strength:** Increases the tensile strength of walls.
- **Cost-Effective:** Reduces paint consumption, lowering overall costs.
- **Enhanced Appearance:** Provides a glossy, smooth finish that enhances the paint's actual shade.

Types of Wall Putty There are two primary types of wall putty available:

1. **White Cement Wall Putty**
    - **Composition:** Made from white cement, added polymers, and minerals.
    - **Applications:** Suitable for both interior and exterior use.
    - **Features:** Non-toxic, low maintenance, excellent abrasion resistance, superior adhesion strength, and a high-quality finish. It also resists algae and fungi growth and requires less paint due to low absorption.
2. **Acrylic Wall Putty**
    - **Composition:** An acrylic and water-based solution.

- **Applications:** Best suited for interior walls.
- **Features:** Fast drying, ready to use, provides a smooth finish, suitable for all paints, better alkali resistance, and protects from external elements.

Manufacturing Process of Wall Putty Using Dolomite in Lean Phase Pneumatic Conveying System

Introduction

The manufacturing of wall putty involves combining white cement and dolomite with various additives to create a fine powder that enhances wall finishes. This process ensures a high-quality, consistent product suitable for both interior and exterior applications. Using a Lean Phase Pneumatic Conveying System, white cement and dolomite are combined in specific proportions. Typically, the ratio is 1 part white cement to 4 parts dolomite. For instance, producing 5 tonnes of putty involves 1 tonne of white cement (BD – 1100 Kg/m3) and 4 tonnes of dolomite (BD – 950 Kg/m3), along with various minor components.

Materials Used

- **White Cement**: Primary binder, providing strength and smoothness.
- **Dolomite**: Acts as a filler and provides bulk to the mixture.
- **Additives**: Various polymers and minerals enhancing properties like adhesion and workability.

Typical Composition

- **White Cement**: 20%
- **Dolomite**: 80%
- **Additives**: As required for specific properties.

Step-by-Step Manufacturing Process

1. Raw Material Handling

- **Unloading and Storing Raw Materials**:
    - White cement and dolomite are transported to bulk storage silos using pneumatic conveying systems.
    - Silo capacity is determined based on production needs (typically 3 to 6 days).
    - Measures like fluidizing cones and bin activators ensure continuous flow and prevent material jamming.

2. Ingredient Weighing and Batching

- **Weighing Process**:
    - Materials are transferred from silos to a weighing hopper equipped with load cells.
    - Screw conveyors facilitate material transport to achieve precise weighing.
    - Rotary airlock valves control material discharge into the charge hopper.

3. Mixing and Blending

- **Blending Process**:
    - Materials from the charge hopper are conveyed to a mixer or blender via screw conveyors.
    - Additives are introduced in controlled amounts to achieve desired properties.
    - Mixing duration ranges from 15 to 30 minutes to ensure uniformity and homogeneity.

4. Lean Phase Pneumatic Conveying

- **Material Conveyance**:
    - A lean phase pneumatic conveying system transports the blended material using low-pressure air through pipelines.
    - Benefits include efficient material handling, reduced segregation, and minimized dust generation for a cleaner environment.

5. Packaging and Quality Control

- **Packaging**:
    - Blended putty is deposited into storage silos and then packed into bags (1 kg to 50 kg) for distribution.
- **Quality Control**:
    - Rigorous quality checks ensure consistency in particle size, chemical properties, and overall performance.
    - Samples are taken throughout the process to maintain high standards.

Materials Breakdown for 25 kg of Wall Putty

1. **White Cement:**
    - Ratio: 1 part
    - Proportion in 25 kg batch:
        - White Cement=0.2×25 kg=5 kg
2. **Dolomite:**
    - Ratio: 4 parts
    - Proportion in 25 kg batch:
        - Dolomite=0.4×25 kg=20 kg

Assuming

1Kg of white cement is about TZS 400 X 5 = 2000,

Assuming 1Kg of Dolomite is TZS 100 after grinding 100 X 20 = 2000,

Packaging cost – 900 Per Bag, TOTAL = TZS 4900

Factoring other production cost per bag at 40% = 1960

Total = 6860

Wall Putty in Tanzania; Manufacturers and Specifications

SN	MANUFACTURER	WALL PUTTY BRAND NAME	COLOURS, PACKAGING QUANTITY
1	**KNAUF GYPSUM TANZANIA LIMITED**	**KNAUF FINISH BORA & KNAUF EXTERIOR BORA**	WHITE & Brown/ Orange/ Green 25Kgs
2	**JK WHITE CEMENT (AFRICA) LIMITED – DAR ES SALAAM***	**JK WALL PUTTY**	BLUE & Green, Yellow, White 25Kgs
3	**BOSPHORUS MANUFACTURING LIMITED**	**YAPFIX WALL PUTTY**	Yellow, White, Red, Blue 25Kgs
4	**MAYANGWA COMPANY LIMITED**	**SKIM COAT WALL PUTTY**	BLUE & White 25 Kgs
5	**ROCKMAX INTERNATIONAL LIMITED**	**EXTRA POWER SKIMMING PUTTY**	White & Blue 25Kgs
6	**DIY LIMITED**	**ANDIKA WALL PUTTY**	White & Green 25Kgs
7	**MAGIC BUILDERS INTERNATIONAL**	**WHITE SKIM WALL PUTTY**	White & Blue 25Kgs
8	**JOHARI BUILDING SOLUTIONS LIMITED**	**ULTRASHINE WALL PUTTY**	WHITE & Sky Blue 25Kgs
9	**HK INTERNATIONAL LIMITED**	**LAIQA WALL PUTTY**	WHITE & BLACK & Yellow 25Kgs
10	**FAJU 45 COMPANY LIMITED - ARUSHA***	**Unknown**	Unknown

MARKET DRIVERS

1. Growing construction activities – Tanzania is currently witnessing a surge in construction activities driven by a need for residential and commercial building. This has created a substantial demand for wall putty products.
2. Aesthetics and Durability – consumers are increasingly becoming more conscious on the enhancement of aesthetic appeal of the buildings. Wall putty products provide a more even and smooth surface that allows for more maneuvering for a painting, improving overall appearance and longevity of the painted surface.
3. Infrastructure development – the Government has invested in major infrastructure development projects, such as hospitals, airports, regional and national administrative offices, residential projects etc. this has created significant demand for wall putty products for surface preparation and finishing purposes.

MARKET RESTRAINTS

1. **Fluctuating raw material prices** – the wall putty market is affected by fluctuating prices of raw materials such as cement, polymers, and additives. These price fluctuations can impact the profitability of the manufacturers and lead to increased product prices.
2. **Availability of substitutes** – Although wall putty offers superior performance characteristics, there are alternative products available in the market, such as skim coat and gypsum plaster. These substitutes pose a challenge in the growth of the wall putty market.
3. **Lack of awareness (General Product education)** – Although there is greater awareness regarding the benefits of wall putty in the formal space, a lot of work is required to bridge the knowledge gap regarding the benefits of wall putty among the informal sector.

SWOT ANALYSIS OF WALL PUTTY MANUFACTURING IN TANZANIA

STRENGTHS

- Strong demand from the booming construction industry
- Availability of dolomite in Tanzania, a key input in the manufacturing of wall putty.
- Growing awareness about the benefits of using wall putty in construction activities.

WEAKNESSES

- Lack of awareness in certain regions about the advantages of wall putty
- Fluctuating operational expenses impacting profitability
- Machinery downtime – most of the machinery used are imported, therefore when machinery downtime occurs it requires extra effort to recover.
- Product innovation – legislation regarding the patenting of chemical formulars need to be considered.

OPPORTUNITIES

- Product innovation and development of eco-friendly formulation.
- Expansion into untapped markets with a growing construction industry within Tanzania.
- Exportation to neighboring countries which do not have dolomite minerals.

THREATS

- Availability of substitute products such as skim coat and gypsum powder.
- Economic downturns affecting the construction sector and consumer spending.

KEY INDUSTRY DEVELOPMENTS

1. Introduction of Low-VOC Formulations – Manufacturers have been focusing on developing low-VOC wall putty formulations to meet the increasing demand for eco-friendly products and comply with regulatory standards.
   NB - VOC Content – VOCs, or Volatile Organic Compounds, are harmful chemicals that can be released into the air during the drying process. It is important that a wall putty has a low VOC content to ensure that the indoor air quality is not compromised.
2. Strategic partnerships – there has been a marked shift from the importation of finished wall putty towards local manufacturing of the same. Key players in the industry have formed strategic patnerships with raw material suppliers, distributors and construction companies to strengthen their market position and enhance product availability.
3. Product expansion – manufacturers have expanded their product offering to a wider rage of wall putty formulations, catering to specific customers requirements and applications.

MAKILULI LIMITED STRATEGIC APPROACH

1. **Invest in research and development** – Makiluli Limited will have product research and development as its key cornerstone, leveraging on the body of work currently available in terms of formulations. This can help differentiate their products and gain competitive advantage.
2. **Enhancing marketing and promotion** - Makiluli Limited will increase awareness about the benefits of wall putty among consumers. There will also be an intentional push to creating a recognizable brand that will be appealing to the local consumers.
3. **Cost-leadership owing to local availability of raw materials** – Makiluli Limited will ensure cost-leadership through sourcing dolomite from local sources instead of relying on importation. This cost-leadership will be transferred to the consumer in the form of lower prices and price stability

4. **Strengthen distribution networks** – Makiluli Limited will create a robust distribution network and partnerships with retailers and distributors who are essential to ensure product availability and reach to a wider network.

EMPLOYMENT ROLES REQUIRED FOR THE OPERATIONS OF THE WALL PUTTY PLANT

SN NO.	POSITON	SALARY (GROSS)	PAX
1.	GENERAL MANAGER / HR MANAGER	TZS 3,000,000 PM	1 PAX
2.	PRODUCTION MANAGER/ SHEQ MANAGER	TZS 2,000,000 PM	1 PAX
3.	QUALITY ASSURANCE MANAGER	TZS 1,500,000 PM	1 PAX
4.	SERVICE ENGINEER	TZS 1,200,000 PM	1 PAX
5.	MARKETING MANAGER	TZS 1,200.000 PM	1 PAX
6.	FINANCE MANAGER	TZS 2,000,000 PM	1 PAX
7	HR OFFICER	TZS 850,000 PM	1 PAX
8.	BOOK KEEPERS	TZS 500,000 PM	1 PAX
9.	PNEUMATIC PLANT OPERATOR	TZS 1,000,000 PM	2 PAX
10.	PACKAGING	TZS 420,000 PM	2 PAX
11.	STACKING	TZS 300,000 PM	5 PAX (3 WILL BE GOING OUT WITH DELIVERY DRIVERS)
12.	DOLOMITE GRINDER OPERATOR	TZS 800,000 PM	2 PAX
13.	SERVICE TECHNICIAN	TZS 700,000 PM	1 PAX
14.	SECURITY	TZS 250,000 PM	4 PAX
15.	CLEANERS	TZS 150,000 PM	3 PAX
16.	DRIVERS	TZS 400,000	3 PAX
	TOTAL	TZS 16,400,000	30 PAX

NB: THE PLANT HAS THE CAPACITY TO EMPLOY UPTO 45 PERSONNEL AT FULL OPERATION

Capital Expenditure plan:

Equity Financing			**Borrowing**	
Description	**Value in TZS**		**Description**	**Value**
Raymond Mill Model No. 130	50,000,000 (Inclusive of CIF)		Raymond Mill Model No. 130	153,500,000 (Inclusive of CIF)
Construction of Production Warehouse, including office and stores	80,000,000		Production Warehouse construction	50,000,000
Generator 100KVA -	35,000,000		Installation of Raymond Mill and all the Electrical fittings	50,000,000
Purchase of vehicles - 3 Suzuki carry	45,000,000		Working capital	250,000,000
Port clearing charges	50,000,000			
Land	270,000,000			
Total	**530,000,000**		**Total**	**453,500,000**

Non-current Assets

Land	270,000,000
Buildings	130,000,000
Machinery	203,000,000
TOTAL	

Current Assets

Dolomite Raw Materials in stock	
Cash in Bank	

Non-current Liabilities

Term Loan	

Office Expenses

Payroll	16,400,000
Utilities – Electricity & Water	
Telephone Charges – 1 Radio Transiter	
Postage and Courier	
Internet	
Software subscription	
TOTAL	

Finance Charges

Bank charges	
Insurance premiums	

Professional fees

NEMC Environmental Fees	
OSHA Fees	
Legal Retainer	
Auditor Retainer	

Project Implementation schedule

1. Research and development of wall putty product at industrial laboratories – Understand how the competitors' products are formulated. 4 Weeks
2. Submission of formulated sample to Tanzania Bureau of Standards for standardization. 12 Weeks
3. Procuring Raymond Mill Model No. 130 from China – Manufacturing and Shipping – 10 Weeks
4. Application for NEMC Approval before starting construction of Production warehouse – 4 weeks
5. Construction of Production warehouse after securing approvals – 3 - Weeks
6. Developing of logo and packaging mock ups and trademarking the same 10 Weeks
7. Installation of Raymond Milling Plant at production warehouse – 3 Weeks
8. Recruitment of Key staff members especially those who will be involved in the production process – 2 weeks
9. Induction Training of newly-recruited staff members – 1 Week
10. Conducting test runs to ensure everything runs well. – 3 Days
11. Developing production plan using data gathered from the test runs – 4 Days
12. Production at 30% Capacity - 2 Weeks
13. Production at 60% Capacity – 2 Weeks
14. Production at 100% Capacity

NB: This entire process is expected to take a maximum of 25 weeks from Research and Development until the plant is operating at full capacity

Integrated Multi-Channel Marketing Model (PESO)

The company will maintain its traditional marketing channels, leaning heavily on established networks and what other industry players are doing as strategies. Our market effort will also draw heavily from the parent company's involvement in the construction industry.

We will scale down traditional print advertising to concentrate on an integrated PESO (Paid Earned Shared and Owned) multi- channel marketing model riding on social and online channels

The PESO Model

Traditional advertising targets mass audiences in select markets to create a flow of enquiries from the audience. This requires a steep ad spend. The Integrated (PESO) multichannel model uses multiple channels and can be optimized to ride on cheaper online and social media advertising.

The PESO model can be combined with an AARRR (Acquisition, Activation, Retention, Revenue, Referral) Marketing Funnel. A marketing funnels works prospects through a sustained filtering process using multiple channels to acquire audiences, activate prospects, retain potential customers, convert actual customers and get referrals to other prospects from present customers.

Unlike traditional marketing that inundates its audience with advertisements in hopes of drawing potential customers, a marketing funnel is a solid game plan that slowly recruits the audience through constant interaction, building a relationship that eventually leads to a sale.

A marketing Funnel utilizes the paid channels to generate sales leads, social channels to nurture prospects, earned channels to build preference towards the brands and owned channels to close the sale.

The key here is to observe three performance indicators when generating leads; **Cost per Impression (CPM)**, **Cost per Click (CPC)** and **Customer Acquisition Cost (CAC).**

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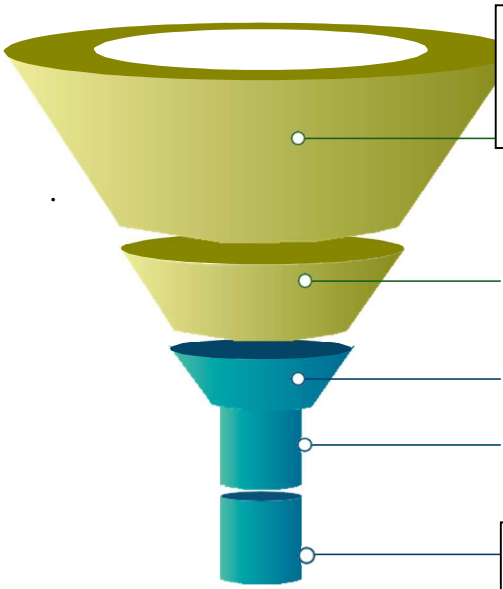

1.**Generate Leads:** Online advertising (Facebook, Google AdSense, YouTube and Search Traffic

2. **Qualify Leads**: Social Content Marketing Channel traffic using segment targeted content- direct them to appropriate nurturing channels

3. Nurture Leads: Earn respect and trust through owned channels (PR, Construction blogs)

4. **Persuade Selection**: Close the sale- lead prospects to commit to a purchase

5. **Spread the Word:** Referrals through shared content generated by Satisfied clients and positive reviews from contractors.