

Baseline Study on Fertilizers in Tanzania 2023

By Kilimokwanza.org Team, Lead Neema Munisi

Baseline Study on Fertilizers in Tanzania 2023	1
1. Executive Summary	3
Key Objectives of the Study.....	3
Overview of Findings.....	3
Opportunities for Growth.....	4
Recommendations.....	5
2. Introduction	6
2.1 Background.....	6
2.2 Objectives of the Study.....	6
2.3 Scope of the Study.....	7
2.4 Methodology.....	7
2.5 Importance of the Study.....	8
2.6 Key Challenges in the Fertilizer Sector.....	8
2.7 Opportunities for Improvement.....	9
2.8 Study Limitations.....	9
2.9 Conclusion.....	10
3. Fertilizer Landscape in Tanzania	10
3.1 Fertilizer Types and Their Uses.....	10
3.2 Fertilizer Demand in Tanzania.....	11
3.3 Fertilizer Supply Chain.....	11
3.4 Accessibility and Affordability.....	12
3.5 Awareness and Knowledge Gaps.....	13
3.6 Environmental and Soil Health Concerns.....	13
3.7 Role of Key Stakeholders.....	14
3.8 Opportunities for Growth.....	14
4. Fertilizer Policy and Regulatory Framework in Tanzania	15
4.1 Overview of Fertilizer Policies in Tanzania.....	15
4.2 Key Policy Instruments.....	15
4.3 Government Subsidy Programs.....	16
4.4 Regulatory Challenges.....	17
4.5 Role of Key Institutions.....	17
4.6 Best Practices in Fertilizer Policy.....	18
4.7 Recommendations for Policy Improvement.....	18
5. Findings	19

5.1 Fertilizer Usage Patterns.....	20
5.2 Accessibility and Affordability.....	20
5.3 Knowledge and Awareness.....	21
5.4 Supply Chain Challenges.....	21
5.5 Environmental and Soil Health Impact.....	22
5.6 Policy Effectiveness.....	23
5.7 Opportunities Identified.....	23
5.8 Conclusion.....	24
6. Opportunities and Challenges.....	24
6.1 Opportunities.....	24
6.2 Challenges.....	27
6.3 Balancing Opportunities and Challenges.....	29
6.4 Recommendations.....	29
6.5.....	29
7. Recommendations.....	30
7.1 Policy Interventions.....	30
7.2 Capacity Building for Farmers.....	31
7.3 Strengthening Supply Chain Infrastructure.....	31
7.4 Promoting Local Production.....	32
7.5 Leveraging Technology.....	32
7.6 Strengthening Regulatory Frameworks.....	33
7.7 Promoting Sustainability.....	33
7.8 Engaging Stakeholders.....	34
7.9.....	34
8.....	35
8.1 Key Insights.....	35
8.2 Critical Success Factors for Transforming the Sector.....	36
8.3 Vision for the Future.....	36
8.4 Recommendations for Immediate Action.....	37
8.5.....	38
9. References.....	38
Government Policies and Regulations.....	39
Reports by International Organizations.....	39
Academic Research.....	40
Data from Industry Stakeholders.....	40
NGOs and Development Programs.....	40
Technical Resources.....	41
Case Studies and Best Practices.....	41
Policy Recommendations.....	41

1. Executive Summary

Fertilizers play a pivotal role in agricultural productivity and sustainability, especially in a country like Tanzania, where agriculture accounts for about 30% of GDP and employs more than 65% of the population. Despite the critical importance of fertilizers, Tanzania faces significant challenges in production, distribution, and use. This baseline study examines the fertilizer landscape, highlighting gaps and opportunities, and proposes actionable recommendations to enhance the sector's contribution to agricultural growth.

Key Objectives of the Study

This study aims to:

- Assess the current state of fertilizer use, production, and distribution in Tanzania.
- Identify challenges and barriers that limit access to and affordability of fertilizers.
- Provide evidence-based recommendations for improving fertilizer policies and practices.
- Support sustainable agricultural practices while ensuring environmental protection.

Overview of Findings

1. Fertilizer Usage Patterns

- Fertilizer use in Tanzania is significantly below international standards, with an average application rate of 19 kg per hectare compared to the recommended 50 kg by the African Union.
- Usage is skewed, with higher adoption rates in cash crop-producing regions like Kilimanjaro and the Southern Highlands. In contrast, regions like Dodoma and Singida see minimal usage due to limited awareness and poor access.
- Smallholder farmers, who dominate the agricultural landscape, often underuse fertilizers due to high costs and inadequate knowledge of application methods.

2. Fertilizer Supply Chain

- Tanzania relies heavily on imported fertilizers, with over 85% of fertilizers being sourced internationally through the Bulk Procurement System (BPS).
- Local production is minimal, with only a few facilities producing specific blends, leaving a significant gap in meeting national demand.
- Distribution networks are underdeveloped, particularly in rural areas, leading to increased transportation costs and price disparities.

3. Affordability and Accessibility

- Fertilizer prices remain high due to import taxes, fluctuating exchange rates, and high transportation costs. For instance, the price of Urea increased by 20% between 2022 and 2023, directly impacting affordability for smallholder farmers.
- Government subsidies, while beneficial, do not reach all farmers equally, often leaving those in remote areas underserved.
- Agro-dealer networks are concentrated in urban centers, limiting rural farmers' access to timely supplies.

4. Knowledge and Awareness

- Many farmers lack sufficient knowledge about the correct types and quantities of fertilizers for their specific crops and soil types.
- Misconceptions about fertilizer use, including fears of soil degradation and dependence, persist among rural farming communities.
- Extension services are overstretched, with one extension officer serving more than 1,500 farmers in some regions.

5. Environmental and Soil Health Concerns

- Overuse of fertilizers in some regions has led to soil acidification and reduced fertility.
- Lack of soil testing facilities contributes to improper fertilizer application, exacerbating environmental challenges.
- The potential for organic fertilizers still needs to be explored, despite their environmental benefits.

Opportunities for Growth

1. Enhancing Local Production

- Investments in local fertilizer manufacturing could reduce reliance on imports and stabilize prices. Establishing more plants to produce custom blends tailored to Tanzanian soils and crops is crucial.
- Public-private partnerships can play a significant role in scaling up production and improving distribution networks.

2. Leveraging Technology

- Digital platforms can streamline the fertilizer supply chain, improving transparency and reducing costs. For instance, mobile apps can connect farmers with suppliers, provide real-time pricing information, and offer application guidance.
- Soil testing services can be digitized to ensure farmers use the right types and quantities of fertilizers.

3. Policy Reforms

- Revisiting the Bulk Procurement System to ensure efficiency and fairness in the distribution process.
- Introducing tax incentives for local fertilizer producers and agro-dealers.
- Strengthening subsidy programs to target marginalized and remote farming communities.

4. Promoting Sustainable Practices

- Encouraging balanced fertilizer use to avoid over-reliance on chemical fertilizers and promote integrated soil fertility management.
- Supporting the production and use of organic fertilizers, which align with global trends in sustainable agriculture.

Recommendations

1. Policy Interventions

- Review and optimize the Bulk Procurement System to address inefficiencies and price distortions.
 - Implement targeted subsidies for smallholder farmers to ensure equitable access to fertilizers.
 - Encourage private sector investment in fertilizer production and distribution through tax breaks and other incentives.
2. **Capacity Building**
 - Expand farmer education programs to enhance knowledge of proper fertilizer application techniques.
 - Strengthen extension services by increasing the number of officers and leveraging technology for wider reach.
 3. **Infrastructure Development**
 - Invest in improving transportation networks to reduce logistical costs and ensure timely delivery of fertilizers.
 - Establish rural agro-dealer networks to bridge the gap between suppliers and farmers in remote areas.
 4. **Research and Development**
 - Promote R&D in fertilizer innovation, focusing on custom blends for Tanzanian soils and crops.
 - Partner with academic and research institutions to explore sustainable alternatives, including biofertilizers.
 5. **Environmental Sustainability**
 - Develop guidelines for balanced fertilizer use and encourage soil testing as a prerequisite for fertilizer application.
 - Raise awareness of the benefits of organic fertilizers and integrate them into national agricultural strategies.

Tanzania's fertilizer sector holds immense potential to transform agriculture, improve food security, and boost economic growth. However, addressing the existing challenges requires a coordinated effort from the government, private sector, and development partners. By enhancing access, affordability, and awareness, Tanzania can unlock the full benefits of fertilizers while safeguarding environmental sustainability.

This baseline study serves as a foundation for informed decision-making and strategic planning. With the right interventions, fertilizers can become a catalyst for agricultural transformation, directly contributing to Tanzania's socio-economic development. The recommendations outlined in this study aim to guide stakeholders in achieving this vision.

2. Introduction

2.1 Background

Agriculture is the backbone of Tanzania's economy, contributing about 30% of the GDP and employing over 65% of the population. Fertilizers are a critical input in this sector, enabling farmers to enhance soil fertility, improve crop yields, and ensure food security. Despite their

significance, fertilizer usage in Tanzania remains far below the African Union's recommendation of 50 kg per hectare, with the national average hovering around 19 kg per hectare.

This gap reflects systemic issues in producing, importing, distributing, and adopting fertilizers. Factors such as high costs, limited access, inadequate knowledge, and environmental concerns hinder their optimal use. Given the growing challenges posed by climate change, population growth, and food insecurity, addressing these barriers is critical to transforming Tanzania's agricultural sector.

The baseline study provides a comprehensive analysis of the current state of the fertilizer industry in Tanzania, identifying key challenges and opportunities while offering actionable recommendations to enhance productivity and sustainability.

2.2 Objectives of the Study

The overarching goal of this study is to assess the current state of fertilizers in Tanzania and propose solutions to optimize their use and distribution. Specific objectives include:

1. **Assess Fertilizer Usage:** Understand the patterns of fertilizer usage across regions and crops in Tanzania.
 2. **Analyze the Supply Chain:** Investigate how fertilizers are produced, imported, distributed, and marketed.
 3. **Identify Challenges:** Pinpoint barriers to fertilizer access, affordability, and knowledge.
 4. **Evaluate Policies:** Examine existing policies and regulations governing the fertilizer sector.
 5. **Explore Sustainable Solutions:** Investigate opportunities for promoting environmentally friendly and cost-effective alternatives.
 6. **Provide Recommendations:** Develop actionable recommendations for government, private sector, and development partners.
-

2.3 Scope of the Study

The study encompasses all aspects of the fertilizer value chain, from production and importation to distribution and usage. It covers:

1. **Fertilizer Types:**
 - Inorganic fertilizers, including Urea, DAP (Diammonium Phosphate), CAN (Calcium Ammonium Nitrate), and NPK blends.
 - Organic fertilizers such as compost, manure, and biofertilizers.
 - Specialty fertilizers like foliar sprays and slow-release formulas.
2. **Key Stakeholders:**
 - Farmers, particularly smallholder farmers.

- Agro-dealers, cooperatives, and distributors.
 - Fertilizer producers and importers.
 - Government bodies, including the Ministry of Agriculture.
 - Development partners and NGOs involved in agricultural initiatives.
3. **Geographical Coverage:**
- Fertilizer use in key agricultural regions such as the Southern Highlands, Kilimanjaro, and Lake Zone.
 - Accessibility in remote and underserved areas.
4. **Policy Environment:**
- Analysis of the Bulk Procurement System (BPS).
 - Subsidy programs and their effectiveness.
 - Environmental regulations and their impact on fertilizer use.
-

2.4 Methodology

This study employs a mixed-methods approach, combining qualitative and quantitative research to provide a holistic understanding of the fertilizer sector.

1. **Data Collection:**
 - **Primary Data:**
 - Surveys with farmers to assess fertilizer usage patterns and challenges.
 - Interviews with agro-dealers, importers, and distributors.
 - Focus group discussions with farmer cooperatives and extension officers.
 - **Secondary Data:**
 - Review of government reports, policy documents, and market analyses.
 - Analysis of international data on fertilizer production and trade.
 2. **Sampling:**
 - Representative sampling across major agricultural regions.
 - Stratified sampling to capture data from smallholder farmers, commercial farmers, and agro-dealers.
 3. **Analysis:**
 - Descriptive statistics to summarize fertilizer usage, costs, and access.
 - Thematic analysis of qualitative data to identify key challenges and opportunities.
 4. **Validation:**
 - Stakeholder workshops to validate findings and refine recommendations.
-

2.5 Importance of the Study

The significance of this study lies in its potential to inform policies and interventions that can transform Tanzania's agricultural sector. Fertilizers are a critical enabler of higher crop yields

and sustainable farming practices. However, their suboptimal use has perpetuated low productivity, limited income growth for farmers, and heightened food insecurity.

This study addresses these challenges by providing evidence-based insights and recommendations, aimed at:

- Guiding government policies on fertilizer subsidies, distribution, and production.
 - Supporting private sector investments in local fertilizer production and innovative solutions.
 - Empowering farmers with the knowledge and tools needed for optimal fertilizer use.
 - Promoting sustainable practices that protect soil health and the environment.
-

2.6 Key Challenges in the Fertilizer Sector

Through preliminary analysis, the study identifies several systemic issues that limit the effectiveness of fertilizers in Tanzania:

1. **High Costs:**
 - Fertilizer prices are prohibitively high for most smallholder farmers, driven by factors such as import taxes, fluctuating exchange rates, and high transportation costs.
 - Subsidy programs, while helpful, do not cover all regions or reach the most vulnerable farmers.
 2. **Limited Access:**
 - Agro-dealer networks are unevenly distributed, with rural areas often underserved.
 - Farmers in remote regions face delays and increased costs due to poor infrastructure.
 3. **Inadequate Knowledge:**
 - Many farmers lack the technical know-how to apply fertilizers effectively, leading to underuse or misuse.
 - Extension services are overstretched, limiting their ability to provide adequate support.
 4. **Environmental Concerns:**
 - Overuse of chemical fertilizers in some regions has led to soil degradation and pollution.
 - Lack of soil testing services means fertilizers are often applied without regard to specific soil or crop needs.
 5. **Dependence on Imports:**
 - Tanzania relies heavily on imported fertilizers, making the sector vulnerable to global price fluctuations and supply chain disruptions.
-

2.7 Opportunities for Improvement

Despite these challenges, the fertilizer sector offers significant opportunities for growth and transformation:

1. **Local Production:**
 - Investing in local fertilizer production facilities could reduce reliance on imports and stabilize prices.
 - Encouraging the production of organic and specialty fertilizers aligns with global trends in sustainable agriculture.
 2. **Digital Innovations:**
 - Mobile apps and digital platforms can connect farmers with suppliers, offer pricing transparency, and provide guidance on fertilizer use.
 - Digitizing soil testing services can help farmers optimize fertilizer application.
 3. **Policy Reforms:**
 - Revising the Bulk Procurement System to improve efficiency and reduce price distortions.
 - Offering incentives for local production and distribution.
 4. **Capacity Building:**
 - Expanding farmer education programs to promote proper fertilizer use and sustainable practices.
 - Strengthening extension services to reach more farmers with timely support.
 5. **Sustainable Practices:**
 - Promoting balanced fertilizer application to avoid overuse.
 - Encouraging the integration of organic fertilizers into farming systems.
-

2.8 Study Limitations

While this study aims for comprehensive coverage, certain limitations may affect its findings:

- **Data Gaps:** Limited availability of reliable data on informal fertilizer markets.
- **Regional Focus:** Challenges in capturing data from remote or conflict-prone areas.
- **Farmer Participation:** Potential reluctance from farmers to share accurate information due to mistrust or privacy concerns.

Efforts have been made to mitigate these limitations through robust sampling, triangulation of data sources, and stakeholder engagement.

2.9 Conclusion

This introduction lays the groundwork for an in-depth exploration of Tanzania's fertilizer sector. By addressing key challenges and capitalizing on opportunities, Tanzania can unlock the full

potential of fertilizers to drive agricultural transformation. The subsequent sections of this study delve deeper into the landscape, identifying actionable steps for a more productive and sustainable future in Tanzanian agriculture.

3. Fertilizer Landscape in Tanzania

3.1 Fertilizer Types and Their Uses

Tanzania utilizes a range of fertilizers to support its diverse agricultural ecosystem, catering to crops such as maize, rice, coffee, tea, and horticultural products. These fertilizers can be broadly categorized into inorganic, organic, and specialty fertilizers.

a) Inorganic Fertilizers: These are synthetic fertilizers manufactured through chemical processes and are the most widely used in Tanzania. Key types include:

- **Urea:** A nitrogen-rich fertilizer crucial for boosting vegetative growth in cereals like maize and rice.
- **Diammonium Phosphate (DAP):** Provides essential phosphorus and nitrogen, critical during crop establishment.
- **Calcium Ammonium Nitrate (CAN):** Supplies calcium and nitrogen, promoting strong crop growth and soil improvement.
- **NPK Blends:** Customizable fertilizers that supply nitrogen, phosphorus, and potassium in varying proportions to suit specific crop needs.

b) Organic Fertilizers: Organic options such as farmyard manure, compost, and biofertilizers are gaining traction for their environmental benefits. They improve soil structure, increase organic matter content, and enhance water retention capacity.

c) Specialty Fertilizers: These include:

- **Foliar Sprays:** Applied directly to plant leaves for quick nutrient absorption.
 - **Slow-Release Fertilizers:** Designed to release nutrients gradually, ensuring prolonged availability and reducing leaching.
 - **Micronutrient Blends:** Target specific deficiencies, such as zinc and boron, for high-value crops.
-

3.2 Fertilizer Demand in Tanzania

Demand for fertilizers in Tanzania is primarily driven by its diverse agricultural base, which includes both staple and cash crops.

1. Staple Crops:

- Maize, rice, and cassava dominate the staple crop sector. Maize, in particular, accounts for a significant share of fertilizer usage due to its role as the primary food crop.

2. Cash Crops:

- Coffee, tea, sugarcane, and cotton are major contributors to Tanzania's export economy and are key consumers of fertilizers.
- Fertilizer demand for cash crops is higher in regions like Kilimanjaro (coffee), Mbeya (tea), and Morogoro (sugarcane).

3. Horticulture and Floriculture:

- High-value horticultural crops such as tomatoes, onions, and flowers require specific fertilizers to enhance quality and yield, especially in export-driven sectors.

4. Regional Variations in Demand:

- Fertilizer usage is unevenly distributed across the country, with higher adoption rates in productive regions like the Southern Highlands and Arusha. In contrast, semi-arid areas such as Dodoma and Singida see minimal usage due to challenges in access and awareness.

3.3 Fertilizer Supply Chain

The fertilizer supply chain in Tanzania spans production, importation, distribution, and retailing. Understanding the complexities of this chain is critical to addressing inefficiencies.

a) Production:

- Local production is minimal, with most fertilizers being imported. A few facilities, such as Minjingu Mines, produce phosphate fertilizers tailored to Tanzanian soils.
- There is potential for expanding local production to include nitrogen-based and blended fertilizers, which are currently imported.

b) Importation:

- Over 85% of fertilizers used in Tanzania are imported, primarily from countries like Morocco, China, and Saudi Arabia.
- The Bulk Procurement System (BPS) is the government's centralized system for importing fertilizers. While it has reduced costs by enabling economies of scale, it has faced criticism for delays and inefficiencies.

c) Distribution:

- Fertilizer distribution is handled by agro-dealers, cooperatives, and large distributors such as YARA Tanzania and OCP Africa.
- Distribution networks are more developed in urban and peri-urban areas, leaving rural regions underserved.

d) Retailing:

- Agro-dealers play a crucial role in retailing fertilizers to farmers. However, limited capital, high transportation costs, and logistical challenges affect their operations.
 - Price fluctuations at the retail level often put fertilizers out of reach for smallholder farmers.
-

3.4 Accessibility and Affordability

Access to fertilizers in Tanzania is hindered by several barriers, primarily related to cost, infrastructure, and distribution.

a) High Costs:

- Fertilizer prices in Tanzania are among the highest in East Africa, with Urea costing around USD 30-50 per 50kg bag.
- Taxes, transportation costs, and fluctuating exchange rates contribute to price volatility.
- While government subsidies under the BPS have reduced costs for some farmers, many still cannot afford fertilizers.

b) Limited Infrastructure:

- Poor road networks in rural areas increase transportation costs and delay deliveries.
- Lack of storage facilities leads to wastage and further price hikes.

c) Disparities in Distribution:

- Fertilizer distribution is heavily concentrated in productive regions, leaving marginal areas underserved.
 - Agro-dealer networks are sparse in remote areas, forcing farmers to travel long distances to access fertilizers.
-

3.5 Awareness and Knowledge Gaps

Despite efforts to promote fertilizer use, knowledge gaps remain a significant barrier to adoption.

a) Limited Farmer Education:

- Many farmers are unaware of the specific fertilizers their crops and soils require.
- Improper application techniques, such as overuse or underuse, lead to suboptimal yields and environmental degradation.

b) Misconceptions:

- Fears about soil "dependency" on fertilizers discourage their use among some farmers.
- There is a widespread perception that fertilizers are expensive and unaffordable, even when subsidies are available.

c) Extension Services:

- Extension officers are critical for bridging the knowledge gap but are overstretched, often serving thousands of farmers each.
-

3.6 Environmental and Soil Health Concerns

The extensive use of inorganic fertilizers has raised concerns about environmental sustainability and soil health.

a) Soil Acidification:

- Overuse of fertilizers, particularly nitrogen-based ones, has led to soil acidification in some regions, reducing productivity over time.

b) Nutrient Imbalances:

- Lack of soil testing services means that fertilizers are often applied without understanding the specific nutrient needs of the soil.

c) Pollution:

- Fertilizer runoff contributes to water pollution, affecting aquatic ecosystems and human health.

d) Sustainable Alternatives:

- Organic fertilizers and integrated soil fertility management practices are being promoted as sustainable alternatives, but adoption remains low due to cost and availability.
-

3.7 Role of Key Stakeholders

The fertilizer landscape in Tanzania involves various stakeholders, each playing a vital role in ensuring accessibility and sustainability.

1. **Government:**
 - Oversees the BPS and subsidy programs.
 - Regulates the fertilizer market to ensure quality and prevent counterfeit products.
2. **Private Sector:**
 - Companies like YARA Tanzania and OCP Africa are instrumental in importing and distributing fertilizers.
 - Local manufacturers such as Minjingu Mines play a smaller but significant role.
3. **Development Partners:**
 - Organizations like AGRA and USAID support initiatives to improve fertilizer access and farmer education.
 - International agencies provide funding and technical assistance for fertilizer-related projects.
4. **Farmers:**
 - As end-users, farmers are the most critical stakeholders. Their adoption of fertilizers is influenced by cost, access, and knowledge.
5. **Agro-Dealers:**
 - Serve as intermediaries between suppliers and farmers, ensuring fertilizers reach the grassroots level.

3.8 Opportunities for Growth

Despite its challenges, Tanzania's fertilizer sector holds immense potential for growth:

1. **Scaling Local Production:**
 - Investing in local manufacturing facilities to reduce reliance on imports and stabilize prices.
 2. **Improving Infrastructure:**
 - Enhancing road networks and storage facilities to reduce transportation costs and wastage.
 3. **Promoting Awareness:**
 - Expanding farmer education programs to address knowledge gaps and promote best practices.
 4. **Leveraging Technology:**
 - Digital platforms can streamline the supply chain, improve transparency, and provide real-time information to farmers.
 5. **Sustainable Practices:**
 - Encouraging balanced fertilizer use and integrating organic alternatives to protect soil health and the environment.
-

3.9 The fertilizer landscape in Tanzania is complex, marked by challenges in production, distribution, affordability, and knowledge. However, it also presents significant opportunities for transformation. Addressing these challenges requires a concerted effort from all stakeholders, including government, private sector, and development partners. With the right interventions, fertilizers can become a powerful tool for improving agricultural productivity, ensuring food security, and driving economic growth in Tanzania.

4. Fertilizer Policy and Regulatory Framework in Tanzania

4.1 Overview of Fertilizer Policies in Tanzania

Tanzania's fertilizer policies are designed to increase agricultural productivity, reduce food insecurity, and promote sustainable farming practices. The government recognizes fertilizers as a critical input in achieving these goals, reflected in strategic plans such as the **Agricultural Sector Development Programme (ASDP II)** and the **National Agricultural Policy 2013**. These frameworks aim to improve access, affordability, and the effective use of fertilizers.

However, while these policies have laid a solid foundation, implementation challenges, subsidy scheme inefficiencies, and regulation gaps have limited their impact. This section delves into the policy environment, identifying key instruments, challenges, and areas for improvement.

4.2 Key Policy Instruments

Tanzania has several policies and regulatory frameworks governing the fertilizer sector. These include the following:

- 1. The Fertilizers Act, 2009:**
 - Provides legal guidelines for the production, importation, distribution, and sale of fertilizers.
 - Establishes the Tanzania Fertilizer Regulatory Authority (TFRA) to oversee compliance with quality standards and regulations.
 - Mandates the registration of fertilizers, manufacturers, and dealers to curb the distribution of counterfeit products.
- 2. National Agricultural Policy, 2013:**
 - Emphasizes increasing fertilizer use to enhance soil fertility and agricultural productivity.
 - Calls for strengthening public-private partnerships in fertilizer production and distribution.
 - Encourages the promotion of environmentally friendly fertilizers and sustainable farming practices.
- 3. The Bulk Procurement System (BPS):**

- Introduced in 2017, the BPS is a centralized system for importing fertilizers, aiming to reduce costs through economies of scale.
 - The government oversees the procurement process, selecting suppliers and ensuring fertilizers are distributed to agro-dealers and farmers.
 - Subsidies are implemented under the BPS to make fertilizers more affordable, particularly for smallholder farmers.
4. **The Environmental Management Act, 2004:**
- Regulates the environmental impact of fertilizer production, use, and disposal.
 - Promotes sustainable practices to prevent soil degradation and water pollution caused by fertilizer runoff.
5. **The Agricultural Input Trust Fund (AGITF):**
- Provides financial support to farmers for purchasing fertilizers and other inputs.
 - Works to enhance credit access for smallholder farmers, enabling them to invest in productivity-enhancing technologies.
-

4.3 Government Subsidy Programs

Fertilizer subsidies play a critical role in making fertilizers affordable for smallholder farmers, who make up over 80% of Tanzania's agricultural workforce. The government has implemented various subsidy schemes, including:

1. **E-Voucher System:**
 - Introduced to ensure that subsidies reach the intended beneficiaries, particularly smallholder farmers.
 - Farmers receive electronic vouchers to purchase fertilizers at subsidized prices from registered agro-dealers.
 2. **Bulk Procurement Subsidies:**
 - Subsidies are applied directly to fertilizers imported through the BPS, reducing their retail price.
 3. **Challenges with Subsidy Programs:**
 - Limited coverage: Subsidies often fail to reach marginalized farmers in remote areas.
 - Delays in distribution: Bureaucratic inefficiencies in subsidy allocation result in late delivery of fertilizers.
 - Leakage: Cases of subsidy misuse and diversion of fertilizers to unintended beneficiaries have been reported.
-

4.4 Regulatory Challenges

While Tanzania has a robust regulatory framework for fertilizers, several challenges limit its effectiveness:

1. **Counterfeit Fertilizers:**
 - The prevalence of fake or substandard fertilizers undermines farmer confidence and reduces crop productivity.
 - Enforcement of quality standards is inconsistent due to inadequate resources and personnel at the Tanzania Fertilizer Regulatory Authority (TFRA).
 2. **Gaps in Monitoring and Enforcement:**
 - Limited capacity to monitor and enforce regulations at the regional and district levels.
 - Weak coordination among stakeholders involved in fertilizer distribution and regulation.
 3. **Complex Registration Processes:**
 - Lengthy and costly registration processes discourage private sector investment in the fertilizer market.
 - Small-scale producers of organic fertilizers face particular challenges in meeting registration requirements.
 4. **Environmental Concerns:**
 - Insufficient emphasis on promoting environmentally sustainable fertilizers.
 - Weak enforcement of environmental regulations related to fertilizer runoff and soil health.
-

4.5 Role of Key Institutions

Several institutions play a critical role in implementing fertilizer policies and regulations in Tanzania:

1. **Tanzania Fertilizer Regulatory Authority (TFRA):**
 - Oversees fertilizer quality control, registration, and compliance with standards.
 - Monitors the distribution chain to ensure transparency and accountability.
2. **Ministry of Agriculture:**
 - Formulates policies and strategies to promote fertilizer use and accessibility.
 - Coordinates with development partners and private sector stakeholders.
3. **Tanzania Revenue Authority (TRA):**
 - Implements tax policies that affect fertilizer pricing, including import duties and exemptions.
4. **Private Sector Stakeholders:**
 - Importers, distributors, and agro-dealers contribute to fertilizer supply and marketing.
 - Private companies also engage in local production and the development of custom fertilizer blends.
5. **Development Partners:**
 - Organizations such as AGRA, USAID, and the World Bank provide funding and technical support for fertilizer programs.
 - Facilitate knowledge sharing and capacity building among stakeholders.

4.6 Best Practices in Fertilizer Policy

Tanzania can draw lessons from successful fertilizer policies implemented in other countries:

1. **Subsidy Targeting (Malawi's Farm Input Subsidy Program):**
 - Malawi's e-voucher system has been praised for reducing leakage and ensuring subsidies reach smallholder farmers.
 - Similar systems in Tanzania could be enhanced by incorporating biometric verification and mobile technology.
2. **Promoting Local Production (Nigeria's Presidential Fertilizer Initiative):**
 - Nigeria has invested in local fertilizer production to reduce dependence on imports.
 - Tanzania could replicate this model, encouraging public-private partnerships to expand production capacity.
3. **Integrated Soil Fertility Management (Kenya's Soil Health Policy):**
 - Kenya promotes balanced fertilizer use and soil testing services to optimize nutrient management.
 - Establishing soil testing labs and farmer training programs in Tanzania could improve fertilizer efficiency and reduce environmental impact.

4.7 Recommendations for Policy Improvement

1. **Enhancing the Bulk Procurement System (BPS):**
 - Streamline the procurement process to reduce delays and inefficiencies.
 - Incorporate digital platforms for transparent bidding and monitoring.
2. **Expanding Subsidy Programs:**
 - Increase coverage to reach underserved regions and marginalized farmers.
 - Simplify subsidy delivery mechanisms to reduce bureaucratic hurdles.
3. **Strengthening Regulatory Enforcement:**
 - Allocate additional resources to TFRA for quality control and counterfeit prevention.
 - Enhance collaboration between TFRA and regional authorities to improve monitoring.
4. **Promoting Local Production:**
 - Provide tax incentives and subsidies to encourage investment in local fertilizer manufacturing.
 - Support small-scale producers of organic fertilizers through simplified registration processes.
5. **Encouraging Sustainable Practices:**
 - Promote the use of organic and biofertilizers to reduce reliance on chemical inputs.

- Establish guidelines for balanced fertilizer application and integrated soil fertility management.
- 6. Capacity Building for Farmers:**
- Train farmers on proper fertilizer use and the importance of soil testing.
 - Develop extension programs that incorporate digital tools for wider reach.
- 7. Investing in Research and Development:**
- Support R&D for innovative fertilizer blends tailored to Tanzanian soils and crops.
 - Partner with academic institutions and international organizations to advance fertilizer technology.
-

4.8 The policy and regulatory framework for fertilizers in Tanzania is a critical enabler of agricultural productivity and sustainability. While existing policies have made progress in increasing access and affordability, significant challenges remain in implementation, enforcement, and targeting. By addressing these gaps and adopting best practices, Tanzania can unlock the full potential of its fertilizer sector, ensuring food security, improving farmer incomes, and promoting environmental sustainability.

Effective collaboration among government, private sector stakeholders, and development partners is essential to achieving these goals. A robust, inclusive policy environment will not only transform Tanzania's agricultural landscape but also serve as a model for other developing countries seeking to optimize fertilizer use.

5. Findings

The findings of this baseline study provide a comprehensive understanding of the fertilizer landscape in Tanzania. These findings are categorized into key themes: usage patterns, accessibility and affordability, knowledge and awareness, supply chain challenges, environmental impact, and policy effectiveness. Each theme highlights critical gaps and opportunities for intervention.

5.1 Fertilizer Usage Patterns

Fertilizer use in Tanzania is low compared to global and regional averages, with an average application rate of **19 kg per hectare**, significantly below the African Union's recommendation of **50 kg per hectare**. This limited use is attributed to several factors:

- 1. Disparities in Regional Usage:**
- Fertilizer adoption is highest in regions producing cash crops, such as Kilimanjaro (coffee), Mbeya (tea), and Morogoro (sugarcane).
 - Staple crop regions like the Southern Highlands show moderate usage, particularly for maize and rice.

- Semi-arid regions, including Dodoma and Singida, exhibit minimal adoption due to lower agricultural output and limited awareness.
 - 2. **Crops Driving Fertilizer Demand:**
 - **Staple crops:** Maize, rice, and cassava dominate fertilizer consumption due to their importance for food security.
 - **Cash crops:** High-value crops such as coffee, tea, sugarcane, and horticultural produce are the primary consumers of fertilizers, particularly NPK blends and specialty fertilizers.
 - 3. **Usage Among Farmer Categories:**
 - Large-scale commercial farmers are more likely to use fertilizers regularly, benefiting from access to credit, knowledge, and economies of scale.
 - Smallholder farmers, who constitute over 80% of Tanzania's agricultural workforce, often underutilize fertilizers due to cost and access barriers.
 - 4. **Seasonal Trends:**
 - Fertilizer demand peaks during planting seasons, leading to supply shortages and price spikes in some regions.
 - Off-season crops like horticulture see consistent fertilizer use, particularly among export-oriented producers.
-

5.2 Accessibility and Affordability

Access to fertilizers remains a significant challenge for most Tanzanian farmers. The following barriers were identified:

1. **High Costs:**
 - Fertilizer prices are among the highest in East Africa, with Urea costing **USD 30–50 per 50kg bag**.
 - Import duties, transportation costs, and fluctuating exchange rates drive these high prices.
 - Government subsidies under the Bulk Procurement System (BPS) have reduced prices for some farmers but have not fully alleviated the affordability challenge.
2. **Geographical Disparities:**
 - Fertilizer distribution is concentrated in urban and peri-urban centers, leaving rural areas underserved.
 - Farmers in remote regions often travel long distances to access fertilizers, increasing their effective costs.
3. **Subsidy Gaps:**
 - While subsidies have been beneficial, they are not equitably distributed. Marginalized farmers, especially women and those in remote areas, face challenges in accessing subsidized fertilizers.
4. **Limited Agro-Dealer Networks:**
 - Agro-dealers play a critical role in fertilizer distribution, but their presence is sparse in remote areas.

- Weak infrastructure further complicates last-mile delivery to rural farmers.
-

5.3 Knowledge and Awareness

Knowledge gaps significantly hinder optimal fertilizer use among Tanzanian farmers:

1. **Limited Farmer Education:**
 - Many farmers lack information on the correct types, quantities, and application methods of fertilizers.
 - Misapplication leads to wastage, reduced yields, and environmental degradation.
 2. **Extension Services:**
 - Extension officers are critical for educating farmers but are overstretched, with one officer often serving over **1,500 farmers**.
 - Digital tools to augment extension services are underutilized, limiting their reach and effectiveness.
 3. **Cultural and Social Barriers:**
 - Persistent misconceptions about fertilizers, including fears of soil dependency and health risks, discourage their use.
 - Social norms and traditional practices also influence fertilizer adoption, with some farmers relying solely on organic inputs or indigenous methods.
 4. **Soil Testing Deficiencies:**
 - Soil testing services, which could guide appropriate fertilizer use, are largely unavailable or unaffordable for most farmers.
 - As a result, fertilizers are often applied without consideration of soil nutrient needs.
-

5.4 Supply Chain Challenges

The fertilizer supply chain in Tanzania faces significant bottlenecks that limit efficiency and accessibility:

1. **Dependence on Imports:**
 - Over **85% of fertilizers** in Tanzania are imported, making the sector vulnerable to global price fluctuations and supply chain disruptions.
 - The Bulk Procurement System (BPS), while intended to streamline imports, has faced criticism for inefficiencies and delays.
2. **Inadequate Infrastructure:**
 - Poor road networks and a lack of storage facilities increase transportation costs and lead to spoilage.
 - Logistical challenges are particularly pronounced in remote and semi-arid regions.
3. **Counterfeit Products:**

- The prevalence of fake and substandard fertilizers undermines farmer confidence and reduces productivity.
 - Weak enforcement of quality standards exacerbates this issue, particularly in informal markets.
- 4. Private Sector Constraints:**
- Small-scale agro-dealers face financial constraints, limiting their ability to stock sufficient quantities of fertilizers.
 - Larger distributors dominate urban markets, creating imbalances in supply across regions.
-

5.5 Environmental and Soil Health Impact

The extensive use of inorganic fertilizers has raised concerns about environmental sustainability and soil health:

- 1. Soil Degradation:**
 - Overuse of chemical fertilizers, especially nitrogen-based ones, has led to soil acidification and nutrient imbalances in some regions.
 - The absence of soil testing services further exacerbates these issues.
 - 2. Water Pollution:**
 - Fertilizer runoff contributes to the pollution of water bodies, affecting aquatic ecosystems and human health.
 - Lack of proper guidelines for fertilizer storage and disposal increases the risk of contamination.
 - 3. Underutilization of Organic Fertilizers:**
 - Despite their environmental benefits, organic fertilizers are underutilized due to limited availability and higher costs.
 - Promoting integrated soil fertility management could address both productivity and sustainability concerns.
-

5.6 Policy Effectiveness

While Tanzania has established a robust policy framework for fertilizers, several gaps limit its impact:

- 1. Bulk Procurement System (BPS):**
 - The BPS has reduced fertilizer prices for some farmers but suffers from inefficiencies, including delays in procurement and distribution.
 - Transparency issues in supplier selection have been reported, undermining stakeholder confidence.
- 2. Subsidy Programs:**

- Government subsidies have increased fertilizer adoption but are not equitably distributed, leaving marginalized farmers underserved.
 - Administrative inefficiencies in subsidy allocation and delivery reduce their effectiveness.
- 3. Regulatory Enforcement:**
- The Tanzania Fertilizer Regulatory Authority (TFRA) faces resource constraints, limiting its ability to enforce quality standards and combat counterfeit products.
 - Weak coordination among stakeholders hinders the implementation of regulations at the regional and district levels.
- 4. Sustainability Gaps:**
- Policies emphasize inorganic fertilizers, with limited support for organic and environmentally friendly alternatives.
 - Environmental regulations related to fertilizer use and runoff are inconsistently enforced.
-

5.7 Opportunities Identified

Despite these challenges, several opportunities exist to transform Tanzania's fertilizer sector:

- 1. Investing in Local Production:**
 - Expanding local manufacturing capabilities could reduce reliance on imports and stabilize prices.
 - Supporting small-scale producers of organic fertilizers aligns with global trends in sustainable agriculture.
- 2. Enhancing Farmer Education:**
 - Expanding extension services and leveraging digital platforms can improve farmer knowledge and adoption of best practices.
 - Soil testing services should be made accessible and affordable to guide appropriate fertilizer use.
- 3. Strengthening Infrastructure:**
 - Investments in rural road networks and storage facilities can improve supply chain efficiency.
 - Establishing agro-dealer networks in underserved areas can bridge the gap between suppliers and farmers.
- 4. Leveraging Technology:**
 - Digital tools can streamline fertilizer distribution, improve transparency, and provide real-time support to farmers.
 - Mobile apps and platforms can connect farmers with suppliers, extension services, and soil testing labs.
- 5. Promoting Sustainable Practices:**
 - Encouraging integrated soil fertility management can balance productivity and environmental protection.

- Policies should incentivize the use of organic fertilizers and other sustainable inputs.
-

5.8 Conclusion

The findings of this study highlight significant gaps in Tanzania's fertilizer landscape, including low adoption rates, affordability issues, supply chain inefficiencies, and environmental concerns. However, these challenges also present opportunities for transformative change. By addressing these issues through targeted interventions, Tanzania can unlock the full potential of fertilizers, driving agricultural productivity, improving farmer livelihoods, and ensuring sustainable growth.

6. Opportunities and Challenges

The fertilizer sector in Tanzania presents both significant opportunities for growth and critical challenges that need to be addressed to ensure its role in transforming agriculture. By exploring these opportunities and understanding the challenges, stakeholders can develop strategies to enhance productivity, improve farmer incomes, and achieve sustainable agricultural development.

6.1 Opportunities

The fertilizer sector in Tanzania is uniquely positioned to catalyze agricultural growth and sustainability. Key opportunities include expanding local production, leveraging technology, strengthening policy frameworks, and promoting sustainable practices.

1. Expanding Local Production

Tanzania's heavy reliance on imported fertilizers offers an untapped opportunity to develop local production capacities.

- **Potential for Domestic Manufacturing:**
 - Tanzania possesses natural resources, such as phosphate deposits at Minjingu, which can be leveraged to produce phosphate-based fertilizers.
 - Investment in nitrogen-based fertilizer production plants can reduce reliance on imports.
- **Public-Private Partnerships (PPPs):**

- Collaborations between the government and private sector players can mobilize resources to establish fertilizer manufacturing facilities.
 - Tax incentives and subsidies for local producers can encourage investments.
 - **Job Creation:**
 - Local production facilities can create employment opportunities, supporting economic growth in rural areas.
-

2. Leveraging Technology

Digital innovations can revolutionize the fertilizer sector by improving access, efficiency, and transparency.

- **E-Commerce Platforms:**
 - Digital marketplaces can connect farmers directly with fertilizer suppliers, reducing intermediaries and lowering costs.
 - Apps providing real-time price information and delivery options can increase accessibility.
 - **Soil Testing Technologies:**
 - Mobile soil testing kits and digital diagnostics can guide farmers on the appropriate types and quantities of fertilizers needed for specific crops.
 - **Blockchain for Transparency:**
 - Blockchain technology can ensure transparency in the supply chain, preventing fraud and counterfeit fertilizers.
-

3. Strengthening Policy Frameworks

A supportive and streamlined policy environment can unlock the potential of the fertilizer sector.

- **Enhancing the Bulk Procurement System (BPS):**
 - Introducing reforms to improve efficiency, reduce delays, and increase transparency can strengthen the system.
 - Regional procurement hubs can address the unique needs of different areas.
 - **Improving Subsidy Programs:**
 - Expanding the e-voucher system can ensure equitable access to subsidies, especially for marginalized farmers.
 - Targeted subsidies for environmentally sustainable fertilizers, such as biofertilizers, can promote their adoption.
 - **Reducing Tax Barriers:**
 - Lowering import duties and taxes on fertilizers and raw materials can reduce costs for both suppliers and farmers.
-

4. Promoting Sustainable Practices

The integration of sustainable practices can address environmental concerns while enhancing soil fertility and productivity.

- **Organic Fertilizers:**
 - Encouraging the use of organic fertilizers, such as compost and manure, can improve soil health and reduce chemical dependency.
 - Supporting small-scale producers of organic inputs can create rural livelihoods.
 - **Integrated Soil Fertility Management (ISFM):**
 - ISFM combines organic and inorganic fertilizers to optimize soil nutrient levels, enhancing crop yields sustainably.
 - Farmer training programs on ISFM can improve adoption rates.
 - **Agroforestry Integration:**
 - Promoting agroforestry systems can improve soil fertility, provide shade for crops, and increase biodiversity.
-

5. Expanding Agro-Dealer Networks

Agro-dealers are critical to bridging the gap between fertilizer suppliers and farmers. Strengthening these networks can improve fertilizer access.

- **Rural Outreach:**
 - Establishing agro-dealer networks in underserved regions can reduce travel distances and associated costs for farmers.
 - Mobile agro-dealer units can bring fertilizers directly to remote communities.
 - **Capacity Building:**
 - Training programs for agro-dealers on fertilizer types, quality assurance, and sustainable practices can enhance their effectiveness.
-

6.2 Challenges

While opportunities abound, the fertilizer sector faces numerous challenges that hinder its growth and impact. These include cost barriers, infrastructure limitations, knowledge gaps, environmental risks, and regulatory inefficiencies.

1. High Costs

The affordability of fertilizers remains a significant challenge for smallholder farmers.

- **Price Volatility:**
 - Fertilizer prices fluctuate due to global market conditions, exchange rates, and logistical costs.
 - Smallholder farmers are particularly vulnerable to price hikes during peak planting seasons.
 - **Inadequate Subsidies:**
 - Government subsidies do not cover all regions or reach all farmers, leaving many without affordable options.
 - Administrative inefficiencies in subsidy programs lead to delays and leakage.
-

2. Limited Infrastructure

Infrastructure deficits increase the costs and complexity of fertilizer distribution.

- **Poor Road Networks:**
 - Inadequate transportation infrastructure hampers the timely delivery of fertilizers to rural areas.
 - High transportation costs are passed on to farmers, making fertilizers less affordable.
 - **Storage Facilities:**
 - Limited storage facilities result in spoilage and wastage, particularly in regions with high humidity.
-

3. Knowledge and Awareness Gaps

The lack of awareness and technical knowledge among farmers undermines the effective use of fertilizers.

- **Improper Application:**
 - Farmers often apply fertilizers without understanding crop-specific or soil-specific requirements, leading to suboptimal yields and environmental degradation.
 - **Extension Services:**
 - The ratio of extension officers to farmers is insufficient, with one officer often serving thousands of farmers.
 - Limited access to training programs restricts farmers' ability to adopt best practices.
-

4. Environmental Risks

Excessive or improper use of fertilizers poses significant environmental risks.

- **Soil Degradation:**
 - Overuse of nitrogen-based fertilizers can lead to soil acidification and nutrient imbalances.
 - The absence of soil testing exacerbates these issues.
 - **Water Pollution:**
 - Fertilizer runoff contaminates water bodies, impacting aquatic ecosystems and human health.
-

5. Regulatory and Institutional Challenges

The effectiveness of regulatory frameworks is undermined by resource and capacity constraints.

- **Counterfeit Fertilizers:**
 - The prevalence of fake and substandard fertilizers undermines farmer confidence and productivity.
 - Weak enforcement of quality standards allows counterfeit products to persist in the market.
 - **Coordination Gaps:**
 - Poor coordination among regulatory bodies, agro-dealers, and development partners leads to inefficiencies in policy implementation.
-

6. Limited Private Sector Participation

The private sector's involvement in the fertilizer value chain remains limited, particularly in rural areas.

- **Small-Scale Agro-Dealers:**
 - Many agro-dealers lack the financial capacity to stock sufficient quantities of fertilizers, leading to supply shortages.
 - Large distributors dominate urban markets, creating supply imbalances.
-

6.3 Balancing Opportunities and Challenges

To capitalize on the opportunities and overcome challenges, a multi-stakeholder approach is essential. This includes the government, private sector, development partners, and farmers working together to achieve shared goals.

6.4 Recommendations

1. **Enhancing Policy Support:**
 - Streamline subsidy delivery mechanisms to reduce inefficiencies and expand coverage.
 - Invest in local production to stabilize prices and reduce dependence on imports.
 2. **Strengthening Infrastructure:**
 - Improve rural road networks and establish regional storage facilities to reduce logistical costs.
 - Support agro-dealers with financing and training to enhance their capacity.
 3. **Promoting Awareness and Training:**
 - Expand farmer education programs on fertilizer use and soil fertility management.
 - Leverage digital platforms to provide accessible training and support.
 4. **Encouraging Sustainable Practices:**
 - Promote the adoption of integrated soil fertility management and organic fertilizers.
 - Establish guidelines for balanced fertilizer use to minimize environmental risks.
 5. **Boosting Private Sector Involvement:**
 - Provide incentives for private sector investments in fertilizer production, distribution, and retailing.
 - Encourage partnerships between private companies and farmer cooperatives.
-

6.5

The fertilizer sector in Tanzania stands at a critical juncture, with immense potential to drive agricultural productivity and sustainability. By addressing the challenges outlined and leveraging the opportunities available, Tanzania can create a robust and inclusive fertilizer ecosystem. This transformation requires coordinated efforts across all levels, ensuring that fertilizers are affordable, accessible, and environmentally sustainable for the benefit of the country's farmers and the broader agricultural sector.

7. Recommendations

This section provides actionable recommendations to address the challenges and harness the opportunities identified in the fertilizer sector in Tanzania. The recommendations are designed to improve accessibility, affordability, efficiency, and sustainability while ensuring the sector contributes significantly to agricultural productivity and food security.

7.1 Policy Interventions

Policy reform is crucial to creating an enabling environment for the fertilizer sector.

1. **Enhancing the Bulk Procurement System (BPS):**
 - Streamline the BPS to reduce delays in fertilizer procurement and distribution.
 - Introduce regional procurement hubs to address localized demand and supply imbalances.
 - Incorporate transparency mechanisms, such as public disclosure of supplier contracts and tender processes.
 2. **Expanding Subsidy Programs:**
 - Increase the reach of subsidies to underserved regions, with a focus on marginalized farmers.
 - Transition to an improved e-voucher system integrated with biometric verification to prevent fraud and ensure subsidies reach the intended beneficiaries.
 - Introduce targeted subsidies for organic fertilizers to promote sustainable practices.
 3. **Reducing Import Barriers:**
 - Lower import duties on raw materials and finished fertilizers to make them more affordable for farmers.
 - Streamline customs processes to reduce delays in fertilizer clearance at ports.
 4. **Incentivizing Local Production:**
 - Provide tax breaks, grants, or low-interest loans to companies investing in local fertilizer manufacturing.
 - Establish special economic zones (SEZs) dedicated to fertilizer production, offering infrastructure support and regulatory facilitation.
 5. **Promoting Environmental Sustainability:**
 - Develop and enforce guidelines for balanced fertilizer use to protect soil health.
 - Incentivize integrated soil fertility management (ISFM) practices through policy support and farmer training.
-

7.2 Capacity Building for Farmers

Empowering farmers with knowledge and skills is key to improving fertilizer adoption and use efficiency.

1. **Expanding Extension Services:**
 - Increase the number of extension officers and equip them with resources such as digital tools for wider outreach.
 - Develop partnerships with NGOs and private organizations to supplement government extension services.
2. **Farmer Education Programs:**
 - Launch campaigns to raise awareness of the benefits of fertilizers and dispel misconceptions.
 - Provide hands-on training on fertilizer application techniques, integrated soil fertility management, and sustainable practices.
3. **Soil Testing Services:**

- Establish affordable soil testing facilities at the regional and district levels.
 - Offer subsidized soil testing kits and training on their use to farmer groups and cooperatives.
- 4. Digital Knowledge Platforms:**
- Develop mobile apps and SMS-based platforms to disseminate information on fertilizer use, crop nutrition, and weather updates.
 - Create e-learning modules for farmers accessible via smartphones and community resource centers.
-

7.3 Strengthening Supply Chain Infrastructure

Improving the fertilizer supply chain is essential for ensuring timely availability and affordability.

- 1. Improving Transportation Infrastructure:**
 - Invest in rural road networks to reduce transportation costs and improve delivery efficiency.
 - Partner with logistics companies to develop innovative last-mile delivery solutions, such as mobile distribution units.
 - 2. Developing Storage Facilities:**
 - Build centralized storage hubs at the regional level to minimize spoilage and ensure year-round availability.
 - Train agro-dealers and cooperatives on proper storage practices to maintain fertilizer quality.
 - 3. Supporting Agro-Dealer Networks:**
 - Provide financial support, such as low-interest loans, to help agro-dealers stock adequate quantities of fertilizers.
 - Establish agro-dealer certification programs to ensure quality assurance and build farmer trust.
 - 4. Integrating Technology in Distribution:**
 - Digitize the supply chain to enhance transparency and efficiency.
 - Use blockchain technology to track fertilizer movement from production/importation to end-users, preventing fraud and ensuring accountability.
-

7.4 Promoting Local Production

Developing local production capabilities can reduce dependence on imports and stabilize prices.

- 1. Investing in Domestic Manufacturing:**
 - Encourage the establishment of fertilizer production plants leveraging local resources, such as phosphate deposits at Minjingu.

- Develop partnerships with international fertilizer companies to transfer technology and expertise.
2. **Diversifying Product Offerings:**
 - Support the production of specialty fertilizers, such as micronutrient blends and slow-release fertilizers, tailored to Tanzanian soils and crops.
 - Promote the manufacturing of organic fertilizers, such as compost and biofertilizers, to meet the growing demand for sustainable inputs.
 3. **Scaling Production Through Cooperatives:**
 - Enable farmer cooperatives to produce organic fertilizers locally, supported by government grants or donor funding.
 - Offer training and equipment for composting and biofertilizer production.
-

7.5 Leveraging Technology

Technology can transform the fertilizer sector by improving efficiency, access, and sustainability.

1. **Digital Platforms for Fertilizer Access:**
 - Develop e-commerce platforms where farmers can order fertilizers directly from suppliers, reducing intermediaries and costs.
 - Integrate digital payment systems to streamline transactions and enhance affordability.
 2. **Precision Agriculture Tools:**
 - Promote the use of drones, sensors, and mobile apps to monitor crop nutrient requirements and guide fertilizer application.
 - Support innovation hubs to develop precision farming technologies tailored to Tanzanian contexts.
 3. **Real-Time Data Systems:**
 - Establish data collection systems to track fertilizer demand, distribution, and usage trends.
 - Use predictive analytics to anticipate fertilizer shortages and optimize supply chain operations.
 4. **Mobile Advisory Services:**
 - Provide farmers with SMS-based advisory services on fertilizer types, application timing, and dosages.
-

7.6 Strengthening Regulatory Frameworks

A robust regulatory environment is critical for ensuring quality, preventing counterfeit fertilizers, and promoting compliance.

1. **Combating Counterfeit Fertilizers:**

- Strengthen the Tanzania Fertilizer Regulatory Authority (TFRA) by increasing funding and resources for inspections.
 - Introduce tamper-proof packaging and QR codes for product verification.
2. **Streamlining Registration Processes:**
 - Simplify the registration of new fertilizers, especially for small-scale producers of organic fertilizers.
 - Reduce costs and timelines for registering imported and locally produced fertilizers.
 3. **Strengthening Quality Control:**
 - Establish regional quality testing laboratories to ensure fertilizers meet national standards.
 - Conduct regular audits of fertilizer suppliers and agro-dealers to ensure compliance.
 4. **Incentivizing Compliance:**
 - Offer tax breaks and recognition programs for suppliers adhering to quality standards.
 - Impose strict penalties for the production and sale of counterfeit fertilizers.
-

7.7 Promoting Sustainability

Sustainability should be at the core of Tanzania's fertilizer strategy to protect soil health and the environment.

1. **Encouraging Integrated Soil Fertility Management (ISFM):**
 - Train farmers on the benefits of combining organic and inorganic fertilizers.
 - Provide demonstration plots to showcase the effectiveness of ISFM practices.
 2. **Scaling Organic Fertilizers:**
 - Support the production and distribution of organic fertilizers through financial incentives and capacity building.
 - Raise awareness of the environmental benefits of organic fertilizers among farmers and agro-dealers.
 3. **Developing Environmental Guidelines:**
 - Establish and enforce regulations to minimize fertilizer runoff and soil degradation.
 - Promote agroforestry and conservation agriculture as complementary practices.
 4. **Climate-Smart Fertilizers:**
 - Support the adoption of fertilizers that release nutrients slowly, reducing greenhouse gas emissions and enhancing efficiency.
-

7.8 Engaging Stakeholders

Collaboration among stakeholders is essential to implementing these recommendations effectively.

1. **Government and Policy Makers:**
 - Drive policy reforms, ensure budget allocations, and oversee implementation.
 - Establish multi-stakeholder forums for regular dialogue and collaboration.
 2. **Private Sector:**
 - Invest in fertilizer production, distribution, and innovation.
 - Partner with government and NGOs to expand access and affordability.
 3. **Development Partners:**
 - Provide funding, technical assistance, and capacity building for fertilizer-related programs.
 - Facilitate knowledge sharing and technology transfer.
 4. **Farmer Cooperatives:**
 - Act as intermediaries to pool resources, access subsidies, and support local production.
 - Organize training and peer-learning opportunities for farmers.
-

7.9

The recommendations outlined above provide a roadmap for addressing the challenges in Tanzania's fertilizer sector while capitalizing on its opportunities. By implementing these strategies, Tanzania can achieve a more inclusive, efficient, and sustainable fertilizer ecosystem. This transformation will enhance agricultural productivity, improve farmer livelihoods, and contribute to national food security and economic growth. Collaboration among stakeholders and a commitment to continuous innovation are essential to realizing this vision.

8.

The fertilizer sector in Tanzania holds immense potential to drive agricultural productivity, enhance food security, and improve the livelihoods of millions of farmers. However, it is equally a sector riddled with challenges that require strategic and collaborative solutions. This conclusion summarizes the key insights from the study, highlights critical success factors for transforming the sector, and outlines a vision for the future.

8.1 Key Insights

1. **Low Fertilizer Use:**
 - Fertilizer use in Tanzania averages **19 kg per hectare**, far below the African Union's target of **50 kg per hectare**.

- Adoption rates are higher among commercial farmers and cash crop producers, with smallholder farmers lagging behind due to affordability and accessibility challenges.
 - 2. Dependence on Imports:**
 - Over **85% of fertilizers** are imported, leaving the sector vulnerable to global price fluctuations and supply chain disruptions.
 - Local production remains limited, despite the availability of raw materials such as phosphate at Minjingu.
 - 3. High Costs and Limited Accessibility:**
 - Fertilizer prices are prohibitive for many smallholder farmers, exacerbated by logistical inefficiencies and high transportation costs.
 - Agro-dealer networks are sparse in rural areas, increasing travel and procurement costs for farmers.
 - 4. Knowledge and Awareness Gaps:**
 - Many farmers lack knowledge of proper fertilizer application techniques and soil nutrient requirements, resulting in inefficient use.
 - Limited extension services and soil testing infrastructure hinder efforts to optimize fertilizer use.
 - 5. Environmental and Soil Health Concerns:**
 - Overuse and misapplication of fertilizers have led to soil degradation, nutrient imbalances, and water pollution in some regions.
 - The adoption of sustainable alternatives such as organic fertilizers and integrated soil fertility management remains low.
 - 6. Policy and Regulatory Challenges:**
 - While Tanzania has established robust policies, including the Bulk Procurement System (BPS), implementation inefficiencies and gaps in enforcement reduce their effectiveness.
 - Counterfeit fertilizers and quality control issues persist, undermining farmer confidence.
-

8.2 Critical Success Factors for Transforming the Sector

To address these challenges and unlock the full potential of the fertilizer sector, the following factors are critical:

- 1. Political Will and Policy Support:**
 - Strong political commitment to reforming the fertilizer sector is essential for addressing systemic challenges.
 - Policies should prioritize inclusivity, sustainability, and efficiency, ensuring equitable access for smallholder farmers.
- 2. Investment in Infrastructure:**
 - Improved road networks, storage facilities, and distribution hubs can reduce logistical costs and enhance supply chain efficiency.

- Investments in soil testing infrastructure can guide farmers toward optimized fertilizer use.
 - 3. Private Sector Participation:**
 - Public-private partnerships can drive local production, innovation, and distribution.
 - Incentivizing private sector investments through tax breaks and grants will strengthen the fertilizer ecosystem.
 - 4. Farmer Empowerment:**
 - Capacity building through training programs, extension services, and digital platforms can equip farmers with the knowledge to use fertilizers effectively.
 - Promoting farmer cooperatives can enhance access to fertilizers, subsidies, and markets.
 - 5. Sustainability and Environmental Stewardship:**
 - Integrating sustainable practices such as the use of organic fertilizers and agroforestry systems will protect soil health and ecosystems.
 - Climate-smart solutions, including slow-release fertilizers and balanced application techniques, should be promoted.
-

8.3 Vision for the Future

The future of Tanzania's fertilizer sector lies in creating an inclusive, sustainable, and efficient ecosystem that benefits all stakeholders, from smallholder farmers to large-scale producers. This vision can be achieved through the following strategic pathways:

1. A Self-Reliant Fertilizer Industry:

- Developing a robust local production base that leverages Tanzania's natural resources and minimizes dependence on imports.
- Establishing facilities for producing phosphate-based, nitrogen-based, and specialty fertilizers tailored to Tanzanian soils.

2. An Inclusive Fertilizer Ecosystem:

- Ensuring that marginalized and remote farming communities have equitable access to fertilizers through expanded subsidy programs and agro-dealer networks.
- Empowering women and youth to participate in the fertilizer value chain as producers, distributors, and users.

3. Sustainable Agricultural Practices:

- Promoting integrated soil fertility management (ISFM) to combine the benefits of organic and inorganic fertilizers.

- Encouraging the adoption of climate-smart technologies and practices that reduce environmental risks and enhance resilience.

4. A Digitally-Enabled Sector:

- Leveraging technology to enhance transparency, efficiency, and farmer education.
- Creating digital platforms for fertilizer procurement, advisory services, and soil testing.

5. Strong Public-Private Partnerships:

- Encouraging collaboration between the government, private sector, development partners, and farmer organizations to pool resources, expertise, and innovation.
 - Aligning efforts toward common goals such as increasing fertilizer use, improving affordability, and achieving sustainability.
-

8.4 Recommendations for Immediate Action

1. Policy Reform:

- Review and optimize the Bulk Procurement System to address inefficiencies and improve delivery timelines.
- Introduce tax incentives for local producers and agro-dealers to reduce costs and expand access.

2. Capacity Building:

- Scale up extension services and farmer training programs to address knowledge gaps.
- Provide subsidized soil testing services to guide efficient fertilizer application.

3. Infrastructure Investment:

- Develop rural road networks and regional storage facilities to reduce transportation costs and spoilage.
- Strengthen agro-dealer networks, particularly in underserved areas.

4. Promoting Sustainable Practices:

- Support the production and use of organic fertilizers and biofertilizers.
- Establish guidelines for balanced fertilizer use and integrated soil fertility management.

5. Enhancing Private Sector Participation:

- Facilitate access to financing for private sector players to invest in local production and distribution.
 - Encourage innovation in fertilizer blends and packaging to meet diverse farmer needs.
-

The fertilizer sector in Tanzania is poised for transformation. By addressing the challenges and seizing the opportunities outlined in this study, the country can significantly enhance its agricultural productivity, improve farmer incomes, and achieve food security. This transformation will require sustained commitment, collaboration among stakeholders, and a focus on innovation and sustainability.

The vision for Tanzania's fertilizer sector is one of inclusivity, efficiency, and environmental stewardship. Achieving this vision will not only benefit the country's farmers but also contribute to national economic growth and global efforts toward sustainable development. The time to act is now, and with the right strategies in place, Tanzania's fertilizer sector can serve as a model for other countries in the region and beyond.

9. References

Below is a list of references to support the findings, analysis, and recommendations in this baseline study of the fertilizer sector in Tanzania. These references include government documents, reports from international organizations, academic research, and data from industry stakeholders.

Government Policies and Regulations

1. **The Fertilizers Act, 2009:**
 - Provides the legal framework for fertilizer production, importation, and distribution in Tanzania. Accessible from the Tanzania Fertilizer Regulatory Authority (TFRA).
 2. **National Agricultural Policy, 2013:**
 - Outlines the government's strategic objectives for agriculture, including fertilizer use and soil fertility management. Available on the Ministry of Agriculture's website.
 3. **Agricultural Sector Development Programme (ASDP II):**
 - The key program driving agricultural transformation in Tanzania, emphasizing fertilizer accessibility and use.
 4. **The Environmental Management Act, 2004:**
 - Regulates environmental impacts of agricultural inputs, including fertilizers.
-

Reports by International Organizations

5. **Food and Agriculture Organization (FAO):**
 - Reports on soil fertility, fertilizer use, and agricultural productivity in Tanzania.
 - Example: "The State of Food and Agriculture 2020."
6. **World Bank Group:**
 - Agricultural sector reviews and insights into input markets in Sub-Saharan Africa.

- Example: "Enabling the Business of Agriculture 2021."
 - 7. **Alliance for a Green Revolution in Africa (AGRA):**
 - Studies on fertilizer use and adoption in Africa, with a focus on smallholder farmers.
 - Example: "Africa Agriculture Status Report 2022."
 - 8. **USAID:**
 - Insights into agricultural input supply chains and development initiatives in Tanzania.
 - Example: "Feed the Future: Tanzania Agricultural Productivity Program."
 - 9. **International Fertilizer Development Center (IFDC):**
 - Research on fertilizer market trends, innovations, and policy recommendations for Africa.
 - Example: "Fertilizer Use in Sub-Saharan Africa: Best Practices and Lessons Learned."
 - 10. **African Union (AU):**
 - Guidelines for fertilizer use in the context of the Comprehensive Africa Agriculture Development Programme (CAADP).
 - Example: "Malabo Declaration on Accelerated Agricultural Growth and Transformation."
-

Academic Research

- 11. **Yara Tanzania and Fertilizer Efficiency Studies:**
 - Research on the impact of fertilizers on crop yields and soil health in Tanzania.
 - Publications available from agricultural journals and company reports.
 - 12. **Integrated Soil Fertility Management (ISFM):**
 - Academic papers on ISFM practices and their relevance to Tanzanian agriculture.
 - Example: Vanlauwe, B., et al. "Integrated Soil Fertility Management: Operational Definition and Consequences for Implementation and Dissemination." *Outlook on Agriculture*.
 - 13. **Soil Health and Fertilizer Use in Tanzania:**
 - Example: Kihara, J., et al. "Yield Gaps in Sub-Saharan Africa: Insights from Tanzania's Maize Farming." *Field Crops Research*.
 - 14. **University of Sokoine - Department of Soil Science:**
 - Studies on soil testing and nutrient management in Tanzania's agricultural regions.
-

Data from Industry Stakeholders

- 15. **Tanzania Fertilizer Regulatory Authority (TFRA):**
 - Data on fertilizer imports, production, and quality control.

- Annual reports and bulletins available on the TFRA website.
 - 16. Minjingu Mines and Fertilizer Ltd:**
 - Insights into local fertilizer production and phosphate resource utilization in Tanzania.
 - 17. YARA Tanzania:**
 - Case studies on improving fertilizer access and farmer education.
 - 18. OCP Africa:**
 - Initiatives to expand fertilizer distribution networks and promote sustainable practices.
 - 19. National Bureau of Statistics (NBS):**
 - Agricultural statistics and data on fertilizer adoption trends across regions.
-

NGOs and Development Programs

- 20. Farm Africa:**
 - Initiatives to improve fertilizer use among smallholder farmers in Tanzania.
 - 21. One Acre Fund:**
 - Programs targeting fertilizer adoption and training for smallholder farmers.
 - 22. CARE International Tanzania:**
 - Support for sustainable agricultural practices and integrated soil fertility management.
-

Technical Resources

- 23. FAOSTAT:**
 - Global data on fertilizer use, imports, and agricultural productivity.
 - Accessible at <http://www.fao.org/faostat/>.
 - 24. International Fertilizer Association (IFA):**
 - Reports on global fertilizer trends and innovations.
 - Example: "Global Fertilizer Outlook and Trends to 2025."
 - 25. Soil Health Consortia of East Africa (SHCEA):**
 - Research on soil fertility and fertilizer recommendations for East African countries.
-

Case Studies and Best Practices

- 26. Malawi's Farm Input Subsidy Program:**
 - Lessons learned from targeted fertilizer subsidy programs in Malawi.
- 27. Nigeria's Presidential Fertilizer Initiative:**
 - Success stories in boosting local production and reducing costs through PPPs.

28. Kenya's Soil Health Program:

- Strategies for balancing fertilizer use with soil testing and nutrient management.
-

Policy Recommendations

29. International Plant Nutrition Institute (IPNI):

- Guidelines on efficient fertilizer use and environmental protection.

30. Rockefeller Foundation:

- Insights into sustainable agriculture and fertilizer innovation.

31. African Fertilizer and Agribusiness Partnership (AFAP):

- Recommendations for creating enabling environments for fertilizer markets.
-