

Small and Medium Scale Industries (SMIs) and its Contribution to Industrialization in Tanzania: Prospects and Challenges

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ABSTRACT

Tanzania has undergone various stages involving industrial sector reforms since its independence in 1961. Since then, the Government of Tanzania has implemented various industrial reform programs aiming to build and capacitate the industrial sector so as to increase industrial outputs, hence strengthening economy of the country. With regard to Small and Medium Enterprises (SMEs) in general and Small and Medium Industries (SMIs) in particular, the country has made several efforts to promote the sub-sector, including establishment of Small Industries Development Organization (SIDO) in 1973, a parastatal organization specifically mandated to plan, coordinate, promote and provide capacity development services to SMIs and SMEs.

Despite all these efforts, still the SMIs/SMEs have been facing several challenges that hinder their growth, and hence making them contribute insignificantly in the national industrialization agenda.

This review note outlines the contribution of small and medium industries and associated enterprises (SMIs/SMEs) to the national industrialization, and their prospects and challenges. The contribution of industrial research towards development and promotion of the SMIs is also reviewed whereby the roles, mandates and contribution of technical Industry Support Organizations (ISOs) towards promotion of industries in general and SMIs in particular is also critically reviewed, and evidences of how they help to promote the SMIs sub-sector are underscored. Alignment of the SMIs/SMEs in various National Development Priorities and plans is also reviewed and areas whether the nation need to put more efforts to realize even much larger economic and social contribution from the sector is also highlighted.

Key challenges that face the SMIs/SMEs have been summarized as lack of enough capital to acquire better supporting infrastructure and business environment; production of goods and services that have low market competitiveness locally and internationally; low industrial, manufacturing and entrepreneurship skills; poor collaboration among the SMIs and hence not getting the advantage of economies of scale; and majority of the SMIs and SMEs operating informally and sometimes in poor environment that limit their compliance to quality standards for local and foreign markets.

Recommendations have been made on how best the nation can align its industrialization priorities, policies and programmes to better accommodate the SMIs/SMEs. This would make them contribute even more to the nation economic growth by creating market to raw materials from agriculture and other economic sectors, reducing importation of goods and machines that can locally be made and hence reducing the use of foreign currency, creating more employment opportunities, and improving the living standard of the people. This in turn will assist the nation to achieve the SDGs and industrialization agenda aiming to improve livelihood of people and the nation moving towards higher middle-income economy by 2025.

Keywords: *Small and Medium Industries (SMIs), Industry Support Organizations (ISOs), National Industrialization Agenda.*

1 INTRODUCTION

Tanzania's industrial sector has evolved through various growth stages since independence in 1961. During colonial time, the primary focus of manufacturing in Tanzania was on primary, low value, labour-intensive agricultural goods. After the Second World War (WWII), main focus was on production of primary products such as cotton, sisal, and tobacco for export and replacing imported ones (Msami and Wangwe, 2016).

After independence in 1961, Tanzania identified the importance of industrial development as one of the effective means of transforming the economy. This could be achieved through increased foreign export of processed goods, reduced importation of industrial goods, expansion of market for raw materials, increasing tax base, and increased employment opportunities. Hence the Government of Tanzania had implemented various industrial reform programs aiming to build and capacitate the industrial sector so as to increase industrial outputs, hence strengthening economy of the country. In an effort to promote Small and Medium Industries (SMIs) in particular the government establishment Small Industries Development Organization (SIDO) in 1973, a parastatal organization specifically mandated to plan, coordinate, promote and provide capacity development services to SMIs and SMEs.

Nevertheless, most of the post-independence industries established were basic industries aimed to process and add value to raw materials prior to export. These industries created technological dependence in operations and maintenance due to limited industrial research capacity, and lack of large (mother) industries to support the large basic industries and the SMIs. For Industrial development to take place reliably there was a need to have Industry Support Organizations (ISOs), which were needed to

conduct industrial researches in the areas of technology development, and provide for spare parts and industrial technical backstopping to the existing and new industries.

The contribution of SMIs and SMEs in Tanzania's industrial economy cannot be understated. According to the Tanzania Chamber of Commerce, Industry and Agriculture (TCCIA), more than 95% of businesses in Tanzania are small enterprises (SMIs/SMEs), which contribute about 1/3 of the country's Gross Domestic Product (GDP) and are responsible for generating up to 40% of total employment. The Tanzania Development Vision (TDV) 2025 indicates that about 54.3% of small, medium and micro enterprises (MSMEs/MSMIs) in Tanzania are women-led businesses and fall under the informal sector, mostly in agriculture.

The Tanzania's Third Five Year Development Plan (FYDP III: 2021/22-2025/26) medium-term development agenda aims to steer the country to a middle-income economy and a high level of human development. The FYDP III main theme is "Realizing Competitiveness and Industrialization for Human Development", with two pillars: (1) Economic growth, focusing on competitiveness, trade, industrialization, and services; and (2) Social Development, focusing on inclusiveness and skills development.

Despite the good previous efforts made by the Government in promoting the industrial sector, the growth and contribution of SMIs has continued to be lower than its projected potential. The SMIs have been facing several challenges including lack of enough capital to acquire better supporting infrastructure and business environment; production of goods and services that have low market competitiveness locally and internationally; low industrial, manufacturing and entrepreneurship skills; poor collaboration among the SMIs and hence not getting the advantage of economies of scale; and majority of the SMIs and SMEs operating informally and sometimes in poor environment that limit their compliance to quality standards for local and foreign markets.

In an effort to solve industrial research, innovations and development challenges, the Government of Tanzania, through the Basic Industry Strategy (BIS) of 1975-1995 established research based (R&D) Industrial Support Organizations (ISOs) for carrying out research and providing research findings to the industrial and other related sectors including carrying out design, adaptation and development of various technologies in order to capacitate the sectors.

Efforts to specifically promote SMIs include allocation and provision of specialized land for SMIs, setting aside a fund for SMIs infrastructure development, provisions of common facilities infrastructure and Technology Development Centers (TDCs) at

regional and now moving to district levels, and encouraging Public-Private Partnership initiatives (PPP) with the SMIs.

With regard to financial support to SMIs, various organizations have in the past supported SME/SMIs in Tanzania in form of startups loans and capacitating various banks. E.g. in Dec 2016 AfDB SUPPORTED Line of Credit LOC amounting to 120 m USD. In April 2022 CRDB received from France Agent for Development (AFD) a credit line and portfolio guarantee of T.shs 182 billion in order to support MSMEs. CRDB also received from IFC a total of \$100 m in order to finance the SME/SMIs. AfDB also approved \$ 1.4 million to support women in Agriculture business in Tanzania and Mozambique. SMIs and SMES are therefore very important in boosting the industrial, agriculture and other sectors since they cut across all sectors.

The aim of this review note therefore is to underscore the contribution of small and medium industries and associated enterprises (SMIs/SMEs) to the national industrialization, their prospects and challenges, and probe discussions on the way forward. The contribution of industrial research towards development and promotion of the SMIs is also reviewed whereby the roles, mandates and contribution of technical Industry Support Organizations (ISOs) towards promotion of industries in general and SMIs in particular is also critically reviewed, and evidences of how they help to promote the sector are underscored. Alignment of the SMIs/SMEs in various National Development Priorities and plans is also reviewed and areas whether the nation need to put more efforts to realize even much larger economic and social contribution from the sector is also highlighted.

2 SMIs/SMEs AND HOW THEY ARE STREAMLINED IN THE NATIONAL DEVELOPMENT PRIORITIES

2.1 SMIs/SMEs and their Challenges

SMIs play a great role in ensuring that the nation achieves its various national development priorities, and sectoral development plans. This comes from the fact that in almost all the sectors of economy SMIs and SMEs are involved (e.g. *machinga*, SIDO entrepreneurs, *wakereketwa*, tour guides, agro-industry processors, small-scale fishermen, etc.). Their main challenge is lack of enough capital to have better supporting infrastructure and business environment in their respective micro-economic sub-sector, thus hindering their development and growth. This has always resulted in production of goods and services of low quality that have low market competitiveness compared to those produced in large industries and imported products; low production and productivity; low industrial, manufacturing and entrepreneurship skills; poor collaboration among the SMIs and hence not getting the advantage of economies of

scale; and majority of the SMIs and SMEs operates informally and sometimes in poor environment that limit their compliance to quality standards for local and foreign markets. There is therefore a need to the National industrial development policies, programmes and plans to address these challenges and provide the needed basic infrastructure and support services to the SMIs for the sub-sector to contribute even more to the national industrial economic growth.

2.2 Tanzania Development Vision 2025 (2020-2025)

The aspects of Tanzania's Development Vision (TDV) 2025, which aspires to have Tanzania transformed into a middle income and semi- industrialized nation by 2025, characterized by the year 2025: (i) high quality and sustainable livelihoods; (ii) peace, stability and unity; (iii) good governance and the rule of law; (iv) an educated and learning society; and (v) a strong and competitive economy. SMIs have a big role in ensuring that TDV-2025 goals are achieved.

2.3 Small and Medium Enterprises Development Policy (2003)

SMIs/SMEs play a critical role in economic development in the country. The SMEDP (2003) main focus is creation of an enabling business environment, developing of financial and non-financial services and putting the supportive institutional infrastructure. There is a great need for the government to support infrastructure development such as provision of ***common use facilities*** all the way to the district level in order to create conducive business environment to SMIs to grow and make a greater contribution to the economy.

2.4 The Third National Five-Year Development Plan 2021/22 – 2025/26

FYDP III implements projects and programmes aimed to open up economic opportunities, build an industrial economy, strengthen competitiveness in domestic, regional and global markets, as well as strengthen human development. Its Main theme is on *Realizing Competitiveness and Industrialization for Human Development*. It strives to enable the country to more effectively use her geographical opportunities and resources for production and economic growth, while, ensuring that the outcomes benefit all citizens in line with the Vision's goals of a high quality of life; underscores that trading system relies on the efficacy of hard infrastructure including rail, roads, ports and energy. SMIs/SMEs infrastructure upgrading like those proposed by SIDO at regional and district levels are key in fulfillment of the objectives of the FYDP III.

2.5 Integrated Industrial Development Strategy 2025

The IIDS (2025) aims to enhance Tanzania to use its own natural and human resources to address prevailing challenges and achieve the goals of Vision 2025. The visions of

the strategy are to (i) Build-up an internationally competitive business environment through development of industrial clusters formation, institutional support and concentrated infrastructure development; (ii) Make Tanzania the industrial and logistics hub of East and Central Africa, through extension and improvement of the existing development corridors and provision of an export and import platform at the waterfront; (iii) Promote rural industrialization through an "Agricultural Development Led Industrialization" strategy; (iv) Provide growth opportunities to all growth-oriented micro, small and medium scale enterprises and entrepreneurs through provision of attentive supporting measures appropriate to each of the specific developmental stages.

Improvement of physical infrastructures such as roads (TARURA/TANROADS), rural electrification (REA), rural water supply (RUWASA) and telecommunication services especially in the rural areas have tremendously contributed in revolutionizing the rural Tanzania, and promoting SMIs and SMEs growth in the rural areas, thereby addressing the IIDS 2025 very well.

3 THE ROLE OF ISO's IN PROMOTING SMIs AND THE NATIONAL INDUSTRIALIZATION AGENDA

3.1 Industry Support Organizations

After independence, Tanzania identified the importance of industrial development as one of the effective means of transforming the economy. This was equally important for both SMIs and large industries. For Industrial development to take place reliably there was a need therefore to have Technical Industry Support Organizations (ISOs), which were needed to conduct industrial researches in the areas of technology and industrial development, and technology adaptations.

The ISOs were also established as means to provide industrial technical support services to existing and new SMIs and large industries alike as part of the Basic Industrialization Strategy (BIS) to have primary/basic industries that process and add value to mostly agricultural and other raw materials without being technically and technologically dependent from outside the country. The established ISOs were the Tanzania Industrial Research and Development Organization (TIRDO) established through Act No.5 of 1979, Tanzania Engineering and Manufacturing Design Organization (TEMDO) established through Act No. 23 of 1980; and Centre for Agricultural Mechanization, and Rural Technology (CAMARTEC) established through Act Na. 19 of 1981. The four ISOs were established for following unique and distinct roles as follows:

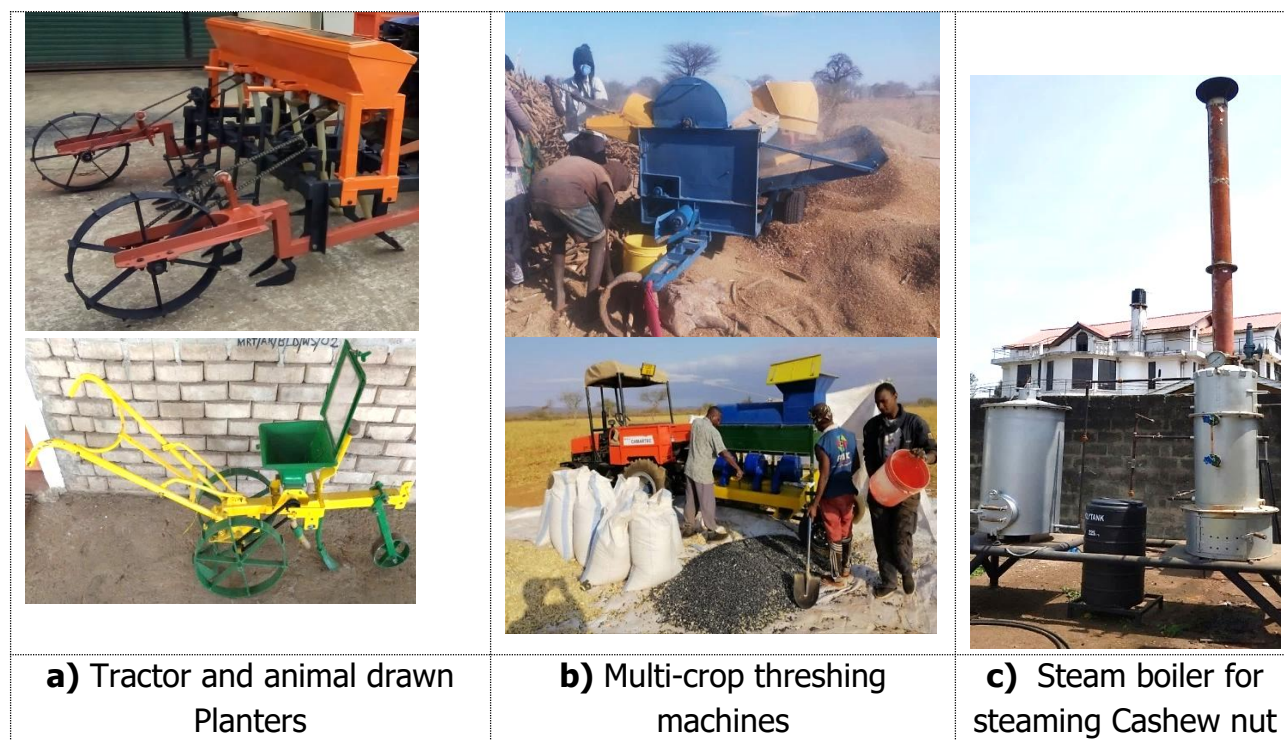
- i. **CAMARTEC:** Agricultural mechanization and promotion of rural technology through applied engineering research for development of agricultural implements and rural technology.
- ii. **TEMDO:** Industrial Development through Engineering design, adaptation, Manufacturing of machinery and spare parts to support local industries and to provide extension services to local industries to enhance self-reliance economy.
- iii. **TIRDO:** Industrial promotion through basic and applied research for local industrial processes, search for appropriate technologies that suit local industrial needs and application of local materials.
- iv. **SIDO:** Small Industries Development Organization (SIDO), a parastatal organization established under the Act of Parliament No. 28 of 1973. The organization was established and given mandate to plan, coordinate, promote and provide capacity development services to SMEs particularly to small industries.

The Industry Supporting Organizations (ISOs) have a great role in supporting the Government in driving the Nation becoming a higher middle income economy by 2025 through industrial research and development, job creating and economy growth by providing necessary information and technologies to Tanzania's SMIs/SMEs and the industrial sector in general.

3.2 CAMARTEC

The Centre for Agricultural Mechanization and Rural TECHNOLOGY (CAMARTEC) was established in 1981 as a combination of the Tanzania Agricultural Machinery Testing Unit (TAMTU) and the Arusha Appropriate Technology Project (AATP). Its main function is developing machineries and implements necessary for mechanizing agriculture.

The functional scope of CAMARTEC is the promotion of agricultural mechanization and rural technology through applied research, testing of agricultural machineries and dissemination of technologies, and providing training and consultancy services on agricultural mechanization and rural technologies.



CAMARTEC was also driven by need to mechanize agriculture, one of the key economic sectors in the country. There were also two factories namely *Zana za Kilimo Mbeya* (ZZK) and Ubungo Farm Implements (UFI), and the Tanzania Tractor Manufacturing Limited which were established in early 1970s - 1980s for mass production of agricultural machineries/implements. However, following privatization process in late 1990s, ZZK and UFI collapsed, thus CAMARTEC has remained a government entity with statutory role of developing machineries and implements necessary for mechanizing agriculture. Other large industries established generally to support small industries were the Kilimanjaro machine tools (KMTC), Mangula Machine Tools.

Since its establishment, CAMARTEC has developed a number of agricultural and rural technologies. These include 5 tillage technologies, 3 planting technologies, 2 weeding technologies, 6 rural transportation technologies, 1 harvesting technology, 14 threshing technologies, 1 crop warehousing, 8 environmental conservation/renewable energy technologies, 1 brick making machine, 2 other technologies were developed as indicated on Table 7. Among these technologies, 21 were transferred to SMEs/SMIs for mass production in their manufacturing industries.

CAMARTEC is currently establishing technology innovation hubs in various districts whereby people can buy or borrow machineries from the hubs to establish their own small agro-machinery industries, thereby supporting the growth agro-SMIs in the country.

3.3 TEMDO

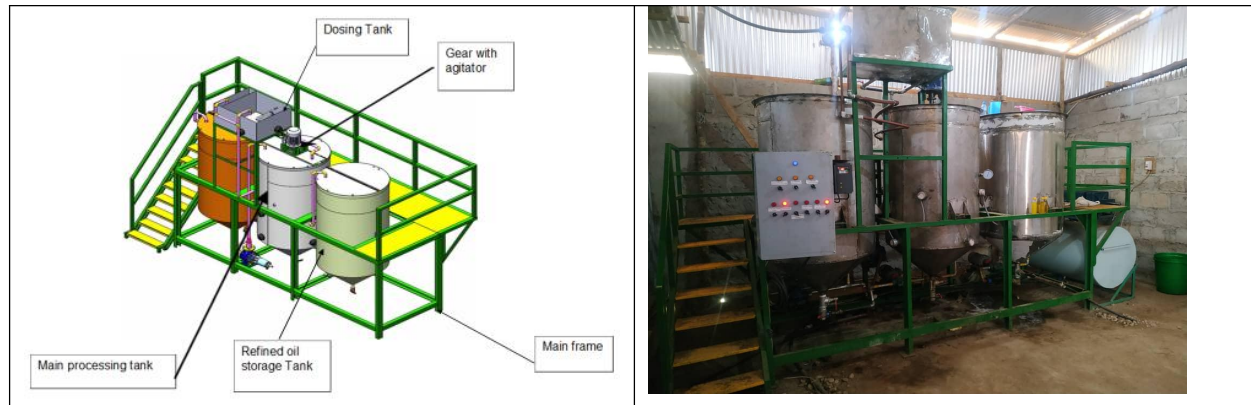
TEMDO was established in 1980 as an Engineering and manufacturing design institution for development of internal/local technologies to support industrial economic development and provide solutions to processing and value addition of locally available raw materials; as a national engineering R&D institution taking responsibilities of the African Regional Centre for Engineering Design and Manufacturing (ARCEDEM).

		
a) Biomedical waste incinerator	b) Briquettes making machines set	c) Bedside locker set

TEMDO supports SMIs through development of machineries and technologies that are up taken by SMEs to establish their own industries; provision of machines spare parts and industrial technical support services to existing industries. It also provides opportunities for young innovators to develop their engineering and industrial innovations through technology incubation programme, and through dissemination of technologies small industries such as SIDO, and private individuals and institutions adopt for commercial manufacture technologies designed and developed by TEMDO.

TEMDO also supports SMIs by allowing them to come and use their state-of the art CNC machineries for works that can not be done by conventional machines. Examples of modern machines available at TEMDO are CNC Lathe machine, CNC milling machine, Plasma cutting machine, NC sheet bending, sheet shear machine and NC pipe bending machines. Some of the machineries and plants manufactured by TEMDO for establishment of SMIs are as follows:

Sunflower oil complete mini-refinery plant with capacity of 1000 L/day



Three -tank mini- refinery plants

Cassava processing plant with a capacity of processing 12 tons of raw cassava per day:



Various machines for processing peanut butter to promote MSMIs



TEMDO has designed and now is in the process of manufacturing a prototype of sugar mini processing plant. The design capacity is 200 TCD, with a total plant cost of Tshs 960,000,000.



All these machineries help the SMIs through, creating expertise and employment, reducing the need for importation of small machines, helping to build new SMIs and building the capacity of existing ones.

The table above contains various technologies, which have been designed and developed into prototypes over the years. Some of them have been transferred to SME/SMIs and commercialized for public use.

3.4 TIRDO

The Tanzania Industrial Research and Development Organization (TIRDO) was established in 1979 to conduct research and provide professional services to all industries. Establishment of this industrial research institution was to avoid each industry having its own research unit. The main purpose of having such an institution for the country was also to put emphasis on the use of raw materials from within the country for industrial production, reduce imports, and create jobs.

TIRDO was formed after the collapse of the former East African Industrial Research Institute (EAIRI) following the downfall of the East African Community in 1977. With the mandate to assist the industrial sector of Tanzania by providing technical expertise and support services to upgrade their technology base. It was established to carry out applied research for the development of suitable technologies, and value addition to indigenous resources through industrial processing as well as to provide accurate technical information to help protect such industries for the interest of the country. Also, it was established to evaluate and develop the best technology distribution as well as the results of research conducted locally and abroad. The organization also develops

and provides training that enables the carrying out of scientific and technological research for industrial development. It also advises the Government, industries and establish a system to control and harmonize industrial activities thereafter prevent or reduce sources of pollution during industrial production by using appropriate technologies.

Similar Institutions in Africa and across the world:

- Uganda Industrial Research Institute (UIRI)
- Kenya Industrial Research and Development Institute (KIRDI)
- The National Industrial Research and Development Agency (NIRDA) - Rwanda
- Council for Scientific and Industrial Research (CSIR) - South Africa
- Botswana Institute for Technology Research and Innovation (BITRI)
- Malawi Industrial Research and Technology Development Centre (MIRTDC)
- Industrial Research and Consultancy Centre (IRCC) -Sudan
- International Development Research Centre (IIRD) - Algeria
- Research Centre in Industrial Technologies (CRTI) - Algeria
- The Malagasy Institute of Applied Research (IMRA) – Madagascar
- Council for Scientific and Industrial Research -India (CSIR)
- Industrial Technology Research Institute (ITRI) – Taiwan
- Korea Institute of Science and Technology (KIST)
- National Institute of Advanced Industrial Science and Technology (AIST) – Japan
- Singapore Institute of Standards and Industrial Research (SISIR)



Figure 1: TIRDO's professional services to industries (Ref TIRDO).

Other activities performed by TIRDO include Conducting High Impact Research such as coal and industrial mapping; Technical Industrial Audits; Feasibility Study for Industrial Establishment and Management; and Advising the government on Major Strategic Projects by Providing Technical Information.

TIRDO has eight laboratories, four pilot plants and a number of other physical facilities and workshops. It has established itself with laboratory equipment in order to increase the value of raw materials available in the country for industrial use, quality assurance services for various food and water products in order to protect consumer health as well as enable industries and service providers to sell quality products.

Therefore, SMEs intending to establish or having SMIs are helped by TIRDO in checking the quality of their products, and ensuring that plants designs are compliant with environmental considerations. This helps to ensure that products produced by SME/SMIs reach standards and hence are able to compete the market of large industries both locally and internationally.

3.5 SIDO

Small Industries Development Organization (SIDO) was established in 1973 and given mandate to plan, coordinate, promote and provide capacity development services to small and medium industries (SMIs). Specifically, with regard to SMEs and SMIs SIDO is responsible to facilitate entrepreneurship development and offer extension services, promote technology development and transfer, provide technical services, facilitate dissemination of business information and marketing, and provide work place and financial services.

The core mandates of SIDO are to:

- i. To promote the development of small industries in Tanzania;
- ii. To plan and co-ordinate the activities of small industry enterprises in Tanzania;
- iii. To provide services necessary for or incidental to proper development of small industries to parastatal organisations and other persons engaged in small industry enterprises;
- iv. To advise the Government on all matters relating to the development of small industries in Tanzania;
- v. To carry out research in the development of small industries and marketing of products thereof, including the standard and quality of such products;
- vi. To provide technical assistance to persons engaged in small industries;
- vii. To provide and promote training facilities for persons engaged in or employed or to be employed in small industries and to assist and co-ordinate the activities of other institutions engaged in such training;
- viii. To provide management and consultancy services to small industry enterprises in Tanzania;

- ix. To undertake or assist any institution or person in the undertaking of technological research and to encourage and promote technological advancement in Tanzania;

Therefore, SIDO has assisted the SMIs to advance in the country by providing services of promoting industrial development initiatives that contribute to industrialization; facilitating on SMIs infrastructure development; facilitating knowledge and business management skills development; investments and SMEs Access to Market; and facilitate SMIs Access to Finance. All these are aimed in ensuring well designed infrastructures, good entrepreneurship knowledge and market access to SMIs in order to support industrial competitiveness for Tanzania SMIs in regional and international markets.

The SIDO machines and technologies, some innovated, designed and manufactured by the SMIs under SIDO have helped in the growth of micro, small and medium industries (MSMIs and MSMEs) in the country thereby contribution in creating skills and employment, increasing the government tax base, reducing importation of small machines, and improving livelihood of the community.

4 CONTRIBUTION OF SMIs/SMEs IN VARIOUS SECTORS OF THE ECONOMY

4.1 SMIs Contribution in the Manufacturing Sector

Historically, manufacturing has played a key role in the economic development of developing Countries (Attiah, 2019). Since the industrial revolution, manufacturing has acted as the primary engine of economic growth and development.

The manufacturing industry is centered around turning raw products from various sectors such agriculture into finished goods. Currently, the majority of crops in Tanzania are mostly marketed in their raw or semi-processed forms, while value-addition to agricultural products is mostly done by SMIs on small scale secondary scale level. This contributes to low income of foreign currency.

Considering SMIs, there are several technologies developed and manufactured by SMIs and are used in various other sectors of the economy. These are such as agro-processing and value addition industries, livestock byproducts processing, fisheries, forestry, mining and forestry engineering. SMIs contributes a great deal in manufacturing spare parts for medium and large industries across the country, and making machines for establishment of new and improving the existing small industries.

Manufacturing industry is viewed as the leading sector to economic development. SMIs in the country contributes greatly to the manufacturing sector in Tanzania. We can have

economies of scale by applying advanced technology and division of labor and scientific management. Therefore, production and employment will increase rapidly. This will bring faster economic growth and capital formation.

SMIs contribute significantly to optimum utilization of scarce resources and provision of market to raw materials. It also contributes to expansion of the manufacturing sector. It increases the national income of the country through increasing tax base and expanding businesses, and increases the production of goods and services. The labor wages from SMIs sub-sector contribute to increased income of workers and hence improving the living standard of the people.

4.2 Mining Sector (MSMEs/SMIs Contribution to small miners)

Mining is first and foremost a source of mineral commodities that all countries find essential for maintaining and improving their standards of living. Mined materials are needed to construct roads and hospitals, to build automobiles and houses, to make computers and satellites, to generate electricity, and to provide the many other goods and services that consumers enjoy (NAP, 2002).

In Tanzania, recent records indicate that the contribution of small miners can not be underscored. It is estimated that small miners contribute about 40% of the mining sector. Also, most of the small miners use technologies that are locally manufactured by SMIs. Hence there is a great contribution of SMIs to the country's mining sector

4.3 Electricity Supply (Contribution of REA in rural industrialization)

Electrical energy plays an important role in progress in both social and economic terms. It is considered as one of the important inputs of industrial production, and plays a vital role in increasing the industrial volume (Johannesen, N.J et al., 2019). In addition to its contribution to industry, electrical energy is also very important in order to meet the daily needs of citizens. Considering SMIs common use facilities and many machineries used by them are electric or fuel driven (Qader, 2009). Presence of electricity in rural areas for example, through the Rural electrification strategy (REA) has greatly enhanced establishment of electricity dependent business and small industries in the rural areas. Examples are car and motor bikes garages, milling machines, welding and metal fabrications, etc. there is a need for the government to continue supporting REA to ensure that all the villages in Tanzania get reliable electricity to promote the industrial development.

4.4 Agriculture Sector

The agriculture sector contributes to SMIs through provision of raw materials. In turn the sector benefits from SMIs through agro-industries value addition and minimization of losses. Many technologies developed by SMIs are used in various nodes of the agricultural value chains from production to consumption. The initiatives on building a better tomorrow (BBT), has proven to be potential for creating employment to the youths while expanding the contribution of the agriculture sector to the national economy. BBT has also created an opportunity for SMIs to be engaged in processing of agro-products from the programme, hence producing even more employment, adding value and increasing shelf life of the produce, and creating opportunity for selling and exporting processed or semi-processed goods from the BBT Programme.

5 CHALLENGES AFFECTING SMI/SME DEVELOPMENT IN TANZANIA

Isanga and Musabila (2017) reported that SMIs development in Tanzania face challenges such as i) lack of access to finance, ii) international competition with cheap imports, iii) a problematic business environment, iv) unreliable power supply, and v) poor business infrastructures. However, people continue to make decisions to be entrepreneurs in order to be independent, self-employ, make a living, and increase personal income.

In order for an SME/SMI to succeed in running a business he/she needs to adhere to self-determination, creativity, passion, and respect for business. Also, a desire to fulfill family responsibilities, having more customers, and trust are some of the secrets towards a successful small businesses.

Sama (2011) reports that SME/SMI have played a very big role in steering Tanzania's economic development through creating employment, generating income and alleviating poverty. However, they face a challenge of insufficient capital resources, access to financing due to lack of collaterals and improper accounting information that are the key criteria for getting bank loans, use of manual and low-cost and inefficient production technologies, and not fitting well in the local and global supply chain systems because their businesses are mostly fragmented. Examples, producers of honey in Tanzania produces quantity of honey that is enough to meet quantity market demand of export, but each one produces independently.

Therefore, SME/SMIs needs to be trained and capacitated on production and supply chain management from availability of technologies and raw materials, production, products collection system, preservation and bulk storage to reduce losses (e.g.

warehouse receipt system), transportation, and strategies for reaching common local and foreign markets.

The infrastructure required for the growth of SMIS industries is inadequate, because the faster mobility of labor, capital, transport and communication facilities are insufficient. It is obstructing expansion of the industries in Tanzania.

Nowadays due to inflation people have low level of income and hence, low purchasing power of industrial products. That is why they demand fewer industrial goods, which hinders industrial development.

There is also shortage of reliable power like electricity and gas in most potential areas for industrial development due to which some industries are forced to shut down or cannot be developed.

Tanzania has extreme virgin land which most of it is located in rural areas whereby most of important infrastructures for SMIs and the industrial development such as water, electricity and means of communications are not available.

6 CONCLUSIONS

The Government should put more efforts on building up and improving infrastructure such as common use facilities transport and communications required for the growth of SMIs and large industries as well.

The Government should set aside funds for provision of loans to the SMIs for the development of these industries.

The Government should assist the growth of SMIs by restricting importation of some of the machineries and products that can locally be manufactured by the SMIs and other industries within the country.

There is a need to put more efforts in educating people and local entrepreneurs and business people on the importance of consuming products from local manufactures in order to promote the domestic industrial development.

The Government should put more effort to supply electricity energy and supportive infrastructures to areas of small industries growth interest for attracting SMIs industrial investments.

The Government should put in place environmentally friendly policies and frameworks to create conducive environment for establishment and operation of SMIs as business

enterprises including the one-stop small businesses clinics where all the government services needed for establishing and registering an industry can be easily accessed. This will attract many people to invest in the small industries sub-sector.

Tanzania Government have to subsidize imported raw materials such as steel, standard parts and iron while un-subsidizing imported machineries so as to bring market competitiveness between local industrial products and imported ones.

Tanzania should have stable policies and long-term vision on industrial development and other related sectors accepted by most of people investing in industries.

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APPENDIXES

Appendix 1: Some of the Technologies developed at CAMARTEC.

No.	Category	Technology
1.	Tilling technologies	CFT-Tractor (Camartec FasTractor).
		CFT-two bottom disc plough
		Ox-plough (CAMA Plough).
		Ox-drawn Ripper ridge with planter attachment
		Ox-drawn Sub-soiler
2.	Planting technologies	Ox-drawn multi-crop planter
		Tractor operated multi-crop planter (22-55hp)
3.	Weeding technologies	Ox-drawn Cultivator/Weeder
		Hand operated Rice Weeder
4.	Rural transportation technologies	Ox-cart
		Donkey-Cart
		Wooden wheelbarrow
		Hand Cart
		Trailer (1-5tons)
5.	Harvesting	Power Tiller Operated Rice Harvester-PORCH
	Threshing	Multi-crop thresher
		Sunflower thresher
		Sorghum/Bulrush thresher
		Tractor operated Milling machine
		Maize sheller
		Palm nut Cracker
		Forage Chopper
		Hay Baler machine
		Tomato Seed Separator
		Oil Press Machine
		Steam Boiler
		Pedal operated Cashew nut thresher
		Hand operated maize sheller
		Honey extraction machine
6.	Crop warehousing	Grain storage bin
7.	Environmental conservation/renewable energy	Community biogas plants
		Domestic biogas plants
		Domestic biogas cook stove
		Community biogas cook stove
		Community wood cook stove
		Parabolic Solar Cooker
		Solar water heater
		Solar dryer
8.	Others	Yoke
		Cinva ram machine (Soil-cement brick making machine)

	Bee hives
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Appendix 2: Some of the TEMDO's engineering and technology development achievements.

NO	SECTOR	TECHNOLOGY
1	Manufacturing	• Machine parts (assorted) • Bolts and nuts • Feeding screw • Machine Gears Industrial Exhaust Metal Pipes/Chimneys
2	Health (Class A)	• Delivery beds • Normal Hospital Beds • Examination Beds • Drip stands • Bedside Lockers • Hospital Screens • Mortuary Cabinets • Body lifters • Hospital Trolleys
3	Energy	• Small Wind Turbines or Turbines blades • Electricity High Voltage Metal Power Transmission Towers • Road/Street side metal lights poles • Cable trays
4	Post-harvest/Food Processing	• Oil seed processing machines • Edible oil mini-refining machines • Butter making machines • decorticating machines • seed sheller • seed huller • milling machines • grapes distemmer and pressing machines • spicy processing machines
5	Construction	• Small concrete mixing machine • Concrete conveyor systems • Block making machines (Manual and electric/power driven) • Dumpers • Trolleys • Wheelbarrows
6	Fishery	• Fish cages • Fish feeding (pellets) machines
7	Agro-technologies	• Tractor driven trailers (manual and with hydraulic braking system) • Edible oils refinery technologies • Tractor driven disc & harrows and ploughs
8	Mining	• Shaping of grinding stones • Fabrication of Cooling Cabinets

Appendix 3: Industrial technical support services performed by TIRDO.

Industrial Services	
- Non-destructive testing of steel pipes of Coca cola (NDT) factory - SGS	- Microbiological testing in ketchup samples
- Inspection of salt produced at Wawi - Pemba salt factory	- Testing of fresh water samples of RELIM water and Juice Co factory
- Testing without damaging SONGAS equipment	- Testing of bread samples to check its quality-
- Measuring air pollution caused by hospital waste incinerator	- Environmental inspection at ALAF factory
- Professional inspection of Pemba oil factory (Essential Oil distillery)	- Environmental Inspection at Cigarette Factory (TCC)
- Environmental Inspection at Tanga Cement Factory	- Professional inspection of TASAF 2015 office infrastructure
- Environmental audit of Morogoro tobacco factory	- Inspection of the impact of storing hazardous chemicals in different areas of the Bulyanhulu mine
- Environmental inspection at Serengeti brewery	- Audit of energy efficiency for industries under CTI
- Environmental audit of Mbeya cement factory	- Microbiological testing in ketchup samples
- Environmental audit of TANESCO plants	- Testing of fresh water samples of RELIM water and Juice Co factory
- Non-destructive testing of steel pipes of Coca cola (NDT) factory - SGS	- Testing of bread samples to check its quality-
- Inspection of salt produced at Wawi - Pemba salt factory	- Environmental inspection at ALAF factory
- Testing of food and water samples at the Hyatt Regency Kempisky Hotel	- Environmental Inspection at Cigarette Factory (TCC)
- Testing of banana juice samples produced by Kagoma Green Estate factory	- Non-destructive testing of Bulyanhulu mine equipment

Appendix 4: Some of the technologies and machineries produced by SIDO:

SN	AINA YA MASHINE	UWEZO	GHARAMA
1	Mashine ya kusindika unga wa mahindi (<i>Screw Conveyor, Distoner, Silo, De-Huller, na Maize Mill</i>)	1 tani kwa saa	39,000,000/=
2	Mashine ya kukamua mafuta ya alizeti (<i>Distoner, Screw Conveyor, Oil Expeller, Oil Filter na Tanks</i>)	80 lita kwa saa	34,000,000/=
3	Mashine ya kukoboa kahawa (<i>Coffee Pulper, Coffee Huller, Coffee Roster na Coffee Milling</i>)	1 tani kwa saa	8,000,000/=
4	Mashine ya kusaga viungo (<i>Cutting Machine, Drying Machine na Milling machine</i>)	kilo 100 kwa saa	3,600,000/=
5	Mashine ya kusindika karanga (<i>Groundnut sheller Machine, Groundnut stripper Machine, Peanut Roaster Machine, Peanut flour Machine na Peanut Butter Machine</i>)	kilo 120 kwa saa	9,700,000/=
6	Mashine ya kusaga na kuchanganya vyakula vya mifugo (<i>Animal feed milling, Animal feed mixer na Chaff cutter</i>)	kilo 120 kwa saa	14,000,000/=
7	Mashine ya kusindika chikichi (<i>Palm nut creaker, digester, Stelizing tank, na Kernel oil expeller</i>)	1 tani kwa Siku	55,000,000/=

8	Mashine ya kusindika korosho (<i>Grading, Boiling, Shelling, Steaming na Drying</i>)	kilo 500 kwa siku	19,000,000/=
9	Mashine za kusindika muhogo (<i>grating, chipping, pressing and milling</i>)	tani 5 kwa siku	8,600,000/=
10	Mashine ya Kufyatulia tofali za Block (<i>Blocks making machine - Manual</i>)	Tofari 300 kwa siku	700,000/=
11	Mashine ya Umeme ya Kufyatulia Tofali na Kuchanganya udongo (<i>Vibrated Blocks Making Machine with Mixer</i>)	Tofari 1000 kwa siku	8,500,000/=
12	Mashine ya Kufyatua Tofali za kuchanganya na udongo (<i>Interlocking Bricks Machine</i>)	Tofali 300 kwa Siku	750,000/=
13	Mashine ya Kukamulia Mafuta ya Nazi (<i>Coconut Grating and Pressing Machine</i>)	Lita 30 kwa siku	1,600,000/=
14	Mashine ya kukamua Mafuta ya Mawese (<i>Palm Oil Digester – Single unit</i>)	800kg (FFB) kwa saa	6,700,000/=
15	Mashine ya kuvunja mise/mbegu za mchikichi (<i>Palm Nut Cracker – Single unit</i>)	1 tani kwa saa	2,500,000/=
16	Mashine ya kukamua Mafuta ya Mise (<i>Palm Kernel Oil Expeller</i>)	80 lita kwa saa	7,500,000/=
17	Mashine ya kusaga nafaka (<i>Grain Milling No 50</i>)	Kilo 500 kwa saa	3,200,000/=
19	Mashine ya kusaga nafaka (<i>Grain Milling No 75</i>)	Kilo 750 kwa saa	4,000,000/=
20	Mashine ya kukoboa mahindi Roller mbili (<i>Maize Huller 2 Roller</i>)	Kilo 400 kwa saa	3,200,000/=
21	Mashine ya kukoboa mahindi Roller Tatu (<i>Maize Huller 3 Roller</i>)	Kilo 400 kwa saa	4,000,000/=
22	Mashine ya kuchakata muhogo mbichi (<i>Cassava Grating – Single unit</i>)	Kilo 750 kwa saa	2,500,000/=
23	Mashine ya kuchakata/kukamua asali (<i>Honey Press Manual - Stainless</i>)	Lita 50 kwa saa	1,000,000/=
24	Machine za kuchenjua dhahabu (<i>Illusion Machine for Gold Extraction</i>)	Kilo 800 kwa Siku	36,000,000/=
25	Mashine za kutengenezea sabuni (<i>Soap Extruder Machine</i>)	300 miche kwa saa	12,000,000/=
26	Mashine kuchana na kuranda mbao (<i>Combined Wood Planner Machine</i>)	16" 14" 12"	8,000,000/=
27	Mashine ya kukamua Juisi (<i>Juice Pressing Machine</i>)	20 lita kwa saa	2,300,000/=
28	Mashine ya Kukamua Asali (<i>Honey Press Machine</i>)	Lita 12	700,000/=
29	Mashine ya Kukamua Asali (<i>Centrifugal Honey Extractor</i>)	Lita 20 Kwa Mkupuo	2,000,000/=
30	Mashine ya Kukata Nyama (<i>Meat Cutter Machine</i>)	0.75 Kw	1,500,000/=
31	Mashine ya Kukamua Juisi ya Miwa (<i>Sugar Cane Juice Extractor Machine</i>)	Lita 30 kwa Saa	2,200,000/=
32	Mashine ya Siagi ya Karanga (<i>Peanut Milling Machine</i>)	Kilo 20 kwa Saa	1,800,000/=
33	Mashine ya Kusaga Viungo (<i>Spice Milling Machine</i>)	Kilo 80-100 kwa Saa	2,000,000/=
34	Mashine ya Kuchana Magogo (<i>Circular Saw Machine</i>)		2,000,000/-
35	Mashine ya Kukaanga Karanga	Kilo 20 kwa	1,800,000/=

	<i>(Groundnuts Roasting Machine)</i>	Saa/Mkupuo	
36	Mashine ya kusindika unga wa karanga <i>(Peanut Flour Milling Machine)</i>	Kilo 120 kwa saa	2,400,000/=
37	Mashine ya kupukuchua karanga <i>(Groundnut Sheller)</i>	200kg kwa saa	2,800,000/=
38	Mashine ya Kuvuna Karanga <i>(Groundnut Stripper)</i>	500kg kwa saa	900,000/=
39	Mashine ya Kuoka Karanga <i>(Peanut Roaster)</i>	80kg kwa saa	2,000,000/=
40	Mashine ya Kusindika Nyanya <i>(Tomato Pulp and Paste)</i>	40-50kg kwa saa	6,400,000/=
41	Mashine ya kusindika Ubuyu	Kilo 120 kwa saa	3,300,000/=
42	Mashine ya kusindika Mchele <i>(Screw Conveyor, Distoner, Kihenge, Kukoboa)</i>	400 Kg kwa saa	28,000,000 /=-
43	Mashine ya kuchakata Mkonge <i>(Sisal Extractor, Sisal Brushing)</i>	400 nyuzi kwa saa	8,150,000/=
44	Mashine ya kuchakata Ngozi <i>(Leather Extraction Machine)</i>	10 hides kwa batch	22,000,000/=
45	Mashine kutengeneza bidhaa za Ngozi <i>(Kukata Mikanda, Kuweka Urembo)</i>	Pc 200 – 500 kwa saa	7,800,000/=
46	Mashine ya kusindika viazi <i>(Kuosha, Slicing, Kukausha na Kusaga)</i>	kilo 120 kwa siku	27,000,000/=