NATIONAL ENVIRONMENT MANAGEMENT COUNCIL (NEMC)
BARAZA LA TAIFA LA HIFADHI NA USIMAMIZI WA MAZINGIRA

ENVIRONMENTAL CONSIDERATION FOR SUSTAINABLE INDUSTRIALIZATION IN TANZANIA

Prepared by:
Eng. B. T. Baya & Menan H. Jangu, PhD
The National Environment Management Council
P. O. Box 63154
DAR ES SALAAM
TANZANIA

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Abbreviations and Acronyms

CBD	Convention on Biological Diversity
COSTECH	Tanzania Commission of Science and Technology
EIA	Environmental Impact Assessment
EA	Environmental Audit
EMA	Environmental Management Act, 2004
EMS	Environmental Management system
EWURA	Energy and Water Utilities Regulatory Authority
GEF	Global Environmental Facility
GDP	Gross Domestic Product
IPCC	Intergovernmental Panel on Climate Change
JET	Journalist Association of Tanzania
LGAs	Local Government Authority
MDGs	Millenium Development Goals
NEMC	National Environmental Management Council
NEP	National Environmental Policy
NERA	National Research Agenda
NGOs	Non-Governmental Organizations
NIM	National Investigation Manual
NSGRP	National Strategy for Growth and Poverty Reduction
PRSP	Poverty Reduction Strategy Paper
SoE	State of the Environment
UNDP	United Nation Development Programme
UNCED	United Nations Conference on Environment and Development
UNEP	United Nations Environmental Programme
VPO	Vice President's Office

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Executive summary

The government of Tanzania is embarking on industrialization drive towards middle income economy by 2025 through job creation and economic growth. Industrial development depends greatly on the availability and accessibility of raw materials and energy resources, skilled manpower in specialized fields, infrastructure systems that are supportive to industrial establishment and operations, and also capability of industries to produce products that can compete at local and international markets. Tanzania is endowed with wealth of natural resources supportive of industrial establishment including mineral resources, oil and gas reserves and agriculture and rangeland resources. In addition, the Country has adequate water and energy resources. However, the continued extraction of natural resources requires interventions that add value to the natural resources as the sustainable industrial establishment would support economic growth and at the same time ensure stable future.

The envisaged industrialization is one in which accounts for economic growth, social advancement and environmental protection. Industrial development tends to influence environmental change through exploitation, transportation and use of raw materials and energy resources. These industries require massive extraction of raw materials and energy resources, the action that could be detrimental to the environment. In addition, industries generate different kinds of wastes (liquid, solid, emissions) that some of them can be hazardous to the environment. Therefore, protecting and conserving the environment as the government is implementing the industrialization agenda is of paramount importance.

The international community is aware of the extent of environmental damage happening in the world and therefore sustainable development (SD) initiatives being advocated globally. One of the issues discussed under SD is the extent in which industrial activities contributed to the pollution as countries strived to expand their economic growth. The government of Tanzania has adapted to the Rio de Janeiro in many different ways. The government has devised policies, legislations and the institutional framework along with strategies that are supportive to sustainable industrial development. These instruments include; Environmental Policy in 1997 and also enacted the Environment management Act in 2004.

The National Environment Management Council has a significant role to ensure established industries incorporate environmental measures for their sustainability. Among other functions of the Council as per Sect. 18 (2) (j), is to collaborate with other sectors to render advice and technical support, where possible, to entities engaged in natural resources and environmental management so as to enable them carry out their responsibilities. Knowing the role and the impacts associated with industrial establishment, the Council is positioning itself in offering guidance for industrial development that accounts for environmentally friendly process that are capable of producing quality product competitive in local and international markets.

The industrialization agenda will be achieved if investors take necessary measures to ensure industries established are sustainable; that they are established through adherence to Environmental Impact Assessment and that environmental issues are incorporated in the Business Plan. Production need to quantity will not be enough to move the industrialization agenda forward. Industrial production need to both quantity and ensure quality of the

established products as well as the environmental performance. The products produced have to account for the requirements of the international markets such as having being qualified with labeling conditions based on the market available.

The proposed industrialization has to account for the development in which natural resources are sustainably used as well as the way in which the environment is protected. It is proposed for Tanzania to have industrial base that is supportive of jobs creation; sustainable livelihoods; capable of increasing returns on investment; using finite resources efficiently; reducing harm to the environment; increased global competitiveness and ensure the long-term business sustainability of enterprises; innovation, technology and skills development.

The paper highlights on key aspects for consideration in order to ensure that established industries are in designated areas (e.g. Industrial Parks); and efficiently operating receive adequate raw materials; run by skilled personnel; using lessons from other countries; and that these industries are producing products that have quality and are produced in environmentally friendly manner and can compete at local and international markets. These industries need also to have good practices and systems for managing wastes to meet Tanzanian standards and that they do not cause harm to people's lives and the environment.

Therefore, this report is divided into four major areas including: 1) Introduction showing the existing industrial status and the need for industrialization in order to boost Tanzanian economy and improve people livelihood, 2) Assessment of environmental conditions of the established industries and the country as a whole, 3) Priority areas for consideration for industrialization, and 4) steps for considerations to move forward the industrialization agenda.
This document therefore is meant to provide information on all actors involved in moving forward the agenda for industrialization.

1. Introduction

1.1 Background

The Government has embarked on expanding industrial base and seeing it as an opportunity to enable Tanzania fulfill its economic goal of attaining middle income economy by 2025. This is in recognition that industrial development has helped economic growth of modern societies. Industries are needed to offer goods and services for societies. It is not surprising since independence the government in many different occasions has encouraged and developed different strategies to support industrial development. The emphasis now is for industrialization that absorbs the rapidly growing labor force, boosting local production, produce products and services that are competitive in the domestic and international markets and improve people's livelihood.

Industrial development *policies, strategies and plans* are key instruments in guiding industrialization process. Numerous policies and strategies have been developed to support industrial development. For instance, the Sustainable Industrial development Policy for Tanzania (SIDP 1196 -2020) was adopted in 1996. In 1999 Tanzania's Development Vision 2025 set the goal of achieving "transformation from weather and market dependent agricultural economy to a self sustaining semi industrialized economy. In addition the Tanzanian mini –Tiger LAN 2020 was introduced in 2005 in an effort to fast-track the implementation of the Tanzania Development Vision by replicating the East Asian model of export –led industrialization (Page, 2016). Likewise, Tanzania developed the Integrated Industrial Development State 2025 (IIDS) with its main focus on type of industries to be established, the need for clustering industries based on the availability of raw materials and energy resources. The IIDS has also highlighted the need to have strategically located industries. IIDS also recognizes the importance of infrastructure development, technological advancement, innovations and adding value to assets before exports.

1.2 Industrial contribution to the GDP

Industrial development is a key to any country's progress and development. It is as well capable of absorbing large number of skilled workers and strengthens the economy. Industrial development played an important role in the economic growth of countries like China, the Republic of Korea, Taiwan and Indonesia. Experience from these countries indicates that they attained strong economy due to industrialization because of more diverse and manufactured products increase the chances for sustained growth.

Focus on industrialization is not new in Tanzania. Since independence, the government has put emphasize on industries with the idea of becoming independent from colonial powers. However, most of the industries established in the post independence period could not survive consequently leading to reduction in the role of industry in the economy. For instance the share of manufacturing in GDP fell from more than 22 percent in 1975 to about 10 percent in 1990 (Page, 2016). Formal manufacturing industry has grown significantly in the last decade in Tanzania and data available indicate that between 2000 and 2010, manufacturing value added (MVA) more than doubled in real terms from US$894 million to US$1,992 million (UNIDO 2012). Since 2010 growth of the manufacturing sector has continued to outpace overall GDP growth, but it has lagged growth in a number of services sectors (Page, 2016). Contribution of manufacturing industries on economic growth shows positive trend and that Tanzania is performing well when compared to other countries in Sub Saharan Africa as shown in Figure 1 below. Despite these trends, Tanzania is still at infant stage of industrialization when compared to other countries.

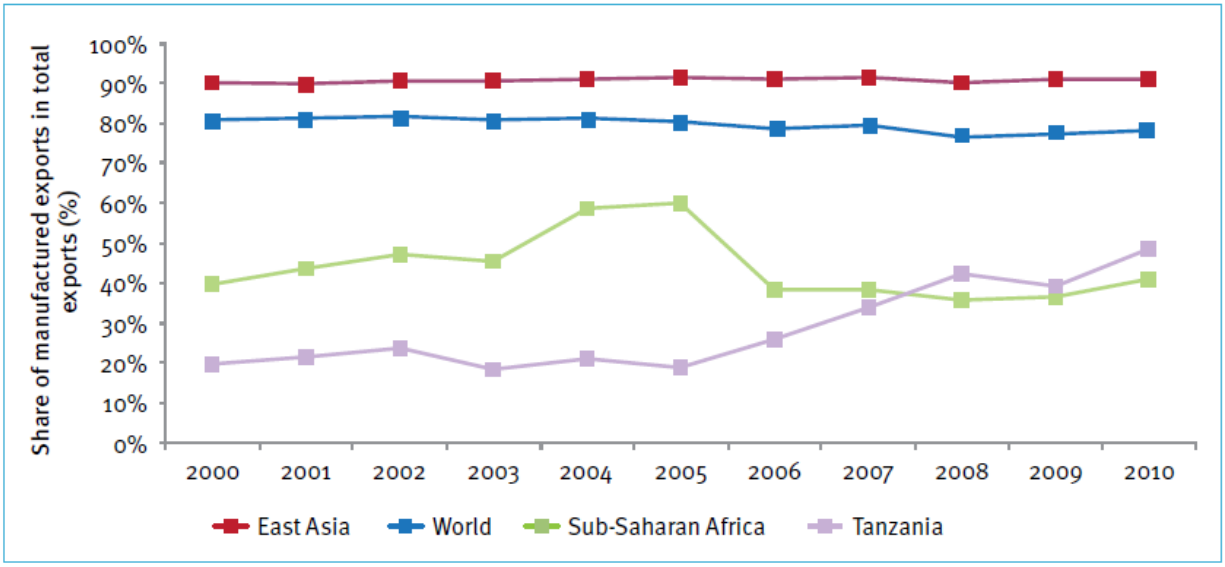


Figure 1: Trends in Manufactured Trade as Percentage of Total Trade *2000 -2010 (Source: URT & UNIDO (2012) Tanzania Industrial Competitiveness Report, 2012*

1.3 Drivers for Industrialization

Through history, industrial establishments are increasingly responding to the global demand of making the business economically sustainable through consideration for appropriate technology that accounts for environmental protection. The industrialization agenda envisaged in Tanzania has to provide mechanisms to tap on industrial economic contributions as well as taking into consideration their ecological (environmental) footprint. The consideration of diverse industrial activities and their corresponding activities require interventions that advocate for efficiently use of resources and protection of the environment. Changes happening in the world now have pushed industries to add value to the business by ensuring optimum use of raw materials and energy resources. Industrialization involves mechanisms that would ensure industries established are resilient and adaptable to economic, social and environmental conditions. Industrialization in some countries has been attained through innovations, availability of adequate labor force, raw materials, capital investment and opportunities for trade. Close examination of countries that are industrialized has shown that there are diverse factors that are necessary for industrial development including among others factors described in Table 1 below:

Table 1: Factors necessary for Industrialization

Aspect	Description
Political will	The government has to demonstrate strongly its willingness to support industrialization.
Tranquility	Investors are more likely to invest in peaceful countries that are governed by the rule of law. Peace is considered to be an important factor for any kind of development agenda. Historically, countries that have political instability tend to have less industrial investments,
Governance	Investors need assurance in terms of stability that guarantees the private property against nationalization and expropriation.
Ecology	Ecological consideration is a key element for industrial development. It involves identification of existing environmental conditions together with strategies to protect the environment from damage caused by industrial establishment.
Resources	Resources are necessary for any industrial establishments and they include aspects such as land, water, energy, waste and materials used or consumed during industrial development and operation. Tanzania has advantage in terms of energy sources that include hdro sources, coal, solar energy, biomass, wind & gas.
Economic Consideration	Sustaining industrial based economy is influenced by many factors such as location of industries in connection with accessibility of raw materials and transportation infrastructure for both raw material and products.
Community participation	Establishment of industries should account for the communities in the neighborhood. Peoples' needs have to be incorporated during planning stage. In addition, potential impacts have to be identified in order to avoid conflicts when industries are in operations. The communities should as benefit from employment opportunities, services and infrastructure systems that are supportive to the industrial establishment.
Plans	Environmental planning is a key element for industrialization**.** The key tools considered to have the most relevance in the development of industrial areas include local planning strategies, rezoning of region and local planning schemes, and local structure.
Supportive policies, legislation strategies and institutional framework in place	The inflow of foreign investment to the country has an important contribution in the promotion of the Industrial Development. Therefore, established policies and legislation need to give confidence to investors. The institutional and legal framework has to govern effectively the industrial establishment. Compliance and enforcement should be applied fairly to all investors.
Infrastructure development supportive of industrial establishment	Industrialization requires stable infrastructure support mechanisms such as having reliable power supply. Government intervention is needed in providing a well planned industrial base with adequate physical infrastructure services. Infrastructure has helped countries to industrialize faster. Development of infrastructure systems such

and activities:	as road, railway, telecommunication, electric power and water supply service are among the major important tractors that can expedite the development of industry and private inventors. But, the infrastructure system has to be designed with environmental consideration in order to avoid the subsequent environmental impacts.
Knowledge and Skills	Developing effective human resource is necessary for supporting industrial development activities that incorporates environmental measures.
Technological change and innovations driven by (R & D)	Technological advancement and innovations have proved to be a catalyst for industrial development in many countries. These aspects should not only be considered for production rather should account for the quality and environmental management practices.
Market Penetration and export oriented industrialization	For industrialists consideration should be on exports and increase business niche and competitiveness. Industrialization process involves strong competitiveness in the world market; available information with regard to the type of products, price, and timely supply of products in the required area should be availed to them.

1.4 Industrialization and its impacts on the environment

Tanzania has a landscape of about 945,087 square kilometers, made up of ocean, lakes, arable and non-arable land mass, hills and mountains. The country is one of the most mega bio-diverse countries and is also endowed with various environmental resources including land, air, atmosphere, water, wildlife, forests, mineral resources, wetlands, renewable energy sources, oil and gas, etc. This calls for strong measures for the protection and management of it so as to ensure that it continues to support services for a healthy society and strong economy.

Protection of the environment and economic growth are often seen as competing aims. The interdependence between economic activity, ecosystems and natural resources present not only opportunities but also environmental challenges. The output of any economy depends on both the quantity of inputs it uses and the efficiency with which these inputs are used. Increase of industrial activities and development projects result to high demand of resources for raw materials and utilities, encroachment of sensitive areas such as wetlands, increased amount of waste generated, air pollution, indiscriminate disposal of liquid and solid wastes which pose health risks.

There are two theories linked to economic growth and environmental degradation. One school of thought have argued that problems associated with resource use, pollution, ozone depletion and global warming are predominantly the result of industrialization and consumption rates in industrialized countries. Others have argued that problems associated with access to safe

drinking water, decent sanitation, loss of biological diversity, desertification and deforestation are of greater relevance to developing countries. But, industrial establishment being small, medium or large depends on human interaction with land and natural resources. Industrialization as it has been for the developed countries and now rapidly industrializing countries such as China, India, and Brazil influence urbanization and consumption thus changing people livelihood. However, increased industrialization tends to have its own impacts such as increased pollution and biodiversity loss. Likewise, unsustainable land use practices for agricultural activities to feed into industries have impacts on water availability.

The National Environmental Policy, 1997 has identified six major environmental challenges including land degradation, deforestation, degradation of aquatic ecosystems, lack of clean drinking water and sanitation, and loss of wildlife habitats and biodiversity. Environmental challenges in Tanzania continue to grow, and now include: unsound disposal mechanisms for both solid and liquid waste; increased deforestation that has subsequent effect on ecological systems; unsustainable mining activities, unsustainable fishing and agricultural practices. In some places, construction of touristic site in protected areas, construction of industries in residential areas. Industries is one of the sectors contributing significantly to the above problems such as land degradation mainly during extraction of raw material and energy resources; industrial pollution causing degradation of water sources.

The relationship between industrial activities and their environmental and social impacts are complex and vary spatially and temporary. Industry and its products has impacts on the natural resource base through the entire cycle of raw materials exploration and extraction, transformation into products, energy consumption, waste generation, and the use and disposal of products by consumers. Industrial production effects the environment through natural resource depletion (water, air, energy, materials and the reduction of biodiversity) and through pollution of the environment (both physically through production plant and through toxic emissions, whether during production or in product use or disposal). Therefore, industrial developments without environmental consideration are generally regarded as one of the primary cause of environmental degradation and exhaustion of natural resources base.

Industries involve investments in infrastructure: energy, transportation, communication and distribution systems, water and air supplies, human settlements patterns, human life style patterns. All these have both direct and indirect environmental impacts. The magnitude of environmental impacts is characterized by the attributes of industrial chemical, physical, technical and biological aspects.

Environmental impacts associated with industrial establishment and its related activities include:

- The raw material and energy resources preparation leads to the depletion, destruction or transformation of the natural resource base, lands, and soils
- Environmental pollution during manufacturing/processing) stages particularly when environmentally unsound technologies are used;
- Product use stage release some wastes that could be detrimental to the environment
- Waste generation after the product end use, and associated problems as a result of re-use, recycling of the products

Most of the established industries in Tanzania are located near sensitive areas (Lakes and Rivers) and failure to adequately manage wastewater, for instance, has impacted both aquatic and terrestrial organisms. Contamination of water bodies such as Msimbazi River (Dar es Salaam) Lake Victoria, Themi River (Arusha), Karanga River (Moshi) has been reported. Furthermore, industrial establishment tends to influence other conditions such as intensified agricultural activities, and urbanization; all of which have their own environmental impacts. History has provided a useful lesson particularly when one examines cases such as that of mercury and cyanide contamination of water bodies that led to Minimata diseases in Japan.

Similarly, chemical products have greatly improved health and life expectancies; increased agricultural production; raised comfort, convenience, and the general quality of life; and expanded economic opportunities. But, these products tend to have severe impact on the environment and the public health. Some of the released chemicals are known to cause cancer and birth defects and have long-term genetic effects.

1.5 Industrial Environmental Status

Tanzania industrial establishment is characterized by many features and their associated pollution problems are mainly attributed to conditions such as having industries built in unplanned areas, use of outdated technology and dilapidated systems, industries being poorly maintained, lacking of environmental safeguards, uncertified products and industrial processes. The government is well aware of all the environmental challenges associated with industrial establishment and other activities including air and water pollution, loss of biodiversity,

Experience from other countries indicates that industrial establishment tends to influence public health concerns, public health, sanitation, energy consumption. The resource base will always be under pressure as raw materials are exploited to feed on increasing demand for industries.
Poor planning of industrial establishment tend to create conditions where industries are built in residential areas and their subsequent environmental problems causing conflicts between investors and communities in the neighborhood. Other problems associated with industrial establishment are the uncontrolled urbanization and increased urban sprawls, deforestation that has subsequent effect on ecological systems, degradation of aquatic ecosystems, natural resources depletion and loss of wildlife habitats and biodiversity.

Management of such environmental problems requires measures before industrial establishment such as undertaking environmental impact assessment (EIA). Failure of having adequate measures tends to influence poor management of emissions, liquid and solid wastes. Despite importance of EIA, industrialists have argued it is something that is delaying "industrialization." The question we ought to ask is what kind of industries we want in absence of EIA. Others have argued that associated costs for environmental measures would suppress investment. But this argument has proven unjustified as industries with appropriate measures tend to have assured business.

2. Justification and Objective of the Report

- There are more stringent environmental regulations than before that are pushing industries to incorporate environmental measures.
- Industries in the world are increasingly striving to reduce the impact of processes, products and services on the environment in order to compete in the world market and make their industries sustainable.
- The globalization process has driven the international market into using conditions for countries to communicate and be accepted based on the achievement of integrating and using international standards.
- There is growing interest among the consumers all over the world regarding protection of environment in which they live.
- Worldwide evidence indicates people are concerned about the quality and environment and are changing their behavior and expecting industrialists to accommodate their need.
- In order to ensure sustained business, products have to be produced in environmentally friendly industries, and green marketing has emerged which speaks for growing market for sustainable and socially responsible products and services.

3. Using this document

This document is intended to be used and applied by different stakeholders involved in the industrialization process in Tanzania. These stakeholders include but not limited to regulatory agencies, planners, local governments, industrial operators, natural resources management, academicians, and community groups. It is the document that is aimed to guide and facilitate decision making process in the industrialization process that accounts for environmental management. The document has been prepared using available recourses and information at the time. But, it will be updated to accommodate new changes in policy, technology as well as situation on the ground.

4. Kinds of Industrialization to be attained

It is well recognized that environmental change is mainly a function of variables such as population growth or demographic change; life style or affluent; and technological change. Industries are very much known for their impacts to the environment and the emphasis globally and locally has been on developing industrial base that is sustainable. Tanzania has the opportunity of avoiding the mistakes that were experienced by richer countries when expanding their industrial base. The knowledge base now is greater than before and can be used to determine the production methods that encourage use of renewable energy resources, optimize use of raw materials as well as recovering raw materials and energy from wastes. Industries are concerned with enhancing good reputation and image of the business to the public and competitors, avoiding high costs to be incurred if they violate the legislation, avoiding risks being involved when inspected or detected of any violations and sanctions to be imposed, promoting their businesses through certification on the quality of the products (ISO 9000) and environment (ISO 14001), and avoiding negative reactions from public and within the industry's sector.

4.1 Environmentally friendly industries with less ecological footprint

Industrial growth will lead to increased consumption of raw materials as well as energy resources. The emphasis should be on establishing industries with minimum effect to the environment and public health. In many cases pollution is considered as a generation of waste, and a symptom of inefficiency in industrial operations. But, pollution can be examined differently as a mechanism in which a company is losing materials. Industries have to efficiently invest in processes that are capable of producing less waste in order to reduce environmental pollution and at the same time optimize the use the valuable resources. Industrialization has to recognize the improvement in the environmental quality by using more efficient and less polluting goods and services. It is of paramount importance to encourage production of goods and services that bring basic needs, while reducing the use of natural resources, toxic materials and generation of wastes.

Historically, industries have consumed resources excessively and discharging their waste haphazardly thus contaminating air, water, and soil. They are the communities and government agencies bearing huge costs particularly when responding to environmental pollution and degradation. More often environmental costs of industrial establishments are not included in the business plan. Consequently, the burden in terms of health problems and damaged ecosystems are externalized and taken by other entities. Industries have to take responsibilities on what is referred to internalizing the costs. Industries have to learn from the past in order to take a new direction that is not detrimental to the environment.

4.2 Producing quality products/services that are competitive at both local and international markets

The globalization has created the situation in which countries in the world are very much interlinked and inter connected particularly on issues related to trade and investment. Quality of products and environmental management are inseparable entities for industrialization. More often products from Africa and other developing countries fail to compete at the international market due to substandard quality. Now the international market require fulfillment of environmental requirements for exported products, and environmental concerns rank after quality and price in purchasing decisions.

- Trade Sanctions

Countries in the world have been using trade sanctions to secure adoption of environment principles. In order to protect locally produced products some countries have based their arguments on quality and environmental grounds. They restrict trade on the basis of the environmental impacts on how products are made or processed. Therefore, local industries have to ensure that they produce product that are competitive in terms of quality and price in order to easily access the global market. The challenge in Tanzania is that, most of the established industries use outdated technologies, have limited capital resources as well as low levels of managerial skills that limit them from becoming competitive and compliant. These issues have to be addressed in order to compete in global market.

- Green Marketing

Fulfilling quality and environmental requirements is famously known as "The green marketing". It is a mechanism that characterizes the emphasis of environmental issues in marketing and trading. It has an important role to promote and reinforce the idea of environmental protection and sustainable development both in the minds of the customer and the firms. Many industries worldwide particularly those selling their products internationally are adopting "green marketing" practices. This is mainly because consumers have become more conscious about the product they consume in term of quality and environment and they ask for environment-friendly products. Environment-friendly products are seen as safe use. As a result, green marketing has emerged, which aims at marketing sustainable and socially-responsible products and services. The industrialization agenda should account for compliance to international standards, capability to conduct quality tests and issuance of certificates that are globally recognized.

- Competitive Quality of Products

The international consumers increasingly support eco-labelling and mandatory carbon footprints. Industrial exports need to account for the accepted international standards such as eco labelling particularly when we want to export our products to the markets in Europe, US and Asia. Products and service have to compete equally at the international market. Therefore, both the local and international should determine nature of industrial establishment we want to establish.

Developed countries have been successful in industrializing their countries and achieve middle income economy by incorporating environmental measures in the plan. They have products and services that are competitive in terms of quality and price at the local and international markets using tools such as Carbon Footprint, Water Footprint, ISO standards and Eco-labeling.

Product Environmental Assessment Tools help determine impacts of products or services on the environment. For instance, Life Cycle Assessment (LCA) can be used to assess the environment impact and resources used throughout a product's life cycle. Carbon Footprint (CF) is another tool that can be used and it measures the amount of greenhouse (GHG) emissions caused by a particular activity or entity (From "Cradle-to-grave" or "Farm-to-fork" or "Field-to-Wheel").

Eco-labeling is affixed to products that pass eco-friendly criteria laid down by government, associations or standards certification bodies. Products awarded an eco-label have been assessed and verified by an independent third body and guaranteed to meet certain environmental performance requirements. However, compliance with eco-label requirements is voluntary. Both Eco-label and can use tools such as LCA. Eco-labels are tools used to communicate quality and environmental consideration of Firms and each country has its own system such as Germany: Blue Angel (Germany); The Swan (Nordic Eco- labeling); Environmental Choice (Canada); Eco-Mark (Japan); Eco-label (EU); Eco – Mark (India)

Tanzania need to deviated from carbon-intensive methods and encouraging a low-carbon development trajectory. Taking advantage of new innovations, technologies and business models on a pathway that uses our natural resources optimally and efficiently as inputs to an industrialization process powered by our endowments of alternative sources of energy that are environmentally friendly.

Increased industrial activities are more like to generate huge amounts of wastes including hazardous. Failure to incorporate environmental measures will lead to public health concerns associated environmental pollution and degradation. The production process should also maintain high environmental standards while safeguarding people's health and integrity of the environment. Products such as flowers produced in Tanzania are faring well after fulfilling those international standards. But, the history remind us that the export ban of fish products from Tanzania and other East African Countries due to high levels of microbiological contamination in 1990s was a result of not complying to the environmental requirements that are accepted internationally. In other words these products did not satisfy the international market based on the quality and environmental requirements.

Therefore, with industrialization it is important that measures to reduce, control, and prevent industrial pollution will need to be strengthened. If they are not, pollution damage to human health could become intolerable in certain cities and threats to property and ecosystems will continue to grow. In general, industries and industrial operations should be encouraged that are more efficient in terms of resource use, that generate less pollution and waste, that are based on the use of renewable rather than non-renewable resources, and that minimize irreversible adverse impacts on human health and the environment

5. Assessment of Environmental Conditions of the Existing Industries

Many developed countries are striving to boost their economic growth through industrial establishment. However, Environmental conditions are continuing to worsen. The amount of pollutants caused by industrial growth is increasing and environmental health problems also escalating. Experience form inspected industrial establishments have shown the following:

5.1 Increased Pollution Load

Pollution is a major problem in urban area particularly in industrial sites. Both manufacturing and processing industries have contributed to the release of wastes in all mediums (air, water, and soil). The pollution load has already been felt and increasing in waste receiving bodies (air, lakes, rivers and the ocean) due to the increased development projects. This problem is caused by facilities lacking effective systems to treat and dispose solid and liquid wastes. The combined results of these problems are that both air and water have been contaminated with pollutants, which are detrimental to human health and the environment particularly in cities like Dar es Salaam, Mwanza and Arusha.

Industrialization will lead to increased volumes of solid wastes that have to be disposed off in landfills. These constitute pollution because of the composition of wastes. More often toxic and hazardous materials such as leachate are leaking into soil and water bodies thus affecting people's health and the environment. Vegetables are grown in areas close to the dumpsite thus posing health risks to the consumers.

5.2 Liquid Waste Management

Industries have continued discharging their untreated effluents into water bodies. The effluents released into water bodies are characterized by high oxygen and chemical demands. Chemicals in wastewaters are hazardous and slow-degrading. Industries of major concern are those having operations which require a lot of water and limited effluent treatment plants. Such industries include edible oil, beverage industries, textile mills, tanneries, food processing and pulp and paper. The environmental pollution is further exacerbated by lack of centralized systems for proper treatment of industrial effluents. Likewise, the discharge of nutrients from farms have negative impacts on water bodies causing conditions such as eutrophication e.g. the decomposition of organic matters can influence depletion of oxygen in water bodies thus cause alteration and loss of biodiversity.

5.3 Energy sources for facilities and their impacts on Air quality

The industrialization process in china for instance has encouraged massive consumption of coal, the main source of air pollution; it is a case where industrialization signifies massive emissions. Data available suggests that about 750,000 people in China die each year from respiratory related illnesses due to air pollution. The majority of the facilities inspected in Tanzania use heavy fuel oil and some lacking oil containment for oil spills. Others have switched to using coal as a source of energy. The environmental impacts associated with the use of heavy fuel oil in term of oil spills and emissions are on the increase.

Tanzania is not one of the countries that have significant contribution to the greenhouse emissions worldwide. However, emissions emanating from industries have localized impacts. Types of air emissions depends on raw materials, process and control measures used. About 80% of all industries are located in urban areas. Use of coal, for instance, without considerable environmental measures could lead to significant air pollution. Likewise, heavy Industries like cement factories are some of the examples of industrial establishment that causes air pollution. These industries have been directed to stop operations in order to address problems of dust emissions.

5.4 Management of chemical and hazardous wastes

There is a substantial use of chemicals in Tanzania which come from different sources. Sectors such as agriculture use a substantial amount of chemicals in form of pesticides, herbicides, insecticides. Mining sector is also known to use chemicals such as compounds of cyanide and mercury. Approximately 2,500,000 tons of mining waste /year from large scale mining activities are released into the environment. The wastes generated include highly hazardous chemicals such as cyanide and mercury. These wastes pose risk to human health and the environment.

Poor management of chemicals is a common problem and their impacts are enormous as described by Rachel Carson in her famous book Silent Spring explaining how chemicals have caused health problems and their impacts on biodiversity. Most of these chemicals have both direct and indirect impacts. All chemicals are said to have adverse effects, and their impacts will depend on how they are managed when manufactured, transported, handled, used and disposed.

The discharge of heavy metals and chemicals have severe impacts on the environment, they accumulate in sediments and enters food chain. They bio-accumulate in the food chain and affecting humans and other organisms in the chain.

5.5 Derelict Land

Disfigured land and damage to the landscape due to the industrial and mining activities is a common problem particularly in mining and quarry sites. It is a result of unwillingness of investors to restore and reclaim degraded land. This problem is now becoming wide spread and increasing every year due to the increased activities related to the extraction of the materials. With industrialization, urbanization increases leading to the increased construction activities that requires deforestation to free up land or extract raw materials for construction. Similarly as the demand for goods increases the demand for raw materials also increases. Metals, aggregate, soil coal and other materials have to be extracted from the earth through mining which leads to land disfigurement.

6. Factors that led to the existing industrial status

There are numerous factors that have contributed to the above environmental problems. There are both general and specific types for different categories of industries. Environmental monitoring reports at NEMC have recorded numerous challenges that contribute no non-compliance. The assessment by NEMC has revealed that some of the established industries have existed before the enactment of the Environmental Management Act, Cap 191 of 2004. These industries have operated without environmental measures and therefore need to be audited as per EMA, 2004.

6.1 EIA/EA Processes

Some of the facilities were established at a time when EIA was not mandatory and environmental impacts were not well understood. Either EIA or EA would have provided the opportunity for the facilities to comply with the environmental requirements. Most of the industries were established without undertaking environmental impact assessment. The majority of the facilities inspected do not have EIA/EA certificate and haven't initiated yet the EIA/EA process. Failure to comply with this requirement is posing enormous challenge on managing environmental conditions. More often lack of environmental impact assessment or environmental audit implies other problems such as lack of systems to manage waste water and oils spill. During compliance inspection, proponents raised their concerns that the exercise of carrying out EIA or EA is expensive.

6.2 Lack of voluntary approach for addressing environmental measures

Many industries are still struggling to incorporate voluntary environmental measures; they lack programs, facilities, and trained personnel needed to manage waste. They do not see this as their obligation until when they are forced to do so. As a result there is poor management of industrial waste as it can be observed through continuous releases of untreated or partially treated effluents to watercourses, haphazard disposal of unsorted solid waste. This kind of approach is threatening the public health and the ecosystems that cater for various services including provisional, regulating, supporting and cultural.

Despite emphasis by institutions such as NEMC to ensure industries have environmental profile and they have adopted environmental management systems, the environmental performances of these facilities have remained relatively low. Industrial monitoring by NEMC has revealed that adoption of Environmental Management System, (EMS) and "Life Cycle Assessment (LCZ), Cleaner Environmental technologies will improve environmental conditions. This is based on EMS systematically manage the interaction of industrial activities with the physical environment, while LCA supports decision making and offers way of approaching problems from the "product chain" perspective. Systems such as Cleaner Technologies ensure optimum use of resources and minimization of wastes, yet many proponents are still using business as usual approach. Lack of environmental management system, low environmental awareness and unwillingness among industrialists to introduce self environmental management system will continue leading to the irreversible environmental damages.

6.3 Failure to adhering to Master Plan and Land Use Plans

The environmental monitoring conducted by NEMC has revealed that some facilities do not adhere to the Master Plans. Consequently, some industries are not located in proper sites. They are situated in residential areas instead of being in areas designated for industries. In situation like this environmental impacts such as emissions or discharge of industrial waste water are directly felt by people in the neighborhood communities. These people have complained in many occasions to regulatory bodies about the industrial activities in such areas. Other facilities are located in sensitive areas or areas within sixty meters of the water source which is contrary to the environmental law.

6.4 Non-existence or dilapidated wastewater treatment plants

Most industries came into operation without having pretreatment facilities for effluent discharged. Industries which had treatment facilities poorly maintained them and most are not in operation due to technical and financial constraints. In some cases the wastewater treatment facilities are dilapidated due to lack of proper maintenance. Most industries lack onsite wastewater treatment facilities and thus untreated effluent is being discharged into the existing water receiving bodies. Most of industries do not have enough space to allow construction of waste treatment facilities.

6.5 Inadequate skilled personnel in the field of environmental management

Facilities lacking personnel with relevant knowledge in the field of environmental management is a common problem observed in inspected facilities. Recruitment of environmental personnel as it is for other fields such as quality control, safety or production has not been prioritized. Therefore, more often industries have argued they are not aware of environmental issues ignoring the fact that they have not recruited the personnel who can guide on environmental issues. In other words, environmental obligations can be hardly achieved in the absence of well-trained environmental personnel.

6.6 Use of inappropriate technologies

In the past, the sitting and choice of technology and the actual operations of the industries were implemented without considering the environmental implications. Either, the technology applied is not appropriate to respond to the environmental challenges. Therefore, it is crucial that industrial activities are properly located in areas where it will be easy for construct infrastructure (drainage and wastewater treatment plants) and must be easily accessible.

6.7 Oversight of environmental issues in business plan

The integration of environmental issues into the general business framework is lacking. This is happening despite knowledge and improving environmental performance has direct benefit to the company reputation and business. The Council has now learned that financial institutions are now requesting industrialists to provide information on whether they have incorporated environmental measures in their process and acquired environmental certificates before they are issued certificates. This is done to avoid liability and has forced investors to fulfill environmental requirements in their search for loans from banks. Likewise, of recently financial institutions have put emphasis on their strategic plans related to environmental liabilities. Financial institutions seek information on whether companies have fulfilled legal environmental obligations.

6.8 Views from the Business Community

When asked to develop industries that are environmentally friendly, the business community has its own views regarding the environmental problems observed suggesting that environmental measurers tend to increase up-front investment costs. In addition, meeting compliance requirement can increase economic burden.

7. Existing initiatives supportive of industrial development

The government has initiated different measures to respond to environmental challenges in order to promote industrial establishment. It has ratified numerous international agreements related to environmental measures. These agreement aim to reduce pollution, protect biodiversity, control haphazard dumping of hazardous materials. The government is aware that in order to sustain industrial development emphasis should be on creating supportive infrastructure, managing water resources, ensure optimum use of energy resources as well as enforce the environmental related laws. This in turn will promote industrial growth but also ensure environmentally friendly industries are established.

Environmental consideration for development projects is as well stipulated in the Constitution, which was amended in 1984 to provide for the Bill of Rights. The Constitution portrays the commitment by the Government to ensure sustainable development. The Article 14 of the Bill of Rights stipulates that every person has a right to life and to the protection of life by society. In addition, Article 9 of the constitution requires the Government to ensure that national resources are harnessed, preserved, and applied toward the common good.

The Millennium Development Goals put emphasize on reducing poverty and improve people's livelihood in the world. Environmental sustainability has been prioritized in order to address environmental challenges. To achieve this goal, energy use, carbon dioxide emissions, deforestation, and the reduction biological diversity must all be carefully monitored and reduced to conditions which our ecosystems can maintain. Tanzania has initiated different measures to implement the Millennium Development Goals.

Tanzania has embraced different strategies in fulfilling sustained support mechanisms for the improved economy and livelihood, protection of the environment, and sustainable use of natural resources. Tanzania is endowed with abundance of varied resources that has supported people's livelihood. They are these resources that have support industrial activities for economic growth. The importance of these resources to sustain people's industrial activities that are aimed to raise the Tanzania economy to reach middle income economy by 2025 is recognized in both national and international policies and programs. Locally, there are National Environmental Policy, 1997; the Tanzanian Vision 2025; the Strategy for Growth and Reduction of Poverty. Recognizing the need for protecting the environment sustainable use of resources, environment and natural resources management have been mainstreamed in the Tanzanian National Strategy for Growth and Reduction of Poverty (NSGRP).

For the past three decades, the country has developed various environmental policies, legislations and strategies in order to address environmental issues. In the year 1994, for instance, the National Environmental Action Plan was developed which set the directives and interventions to national environmental problems. Three years later, the National Environmental Policy (1997) was developed in order to provide framework for making fundamental changes that are needed to bring environmental considerations into the mainstream of decision-making in Tanzania. Tanzania Vision 2025 and National Strategy for Growth and Reduction of Poverty (NSGRP) which have both emphasized the following among others attaining high quality livelihoods, ensuring competitive economy; food sufficiency and security; universal access to safe water; absence of abject poverty; and adequate level of infrastructure; Achieving equitable economic growth through community participation and good governance; Reversing of adverse trends: losses and degradation of environmental resources forests, fisheries, freshwater, soils and biodiversity

The environmental consideration in industrialization is provided in existing legal and institutional framework. These supportive framework highlight the importance of environmental governance in order to achieve industrial growth that do not ruin he resource base, capable of protecting the environment while ensuring people's livelihood are provided. These documents have highlighted for the development which encourages environmental protection. They also highlight the need to protect natural resources from human activities. They also emphasize on EIA in order to protect the environment from established industries as well as development project.

Table 2: Other policies and strategies supportive of Industrialization

Policy/Strategy	Description
Tanzania Vision 2025	Is for Tanzania to develop a strong, diversified resilient and competitive economy which can effectively cope with the challenges of development and which can also easily and confidently adapt to the changing market and technological conditions in the regional and global economy
Tanzania Integrated Industrial Development Strategy 2025	Formulated and adopted in 2010 with a view to provide concrete strategies to implement SIDP 2020 and build a competitive industry by putting in place a competitive business environment. The strategy was adopted four years after the SIDP 2020 had been created, to promote the efforts of achieving the SIDP goal of bringing an economy to a state of accelerating industrialization and to provide concrete strategies to implement SIDP 2020. The strategy target six sub-sectors: agro-processing, textiles, leather, fertilizer and chemicals, light machinery and iron and steel.
Mini-Tiger Plan 2020	In 2005 the government created the Tanzania Mini-Tiger Plan 2020 to fast-track the implementation of Vision 2025, by imitating the Asian Tigers model in Tanzania. The Mini-Tiger Plan emphasizes the introduction of Special Economic Zones and Export Processing Zones.
Long-Term Perspective Plan	Created to help implementation of the Vision 2025 was the Tanzania Long-Term Perspective Plan (LTPP) 2011/12-2025/26. The Long Term plan has been divided into three five years plans to simply its execution.

2011/12-2025/26	The FYDP I (2011/12-2015/16) was to focus on building the requisite infrastructure, improve energy supply and markets. The FYDP II (2016/17-2020/21) intend to deepen industrialization as the key pillar of socio-economic and political development while the FYDP III (2021/22-2025/26) will focus on further promoting the competitiveness of the manufacturing sector and a substantial improvement in Tanzania's share in global and regional trade.
National Trade Policy 2003	Prepared by the Ministry of Industry and Trade and strictly followed the principles stated in the Vision 2025 by focusing on private sector led export growth. The National Trade Policy 2003 emphasized stimulation and encouragement of value addition as one of its chief objectives
Kilimo Kwanza Policy	The policy which was adopted in 2009, emphasizes industrialization to address the needs of agricultural producers. Industrialization is considered to lead to both increased supply of fertilizers and agricultural machinery and improved seeds as well as adding value to agricultural produce.
Small, Medium Enterprise Development Policy 2003	This policy specifically acknowledged the special role of SMEs in the context of Tanzanian industrialization. It aimed to address the constraints to industrialization and to tap the full potential of Tanzania's SME sector. The policy had a beneficial impact on SME performance, but many constraints it aimed to address still exist to this day.

Source: http://allafrica.com/stories/201605041028.html

The Tanzanian National Strategy for Growth and Reduction of Poverty (NSGRP)

The Tanzanian National Strategy for Growth and Reduction of Poverty (NSGRP or MKUKUTA1 in Kiswahili), clearly highlights the important role of natural resources and environment to combat poverty. There are environmental targets under all three clusters. 14%of the targets directly or indirectly relate to environment and natural resources management. The NSGRP emphasizes improving the linkages between macro-economic drivers of growth such as tourism and mining, and rural livelihoods at the micro-level. It also emphasizes the importance of sound, accountable, and transparent governance of public resources as the foundation of a healthy and growing economy that spreads benefits throughout the population.

The National Integrated Coastal Environment Management Strategy, 2003

This strategy comprehensively provides useful linkages between environment and poverty and the coastal resources. It strongly advocates for integrated and participatory approach to coastal zone management. The strategy proposed to be adopted to arrest the rapid deterioration of coastal ecosystems include among others promoting integrated, sustainable and environmentally friendly approaches to the development of major economic uses of the coastal resources to optimize benefits. This strategy is useful particularly on project such as oil and gas that are being developed in some areas along shores of Indian Ocean.

National Strategy on Climate Change (URT, 2012)

The National Strategy on Climate Change focuses on enhancing climate resilience in Tanzania while reducing vulnerability of natural and social systems. This can be attained by establishing efficient and effective mechanism to address climate change adaptation and achieve sustainable national development through mitigation actions with enhanced international cooperation. The strategy objectives among others include building the capacity for Tanzania to adapt to climate change impacts, and also enhancing resilience of ecosystems to the challenges posed by climate change

National Environmental Policy, 1997

The National Environmental Policy, 1997 provides a framework for making fundamental changes that are needed to bring environmental considerations into the mainstream of decision-making in Tanzania. It also seeks to provide policy guidelines and plans and gives guidance to the determination of priority actions, for monitoring and regular review of policies, plans, and programmes. The overall objectives of the National Environmental Policy are, therefore, to ensure sustainable and equitable use of resources without degrading the environment or risking health or safety; to prevent and control degradation of land, water, vegetation, and air which constitute the essential life support systems; to conserve and enhance natural and man-made heritage, including the biological diversity of the unique ecosystems of Tanzania; to improve the condition and productivity of degraded areas including rural and urban settlements in order that all Tanzanians may live in safe, productive and aesthetically pleasing surroundings; to raise public awareness; to promote individual and community participation; and to promote international cooperation

The Tanzania Investment Act, 1997

The Tanzania Investment Act, 1997 stipulates that one of the functions of the Investment Promotion Center (IPC) is to liaison with appropriate agencies to ensure investment projects use environmentally sound technologies and restore, preserve, and protect the environment. Under this important step, IPC vets unscrupulous investors who may want to maximize profits at the expense of the environment.

The Environmental Management Act (Cap. 191), 2004

The Environmental Management Act was passed by the National Assembly in 2004, and in the beginning of 2005 the President assented to the Act. The Act repealed and replaced the National Environment Management Council Act, 1983. The Act is a framework environmental law which provides for legal and institutional framework for sustainable management of the environment and natural resources in the country. The Act includes provisions for institutional roles and responsibilities with regard to environmental management; environmental impact assessments; strategic environmental assessment; pollution prevention and control; waste management; environmental standards; state of the environment reporting; enforcement of the Act; and a National Environmental Trust Fund.

The gives roles and responsibilities to institutions with regard to environmental management; principle for management; impact and risk assessments; strategic environmental assessment; prevention and control of pollution; waste management; environmental quality standards; public participation; compliance and enforcement; implementation of international instruments on environment; state of the environment reporting; implementation of the National Environment Policy; establishment of the national environmental trust fund; and to provide for other related matters. The Act provides for legal and institutional framework for sustainable management of Biodiversity. It addresses environmental protection and ecosystem management plans; conservation and protection of economical sensitive areas; prohibition of human activities in certain areas; management of forest resources; conservation of biological diversity.

The National Environment Management Acts 2004 contains a number of regulations that have relevance to industrial establishment including those regulations for controlling pollution as well as protecting the natural resource base. Some of these Regulations include Biosafety Regulations, 2009; Waste Management Regulations 2009; Strategic Environmental Assessment Regulations, 2009; Solid Waste Management Regulations, 2009; Environmental Inspectors Regulations, 2011; Noise and Vibration Standard Regulations, 2011; and Hazardous Waste Management Regulations, 2009.

Other sectoral legislations

A number of other environmental management strategies and legislations have been evolved around sectors that are supportive to industrialization agenda including legislations related to arid lands, mountainous lands (Land Act 1999), wetlands, agricultural and pastoral land (Land Management Act 2004), coastal and marine areas, water (Water Resources Management Act 2009 and Water Supply and Sanitation Act 2009) and forests (Forest Act 2002). Other sectoral laws are Wildlife Conservation Act 2005, Tanzania Food, Drugs and Cosmetics Act 2003, Occupational Health and Safety Act 2003, Mining Act 2010 and Industrial and Consumer Chemicals (Management and Control) Act 2003. These entire acts have defined, identified and set priorities to issues of environmental conservations. In addition, sector-specific policies, strategies and laws address issues of deforestation, land degradation and poverty reduction, e.g., in water resources management, rangeland management, energy resources, local government and mining.

Table 3: Summary of Policies Relevant to Industrial Development –

Policy	Policy
National Environmental Policy (1997)	National Environmental Action Plan (2013)
The Sustainable Industrial Development Policy (1996- 2020)	National Strategy for Growth and Reduction of Poverty II (2010) and
National Water Policy (2002)	Tanzania Development Vision 2025
National Health Policy (2007)	National Agriculture Policy (2013)

National Science and Technology Policy (1996)	National Livestock Policy (2006)
National Biotechnology Policy, 2010	National Irrigation Policy (2010)
Mineral Policy of Tanzania, 2009	National Forest Policy (1998)
Agricultural and Livestock Policy (1997)	Fisheries Sector Policy (1997)
Wildlife Policy (2007)	National Tourism Policy (1999)
National Land Policy (1995)	Mineral Policy of Tanzania (2009
National Energy Policy (2003)	National Population Policy (2006)
National Human Settlements Development Policy (2000)	

Tabl 4: Summary of Legislations Relevant to Industrial Development

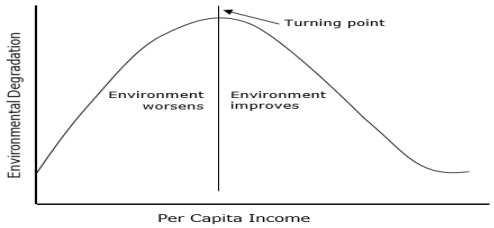
Legislation	Legislation
National Environmental Management Act (EMA) No 20 of 2004.	Mining Act No. 14 of 2010:
Tanzania Food, Drugs and Cosmetics Act (2003)	The Veterinary and Animal Diseases Act, 2003
Occupational Safety and Health Act (2003)	Local Government (Urban Authorities) Act No. 8 (1982) and Local Government (District Authorities) Act No. 7 (1982).
Tanzania Bureau of Standards Act, 1975 (Act No. 3 of 975);	Water Resources Management Act, 2009
The Public Health Act No. 1 of 2009	Water Supply and Sanitation Act, 2009
The Plant Protection Act of 1997	Air Quality Regulation
The Merchant Shipping Act No.21 of 2003	Effluent Quality Regulations
The Merchandise Marks Act of 1963	Tanzania Food, Drugs and Cosmetics
Fair Competition Act, 2003 and Merchandise Marks Act (1963)	Environmental Solid Waste Management) Regulation
Atomic Energy Act (2002)	Environmental Management (Hazardous Waste Control and Management) Regulations (2009)
Industrial and Chemicals (Management and Control) Act 2003	

There are also other initiatives that are supportive to industrial development in the country. For instance, NEMC has worked in collaboration with other institutions to ensure compliance and enforcement through awareness program, and issuing orders has enabled improve the environmental conditions. Since the enactment of EMA in 2004 use in there are about 2200 certified projects, with 10 percent of that number accounting for industrial establishment. In support of industrialization Agenda also the Council has registered environmental experts who can guide industrialists on environmental impact assessment and environmental audit the key elements for the implementation EMA, 2004.

8. Environmental considerations for industrial development

Industries established have to fulfill the environmental requirements (SD, local legislations and voluntary schemes). Resource and environmental considerations must be integrated into the industrial planning and decision-making process of government and industry. This will allow future growth by increasing the efficiency of resource use, reducing waste and encouraging resources recovery and recycling. The *Brundtland Report* (1983) defined SD as "development that meets the needs of the present without compromising the needs of future generation to meet theirs. Development to be *sustainable* must not interfere with the function of ecological processes and life support system. SD is defined by three pillars of sustainability (social equities, economic needs and the environment).

Historically, countries have sacrified their environment for the economic growth. It is later when the economy has stabilized that is when the environmental measures are prioritized and the accumulated capita can be directed to environmental management programs as shown by the Kuznet Curve. Developed countries such as USA, Japan and now China have gone through that transition. Many economic environmental challenges are not included in the planning even in the developing countries since they were observed as distracting achieving economic goals. Although natural resources are fundamental to the economy and the livelihoods of both urban and rural populations, their exploitations have contributed to the environmental degradation.



The assumption is that economic growth has to compromise environmental protection and Tanzania can learn from others and support industrial development that accounts for environmental protection. Industrialization of western Countries in 20th century is associated with increased wealth. However, it led to massive environmental problems such as emission of GHG, ozone layer depleting substances.

Technological change has been motivated by private companies with environmental effects seen as externalities and burden shouldered by human community and the government. The negligence in protecting the environment is partly based on avoiding incorporating externalities in industrial planning and budgeting. This omission is a leading cause of the wide-spread environmental damage and social strives that are experienced in almost every part of the country. As long as the environmental damage is not addressed, a substantial base of economic growth will be slowly eroded and poverty reduction objectives are unlikely to be achieved.

9. Path to Sustainable Industrial Development

Planning Aspects

There are numerous environmental constrains to industrial activities, and therefore planning is necessary. The choice of environmentally sound sitting of industrial activities is extremely important. Industries can be located in designated areas through zoning, the approach that allows intensifying industrial activities within a specified geographical site that has support mechanism to deal with environmental impacts. Established industrial zones must consider the master plans and each designated site must be well suited with environmental consideration

The knowledge of the state of the environment in the chosen area by getting inputs from environmental assessment is necessary in order to know the capacity of ecosystems to support industrial establishment in term of resources needed as well as the waste generated. Therefore, planning has to address the following aspects among others:

- Environmental resources affected by externalities (public health issues or environmental damage;
- Avoiding environmentally sensitive areas and protect and enhance natural areas and natural processes;
- Proximity of existing infrastructure including transport and waste networks, energy supplies and water services;
- Efficient use of land,
- Buffer zones to manage impacts avoid offsite impacts;
- Exploration of opportunities for synergies including by-product reuse and co-location with existing land uses; and
- Industrial development that accounts for economic and social issues including employment, safety, heritage and identity.

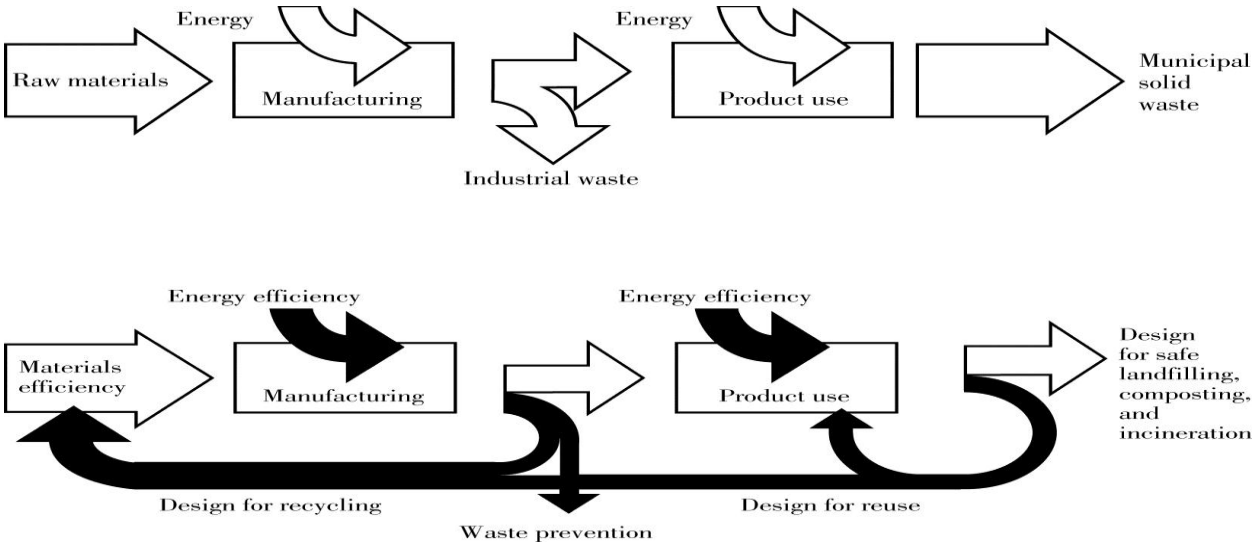
Through planning, the designated sites for industries (e.g. industrial parks) have to be designed in such a way that they offer serviced industrial land, equipped will all-encompassing utilities and infrastructural facilities that fit international standards and that has adequate consideration for people safety and environmental conservation. Likewise, strategies for the supply and use of resources as part of the planning, design, construction and operation of industrial areas should promote innovation and efficiency; consider opportunities for the use of renewable resources and the reuse and recycling of all resources.

Resources Efficiency

Resources for industrial activities are scarce, yet human demands and are alternative use are increasing. As resources are limited and human wants are unlimited, it is important for the industrialists to utilize the resources effectively and efficiently without waste. This situation calls for green industries, with their aims at achieving eco-efficiency of industry. They are the industries that have adopted and are applying environmentally sound technological processes and equipment, as well as products taking into account the complete product life-cycle. To achieve resources efficiency entails using tools such as Life Cycle Assessment that will help using less material in production processes, designing products that use less energy resources, it promotes re-use and recyclability of the materials, also encouraging extended product use life span.

Application of a closed system of material flow instead of conventional linear

Resource and environmental considerations must be integrated into the industrial planning and decision-making processes of government and industry. This will allow a steady reduction in the energy and resource content of future growth by increasing the efficiency of resource use, reducing waste, and encouraging resource recovery and recycling. Therefore, concept such as industrial ecology should be applied with emphasis on optimum utilization of resources that advocate for minimizing use of resources while maximizing the reuse of resources. This principles encourages reduction of wastes and the waste that is generated is used by other processes.



Competitive Industrial Products

The recent trend towards a growing open market through globalization have created a new dimension where quality and environmental measures has become the language of communication in trade and integration (Japan, Europe, USA, Asia). As a result the international decisions and agreements in the environment adopted in countries do not practically help to improve environmental conditions. Industrialization in Tanzania should account for globalization such as interdependence associated with flows of capital and technology and the dynamics of trade in goods and services. In other words, globalization can be a blessing or a curse. To benefit from globalization we need examine the advantages of globalization (capital, skills and technology). Industrialization should account for producing acceptable products into markets (local and International), they should be products that are presumed to be environmentally safe, involves developing and promoting products and services that satisfy customers want and need for Quality.

Eco-design consideration

Newly established industries have to consider eco-design aspects such as taking into consideration environmental factors in the design of products for various reasons including compliance to the environmental legal requirements, adherence to the international products standards which entails safety, toxicity and energy requirements. Likewise, industrial designs that consider waste minimization tend to reduce production costs through efficient use of materials and energy resources. Scarcity of resources nowadays encourages consideration for alternative designs, alternative use of raw materials and products. Similarly products produced efficiently may be less expensive

Economic Instruments for Integration of Environmental and Industrial Policies

Integration of environmental and industrial policies in Tanzania takes place through the development and application of economic instruments such as charges for emissions and discharges of pollutants, disposal of waste into the environment. In 2008, types of charges were introduced such as charges for the review of the EIA as well as charges as annual environmental Fees and charges. These charges were further reviewed in the new regulation that was released in 2016. Introduction of environmental fees and charges is to put the tax burden on resource use and pollution.

Environmental assessments

Increased number of industries if unregulated will exacerbate environmental problems. But, these problems can be minimized or controlled by employing tools such as EIA. EIA has helped introducing environmental sensitivity in decision making process at the project level. Proponents of the projects are required to subject their projects into environmental impact assessment. But the lack of institutional capacity and skilled personnel mean that these are often conducted by outside consultants, without quality checks. In some cases, government authorities would benefit from a second opinion on the environmental documentation they receive. This broader environmental assessment should he applied not only to products and

projects, but also to policies and programmed, especially major macroeconomic, finance, and sectoral policies that induce significant impacts on the environment.

Compliance and Enforcement of Environmental Requirements

The regulations and standards should govern such matters as air and water pollution, waste management, occupational health and safety of workers, energy and resource efficiency of products or processes, and the manufacture, marketing, use, transport, and disposal of toxic substances.

Management of Hazardous wastes

Increased number of industries will lead to increased volume of hazardous wastes that requires appropriate disposal mechanism. At the moment the country lacks systems to for disposing hazardous wastes. More often Cement Kilns have been used for incinerating hazardous wastes. Therefore, the government has to establish a system for handling hazardous wastes.

Understanding Vulnerabilities to Industrialization

Industrial development is very vulnerable to the impacts of climate change. For instance, agro-industries that are supposed to feed materials to other industries are more likely to be impacted by the climate changes since agriculture heavily depends on annual rainy season. Water supply alike for power generation needed to run industries is affected by weather pattern variation. Therefore, these vulnerabilities have to be analyzed and mitigation measure proposed to ensure that industrial operations are not impacted.

In summary, environmental imperatives for industrial development in Tanzania are included in the Table 7.0 below.

Table 7: Environmental Management Recommendation for ensuring Sustainable Industrialization

ASPECT	RECOMMENDATIONS
Planning Consideration	Location of an industrial area will ultimately influence its environmental, economic and social performance. There is a need of identifying and selecting sites that are optimal for industrial establishment. The assessment and choice should involve a more rigorous study of opportunities for resource efficiencies, infrastructure development as well waste management. Planning of industrial need also to account for strategic and targeting global and regional standards of the products and service. Data base for industrial establishment has to be strengthened for effective environmental monitoring. Industrial Zones have to be established in major cities and towns and supported with infrastructure facilities such as road, electric power, telecommunication, water supply, and waste management facilities. Design should as well be considered during planning stage. Continuing applying SEA to all established industrial parks and EIA for the newly established industries.
Site Selection	Undertake an analysis of the economic, ecological, hydrological, and physical features of the site, which may include various technical site investigations to determine whether the area is capable of sustaining industrial uses and that it will accommodate waste management facilities.
Economy	Industrial developments tend to create socio economic activities, therefore, sitting of these industries need to minimize environmental impacts and footprints. The location of existing infrastructure, particularly transport and the co-location of industries close to or within the development can influence the economic success of an industrial development.
Strengthening Institutional make-up for Industrialization	Industrial growth is attracted more to the countries that have tranquility in political systems or those which have investment friendly policies. Compliance and enforcement of environmental laws is influenced by good governance and well-functioning institutions and rule of law where each entity is treated fairly.
Technological Consideration	Industrial development need to account for technologically geared systems on environmental issues such as using systems that are efficient on using resources and also capable of managing management wastes and emissions as well. The government on its side has to create training opportunities for personnel in the field of environmental management that can work on regulatory institutions as well as on regulated institutions. Industries on their side have to ensure that they have employed qualified personnel in the field of environment.
Land issues	Land for industrial establishment is often in short supply due to land use constraints and the potential for land use conflicts between industrial activities and sensitive land uses. Considerable economic, social and environmental benefits arise from locating industrial developments in close proximity existing infrastructure and services. Therefore, industrial establishment would entail availability of serviced land.
Water Supply	Industrial establishment involves massive consumption of water. There are many factors which dictate the availability of cost effective, suitable alternative water supplies including the types of industries likely to be located within the development. Water supply options require thorough investigation at the earliest stages of planning. The use of recycled water for industrial operations is a preferred option.

Energy Resources	The expansion of the electric power supply has a paramount contribution in the development of industrial sector. As a result, both domestic and foreign private investors are highly encouraged to invest in power generation area. In addition an appropriate mechanism, which activates the generation of electric power using diesel generator, sunlight and wind power has to be mapped out. Reducing energy use in industrial areas requires efficient design and construction practices, including greater utilization of renewable resources, improved energy efficiencies and offsetting unavoidable emissions. Reductions can be achieved through legislative controls and voluntary changes. Due to the energy requirements of industrial processes, it is not always physically or economically viable to utilize renewable sources for primary supply. Nevertheless, Tanzania has a number of locations where renewable sources including solar, wind, geothermal, hydro, landfill gas and biomass are suitable and these should be explored as a secondary supply.
Infrastructure Development	Establishment of Industrial Parks/SEZ need necessary services and facilities (e.g. Ethiopia, South Korea, India and Ethiopia) As stipulated in IIDS, 2025. Industrial Parks located along key economic corridors, and surrounded by infrastructures. Infrastructure development should account for central systems for waste management as well as hazardous waste.
Internationalizing economies and Market approach	This aspect involves developing products/services that are competitive in both local and international markets. Industrialists through the support of the government have to recognize tools for products environmental assessment such as carbon foot print and eco-labeling. In order to attain middle income economy by 2025, the foreign currency is needed, therefore investing in environmentally competitive products and services is of paramount importance.
Resources Efficiency	This will allow a steady reduction in the energy and resource content of future growth by increasing the efficiency of resource use. It also advocate for waste reduction and encouraging resource recovery and recycling
Manpower development	The effective development of disciplined and hard working labor force has an important role to play in ensuring efficient industrial development sector. To this effect, an appropriate educational curriculum of professional and vocational system has been started. In addition to this, the promotion of on the job training and apprenticeship has to be firmly undertaken. Further make the training system should include ethical values, be able to meet the labour force requirement of the investors and consider the accountability of managers. Human capital, financing and institutional capacity.
Strengthen Micro and Small Companies	As micro and small companies are the playground for the emergence of entrepreneurs and as they have the potential to create large employment opportunity, they need to be given special attention and support for growth and development. However, these also have contribution to environmental damage and they have to be adequately governed.
Community consideration	Sustainable industrial developments are unlike traditional industrial areas and apply concepts which may be new to many communities. It is important that developers and planning authorities engage communities early in the planning process to communicate how the community will benefit from the development and to generate trust and support for the proposed outcomes.

10. Benefits of implementing the suggested interventions

Concern for the environment is being reflected in changes in consumption-related perceptions and behavior. People are increasingly more interested on environmentally friendly products; this in turns has important implications for business strategy and public policy. In some countries the green marketing is part and parcel of the overall corporate strategy. In other words the proposed interventions will help;

- Sustain long-term growth along with profitability.
- Companies market their products and services keeping the environment aspects in mind.
- Accessing the new markets and enjoying competitive advantage.

11. Proposed Roadmap for Environmental Improvement in Industries

PHASE I (SHORT TERM)	PHASE II (MEDIUM TERM)	PHASE III (LONG TERM)
Built Capacity of industries to manage environmental challenges (e.g. improving waste management infrastructure; strengthen skills of industries in environmental management and initiate planning of special Industrial Zones (Parks & SEZ); initiate the international requirements in production for selected industrial segment; and ensure enabling environment	Enhance capacity of industries in environmental management and skill in specialized fields of waste management and industrial/SEZ planning; Establish Parks/SEZ with supportive infrastructure; and initiate integrate requirements for internalization for the products; and enhance enabling environment	Modernizing the environmental management infrastructure; adoption and application of the international standards for the products; enhance domestic and international market penetration strategies

12. Conclusion

Industrialization is a must and its benefits are numerous. The envisaged industrialization in Tanzania should fulfill the objective of ensuring the middle income economy by 2025. It requires a balance on economic development as well as achieving social and environmental goals and values. Historically, inappropriate site selection and poor waste and emission controls have led to the pollution of the environment and social economic discomfort. Therefore, future industrial development should aim to maintain, protect and enhance natural environments and ecological systems. Integration of environmental considerations into industrial developmental activities raises fundamental issues concerning the type of Sustainable Development that is envisaged.

Waste generated as a result of increased industrial activities can increase in Tanzania because of waste intensity of industrial production. Water use in industry is expected to grow as a result of increased industrial activities such as those in the categories of food-processing, wood products, paper and chemical industries. In addition, municipal sewage discharges will increase with the development of small industries and services in urban areas. The industrial emissions are as well going to increase. While environmental regulations in industry are mainly focused on large factories or industrial complexes which are easily controlled by authorities, a host of small businesses, cause much environmental pollution and thus need special attention.

Therefore, aspects related to industrial development such as technological changes should account for environmental protection as well. Established industries require EIA, Risk Management and in addition they should incorporate economic instruments and regulatory approaches, as well environmental valuing techniques. This paper highlights and emphasizes development of environmentally friendly industries producing quality product that are competitive in both local and international markets. The life-cycle management approach is useful tools that can be used for environmental product declaration the spread of eco-labeling are just examples of the trend. In sum, proper planning of industrial establishments will protect our environment and minimize social-economic stress.

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