

Mineral Facilities Analysis in Middle East & Africa



IIP CAPSTONE PROJECT BY HENKEL PI
GROUP 4

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Introduction

Mining plays a vital role in driving economic development, industrialization, and infrastructure growth, particularly across resource-rich regions like the Middle East and Africa. This project aims to provide a data-driven overview of mining facility distribution and capacity across these two regions. Using a structured dataset, we analyze country-level statistics to uncover patterns in the number of mining facilities, their production capacities, and investor involvement. Our analysis offer key insights that can guide government and investors.



Statement of the problem



There is a lack of comprehensive understanding regarding the distribution of mineral facility locations, production capacities, and investment trends across the Middle East and Africa. Insufficient analysis of key minerals, facility types, and ownership structures has hindered the identification of patterns in mining operations and investment behaviors in the region. This gap limits the ability of stakeholders to make informed decisions and strategize effectively within the mineral sector.

Our Objective



Assess investment patterns
To explore the role of main and other investors in mineral facility operations.

Geographic distribution

To analyze the distribution of mineral facilities across different countries.

Commodity production

To examine commodity production trends to identify the most mined commodities and their production capacity

Facility status and capacity

To determine active vs. inactive facilities and their production potential

Data Description



- The original dataset contains 6,478 records and 22 columns, detailing global mineral facilities.
- Key features include:
 - Country, Location, and Geographic Coordinates (latitude/longitude)
 - Facility Name & Type (e.g., mine, smelter, refinery)
 - Commodity extracted
 - Production Capacity and Units
 - Operating Company and Investors
 - Operational Status (e.g., active, inactive)
 - Year of Data Collection
- For the purpose of this project, the dataset was filtered to focus on Middle East and African countries, resulting in 1,412 records across 59 countries.
- Year of data collection: 2007

Data Preprocessing

Data cleaning

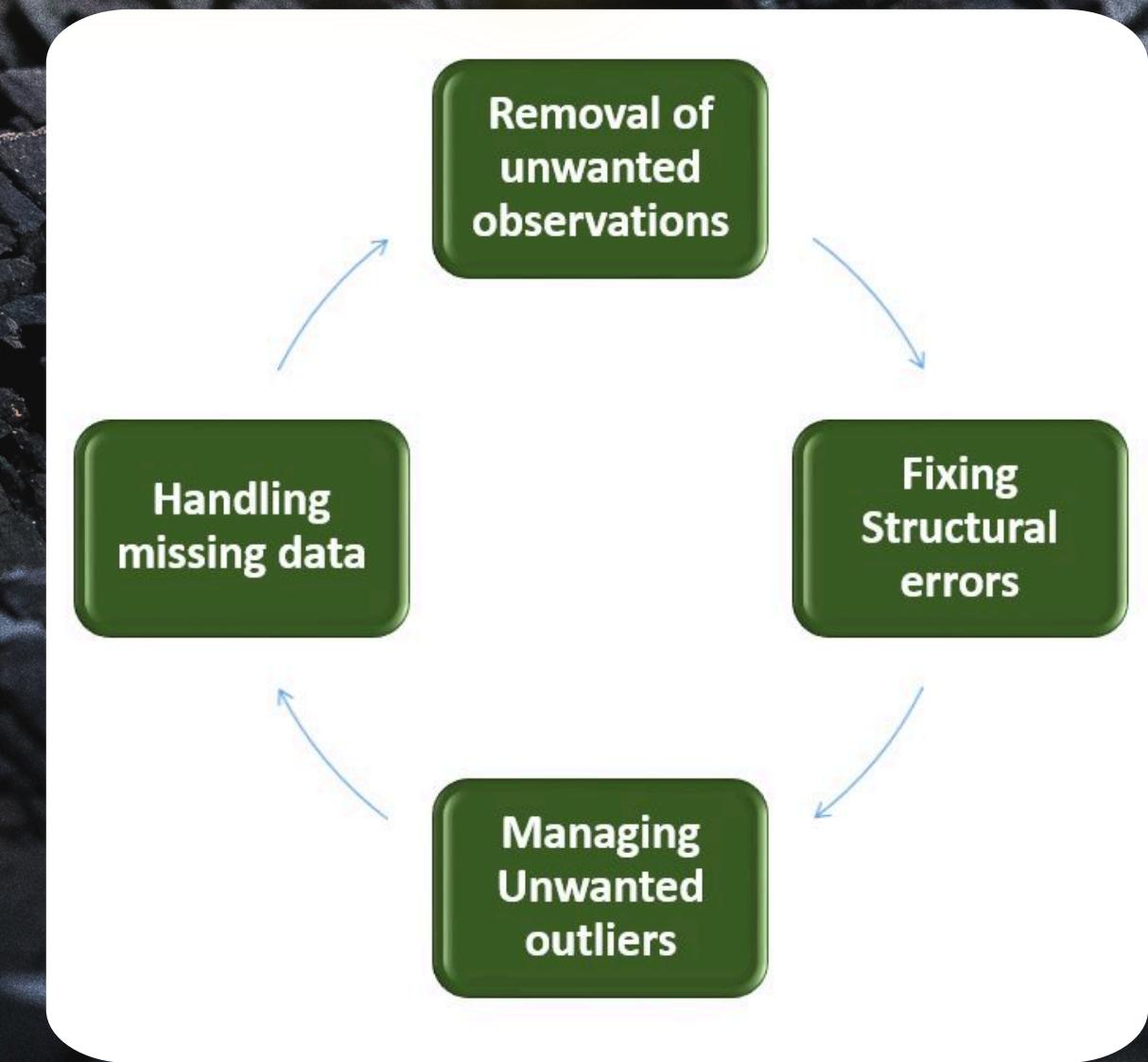
Dropped non-critical columns: maininvest, othinvest, notes, mm, dmslat, dmslong. For effective analysis we retained year, country, location, latitude, longitude, commodity, fac_name, fac_type, capacity, units, op_comp, status, precision

Country filtering

Extracted records only from countries in the Middle East and Africa (59 countries) hence 1,412 records out of the original 6,478

Handling missing values

Filled missing entries in key categorical columns such as fac_name, op_comp, fac_type with placeholder - Unknown



Data type conversion

Converted capacity to numeric (float), enabling aggregation and analysis. Invalid or non-numeric entries were handled as NaN

Key Analysis

- Geographical analysis by regions
 - Gold/Copper: West & Central Africa.
 - Oil/Gas: Arabia (Saudi Arabia, UAE).
 - Iron Ore/Coal: Southern Africa.
- Top 5 Countries (by facility count):
 - South Africa (28% of facilities) – Gold, coal, iron ore.
 - Saudi Arabia (15%) – Petroleum, natural gas.
 - DR Congo (12%) – Cobalt, copper.
 - Ghana (9%) – Gold, bauxite.
 - Zambia (7%) – Copper.

1. Geographic distribution



Key Analysis

2. Commodity production analysis



Top commodities in MEA

- Cement is the leading commodity with 31.8% (194 facilities). Its distributed across 47 countries
- Gold is the second leading commodity with 15.9% (97 facilities). It is distributed across 22 countries
- Steel is the third leading commodity with 10.2% (62 facilities). it is distributed across 16 countries.

Key Analysis

- In the given dataset, there are no investors across MEA unlike other regions which has investors such Alcoa World Alumina (Australia), Barrick Gold (Canada) etc
- We concluded that the investor columns has missing values or there are no investors found.
- Therefore, there is under explored investments across MEA.

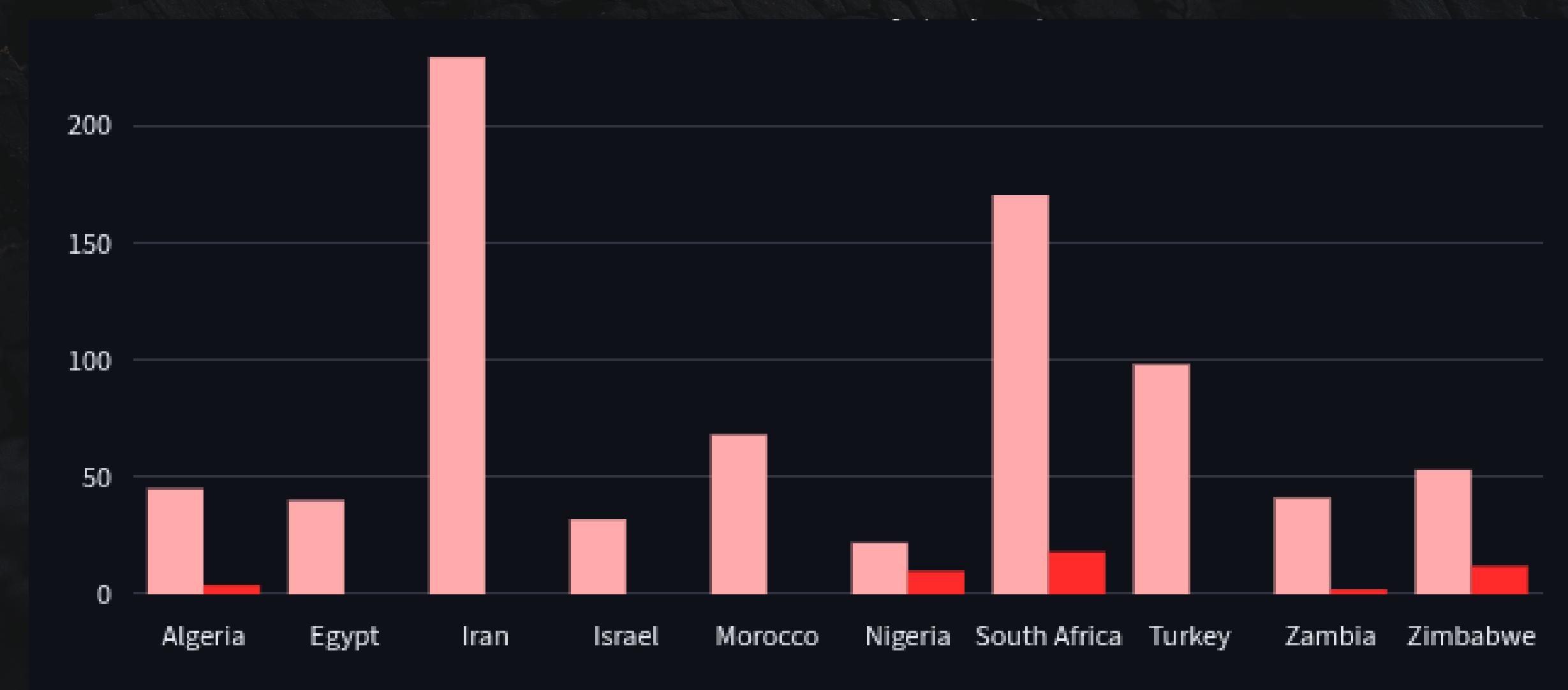
3. Investment patterns



Key Analysis

4. Facility status

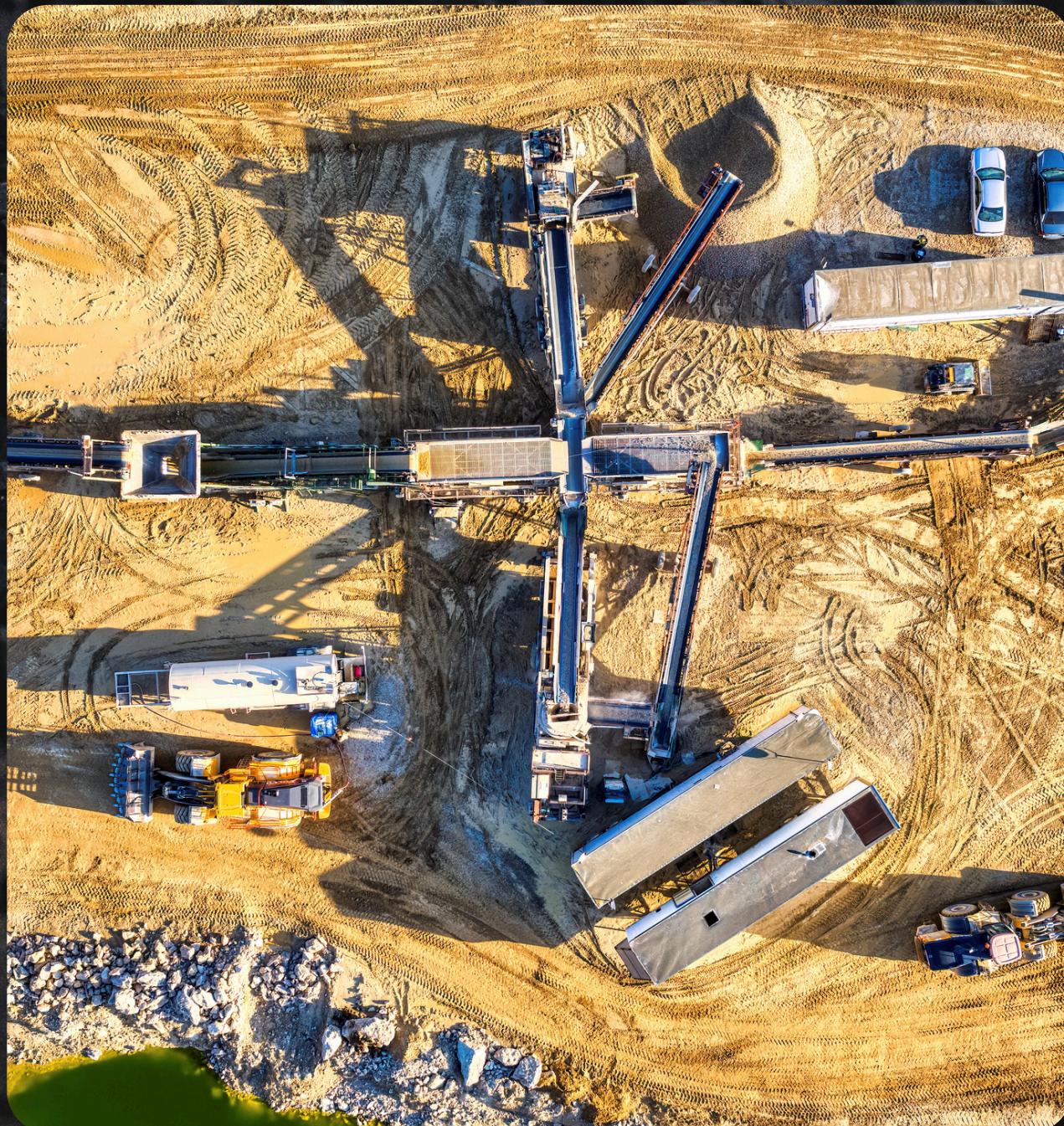
- In MEA most of the facilities ie 85.5% of the facilities are active while the other 15.5% are either inactive or closed, highlighting potential redevelopment opportunities
- Iran has the highest rate of active facilities (100% active).
- South Africa is the second leading with 92% rate of the active facilities. However, there is high rate of inactiveness.



RECOMMENDATIONS

- Governments in both regions
 - should encourage transparent investment policies to attract diverse investors.
 - should provide financial support programs for potential investors.
- Mining companies should focus on high-capacity commodities like cement for growth.
- More exploration should be done on areas with inactive facilities e.g., South Africa for potential reopening.
- The Middle East and African regions are rich in various commodities with 85.5% active yet they are under explored. Therefore, investors can tap this opportunity.

Conclusion



Middle East and Africa contains varying commodities with cement, gold, steel having the highest production capacity respectively. Despite the availability of these mineral resources and facilities, there are no investors based on this dataset. Therefore, with standardized policies, government can facilitate cross-border investments. Additionally, mining companies should utilize MEA's potential of rich resources to grow their investments.



DEMO

**THANK YOU
FOR LISTENING**