Success story for Capacity Enhancement of Medical Technical Services (CEOMETS) project and health care technical services in Tanzania

Engineer Haule from Tanzania shares how the Tanzanian government has leveraged technical support from various sources to enhance its medical equipment management systems

South-South collaboration is Medical Equipment and other infrastructure Management within health facility is important to ensuring quality health services provision in any country. While Health-care technology is central to boosting the productivity and quality of healthcare systems, in many African countries medical equipment management systems are either weak or not available. A Health Policy reform is required for underdeveloped countries in Sub Saharan African Countries to change the status to a better system. Policy reform can help to ensure health-care technology is translated into everyday practice and how an integrated systems approach can enhance the operation of medical device management.

In the 1970s, the government of the United Republic of Tanzania established equipment maintenance systems to reduce downtime and raise uptime so that lifetime of equipment is prolonged. The Ministry of Health established hospital maintenance workshops at referral hospitals in the cities of Dar es Salaam, Mbeya, Moshi and Mwanza. Further, maintenance workshops were established to serve voluntary agency hospitals under the Christian Social Services Commission (CSSC).

Within this era, faith-based health institutions incurred huge investment in health technology/ equipment when compared to other areas like buildings renovations and human resource recruitment. Their source of funds was from overseas organizations. The idea to advocate for management change in health facilities evolved within this era. The Christian Organization - Tanzania Episcopal Council (TEC) through its medical board and Tanzania Christian Medical Association (TCMA) in one of the health facilities owned by Anglican Church Diocese of Central Tanganyika established a short course (Three Month) training center for maintenance of basic equipment at Mvumi Hospital in Dodoma whereby all technician and artisans working in health facilities (mechanic, electrician and plumbers) were enrolled.

This course was supervised by Christian Social Services Commission (CSSC) of Tanzania which is among the divisions managed by Tanzania Episcopal Council to specifically to coordinate for social health and education. Still the demand to improve for health technology management was recognized and in the 2000's a Health Care Technical Services Coordination office

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Biomedical Engineers at work

was established within the CSSC office headquarters. It was mandated to coordinate trainings and maintenance activities in faith-based health facilities while an idea to set Zonal Maintenance Centers in Tanzania was also muted.

In between 2000 and 2004 several maintenance workshops were put in place, namely Mbeya Hospital Maintenance Workshop (MBEHOMA), Evangelical Lutheran Church Moshi Workshop, Kilimanjaro Christian Medical Centre (KCMC) Workshop, Bugando Medical Centre Workshop, Kagera Medical Technical Services (KAMTES) workshop, Nyanza Medical Engineering Association (NMEA) workshop, Southern Highlands Hospital Maintenance (SHHOMA) Workshop and Eastern Zone Maintenance (CCBRT) Workshop under CSSC. It was supported by funds from GIZ by then was it was GTZ, KFW and the British Government. From the Government side the maintenance workshops were established at Muhimbili National Hospital, Mbeya Region Hospital and Mtwara Regional Hospital through

funding from GTZ, JIKA and SIDA from 1970's onwards although sustainability of all mentioned workshops was not maintained due to unavailability of policies.

The second phase of Health Technology Management happened between 2002 and 2010 whereby advocacy from external and internal health stakeholders urged the public sector to include Health Technology Management interventions in the government main budget and to include scheme of service for the biomedical engineering cadre in public service.

During discussions, it was noted that the available small number of biomedical engineers were not recruited in the country and no training institution had a curriculum to train for such cadre. Partners like Swiss Development Corporation (SDC) through its project called Health Promotion and System Strengthen Project (HPSS) implemented by Swiss Tropical and Public Health Institute (STPHI) towards Universal Health Coverage Insurance advocacy, added Health Technology Management (HTM) among the project elements.

The Ministry of Health acknowledges the importance of medical device management in all its health sector strategic plans. Three plans illustrate how the importance and anchoring of strategic interventions grew: Health Sector Strategic Plan III (2009–2015) only touched briefly on medical device management,19 whereas Health Sector Strategic Plan IV (2015– 2020) embedded medical device management within the infrastructure, transport and equipment strategy.20 Subsequently, Health Sector Strategic Plan V (2021–2026) outlined specific strategic outcomes for health infrastructure and committed to improved preventive maintenance.

During this project implementation, advocacy to establish a training course for biomedical engineers within Tanzania yielded results and managed to align this idea with Dar es salaam Institute of Technology (DIT) and Technical College Arusha (TCA) where by training started from 2011 for Diploma Level and bachelor level in 2016, followed by Mbeya University of Technology (MUST) diploma level in 2018, Muhimbili University of Health and Allied Science bachelor level in 2019. The University of Dodoma is expecting to start training in biomedical engineering bachelor level in 2024/2025 academic year.

The total number of biomedical engineering cadre graduated from local training institutions from 2014 to June 2024,1330 at diploma level and 166 at bachelor's degree level of which 427 are employed and working in public health facilities. Others are employed in private health facilities, pharmaceuticals industry and medical equipment venders/companies (No data created to determine the distribution).

The availability of biomedical engineers has increased through new training courses and the creation of permanent positions in government. Moreover, additional district and regional maintenance and repair workshops have been built, and a National Centre for Calibration and Training established to ensure optimal functioning of medical devices. Every level of government is encouraged to allocate more human and financial resources to medical device management. The percentage of functioning equipment increased substantially, and costs reduced for repairing compared to replacing equipment.

According to reports, formal medical device management is either ineffective or lacking in Africa. For instance, in the United Republic of Tanzania, there was virtually no system in place for medical device management before 2011. During the last decade, however, medical device management in the country has undergone changes thanks to a continuous Swiss - bilateral effort in cooperation with other unlimited number of partners from the private sector and other development agencies, most notably the Korea International Cooperation Agency and Korea Foundation for International Healthcare (KOFIH).

The Health Care Technology Policy Guideline has still not been fully implemented. Although the guideline outlined a referral system for planning and managing the maintenance of health-care technology, which included the establishment of zonal, regional and district workshops, implementation was poor and support from the ministry of health was limited. Moreover, there were few qualified technical staff for planning and maintaining medical devices who had undergone formal education and received a certificate from a technical school, community college or similar institution and who had undertaken an apprenticeship or received more hands-on training.

In terms of infrastructure, most healthcare facilities from primary to tertiary level lacked qualified staff to plan and execute maintenance activities. Lack of a maintenance culture was evident in the absence of a systematic approach, regular inspections and long-term maintenance planning. In addition, the supervision of outsourced services was often insufficient, which raised concerns about service quality.

Based on initial assessment, we took a holistic systems approach to reforming medical device management. We piloted the implementation of the medical device management system in the Dodoma Region, guided by four principles: (i) alignment with national technology management policy and regulations; (ii) utilization of all available maintenance resources, including those of local and central government, health facilities, the private sector and faith-based organizations; (iii) integration of the maintenance of both medical equipment and infrastructure into overall management of the health system and individual healthcare facilities; and (iv) adaptability, scalability and sustainability of the suggested improvements.

The development of the medical device management system followed established health-care technology management practices. In addition, tools were provided for documentation and reporting, such as: (i) standard operating procedures; (ii) data collection checklists for equipment inventories; (iii) planning and budgeting templates; and (iv) maintenance registers. These tools are digitized and integrated into the national Medical Equipment and Infrastructure Management Information System (MEIMIS).

The ministry of health had a dialogue and collaboration on health-care technology policy with national authorities through its Diagnostic and Health

Care Technical Services Section. All resulting actions were designed and discussed by the regional health technology working group established within the project and were endorsed for implementation by local government authorities. Members of the working group also lobbied district administrations to raise awareness of medical device management and of the need for an earmarked maintenance budget. In collaboration with the President's Office – Regional Administration and Local Government, we developed policy guidelines that provided a strategic direction for medical device management and that covered planning, acquisition, installation, inventory management, training, maintenance and decommissioning.

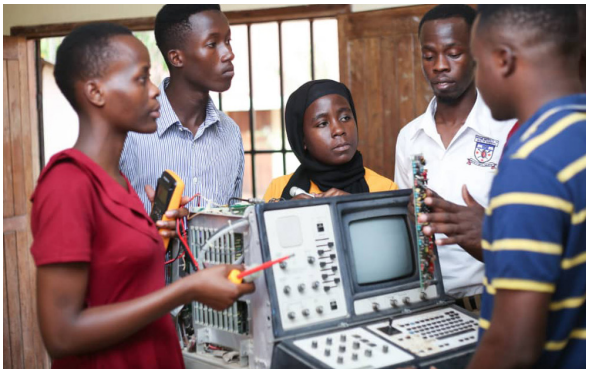
Due to economic constraints, dependence on donors and inadequate implementation of the National Health Policy, the Tanzanian government has faced problems with simultaneously maintaining various pieces of technology with different brands.

In 2011, the Director of Curative Services of the health ministry oversaw the medical device management through the Diagnostic and Health Care Technical Services Section. In 2022, the health ministry underwent reforms, which led to the establishment of a new Directorate of Diagnostic and Health Care Technical Services, which comprises three main components: (i) radiology and imaging services; (ii) health laboratory services; and (iii) healthcare technical services. This transition from a section to a directorate markedly enhanced the importance of medical device management within the ministry and is accompanied by a corresponding additional allocation of personnel and funding.

The reforms initiated by the ministry of health within the cooperation framework with partners in health led to the adoption of a systems approach to addressing problems with medical device management.

With partner SDC through Health Promotion and System Strengthening Project (HPSS) Ministry of Health incorporated equipment and infrastructure management software called Medical Equipment and Infrastructure Management Information System (MEIMIS) in health facility registry system (HFRS) in 2022. This management information system is made available nationwide. Currently, the system facilitates inventory management for all types of healthcare facilities, including hospitals, health centres and dispensaries. The software aids equipment management and supports informed decision-making on investment, technology deployment, maintenance and decommissioning. Having an online register of the operational status of all equipment greatly aids the government in managing medical devices nationwide.

In 2022 the ministry of health established the only facility in country the "National Centre for Calibration and Training" at Mirembe Institute of Mental Health at Dodoma to meet the increasing demand for medical equipment calibration services. During preparatory work for the centre in 2019, ministry of health with support from HPSS identified tools and equipment needed, develop product specifications and carry out procurement. Unfortunately, procurement of some highly specialized equipment was not feasible within



Biomedical Engineering students

the project's timeframe more funding was from other donors, for example, the Kingdom of the Netherlands, the Republic of Korea (Korea Foundation for International Healthcare – KOFIH) and UNITAID through NEST360 project.

The Government of Republic of Korea joined his efforts to strengthen management of medical equipment to biomedical engineers employees working in public health facilities specifically from 2005 whereby each year between two (2) to four (4) participants is going to Korea for a maximum of 5 months to attend for Dr. Lee Jong-Wook Fellowship training Program for mid and senior levels and when they are back some of them who demonstrated a good capacity has been deployed to be local trainers during Capacity Enhancement of Medical Technical Services (CEOMETS) training program which is conducted each year between October and November. At the same time from 2015 local training has been locally conducted whereby between 25 and 35 participants are invited to attend this CEOMETS training for four weeks duration. Up to 2024 we have total of 249 which is 59% of employed biomedical engineer personnels attended training in Korea and total of 26 which is 6.16% of Biomedical engineer personnels attended local training.

This has a big impact to healthcare technical services (HCTS) management and health technology management (HTM) improvement in Tanzania.

Background Reading:

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