

REPUBLIC OF KENYA
MINISTRY OF EDUCATION

Vocational and Technical Training

Mapping TVET Data in Kenya

TVET Data Ecosystem

May, 2022



Zizi Afrique
Foundation



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ABBREVIATIONS AND ACRONYMS

CBC	Competency Based Curriculum
CBET	Competence Based Education and Training
CDACC	Curriculum Development Assessment and Certification Council
COG	Council of Governors
DVET	Directorate of Vocational Education
ESSA	Education Sub-Sahara Africa
HELB	Higher Education Loans Board
KATTI	Kenya Association of Technical Training Institutions
KIPPRA	Kenya Institute of Public Policy Research and Analysis
KNBS	Kenya National Bureau of Statistics
KNAQ	Kenya National Qualifications Authority
KUCCPS	Kenya Universities and Colleges Central Placement Service
MIS	Management Information System
NACOSTI	National Commission for Science, Technology and Innovation
NP	National Polytechnics
NESSP	National Education Sector Plan
SD-PTSD	State Department for Post Training and Skills Development
SD-VTT	State Department for Vocational and Technical Training
TVET	Technical and Vocational Education and Training
TVETA	Technical Vocational Education and Training Authority
TVC	Technical Vocational Centre
UNESCO	United Nations Educational, Scientific and Cultural Organization
VaLi	Values and Life Skills
VSO	Voluntary Service Overseas
VTC	Vocational Training Centre
Zizi	Zizi Afrique Foundation

FOREWORD

The mandate of the TVET sector is to provide middle-level manpower which is vital in driving the country's economy and in providing an important gateway for up-skilling of workers. The country has a vibrant and economically viable youthful population that needs to be engaged in productive ventures to help make significant contributions to the national development, and to help overcome their vulnerability to anti-social activities that threaten their livelihood.

It is clear that one of the barriers to delivery of TVET is lack of accurate, timely data and information to guide decisions and policy making process. To deal with these emerging issues, more consideration is necessary to facilitate users of data with reliable TVET data in the country. TVET data mapping whose aim is to create a common data hub for ease of access to quality, reliable and timely data for policy influence and decision making is a collective commitment by the Ministry of Education (MOE) and other stakeholders.

All the key stakeholders are committed to providing data, information, and knowledge regarding implementation on TVET and to updating relevant data which shall be available to TVET stakeholders for various purposes. The policymakers, practitioners and researchers in TVET harnessed information from the databases for informed decision making and to forecast the future patterns in TVET development necessary in formulating programmes, anticipating market labour trends, as well as in revising the existing programs and trainings offered by TVET institutions.

The TVET system in the country has the capacity to fulfil this mandate if it is made accessible, affordable and relevant to the labour market. Evidence-based decision making and policy making process is therefore a requisite to the fulfillment of this commitment.

This initiative will be useful to the TVET experts including researchers, practitioners, policymakers, curriculum developers, and others who are having challenges in gathering the relevant data as the existing data sources have gaps due to weak data management. In addition, the important TVET data are scattered within different ministries, organizations, and agencies which create a bureaucracy: contributing to limited administrative data among others.

Overall, this initiative intends to ensure that TVET datasets and information are well synchronized and that they are used effectively as a source of information for planning and improving efficiency in the TVET system. These stakeholders are to be supported by an effective, shared platform that is able to provide accurate and up-to-date data to the different sector players and to support effective reporting, planning, and decision-making. It is our hope that this initiative will be useful and beneficial to all stakeholders.

PROF GEORGE A. O. MAGOHA, CBS
CABINET SECRETARY
MINISTRY OF EDUCATION

PREFACE

The development of any nation depends on the ideal positioning and empowerment of the youth in national building plans. In order to realize the national aspirations of our nation's development through the various development blue prints such as the Sustainable Development Goals (SDGs), United Nations Strategy for the Youth (2014), African Union Agenda (2063), Kenya Vision 2030 and The Big Four Agenda, it is imperative that the youth are equipped with requisite skills, competencies and attitudes to enable them to compete at an equal footing with their peers in the developed world for global competitiveness.

TVET requires immense resources to achieve market-ready trainees who match the labour market requirements. This is achievable through pooling of resources from a wide range of stakeholders such as industry, development partners, and parents and communities through a sector-wide approach financing model. This requires policy intervention and informed decision making based on evidence. The TVET sector has data which are housed in various agencies and stakeholders making it difficult to access. Effective and efficient exploitation and utilization of the data and information calls for a centralized data storage with ease of access to all stakeholders. The State Department for Vocational and Technical Training (SD-VTT), in collaboration with its stakeholders, is in the process of developing a TVET data hub which will house all the information, knowledge and data that are critical for informed decision making in TVET. Data mapping is the process of managing the availability, usability, integrity, and security of the data, based on internal data standards and policies that also control data usage. We are committed to ensure that available data are consistent and trustworthy.

Finally, on behalf of the State Department for Vocational and Technical Training, I express gratitude to all stakeholders who participated in the development of this data mapping initiative and call upon the entire TVET sector fraternity to take full advantage of harnessing data and knowledge for informed decision making.

Dr. Margaret W. Mwakima PhD., DD., CBS
PRINCIPAL SECRETARY,
STATE DEPARTMENT FOR VOCATIONAL AND TECHNICAL TRAINING
MINISTRY OF EDUCATION.

ACKNOWLEDGEMENT

The issue of sustainable development in Kenya through efficient Technical and Vocational Education and Training (TVET) has been of critical concern to the TVET sector. Professional and technical training is instrumental in achieving the development agenda of any nation. To acquire the high-end competences, there is need for heavy investment in infrastructures and human capital. The government has over the years invested in TVET; however, this intervention is not well informed by evidence and research. This data mapping initiative provides approaches for effective data mapping and sharing for decision-making and policy formulation.

Data, in this case, are sets of facts, figures, measurements, and other information that can be used to start conversations, gain knowledge, and make informed decisions. TVET data are collected from demand, supply, inputs, outputs, and outcomes. These data are important because they help the TVET sector to make better decisions, understand demand and supply of TVET, improve resource allocation towards TVET, identify research gaps, and to make informed policy decisions.

Our gratitude goes out to ESSA team comprising Dr Late Lawson and Dr Lucy Heady; and the Zizi Afrique Foundation team comprising Executive Director Dr. John Mugo and Renaldah Mjomba; for their continued commitment to this process, our colleagues at the Ministry of Education, representatives from the Department of VTT; Kenya National Bureau of Statistics (KNBS), Curriculum Development Assessment and Certificate Council (CDACC), Council of Governors and County Governments, TVETA; the Kenya Institute for Public Policy Research and Analysis (KIPPRA), and other agencies and institutions who participated in the initiative. The Technical Committee comprised:

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Special thanks to ESSA and Zizi Afrique Foundation for the financial support.

Tom Mulati
Director, Technical Education

1.0 INTRODUCTION AND BACKGROUND

1.1 Introduction

The Sustainable Development Goal 4 (SDG-4) of the 17 SDGs adopted by the United Nations as part of the Agenda 2030¹ for Sustainable Development aims to “ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.” In order to ensure the realization and effectiveness of this SDG, numerous education-related targets and indicators which have been identified need to be regularly assessed, justifying data-based research on the education system, educational attainment, and policies, especially in developing countries such as Kenya.

In Sub-Saharan Africa, Kenya included access to micro-level data on education, a key input in enlightening educational outcomes; however, this is limited, resulting in little contribution to the world’s research (Salzano, & Labate, 2016). Where the data exist, it is difficult for researchers and policy analysts to access them. Primary data collection in the education field by researchers and policy analysts is costly and often beyond their financial resources, thus the continued dearth of information on education in Kenya. Strategies aimed at unlocking the patchwork of data that have been collected for baseline evaluations, empirical research, landscaping studies and feasibility assessments are poised to give decision-makers a better picture of the state of education and training in their countries. Furthermore, access to such data has the potential of increasing the generation of relevant knowledge, leading to growing local capacity for analysis and to the production of outstanding, policy-relevant studies in Kenya and across African countries.

Therefore, to explore and understand the challenges and possible constraints limiting the attainment of SDG in Kenya, particularly Goal 4 on Education, especially in the TVET sub-sector, there is a need to capitalize on knowledge management. This can be done through getting value from the data and information in the key thematic areas in the Education sector of Access, Equity, Relevance, and Quality. This will boost the country’s commitment towards achieving SDGs by 2030. The TVET sector in Kenya is essential in the attainment of the SDGs mainly because of its contribution in production of relevant functional skills for economic growth development. Therefore, a data mapping exercise will be important in providing the data and information needed to track, monitor and evaluate the TVET SDGs over time. This information needs to be collected based on common and global indicators that facilitate impact measurement and that respect the privacy of individuals as provided for in the Kenya Data Protection Act (2019).

1.2 On mapping education/TVET data: An overview

The task involved a systematic review procedure that identified and selected existing studies, evaluated their contributions, analyses, synthesizes, and reports evidence in such a way that allows reasonably clear conclusions about what is and is not known (Buchanan & Bryman, 2009). On the other hand, data mapping involved the process of identifying and linking multiple datasets into a centralized database. The purpose was to identify and centralize data in order to improve researchers’ access to quality data and favor the generation of high-quality evidence to inform policy in Africa. For this task, the systematic review and data mapping involved reviewing TVET existing studies and linking multiple datasets into a centralized database.

1.3 The procedure of a systematic review

The task sought to incorporate a systematic review connecting a procedure that identifies and selects existing studies, evaluates their contributions, analyses, synthesizes, and reports evidence in a simplistic way that allows reasonably clear conclusions about what is and is not known (Buchanan & Bryman, 2009).

1.3.1 Data mapping

Data mapping involved the process of identifying the datasets, the relevance and quality of the latter, as well as the actors involved in the data collection/production and use. Education-related data can either be qualitative or quantitative and can be found in a number of sources. This list includes:



1.3.2 Relevance criteria

Globally, microdata on education and training collected at the institution, region and country level was considered in the screening because of their relevance in producing locally relevant knowledge. In the case of Kenya, the mapping took into consideration county, sub-county, institutional, and individual units of analysis. In the present TVET data mapping exercise, each dataset identified fulfilled the following criteria:

Datasets are mostly constituted by several variables or layers. This criterium implies that, independently on the other layers (age, gender, income...) which could be exploited for empirical analysis on topics related to gender, inequalities, among others, TVET is the core variable of our data mapping exercise. Collected in Kenya: This criterium implies that data must be collected in Kenya (at the national, sub-national and county levels).

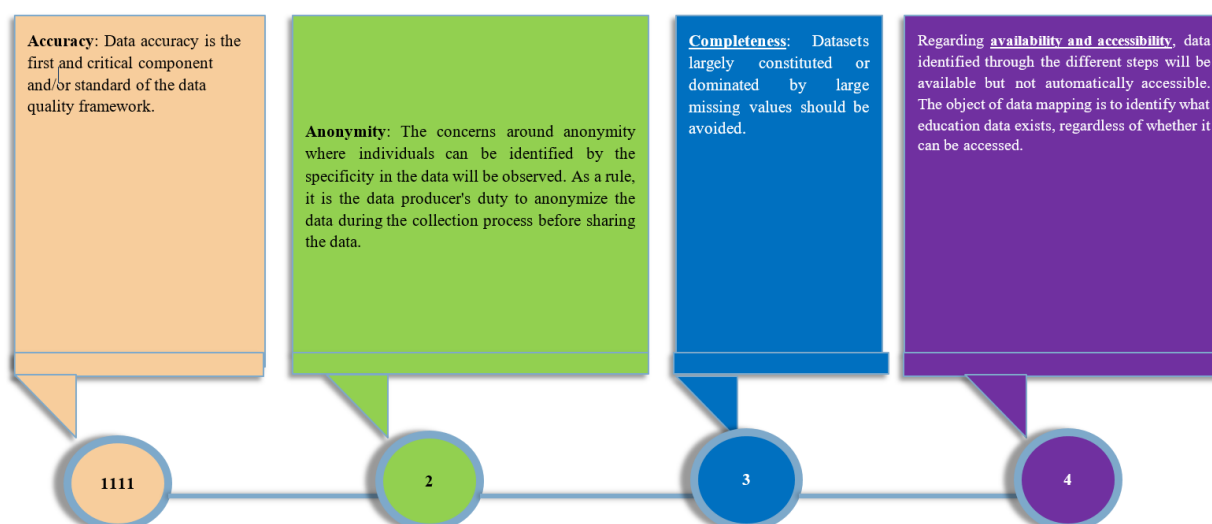
Recent (collected between 2010–present) with the exception of periodical (repeated) surveys, waves of surveys conducted before 2010 will be considered to enable panel data and any type of time-series analysis.

The statistical unit is the individuals (or households): To generate locally and policy-relevant knowledge, disaggregated and preferably individual or household level data are needed. However, datasets in which educational institutions and regions are the statistical units were considered since such data were useful for between institutions' or regions' comparative analyses.

Usable i.e., stored in a way that allows the use of the data to inform TVET policy. This criterium also implies that the data satisfy certain quality criteria that need further discussion.

1.3.3 Quality criteria

In addition to the relevance criteria, data identified through this mapping strategy satisfied certain quality norms. These include:



1.4 Global TVET Data Mapping

A few countries have tried or are in the process of mapping data in education and in specific departments including the TVET level. In Europe for instance, the European Commission did mapping and classification of TVET and skills development. The main goal was to provide a basis for an effective, structural, and coherently strategic approach to support the process of skills development and mapping in the country. The mapping exercise produced a data map and a classification of projects by sectors and areas of TVET and skills, instrument and period (temporal dimension), which was further enhanced with information relating to funding and implementation status². The exercise involved the review of pertinent literature and field work data collection and stakeholder engagement to collect up-to-date data and views from the actors in the sector. In addition, several documentations related to TVET were collected including global documents, reports, and studies from international and bilateral partners, academia, practitioners and national authorities. It also involved the development of a content management tool (mother list) to be used to systemize, update, retrieve data and information and facilitate their classification and assessment.

Further, Germany's engagement in open data with the G8 countries in 2013 adopted an Open Data Charter and in the subsequent year, incorporated the activities in the action³. The main goal for mapping out open data ecosystem was to have a clear direction signal for the open data in Germany, the publication of records, the publication of the data on a national portal, and measures for consultation, engagement and exchange of experience. Further, the country supported the process through the development of the E-government Act which sought to specify the central criteria for open data including the free provision, free access to the data, and machine readability (Veja, Hocker, Schindler, & Rittberger, 2021). In Germany and Europe, the process involved the information and data extraction from the provided documentation by the stakeholders and additional sources identified through the online search, including journal and research papers.

In Africa, to the best of our knowledge, only Sierra Leone has tried to map data in the education and training ecosystem. The country, through the Ministry of Basic and Senior Secondary Education (MBSSE), built the institutional frameworks to direct the collection, management, and use of data. Key stakeholders were brought on board, including the major donors and NGOs to support investment in the education data systems. The broad aim of the exercise was to develop a single-source repository of data and information by mapping existing and planned education data programmes to identify steps to further consolidate the ecosystem.

² <https://europa.eu/capacity4dev/file/17189/download?token=mLW9wAQC>

³ https://epub.uni-regensburg.de/44955/1/isi_veja_et_al.pdf

In addition, South Africa has developed a legal framework to guide its data policy and governance of education data. The country has also developed steps needed to kick-start the process. This guide is part of a series curated by the Policy Action Network (PAN), a project by South Africa's Human Sciences Research Council (HSRC). Further, the country is guided by the Protection of Personal Information Act (POPIA) on the key issues relating to how data are collected, shared, and used, including provisions for automated decision-making while protecting the rights of an individual. The guide also addresses the concerns of sharing and reuse of the wider spectrum of education data. This ranges from the content of books and journal articles, to administrative data, such as student enrolments and graduations. Sharing or publishing these data responsibly can stimulate the development of many creative and useful applications. But data sharing intersects with evolving copyright laws and debates around ownership and reuse. These have had implications for data-driven innovation in the sector⁴.

1.5 TVET Strategy and Key Policy Documents in Kenya

The Kenya National Education Sector Plan (NESSP) for 2018 to 2022⁵ outlines the policy's priorities, programmes, and strategies for the Ministry of Education. Under it, are the sub-sectors in the education sector including Technical and Vocational Education and Training (TVET), University and Teacher Education, among others. The plan's vision is to provide quality and inclusive education, training and research for sustainable development through the achievement of the following pillars: Access and Equity; Quality and Relevance; and Governance and Accountability. Among the challenges that NESSP sought to address was the inadequate data in the TVET and University sub-sectors including data on enrolments, graduates, data relating to the number of graduates transiting into the labour industry, and inadequate data on physical infrastructure and equipment necessary to support teaching of CBET Curriculum, among others. Furthermore, NESSP noted a number of constraints facing the TVET sector over time, despite the various interventions by the stakeholders in the sub-sector. These include inadequate data on the number and nature of institutions operating in the sub-sector, the types of courses they offer and their enrolment patterns, and the status of human, physical and financial resources in the sub-sector.

In addition, the TVET Act No. 29 of 2013 establishes the TVET management and administration system and sets out how the provision of TVET is implemented. It stresses the establishment TVET Authority, a body responsible for registration and quality assurance, and the Curriculum Development, Assessment and Certification Council which is tasked with the development of the curriculum. These bodies are also responsible for keeping data related to the assessment and certifications of TVET institutions – this data addresses the quality of TVETs. Further, the Sessional Paper No. 1 of 2015 gave proposals centered around advocating for improvements in the areas of access, equity, quality, and relevance of education. These suggestions cover governance and management, trainers' development and nurturing, monitoring and evaluation, and financing through greater public-private partnerships. All these proposals are data-driven and therefore present the case for the need for a comprehensive database.

The TVET Reform Strategy (2016-2020)⁶ introduces a number of measures with the aim of developing an attractive as well as inclusive and accessible TVET system. The proposed measures aim to improve the quality of education and training by introducing appropriate teaching and learning support interventions for TVET institutions and by expanding infrastructure. It also emphasizes the importance of strengthening relations with stakeholders to improve the management of the TVET system, including financial management and resource mobilization. This is also prioritized in the Medium-Term Plan (MTP) III⁷ and in the Big four Agenda. Further, the current MTP IV under the post-training information management seeks to develop and maintain up-to-date

4 <https://phys.org/news/2021-01-south-africa-data-driven.html>

5 <https://www.education.go.ke/images/NESSP/NESSP-2018-2022.pdf>

6 http://www.tvetauthority.go.ke/wp-content/uploads/2018/06/TIVETA-STRATEGIC-PLAN-2-e-pub_2-Compressed.pdf

7 <https://www.treasury.go.ke/wp-content/uploads/2020/11/KEY-HIGHLIGHTS-OF-MTP-III-PRIORITIES.pdf>

post-training, skills, and employment database for policy formulation and implementation.

Further, the roll-out and implementation of Competence Based Education and Training (CBET) has been embraced by TVET as the guiding principle for Kenya's TVET ecosystem. The system requires that all the stakeholders work collaboratively to develop and implement CBET. So far, TVETA has developed the training standards and guidelines for CBET implementation. One of the primary goals of CBET is to set measurable professional standards. Further, TVET has developed training standards, and accredited TVET institutions and is continually undertaking quality audits of accredited institutions to ensure that the standards of training are continually improved. Some programmes in the TVET sector have adopted the Competency-Based Teacher Education, which is closely aligned to the CBC approach, which adopted a student-centered approach. TVET promotes culture and recreation via sports, which promote social cohesion and nationalism in the country: a key ingredient in the provision of learning and helps to identify, develop and promote talents in line with CBC expectations. These two institutions therefore, act as the main sources of data relating quality and standards of TVET.

1.6 Statement of the Problem

Researchers in education and training, sociology, and economics, among others, appear to have made minimal contributions to education data mapping. In Kenya, access and availability of micro-level data on education, especially in the TVET sector, is a challenge burred with data unavailability, inconsistencies, incomplete data and bureaucracy for one to access the data. These limit research, baseline evaluations, landscaping studies, feasibility assessments and data-driven policy reforms. Further, the few datasets available are kept within the departments' storage devices such as laptops which are accessible to only a few authorized persons. This is because there is no centralized data storage platform where all the departments can upload and store the datasets for easy access by all the stakeholders.

Therefore, in an attempt to address these challenges and constraints, there is a need to capitalize on data management. This can be done through deriving value from the data in the TVET sector by considering key thematic areas in the education sector of Access, Equity, Relevance, and Quality. This will boost the country's ambition of achieving SDGs by 2030. Therefore, a data mapping exercise will be important in providing the data and information needed to track, monitor and evaluate the TVET SDGs over time. This information needs to be collected based on common and global indicators that facilitate impact measurement and needs to respect the privacy of individuals as provided for in the Data Protection Act (2019)

The rationale for undertaking Technical and Vocational Educational and Training (TVET) data mapping in Kenya was premised on the need for quality and timely data and evidence to inform the attainment of Sustainable Development Goals 4 (SDG-4)⁸ and various national TVET policies and strategies. The SDG 4 aims to "ensure inclusive and equitable quality education and promote lifelong learning opportunities for all." In order to ensure the realization and effectiveness of this SDG, various education-related targets and indicators which have been identified need to be regularly assessed, justifying data-based research on the education and training system, educational and training attainment, and policies. The data and indicators fall under the following thematic areas: access and equity; quality and relevance; assessment and accreditation; resources and utilization; and governance and management. The data mapping task will therefore inform the implementation of SDGs and other nations' education goals as contained in the following policies and initiatives in the country: National Education Sector Plan (NESSP); TVET Policy; TVET Strategy; Kenya Vision 2030; Medium Term Plan (MTP) IV; and Country Integrated Development Plans (CIDPS), among others.

Objectives and scope

The success of a data mapping exercise in the TVET sector incorporates the identification of existing data and information, establishment of gaps, understanding the TVET data ecosystem, and a review of policies and laws relevant to data mapping. Therefore, the purpose of this mapping was to:

- i. Identify existing data and research on TVET in Kenya;
- ii. Classify the existing data and research into the major themes under TVET which includes but not limited to:
 - a. Provision of TVET (access, equity, quality, relevance),
 - b. Resources and Utilization (Physical, Human and Financial),
 - c. Legal and political economy environment - Governance and management of TVET, Implications of Devolution on TVET;
- iii. Identify gaps in data and research focusing on TVET;
- iv. Provide recommendations and propose interventions to fill the gaps identified;
- v. Identify policy gaps and recommendations;
- vi. Map out the TVET Ecosystem in Kenya; and
- vii. Support in the establishment of the TVET Technical Committee.

2.0 METHODOLOGICAL APPROACH

To undertake the data mapping, the following strategies (steps) were employed.

STEP 1: Online search for education datasets and identification of all data sources

The online search for education datasets aimed at identifying data collected, among others, by public institutes of statistics, national and international organizations, as well as data collected by Higher Education Institutions (HEIs), NGOs, private providers of education, and researchers.

a. Education data from national institutes of statistics and other public sources

This formed the first part of identifying TVET data. It involved visiting the websites and the data repositories of the respective institutes of statistics and searching for datasets on TVET that match the relevant criteria. Datasets derived from demographic/household surveys that contain variables (questions) related to TVET were considered, as long as they could be used to generate locally relevant knowledge on TVET.

The principal limitation of this source of data is that most national institutes of statistics record and only document data generated by surveys they have been involved in. Therefore, there is need to identify data generated by international organizations and private stakeholders.

b. International data sources (Microdata on education from International Organizations)

This involved visiting the websites of international organizations such as the World Bank and ILO and searching for datasets on TVET for Kenya that matched the relevant criteria.

c. Micro-level education data from NGOs, researchers and others

Although it was unfeasible to list and visit the website of every single organization for education data mapping, the study extended the search and accessed data stored in Microdata Libraries such as The World Bank Microdata Library, Afrobarometer, DataFirst, HDX, UK Data Service, and Harvard Dataverse, among others for relevance and quality. In addition, NGOs also fund data collection activities and several studies that produce large amounts of potentially rich data, most of which were not available online and may have been inaccessible for empirical research. Therefore, it was necessary to extend data mapping of TVET microdata to NGOs' databases and publications relevant to researchers and policy analysts in providing insights into critical TVET issues.

STEP 2: Screening empirical research for education data

Once data had been identified and accessed, they were screened for TVET data. The process involved:

- a. Accessing academic databases, specifically World of Science;
- b. Searching the data through the search query option;
- c. Refining the search result to consider only research papers that exploited actual data.

Moreover, the process of refining the search result consisted of specifying the **country, the publication years, and the research domains, among others**. When a research paper was identified, the data used to conduct the analysis was recovered.

STEP 3: Country-level stakeholders and consultations

Subsequently to screening empirical research for data and accessing data from public and private institutions, the next step involved undertaking country-level stakeholders' consultations. Step 1 and 2 yielded a list of public and private organizations and institutions, researchers as well as NGOs involved in TVET data collection and use. The list was then used to form a basis for stakeholder engagement (discussions) and advocacy.

The purpose of consultations with local education stakeholders was to identify gaps and missing data; i.e., data needed for a clearer picture of the education system; data that had been collected but were not publicly accessible; and data that were needed, but that had not been collected yet. The consultations were also decisive in understanding why specific data were not accessible and the strategies could be explored to make the data publicly available.

Engagement and group discussions involved education data stakeholders, education authorities, and education regulatory bodies. These consultations were vital, not only in making useful data available for research, but also in understanding some barriers faced by public authorities in sharing data and learning about the types of data that had more influence in policy-making.

Formation of Technical Working Group by Government

Formation of Technical Working Group was formed to facilitate strong participation and collaboration among the key stakeholders, including but not limited to:

Technical Working Group Stakeholders
Ministry of Education; Directorate of Technical Education (DTE)
Teachers Service Commission (TSC)
Directorate of Vocational Education & HR- Vocational and Technical Training
Central Planning and Project Monitoring Unit-CPPMU-VTT
Council of Governors
Kenya National Qualifications Authority
Kenya National Examinations Council
Kenya National Bureau of Statistics
Technical Vocational Education and Training Authority (TVETA)
Curriculum Development, Assessment and Certification Council
Kenya Institute for Curriculum Development
Kenya Association of Technical Training Institutions (KATTI) (public & private)
Representative, Technical Universities: University of Eldoret; Technical University of Mombasa;
Technical University of Kenya, CUEA
Kenya Institute for Public Policy Research and Analysis (KIPPRA)
Linking Industry with Academia (LIWA)
Zizi Afrique Foundation
The Values and Life Skills (VaLi) Working Group

2.1 Metadata presentation

Once education datasets were identified, the host website of the institutions producing the data was accessed and where necessary, the researchers/authors were contacted for the purpose of metadata collection. Dataset-related information such as the source of data, type of organization, area of focus and the URL to the data, country/region of focus, most current available data, sample size, funders and the phase of education, etc. was

also extracted and introduced into the Country_EdDataMapping spreadsheet.⁹ Table 1 presents the main meta-data and their definition.

Table 1: The Main Metadata and Their Definition

Metadata	Definition
Source of Data	Source where the dataset had been identified
Name of survey	Name given by data producers to the collection project
Year	Years covered by the survey, or the specific dataset identified
URL	URL leading to the website of the organization, institutions, report, or research paper in which the dataset had been identified or used
Country	The country or countries where the data had been collected
Region	Region, if provided in the description of the dataset
Phase of education	Phase of education concerned: Primary, secondary, tertiary...
Type of education	General programme or TVET
Type of access	The researcher was expected to provide details on the accessibility of the data This could be, among others, open, accessible upon request, not accessible

3.0 TVET DATA ECOSYSTEM AND VALUE CHAIN

TVET Data Ecosystem and Value Chain are two broad interrelated concepts that are crucial in data mapping by providing an outline, procedures, stakeholders involved and necessary support system across all the stages from data collection (identification, collection, & processing), publications, uptake, use, and impact.

3.1 Kenyan TVET Data Ecosystem

Data ecosystem is a platform that combines data from numerous providers and builds value through the usage of processed data. This includes data from both macro and micro players in the TVET sector.

3.1.1 Supply of TVET data

The data supply chain involves the technological steps and human-involved processes that support the flow of data through the organizations: from its raw state, through transformation and integration, all the way through the point of consumption or analysis and impact. The government plays a critical role in the production and supply of data. This includes facilitating the processes of data generation and provision through the provision of human and financial support, capacity building the responsible staff, conduction of the research on TVET, and regulatory support to ensure data management and backup. Further, the government has the role of providing safe custody of data, and the sustainability of data management, since it is a continuous process. In addition, the government acts as a source of data through publications, dissemination workshops and providing public repositories.

The stakeholders in the mapping of TVET data cut across various sectors and play key roles in the process including the production of the datasets, management and storage of data, and provision of legal guidelines and laws which guide the use and management of the data. The key stakeholders are presented in Table 2 below.

Table 2: Key Stakeholders Involved in TVET Data Mapping

	Stakeholder	Interests - Nature of Data
1	Ministry of Education State Department for Vocational and Technical Training.	Legal and political economy environment; Governance and management of TVET; Devolution
2	Council of Governors and County Governments.	Devolution, financial resources, governance, management and quality assurance, curriculum implementation
3	TVETA.	Quality Assurance
4	Universities/Colleges.	Capacity building/Research
5	NACOSTI	Regulate and assure quality in the research, science, and technology and innovation sector and advise the government in matters related thereto
6	Civil Societies / NGOs	Research, Publication, Financing hence Access
7	KICD, TVET- CDACC	Curricula & OS Development: Relevance
8	KNQA	Qualifications: Quality
9	NITA/KNEC & CDACC	Assessment
10	KIPPRA	Data analysis for effective public policy
11	Public Service Commission/ County Public Service Board	Recruitment of Trainers: Human Resources
12	KISE	Special needs/ Equity
13	TVC/TTI/Technical Universities	Provision of training hence Access
14	Development Partners (ILO, UNES-CO)	Financing and Data Sources
15	KTTC	Trainers of Trainers: Human Resource Development

3.1.2 Demand FOR TVET data

Demand for TVET data is increasing over time, as policy makers seek data to influence reforms and to address, among other issues, the rise in the number of young people exiting basic education and demanding training and preparation for the world of work. Mostly, the data demand by the stakeholders is used to influence policy priorities, the country's agendas, data literacy, and equity initiatives among other uses¹⁰. Further, for discussion purposes, the demand for TVET data can be divided into two areas: the social demand and economic demand.

Table 3: Categorization of TVET Demanded Data

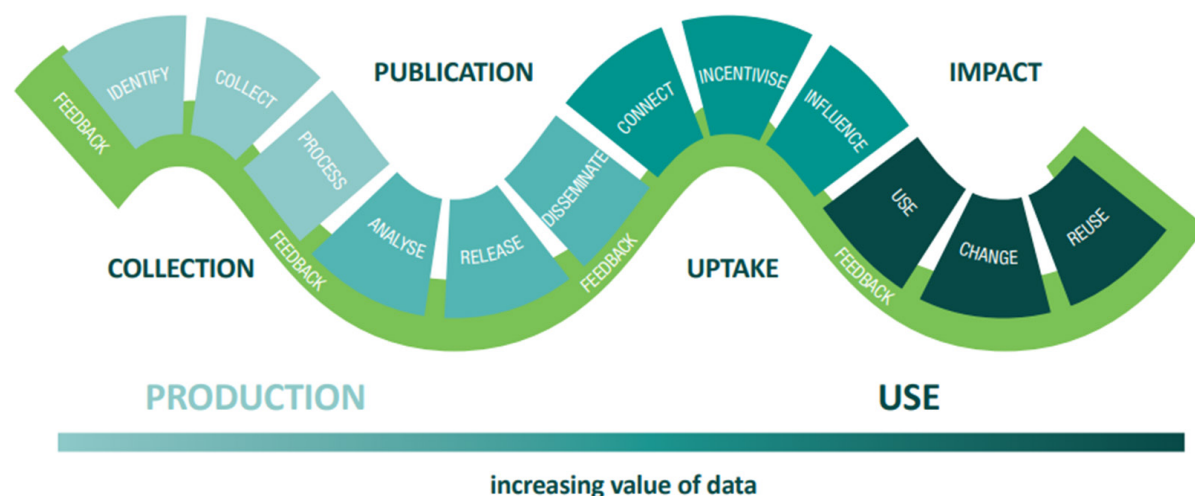
	Key Indicators	Nature of Data
Social Demand	Labour Market (Employers)	Indicates the number of graduates The number of personnel in the labour market from TVET institutions Skills are distributed among the TVET graduates
	Parents and Trainees	Employability of the graduates indicated by the length from graduation to employment Available courses for selection
	Entrepreneurs	Identify areas of investments
	Civil Society	To support design for interventions Influence and contribute in the development projects in support with other development partners Identification of gaps Policy formulations
	Organizations such as KEPSA, FKE, KIPPRA	Research Policy formulation Curriculum development Assessment
Economic Demand	Government	Employment rates
	Government	Qualifications required to join TVET institutions Budgeting Enrolments to policy formulations and inform on the trend
	Development partners & International stakeholders	To identify areas of support, both financial and human resources Recognition of skills and talent mentorship

3.2 TVET Data Tracing, collation, sources and usage TVETA

The TVET data value chain was considered. Data value chain is a process that entails data mining and hence manipulation to yield useful information inclined towards solving a given problem (data/information gap). Put differently, data value describes the process of data creation and use from first identifying a need for data to their final use and possible reuse. The data value chain has four major stages: collection, publication, uptake, and impact.

Figure 1: The TVET Data Value Chain

¹⁰ <http://uis.unesco.org/sites/default/files/documents/towards-innovative-demand-driven-global-strategy-education-data-2018-en.pdf>



Source: Open Data Watch, 2018

3.2.1 Access and Equity

Access to education and training refers to the ability of all people to have equal opportunity in education, regardless of their social class, race, gender, sexuality, ethnic background or physical and mental disabilities¹¹. The Government of Kenya seeks to enhance access and equity to TVET through the implementation of the MTP III. An equitable education system helps all learners develop the knowledge and necessary skills to enable them secure jobs, become entrepreneurs and become more productive members of society.

Population Enrolment: Participation and Distribution

In the Ministry of Education, enrolment is commonly used as a good proxy to inform on the status of the access and equity in the provision of education. Normally, enrolment is categorized by gender, disability, courses and their levels, among other categorization levels. Further, distribution of institutions, and courses provided include the key data required in mapping out the extent of access and equity.

Further, global assessment of equity in education has adopted some key datasets including data on inclusion of special needs learners/trainees, refugees, and regional and gender balance. Moreover, participation has also been used to inform on the equity discussions in the education sector. Some of the data areas considered include the number of drop-outs, repetitions, enrolment by gender, regional distribution of institutions, enrolment on courses, number of students accessing loans, availability of disability friendly facilities, and involvement of refugees in TVET programmes.

In the Kenyan context, production and management of these datasets is within the TVET institutions, TVETA, Directorate of Technical Education (DTE), county governments, Kenya National Bureau of Statistics through demographic surveys, and research entities such as Kenya Institute for Public Policy Research and Analysis (KIPPRA), KUCCPS, HELB, UNESCO, NEMIS, VSO and Zizi Afrique among other institutions.

Table 3: Data Availability on Access and Equity

11 <http://campaignforeducationusa.org/blog/detail/universal-access-to-learning-improves-all-countries>

Indicator	Source of Data	Links/Documents	Data Gaps
TVET enrolment, number of trainees by gender	The Kenya Journal of Technical and Vocational Education and Training Reports on trends in enrolment 2014-2019 KJ journal of TVET & TVET institutions	www.TVETa.go.ke (journal)	Real time data collection Data accuracy/ Consistency in enrolment
Distribution of Institutions	National Economic Surveys	www.knbs.or.ke	
Number of students accessing loans	HELB & County Governments	www.helb.or.ke www.helb.or.ke	
Special Needs enrolment by gender, availability of disability friendly facilities	Council for Disability & KNBS	KNBS www.knbs.or.ke Special needs reports (MoE and KISE) SNE Report Full -2 Official Research Report on Disability Published by KISE (2018)	
Number of refugees in enrolment in the TVET institutions	Not available	Data on refugees in TVET in terms Gender and Disability	

Proposals to fill the gaps/Proposed areas of focus

- Development of a Management Information System.
- Proposal to conduct a study on Access and Equity in TVET to capture data and information on gender inclusion, region, and refugees among others. Collect data on Dropout rates and repeaters.

3.2.2 Quality

The TVET Curriculum Development Assessment and Certification Council (CDACC) is mandated to undertake the design and development of competency-based curriculum for TVET. The quality of technical and vocation education and training involves a set of characteristics of a TVET programme/competence-based training and of its institution, through which mandatory standards are set by TVETA and other agencies in charge as well as other stakeholders, and through which labour market expectations are met.

i. Curriculum and by course

The data relating to the number of curriculum and categorization by course are with the CDACC. The council has approved and published a list of 286 courses in the new curriculum, which are monitored by the council¹².

ii. Assessments

CDACC standards and guidelines outline the requirements in establishing and operating assessments across different courses, institutions and trainees to ensure uniformity, reliability, validity and efficiency of competence assessments. Further, assessments are conducted by assessors registered by TVETA. The information and data regarding assessments are kept by the CDACC¹³.

iii. Qualifications

Kenya National Qualifications Framework (KNQF) is a system of accreditation, quality assurance, assessment

12 <https://www.tveta.go.ke/approved-cbet-curricula/>

13 <https://www.tveta.go.ke/wp-content/uploads/2020/04/TVET-Assessment-Centre-Standards-and-Guidelines.doc>

and examination of national qualifications. The Kenya KNQF Act No.22 of 2014¹⁴ and KNQF Regulations, 2018 help coordinate and harmonize the various levels of education, and to create a database of all qualifications in the country. The KNQF that the Authority has developed and that is currently being implemented forms part of the country's international commitments to develop an accurate, reliable and robust database of all qualifications in the country and more so allows for comparability, equation, recognition and information sharing of qualifications globally.

iv. Performance

The performance of a TVET institution explains in part the quality of education offered in TVETs in Kenya. High performance of TVET institutions partly implies a high quality of TVET and normally leads to higher status and improved attractiveness of TVET. This shows the need to strengthen the standards of Quality Assurance and Quality Control in TVETs in Kenya. The key principle for quality assurance requires the output to be fit for purpose, timely and to meet the quality.

v. Talent Nurturing

The influx of white-collar job seekers creates the need for diversification and value addition to the quality of education provided in Kenya. This can be achieved by nurturing talents and enhancing technical skills demanded in the market. Roughly, it is estimated that Kenya requires 30,000 technologists, 90,000 technicians and over 400,000 craftsmen to attain the mega projects under Vision 2030¹⁵. This ignited the desire on the part of the government to include Technical Vocational Education and Training (TVET) as a key component of Vision 2030.

Table 4: Data Availability on Quality

Indicator	Source of Data	Links/Documents	Filling Data Gaps
No of curricula developed per course	CDACC KICD KISE NITA TVETA	https://www.TVETcdacc.go.ke/downloads/ https://www.TVETa.go.ke/approved-cbet-curricula/	Collaborative approach in filling the knowledge gap
Number and range of curricula support materials developed	KICD CDACC KISA	https://www.TVETcdacc.go.ke/downloads/	Collaborative approach in filling the knowledge gap
Number of trainers licensed/registered	TVETA TSC	https://www.TVETa.go.ke/trainers/	Collaborative approach in filling the knowledge gap
CBET standards developed	TVETA	https://www.TVETa.go.ke/compliance-enforcement/	Collaborative approach in filling the knowledge gap
Qualification framework developed	KNQA	https://www.knqa.go.ke/index.php/about-the-qualification-framework/	Collaborative approach in filling the knowledge gap

Proposals to fill the gaps/Proposed areas of focus

- Collaborative approach in filling data gaps identified is critical. For instance, CDACC and KICD could have a

14 Kenya KNQF act No.22 of 2014

15 <https://www.kenyanews.go.ke/nurturing-talents-to-curb-youth-unemployment/>

centralized database outlining the number of curricula developed per course and the institutions offering those courses.

3.2.3 Relevance

TVET has emerged as one of the most effective human resource development strategies that Kenya needs to embrace in order to train and modernize her technical workforce for rapid industrialization and national development. Among the key goals of TVET is the provision of relevant and adequate skills and competencies in strategic disciplines to spur the industrial and economic development of a country.

i. Transition to labour market

According to ILO (2015, p.4), the relevance and effectiveness of TVET programs must be anchored in providing education of the highest possible quality, supporting lifelong learning and training opportunities that facilitate adjustments to the technological and labour market changes and transition¹⁶. Learning, according to Armstrong (2009, p.664), needs to be understood as a means by which a person acquires and develops new knowledge, skills, capacities, behaviors and attitude which can lead to job creation and adaptation to the dynamic market demands¹⁷.

The number of trainees absorbed into the labour market has been used as the best proxy to inform on the labour market transition discussion across the globe. In Kenya, the availability of data on the number of trainees employed in the market is a challenge and most studies have used surveys to collect the data directly from the firms and employing agencies. Currently, TVETA has developed a graduate tracker draft and demo online portal where it will collect information relating to the number of graduates from TVET institutions and those who have been absorbed into the job market¹⁸.

ii. Entrepreneurship and self-employment

In the current world, flexibility, adaptability, and life-long learning have become major objectives of best practice, in addition to employability. According to UNESCO, many TVET graduates become self-employed and apply the entrepreneurial skills acquired in the technical training institutions in their businesses¹⁹. This could be an indication that TVET is seeking to reduce the rate of unemployed TVET graduates by encouraging self-employment through entrepreneurship. Currently, in Kenya, there is no clear data on the number of graduates from TVET who have ventured into entrepreneurship. Some existing data and information were collected through surveys such as the World Bank Step-wise Survey of 2016–2017.

iii. Values and skills - Employability

Employability skills refer to the transferable skills needed by an individual to be made 'employable'. Beyond the qualifications and experience, employers do also consider the necessary skills and talents that an individual possesses. Further, there are certain attributes that professionals are required to possess. These include the competency, honesty & integrity, accountability, self-regulation, and teamwork. Most of this data is collected through surveys. The existing datasets were collected in 2016–2017, through the World Bank Step-wise Survey.

iv. Labour market information

The labour market information involves all the quantitative data, like numbers and statistics, and qualitative information, or the personal stories to support the data, related to employment and the workforce. This information comprises the size and characteristics of the labour market, including demand for and supply of labour, characteristics and requirements of jobs by industry and occupation, among others. In Kenya, the Kenya Labour Market Information System (KLMIS) serves as a labour market observatory, intelligence,

16 International Labour Organization (2015). Global Employment Trends for Youth 2015: Scaling Up Investment in Decent Jobs, Geneva: International Labour Organization.

17 Armstrong, M. (2009). Armstrong's Handbook of Human Resource Management Practice, London: Kogan page

18 https://www.nationalskillsgateway.go.ke/graduate_tracker.html?applicableHeader=5

19 <https://unevoc.unesco.org/home/Entrepreneurship+Education+as+a+Tool+to+Support+Self-Employment+in+Kenya&context=>

and watchtower for the economy through the provision of timely, relevant, and reliable labour market information²⁰.

The website provides both the labour demanded and the labour supply. Under the labour demand section, it presents the summary of all the vacancies within various occupational groups that were advertised within specific periods of the year. The vacancies were either advertised directly in the KLMIS or in the mainstream media (Daily Nation, The Standard or the East African)²¹. This information is important for career guidance, development and growth. While of the supply domain, it presents information on the skilled manpower joining the labour market. This includes information on graduates (outturns) from various training institutions, skills inventory, and skilled manpower distribution in both the public and private sectors²².

Table 5: Data Availability on Relevance

Indicator	Source of Data	Links/Documents	Data Gaps
Number of TVET graduates by gender, region and course	TVETA COG KATTI MOE TVET Institutions	Data and documents not available	No data on employment available
Number of TVET graduates employed	Firms and institutions	Data and documents not available	No data on employment available
Value and skills	Firms, SD-PTSD, and public institutions	Data and documents available at Zizi Afrique website	
Labour Market Information	Ministry of Labour and COG Kenya Labour Market Information System	https://www.labourmarket.go.ke/labour/supply/ https://www.labourmarket.go.ke/demand/labourdemand/	
Entrepreneurship, employability and self employed	Firms	Data and documents not available	

Proposals to fill the gaps/Proposed areas of focus

- Capture the data on the number of TVET graduates on the TVET MIS
- Validate data captured in TVET on the number of graduates
- Conduct survey or institutional tracer studies by ensuring it is on the performance contracts to address the data gap on the number of TVET graduates employed.

3.2.4 Resources and Utilization (Physical, Human and Financial)

Resource utilization measures how much of the existing resources are currently being utilized. Understanding these concepts is critical in planning and guiding on how to utilize resources more effectively to ensure that the institution is being productive. In this section, three aspects are discussed, that is, the physical infrastructure and equipment, human resource, and financing.

i. Physical Infrastructure and Equipment

The physical infrastructure datum comprises the number of workshops, lecture halls, production units, accom-

²⁰ <https://www.labourmarket.go.ke/>

²¹ <https://www.labourmarket.go.ke/demand/skills-in-demand/>

²² <https://www.labourmarket.go.ke/labour/supply/>

modation and catering facilities, administration blocks, laboratories, sanitation facilities, and other infrastructures such as power supply, electric lighting, and water supply. Currently, there is limited documentations of information and data relating to TVET infrastructure in Kenya. The available documents provide a broad conclusion that the available infrastructure in TVETs in Kenya are old, dilapidated, and inadequate²³. Further, the reports indicate that the infrastructures are inadequate and unable to meet the standards required for some courses. However, there is no classification indicating which infrastructures are inadequate; for instance, whether it is infrastructures related to workshop, ICT, energy, or equipment among others.

ii. Human Resource

A distinction is made between TVET trainers and instructors. The training and quality of TVET trainers is the responsibility of the Ministry of Education. Trainers teach in national polytechnics, technical and vocational centres, and in schools at the secondary education level. Instructors are responsible for teaching in vocational training centres and in private industrial centres. TVET trainers and instructors are required to have various qualifications, depending on the level of TVET taught. At the secondary education level, trainers are required to have a Diploma or Craft Certificate (ISCED 5). At the tertiary education level, trainers are required to have a

Higher Diploma or a Bachelor of Technology (ISCED 6).

Therefore, data and information relating to trainers can be sourced from the Ministry of Education; however, currently the information and data relating to the number of trainers, by course categorizations are not publicly available. Further, disaggregated information and data relating to the number of instructors in TVET institutions in Kenya is limited. This makes it hard to establish the human resource gap, trend, or need for personnel for specific courses at the micro level.

Technical trainer colleges and universities which offer pre-service and in-service trainer trainings do not have a centralized database where they can share the number of trainers who have undergone the trainings over time. In addition, universities offering pre-service training which takes two years for diploma and four years in the university degrees also lack a centralized database to share the numbers. In most cases, these institutions only keep records of their graduates over time. The greatest recent development is that trainers will be under the DTNET and administration will be more streamlined than it was previously.

iii. Financing

A number of ministries are responsible for the financing of the formal and non-formal TVET systems. These include the Ministry of Education, the Ministry of Health, the Ministry of Agriculture, the Ministry of Infrastructure, the Ministry of Water, and the Ministry of Energy. Public TVET institutions are funded through the National Treasury, but can also receive additional funding through public-private partnerships. They are also supported by a Training Levy under the National Industrial Training Authority, collected from the employers who receive the services of the certified trainees. Therefore, access to TVET financing-related information can be sourced through the national treasury and the Ministry of Education. However, currently, there are no documents providing a clear documentation of the TVET financing trends up to the institutional level. In addition to the aforementioned training levy under the National Industrial Training Authority, certain institutions have also set up income-generating activities, including enrolment fees. This information and data can be sourced from the respective institutions. Unfortunately, currently they are not available in the public domain or in the institutions' publications.

23 <https://www.tveta.go.ke/wp-content/uploads/2021/02/National-TVET-Standards-Kenya-Report-2020-5.12.-2020-2.pdf>

Further, TVET funding information can be accessed through documents published by development partners who support TVET development projects such as the African Development Bank, World Bank and NEPAD, amongst others. Bilateral donor support from the governments of China, Canada, and Germany also contribute to financing the sector.

Table 6: Resource and Utilization Indicators and Data

Indicator	Source of Data	Links/Documents	Data Gaps
Number and status of registered and licensed institutions	DTE COG TVETA	https://www.TVETa.go.ke/institutions/	The features/ status of the infrastructural development
Number of licensed permanent and pensionable employees & Number of contractual BoG employees	TVETA COG	https://www.TVETa.go.ke/institutions/	No. of Non-teaching and BoG untrained trainers
Amount of financing, Government of Kenya Capitation, Ongoing projects	DTE UNESCO COB	https://www.treasury.go.ke/wp-content/uploads/2021/10/EDUCATION-SECTOR-REPORT.pdf	The exact capitation per institution from Ministry of Education and County Government.
Equipment Hardware Software	DTE	Administrative data	Data on equipment in the Private Institutions, TVC from the counties

Proposals to fill the gaps/Proposed areas of focus

- There is need for infrastructural audit to ensure prudent utilization of government funds, and to establish the status of the existing infrastructures and the gaps. This could be done through infrastructural needs assessment.

3.2.5 Governance and Management of TVET

The Kenyan TVET governance and management provides the guidelines in the sector. The TVET sector is guided by a national TVET policy and strategies, which are fully aligned and supportive to national development policies. Additionally, there is an established TVET governance structure with MoE/DTE, TVETA, KNQA, CDACC and other agencies promoting and supporting TVET. Further, regulatory agencies are in place and are tasked with crucial regulatory areas, such as KNQA, TVETA, CDACC and others. Other important guidelines for important aspects of TVET, such as CBET, Quality Assurance, Qualifications Framework, CQF, CBT, curriculum and standard development are in place.

i. Governance

The State Department of Vocational and Technical Training under the Ministry of Education is responsible for the development of TVET and related policies. In addition, the Ministry of Public Service, Youth and Gender Affairs, and the Ministry of Labour, East Africa and Social Protection are involved in TVET. Other actors involved in the development of TVET in Kenya include:

- TVET Authority, which is responsible for 17 functions that include accreditation of institutions, programmes and trainers, ensuring quality standards and licensing, regulating and coordinating training, determining national TVET objectives, promoting access and relevance of training programmes with the national socio-economic plans and objectives, amongst others (See more in Part II of the TVET Act 2013, Section 2).
- Curriculum Development, Assessment and Certification Council, which is responsible for the development

of TVET curricula and certification. The council is composed of a chair appointed by the Cabinet Secretary, Principal Secretary TVET, Director-General, TVET Authority, Representative(s) of the Senate of Technical University, Representatives of TVET Principals, and three members of the industry.

- National Qualifications Authority, which is responsible for qualifications and the establishment of a national qualification's framework. The framework aims to promote flexible access to and equity in education, foster quality and relevance of qualifications, evidence-based competencies, and provide affordable education, training assessment and qualifications.

Religious institutions, private industries, the Micro and Small Enterprise Authority (MSEA), and the National Industrial Training Authority (NITA) are also active in the TVET sector. MSEA regulates, harmonizes and coordinates the sector and its growth. It was established in 2013 and trains entrepreneurs on business, managerial, and leadership skills, in addition to facilitating their access to the labour market.

NITA deals with industrial training, specifically with assessment and collection of industrial training levy and fees, and educating/qualifying trainers. It is tasked with curriculum development, integrating labour market information, ensuring the equivalence of certificates, accrediting institutions assessing industrial training, evaluating occupational skills, and awarding certifications. It was established under the Industrial Training Act No. 12 of 2012. All these institutions collect and manage data on TVET in the country.

ii. Legal (Policy and Guidelines)

In pursuance of Section 33 Sub-section 4 of the TVET ACT, the authority is tasked to visit counties for quality audit to assess the quality of training offered by Vocational Training Centres in the country. In VTCs, majority have complied to the requirement of accredited BOGs within the institutions, though it is still a matter of concern.

iii. Devolution

The Constitution of Kenya provides under its 2nd schedule that upon devolution, TVET institutions shall be under the responsibility of the National Government whereas the village polytechnics, craft centres and farmers training centres and by extension similar institutions that train operators in vocational trades and skills, shall be under the responsibility of respective county governments. Before the onset of devolution, there were only 753 TVET institutions in Kenya, 9 years later, there are 2,301 TVET institutions in the country. Further, the devolution of TVET institutions has seen a significant increase in the number of trainees joining vocational training centres. In return, this has led to a corresponding need for increased resource allocation to enable them to produce good quality skilled labour that can meet current and future market demands. Data on TVET governance are therefore critical in enhancing TVET service delivery.

4.0 MAPPED DOCUMENTS, STUDIES AND DATA

During the data mapping exercise, the following documents and published papers were mapped.

4.1 Published Papers

The papers focus on access, and quality themes of TVET.

Serial	Title	Theme
01	Evaluation of artisan training in metal silo construction for grain storage in Africa: Impact on uptake, entrepreneurship and income	Quality
02	Gender Inclusion in TVET: An Examination of Sustainable Interventions in Selected TVET Institutions In Kenya	Access and Equity
03	Trainees' Perception on the CBET Curriculum in Kenya: The Case of TVET Institutions in the Coast Region	Access
04	Environmental Strategic Planning Practice and Performance of TVET Institutions in Kenya	Quality
05	Improving use of Evidence to Increase Impact of TVET in Kenya	Access, Quality
06	Factors Influencing Trainee Career Choice in TVET Institutions in North Rift Kenya	Quality
07	Female Participation in Technical, Vocational Education and Training Institutions (TVET) Subsector: The Kenyan Experience	Access
08	Relationship Between Technical and Vocational Acquired Skills Required in Job Market; Evidence from TVET Institutions, Uasin Gishu County, Kenya	Relevance=Transition to labour
09	The Effect of Trainer Competencies on Training Effectiveness: A Survey of Public TVET Institutions in Kenya	Quality
10	The Impact of Industrial Attachment in TVET Institutions; A Case Study of Engineering Departments in Masai Technical Training Institute in Kajiado, Kenya	Quality
11	Influence of Technical, Vocational Education and Training on Graduates' Employability in Kenya: An Inherent Concern	Relevance=Transition to work
12	Instructors' Capabilities in Embedding Core Values and Soft Skills in TVET Institutions in Kenya	Quality
13	Integration of Soft Skills into Education and Training Systems by TVET Institutions in Kenya	Quality = Curriculum
14	Implementation of Whole Youth Development Skills in Kenya's TVET Institutions	Quality
15	Investigation of Participation of Industry in a Quality Electrical Installation CBET Curricula Development, Delivery and Evaluation	Quality
16	A Review of Technical and Vocational Education and Training Institutions' Online Learning as a Response to Corona-Virus Disease 2019 in Kenya	Access, Equity and Quality
17	Evaluation of Distance Learning at Kenya Technical Trainers College, Nairobi, Kenya	Quality
18	Determinants of Entrepreneurial Intentions Among Graduates of Public TVET Institutions in Kenya	Relevance=Transition to Work
19	Linking Technical and Vocational Education and Training (TVET) with Entrepreneurship Education: A Case of Kenya Technical Trainers College (KTTC), Nairobi County, Kenya	Quality, Transition to work
20	Realigning Technical and Vocational Education and Training (TVET) for Employment Creation in Kenya	Quality, Relevance=Transition to work

21	Assessment of Access to Quality Training Based on the Distribution of TVET Institutions in Kenya	Access and Quality
22	Enrolment Trends in Kenyan Technical and Vocational Education and Training Institutions	Access and Equity
23	Effectiveness of Non Formal TVET Programs in Developing Social Skills Competencies Among the Vulnerable Youth in Nakuru County-Kenya	Quality
24	Changing Strategies in Student Recruitment Among Selected TVET Institutions in Machakos County, Kenya	Access
25	Internal Efficiency of Public Vocational Training Centres in Kenya	Governance
26	The Risk to Achieving Sustainable Development Competencies: A Gendered Analysis of Access and Training Outcomes in TVET Institutions in Kenya	Access, Equity
27	Journal of the Kenya National Commission for UNESCO	Access, Equity
28	Does Government Policies Contribute to Enrolment in Vocational Training Centres in Kenya	Access, Equity
29	Female Participation in Technical, Vocational Education and Training Institutions (TVET) Subsector: The Kenyan Experience	Access, Equity

4.2 Other documents and reports

The documents and report focus on access, equity quality and relevance

Serial	Title	Theme
01	Access, Participation and Equity Research Report Rd	Access, Participation and Equity
02	Cap Yei Pre-Training Survey: Understanding the Characteristics of Youth Before Training	Relevance
03	The Unwritten Rules That Affect Implementation of Demand Driven Skills Training in TVET Curriculum	Quality and Relevance
04	Finance and Efficiency Research Report Rd	Finance and Efficiency
05	Securing the Future for Youth: Facilitating Multiple Earning Strategies	Relevance
06	Exploring How the Eu-Giz Program Is Changing Lives in The Coastal Areas of Kenya	Quality and Relevance
07	Experience-Of-Covid-19-Report-On-TVET-Learning Rd	Access, Equity and Relevance
08	Governance and Accountability Research Report Rd	Governance and Accountability
09	Testing the Integration of a Life Skills Curriculum in The Government Run TVET System in Kenya	Quality
10	National Education Sector Strategic Plan	
11	National-TVET-Standards-Kenya-Report-2020-5.12.-2020	
12	Negative Views Towards TVET: The Role of Colonial and Post-Colonial TVET Policies in Kenya	Quality and Relevance
13	Quality Research Report Rd	Quality
14	Relevance Research Report Rd	Relevance
15	Revamping Youth Polytechnic Training: Assessment of Effects of Capacity Building Training	
16	The Role of Partnerships in Youth Skills Development: The Case of Cap Yei Basic Employability Skills Training (Best) Model in Kenya	
17	TVET Blueprints - TVET Insights Report - Executive Summary Rd_	
18	Wyd-Study_Synthesis-Report_Ziziafrique	Access, Equity and Relevance

19	Wyd-Study_Working-Youth_Aku	Access, Equity and Relevance
20	Wyd-Study_Youth-In-TVET_Aphrc Rd	Access, Equity and Relevance
21	Wyd-Study_Youth-Neet_Dalberg	Access, Equity and Relevance
22	National-TVET-Standards-Kenya-Report-2020-5.12.-2020-2	Access, Equity and Relevance
23	TVET Report December 2019	Access, Equity and Relevance
24	TVET-Short-Report-Final	
25	State of Skills (Wcms_742210)	
26	World TVET Database (Kenya)	
27	2013 Country Profile	Access, Equity and Relevance
28	2018 Country Profile	Access, Equity and Relevance
29	Final-Education-Sector-Mtef-2021-2023-10012020	
30	Factors Influencing Life Skills Training in Technical and Vocational Education and Training Institutions in Kenya	Access, Equity and Relevance
31	Awiti, A., & Scott, B. (2016). Kenya Youth Survey Report.	
32	Drivers of Whole Youth Development in TVET Institutions in Kenya	Relevance and Quality
33	Building Capabilities for Work and Life: Assessing the Production of Core Values and Capabilities Among Youth in TVET Institutions in Kenya.	Access, Equity and Relevance
34	The Influence Of Competency Based Technical Training on Youth Employability: A Study of Technical Training Institutions in Nairobi County	Access, Equity and Relevance
35	Determinants of Entrepreneurial Intention Among TVET Students in North Rift Region, Kenya.	Access, Equity and Relevance
36	Determinants of Effective Implementation of Artisan and Craft Curriculum in Catholic Sponsored Community Colleges In Nairobi Region, Kenya	Quality
37	Education and Training (TVET) Sector Mapping in Kenya	
38	Increasing Women Access in TVET Through Odl Programme: A Case of Thika Technical Training Institute in Kiambu County, Kenya	Access and Equity
39	Factors Influencing Female Students' Enrolment in Technical Courses: A Case of Matili Technical Training Institute: Nairobi, Kenya: University of Nairobi	Access and Equity
40	Female Participation in Technical, Vocational Education and Training Institutions (TVET) Subsector: The Kenyan Experience	Access and Equity
41	A Study of a Current Model for Integrating Education For Sustainable Development In Centres Of Excellence In TVET In Kenya	

Metadata	Whole Youth Development in Kenya (WYD-Study_Synthesis-Report_ZiziAfrique)	Whole Youth Development in Kenya (WYD-Study_Working-youth_AKU)	Youth not in education, employment and training in Kenya (WYD-Study_Youth-NEET_Dalberg)	Kenya National Bureau of Economic Surveys and Statistical Abstracts Data	TVET Management Information System Data
Source of Data	Online, published document	Online, published document	Online, published document	Online, published document	Institutional data
Name of survey	Whole Youth Development in Kenya (WYD-Study_Synthesis-Report_ZiziAfrique)	Survey of employers and employees in the formal and informal sectors to determine entry-level skills among youth (18-30 yrs) in employment Kenya.	Youth not in education, employment and training in Kenya: Understanding values, capabilities and barriers towards achieving career and life goals	Kenya National Bureau of Economic Surveys and Statistical Abstracts Data	TVET MIS housed at TVETA
Year	October 2019 and published on January 3, 2021	October 2019 and published on January 3, 2021	October 2019 and published on January 3, 2021	Published yearly	Data managed by TVETA
URL	https://ziziafrique.org/download/whole-youth-development-in-kenya-wyd-study-synthesis-report_ziziafrique/ Publications on Youth - Zizi Afrique Foundation	https://ziziafrique.org/download/whole-youth-development-in-kenya-wyd-study-working-youth_aku/	https://ziziafrique.org/download/youth-not-in-education-employment-and-training-in-kenya/?wpdm-redirect=3817&refresh=6278bea3464d41652080291	https://www.knbs.or.ke/ https://www.knbs.or.ke/?wpdm-pro=economic-survey-2020	https://mis.tveta.go.ke/
Country	Kenya	Kenya	Kenya	Kenya	Kenya
Region	Kenya	Kenya	Kenya	Kenya	Kenya
Phase of education	Across all phases: Primary, secondary & tertiary.	Across all phases: Primary, secondary & tertiary.	Across all phases: Primary, secondary & tertiary.	Across all phases: Primary, secondary & tertiary.	TVET
Type of education	Both General Programme and TVET	Both General Programme and TVET	Both General Programme and TVET	Both General Programme and TVET	Both General Programme and TVET

Type of access	The data are available and accessible upon request.	The data are available and accessible upon request.	The data are available and accessible upon request.	The data are available and accessible upon request.	The data are accessible upon request.	The data are accessible upon request.
					The microdata are available and accessible upon request. Published data are accessible and available	

5.0 TVET DATA GAPS

The data gap is defined as the data needed for a particular element or social group that is knowingly or unknowingly missing when policy is made on the basis of large datasets. In this context, the scope of data gaps is defined as the primary, secondary, and unknown data gaps that cover scenarios of knowingly or unknowingly missing data and how that is partially compensated through alternative sources or proxy indicators (Giest & Samuels, 2020). In the TVET sub-sector, there are seemingly more data to draw on for policymakers; the quality of the data in combination with the potential known and unknown data gaps constraints government’s ability to create inclusive policies. In the current era of big data, there is a widespread techno-optimist notion that the so-called big data will in turn facilitate better decisions. The data gaps are discussed below per the thematic areas and as presented in Figure 2.

Figure 2: Density map of TVET Data availability and accessibility

Data Type	Level of Accessibility and Availability
i) Access and Equity	
ii) Quality	
iii) Relevance	
iv) Assessment and Certification	
v) Resource and Utilization	
vi) Governance and Management	

Key	Most data are available and accessible	Most data are available but not accessible	Most data are not available and not accessible

- i. Access
 - a. Lack of adequate information on enrolment in private institutions. In the Economic Surveys and education sector reports, only data and information relating to the number of institutions both private and public are provided yearly. The reports do not provide a trend analysis on the enrolment rates in the private institutions or per course, and at sub-national and institutional levels.
 - b. Real-time data collection is missing for some key indicators. For instance, data on TVET enrolment, number of trainees by gender, and enrolment by course are not normally published regularly, thus creating a possibility of missing real time data.
 - c. Data accuracy for some key indicators relating to access is evident, especially with the inconsistency in the available data online and in the published documents.
 - d. Inadequate information on catchment in relation to the establishment of TVET institutions. There is limited up-to-date data on the number of new and closed TVET institutions in the country.
- ii. Quality
 - a. Curriculum and assessment. There are limited up-to-date data on the verification of assessment, certification, and number of assessments of the qualification level of vocational employees and upgrade of their qualification levels.
 - b. Data on CBET assessment results. Considering the current TVET system in Kenya is largely based on theoretical training, that to some extent gives less attention to the assessment of competence. This makes it difficult to have data relating to the assessment of CBET.

- iii. Relevance: Transition to labour market
 - a. Lack of adequate information on transition to industry. There are no real time data on the number of TVET graduates transitioning to the labour market. Existing data and information have been collected through surveys, making it difficult to predict the number of yearly graduates being absorbed into the industry.
 - b. Inadequate information on labour market survey. The current surveys are not done regularly: some are done after 3 years, 5 years and others after one decade.

- iv. Assessment and certification
 - a. No information on certification through Recognition of Prior Learning (RPL)²⁴. There is no information and data relating to the assessment of the qualification level of citizens who are working and who apply for RPL and to the certification of the candidate's knowledge, skills and competencies.
 - b. Number of certifications. There is no clear number of courses that a graduate from TVET can receive a certificate for after completing the courses.

- v. Resource and Utilization
 - 1. Financing
 - i. Inadequate data on value for money (no tracing on impact).– There are limited data and literatures relating to the impact of financing TVET or of tracing the impact through the TVET graduates.
 - ii. Lack of data on Differentiated Unit of Costs.
 - iii. The exact capitation per institution from the Ministry of Education and County Government.

 - 2. Human Resource
 - i. Number of non-teaching and Board of Governors (BOG) untrained trainers.
 - ii. The data of trainers under TSC and those under the county payrolls.

 - 3. Physical Infrastructure and Equipment
 - i. The features/ status of the infrastructural development.
 - ii. Data on equipment in the Private Institutions, TVC from the counties.

 - 3. Governance and Management
 - i. Devolution: The data of trainers under TSC and those under the county payrolls. This affects the delivery of services in the Vocational Training Centres and Village Polytechnics.
 - ii. Policy compliances: There are limited clear data on the number of VTCs, who have complied to the requirement of accredited BOGs within the institutions. This is still a matter of concern in the sub-sector.

24 Recognition of Prior Learning (RPL) is the process used to identify, assess and certify a candidate's knowledge, skills and competencies

6.0 CHALLENGES, EMERGING ISSUES AND LESSONS LEARNT

6.1 Limitations and Challenges of mapping TVET data in Kenya

- i. Getting quality, accurate and reliable data from institutions and agencies was challenging. This was occasioned by lack of a public central repository site for TVET data and information. Further, the existing data in the publications were inconsistent (vary across the reports) and were not up-to-date or real-time data.
- ii. Some institutions were reported to be unwilling to share data hosted in their offices because of bureaucracy and policies put in place.
- iii. The data collected and stored in some formats were obsolete data in certain instances, hence they were not useful to inform current policies.
- iv. Irregular data collection constraints, and the use of prediction models to inform on the policies. Some data indicators are not updated yearly unless and until data is collected through a survey.
- v. Some datasets are fragmented into many pieces that are not close together. This is typically the result of attempting to insert a large object into storage that has already suffered external fragmentation.
- vi. Non-uniformity in data collection, especially on the units of measurement makes it difficult to predict trends and inform on policies.
- vii. Unstructured data collection is also a main challenge, considering the datasets are collected across different data collection points and are expected to be merged into one central repository.
- viii. Lack of personnel and limited skills for data collection and management. The development and management of data collection across the TVET institutions requires skilled professionals with skills in data collection and management to ensure an accurate dataset is produced.
- ix. Failure to adopt ICT in data collection. With the trend in big data collection and management, TVET is yet to adopt an ICT approach in data management and collection.
- x. Inaccessible data is still a major challenge and constraint in data collection and compiling since some datasets could be in manual filing systems.
- xi. No knowledge management units in organizations due to limited human and capital resources.

6.2 Barriers to Accessing Datasets and Mapping

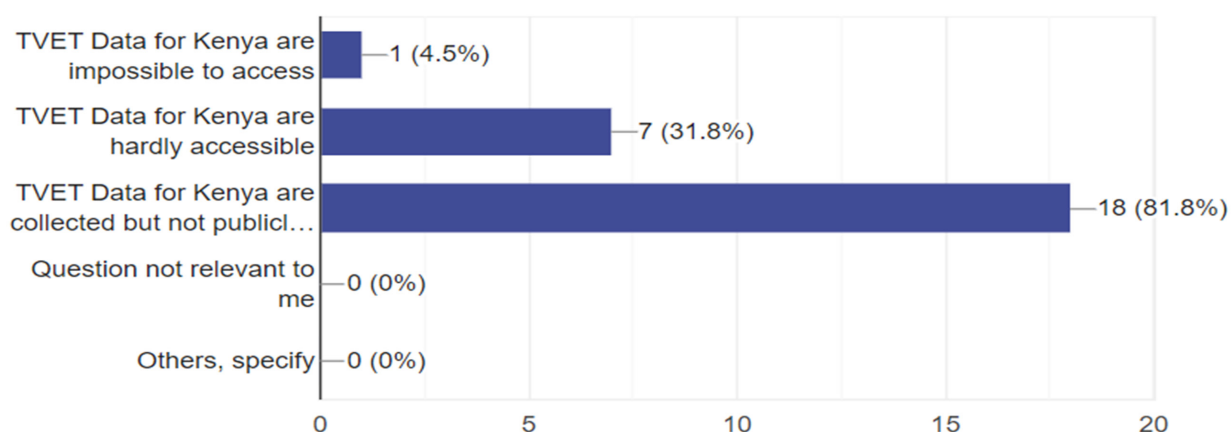
- a. Privacy and bureaucracy of data in some institutions limits the access of some data in the TVET sub-sector.
- b. Commercialization of data and copyright issues by the private players and stakeholders, especially in data collected through surveys. Some of these datasets are kept in private sites that require subscriptions for one to gain access.
- c. No access to a central repository for the studies. This makes it difficult to understand the already done and published literatures, documents and reports in the TVET sub-sector in Kenya and possibly understand the data set used in the reports.
- d. Difficulty in Identification of Quality of data due to the presence of many predatory journals, and due to inconsistency in datasets and data available in the online domains.
- e. Lack of the needed skills to mine and convert data into readable and usable formats, especially converting data in PDF documents into analyzable formats such as Microsoft Excel Sheets formats.
- f. Rigid data and organization policy is also a barrier in the collection and access of some key datasets such as data relating to finance.
- g. Budget-constraint limits the scope of data collection and personnel to be involved in data collection, management and analysis.

6.3 Lessons Learnt

From the mini-survey rolled out to the stakeholders in March 2022 who participated in the data mapping exercises, some key lessons were drawn. For instance, some stakeholders noted that there existed data on various thematic areas which other stakeholders were not aware of. Further, it was also reported that some decisions were made without evidence since there were existing data gaps.

In addition, the stakeholders gave their opinions regarding the availability of TVET data for research or evidence-based policy formulations. The responses for the stakeholders are summarized in Figure 3 below.

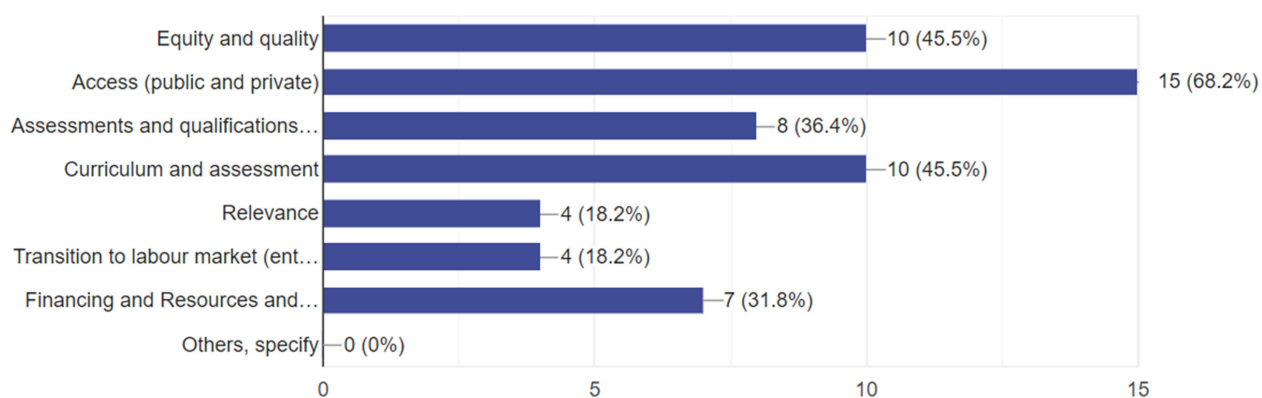
Figure 3: Availability of TVET Data for Research or Evidence-based Policy Formulation



Source of Data: Data Mapping TVET Stakeholders Survey, March 2022

Considering the key thematic areas in education and TVET data relating to access, relevance, equity & equality, transition to labour market, financing & resources, and governance and management, the stakeholders were asked to give their opinions on the thematic areas that could be addressed by the already available data in the public domain. It is evident that most institutions are collecting data that can address issues relating to access, equity and equality, and curriculum and assessment. Limited data are available to address issues of relevance, transition and quality (Figure 2).

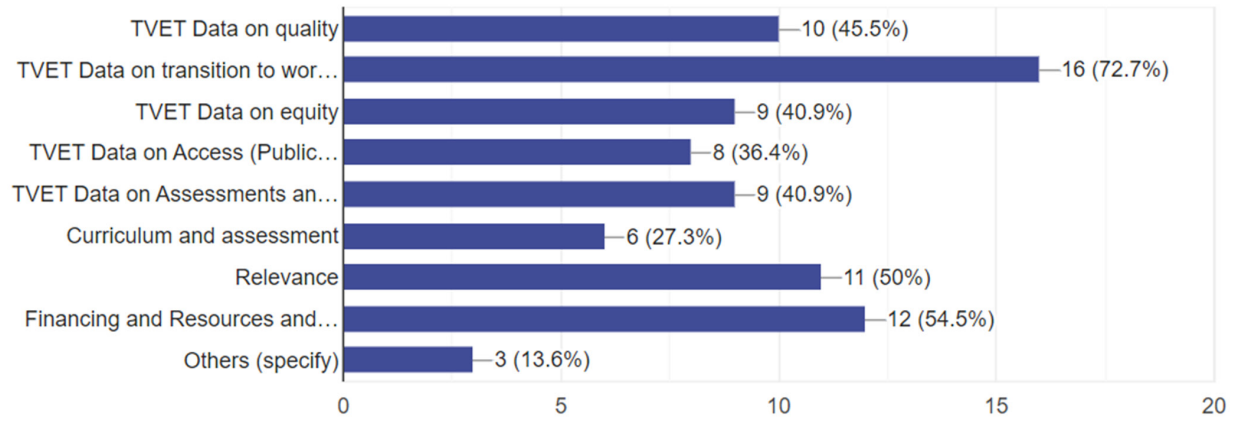
Figure 4: Availability of Data Relating to the Thematic Areas Relevant to TVET Policy Formulations



Source of Data: Data Mapping TVET Stakeholders Survey, March 2022

In terms of the data gaps in the TVET sub-sector, the TVET stakeholders were asked to provide the list of data gaps relevant for research and policy purposes. The survey results showed that huge data gaps exist in data, touching on market transitions, financing and resources and relevance among others as presented in Figure 5, below.

Figure 5: Areas With Data Gaps Relevant for TVET Stakeholders Policy Formulation



Source of Data: Data Mapping TVET Stakeholders Survey, March 2022

7.0 RECOMMENDATIONS

To overcome the aforementioned challenges/barriers, we recommend the following initiatives:

- i. **Data Gaps.** The government, through the SD-VTT in collaboration with the stakeholders, needs to provide the necessary support to aid the development of a central data repository where all the data from the TVET institutions could be centrally placed and managed. This will reduce the cases of data inconsistencies, data gaps, and will reduce the bureaucracy. Further, the open-source repository will reduce the cost of data collection and of conducting surveys.
- ii. **Data Collection.** To address the challenge of data inconsistencies and management of the data, there is a need for the government to capacity-build relevant individuals on data collection, data management, analysis and reporting. Further, there is a need for the adoption of ICT in data collection and management, for the development of a web-based interactive dashboard that presents real-time data and visualizations, and for the development and administration of a comprehensive TVET data tool to capture data and information for key and uniform indicators annually. This will involve the establishment of ICT-enabled knowledge management centres and data hubs at the institutional level. This will reduce data inaccuracy and inconsistencies.
- iii. **Linkages & Partnerships** among the TVET stakeholders to provide an avenue for easy access and collaboration of information and database. This will reduce the bureaucracy and rigid policies in place regarding data access and sharing.
- iv. **Both National and County government intervention** is required to facilitate the development of policies and legal frameworks that enhance the data ecosystem and value chain across all the TVET institutions managed by both governments. Further, there is a need for the Ministry of Education to strengthen collaboration among entities in the TVET sector for better data sharing.
- v. **Quality.** There is a need for a TVET Assessment Center tasked to compose a consolidated database system that contains all information/data related to assessment, verification and certification. Furthermore, the organization aims to conduct an assessment of the qualification level of citizens who are working and who apply for Recognition of Prior Learning (RPL).
- vi. **Human resource.** There is a need for continuous mentorship and capacity building among the TVET personnel to enhance professionalism around TVET data management and dynamic data ecosystem, especially around the use and management of big data to influence policy decisions.
- vii. Further, this data mapping exercise has provided a basis for the development of an open source website/platform to host all the TVET journals, publications and documents. This could also be hosted on the same website where the data portal will be hosted.
- viii. **Equipping of TVET institutions and effecting scheme of service** for all TVET instructors.
- ix. **Establishment of regular knowledge sharing forums and knowledge management units** in institutions.
- x. **Legal framework on data storing and sharing** that enables the institutions to share and manage data with the various stakeholders in the sector. This will also lessen the bureaucracy in data collection and management.
- xi. **Establishment of a strong Monitoring and Evaluation system** that facilitates tracking and reporting of data entering the data portal and that informs on timely reflection of the policies.

REFERENCES

- Buchanan, D. A., & Bryman, A. (2009).** *The organizational research context: properties and implications.* *The SAGE handbook of organizational research methods*, 1-18.
- Giest, S., & Samuels, A. (2020).** 'For good measure': data gaps in a big data world. *Policy Sciences*, 53(3), 559-569.
- Open Data Watch. (2018).** *The data value chain: Moving from production to impact, Executive summary.* Retrieved from: <https://opendatawatch.com/reference/the-data-value-chain-executive-summary/>
- Salzano, C., & Labate, H. (2016).** *Teaching policies and learning outcomes in Sub-Saharan Africa: issues and options.*
- Veja, C., Hocker, J., Schindler, C., & Rittberger, M. (2021).** *Educational open government data in Germany: The landscape, status, and quality.*

