



NATIONAL TVET STANDARDS

KENYA REPORT 2020



TECHNICAL AND VOCATIONAL EDUCATION
AND TRAINING AUTHORITY

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and Training Authority

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FOREWORD

The Technical and Vocational Education and Training Authority (TVETA) is a State Corporation established by the Technical and Vocational Education and Training (TVET) Act No 29 of 2013 (Kenya Gazette Supplement No. 44). The mandate of TVETA as a regulatory body is to regulate and coordinate the TVET sector through the accreditation of institutes, programs and trainers. It also assures that quality education and training is imparted and is accessible to all.

We are pleased to present this 'National TVET Standards' report that will provide a clear guide for development of TVET standards in Kenya and help the country achieve its competitive human capital. The development of this document is based on extensive research of the current international and national scenarios in TVET, industry requirements, analysis of labour market research and deep dive into priority sectors. This study is done through extensive stakeholder engagements across the country.

The world of work is continuously evolving and it is critical to ensure that the training programs we offer are relevant and standardized. The development of this document is therefore important to pave the way for outlining the approaches for prioritizing and development of standards that shall guide the TVET ecosystem.

It will be the responsibility of the Board to oversee the implementation through the development of the standards that are current and in line with global best practices.

Lastly, I take this opportunity to sincerely thank the entire team involved in the development of this report, including board members, management, staff of the Authority and all relevant stakeholders.



Prof. Ahmed Ferej, Ph. D.

Chairman, TVETA Board

PREFACE

The TVET Authority of Kenya has the mandate to coordinate and regulate TVET across Kenya. The strategic objectives of the Authority revolve around promoting access and equity, quality and relevance, governance and management within the TVET system in Kenya.

With this research on international best practices and local requirements in the post-COVID-19 world, we are keen to look at standards that support creating opportunities for youth that are relevant for the job market and ensure improvement of quality of TVET in the country. The identification of best practices in the TVET sector and the benchmarking of Kenya's standards with other developing and developed countries gives us a view of global practices for development of training standards.

Quality TVET system can guarantee a strong connection between the skills learnt and the needs of the labour market, ensuring that learners get proper opportunities to become self-dependent and earn their livelihood. A thorough analysis of the labour market, various sectors of the industry, TVET systems across the world, standards and classifications defining the occupational levels and industry standards has been done as part of this study to provide recommendations aligning with the global standards and ensuring that skill development is done in the right way to adequately address the requirements of the labour market.

The execution of this National TVET standards report will identify gaps on sector and regulatory standards required in the Kenyan TVET sector. This will guide in ensuring that standards developed will enhance provision of relevant training that leads to employment and economic growth.



**Dr. Kipkirui Langat,
Ph.D. FIETK**

Director General/CEO, TVETA

In conclusion, I would like to appreciate the TVETA Board of Directors' guidance and support during this study and development of this report, and look forward to further guidance and support to inform its successful implementation. To my colleagues in the Management, I wish to express my gratitude in your role in the process of developing this report and assure you of my guidance, support and availability in order for us to actualize the Plan successfully for the benefit of all Kenyans. Finally, I wish to appreciate Step Innovations Africa Limited, for providing the consultancy services in conducting this study and developing this report.

ACKNOWLEDGEMENT

During the study the project implementation team worked with Technical and Vocational Education and Training Authority (TVETA) staff as well as with wider international and national TVET stakeholders.

This is to appreciate the support received from TVET experts and stakeholders in Kenya including Directorate of Technical Education, Directorate of Vocational Education and Training, Kenya National Qualifications Authority (KNQA), Kenya Bureau of Standards (KEBS), TVET Curriculum Development, Assessment and Certification Council (TVET CDACC), Kenya Institute of Curriculum Development (KICD), Kenya National Examinations Council (KNEC), Ministry of Labour, National Industrial Training Authority (NITA), Kenya Association of Technical Training Institutes (KATTI), Kenya Association of Manufacturers (KAM), Kenya National Chamber of Commerce and Industry (KNCCI), Kenya National Federation of Jua Kali Associations (KNFJA), Kenya Investment Authority (KenInvest), National Employment Authority (NEA), Kenya Universities and Colleges Central Placement Service (KUCCPS), Kenya

National Association of Private Colleges (KENAPCO), National Construction Authority (NCA), Kenya Engineering Technology Registration Board (KETRB), Kenya Medical Laboratory Technicians and Technologists Board (KMLTTB), Kenya Medical Practitioners and Dentists Council (KMPDC), Nursing Council of Kenya (NCK), Kenya Nutritionists and Dieticians Institute (KNDI), Kenya Civil Aviation Authority (KCAA), Kenya Maritime Authority (KMA), East African School of Aviation (EASA), Tourism Regulatory Authority (TRA), Media Council of Kenya, Kenya Power and Lighting Company (KPLC), National Environment Management Authority (NEMA), Kenya Water Institute (KEWI), Kenya Institute of Special Education (KISE), Railway Training Institute, representatives from TVET training institutes and all participants of the validation workshop.

We would like to acknowledge the invaluable inputs of representatives from the World Bank, African Development Bank (AfDB) and Mastercard Foundation. Additionally, we would like to appreciate Prof. Bonventure Wanjala Kerre, Dr. Bitange Ndemo, Prof. Eric Ogur and Prof. David Kimutai Some for their expert inputs.



TVETA Board of Directors, management and staff

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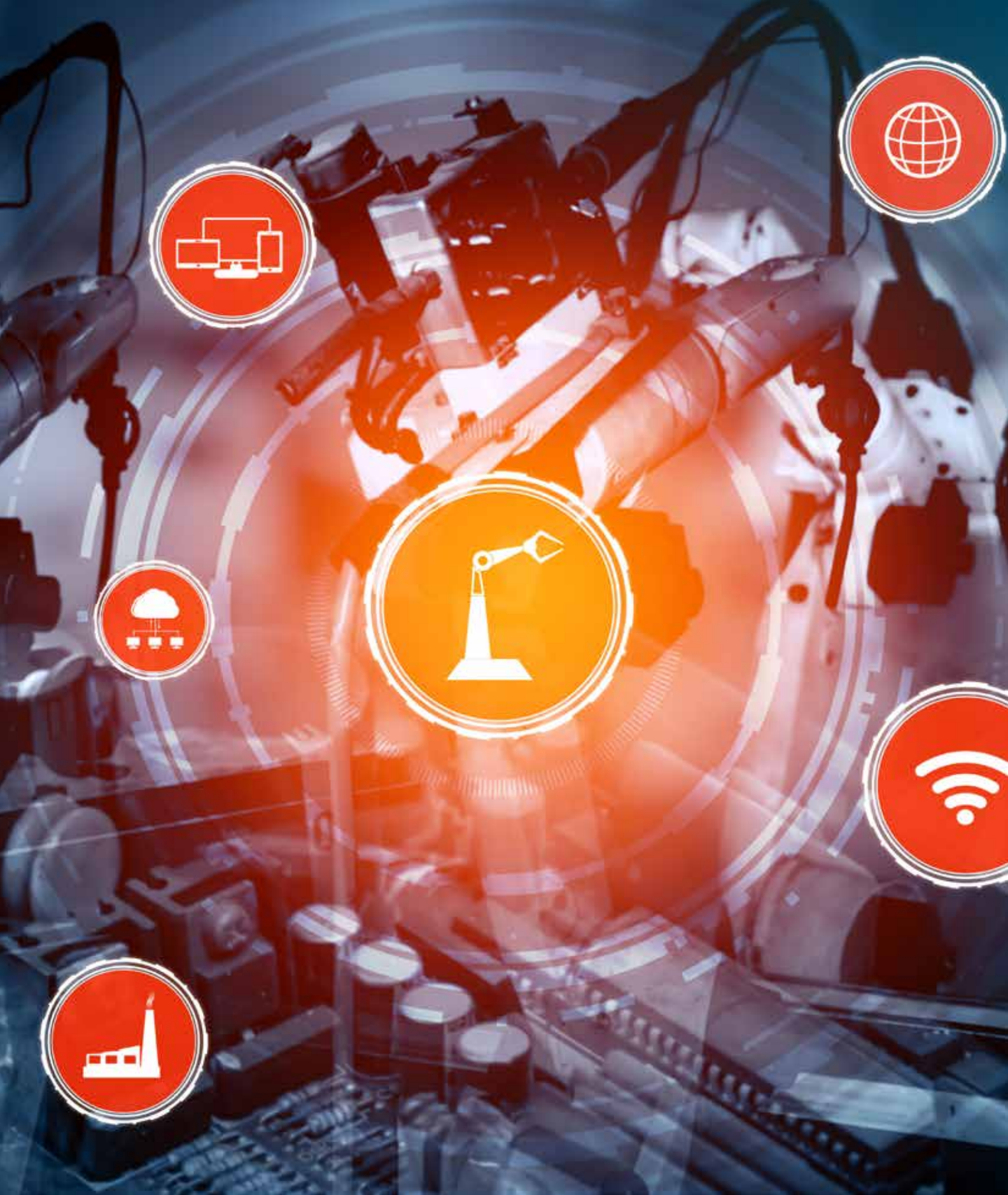
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ABBREVIATIONS

AGOA	African Growth and Opportunity Act	STED	Skills for Trade and Economic Diversification
ASALs	Arid and Semi-Arid Lands	STEM	Science, Technology, Engineering and Mathematics
ASTGS	Agricultural Sector Transformation and Growth Strategy	TSC	Teacher Service Commission
CAADP	Comprehensive African Agricultural Development Program	TVET	Technical and Vocational Education and Training
CAGR	Compounded Annual Growth Rate	TVETA	Technical and Vocational Education and Training Authority
CBET	Competency Based Education and Training	UIS	UNESCO Institute for Statistics
COE	Centres of Excellence	UNESCO	United National Educational, Scientific and Cultural Organization
COMESA	Common Market for Eastern and Southern Africa	UNWTO	United Nations World Tourism Organization
CPD	Continuous Professional Development	VTCs	Vocational Training Centres
DACUM	Developing a Curriculum	WSI	WorldSkills International
EU	European Union	WSC	WorldSkills Competition
ILO	International Labour Organization		
ISCED	International Standard Classification of Education		
ISCO	International Standard Classification of Occupations		
ISIC	International Standard Industrial Classification		
LMIS	Labour Management Information System		
MTPs	Medium Term Plans		
NTB	National Tourism Blueprint		
ODeL	Open Distance and eLearning		
OECD	Organization for Economic Cooperation and Development		
PLAR	Prior Learning Assessment and Recognition		
QPs	Qualification Packs		
RPL	Recognition of Prior Learning		
SAGA	Semi-Autonomous Government Agency		
SDGs	Sustainable Development Goals		
SET	Supporting Economic Transformation		
SEZ	Special Economic Zones		
SIDA	Swedish International Development Cooperation Agency		
SMEs	Small and Medium Enterprises		
SSCs	Sector Skills Councils		



EXECUTIVE SUMMARY

Technical and Vocational Education and Training (TVET) is a vital tool for the development of a country's skill capital. TVET systems help countries achieve their growth agenda by supporting industries with a steady supply of trained workforce to meet demands of skilled labour. TVET contributes positively to the economy by providing opportunities for employability through jobs and self-employment. It gives an opportunity for the youth to be empowered with skills for sustainable livelihood opportunities.

International Labour Organization (ILO) has ascertained that the development of skills and the TVET system across countries is standardized and in line with the requirements of the labour market and sectors. The use of standards such as International Standard Industrial Classification (ISIC) and International Standard Classification of Occupations (ISCO) is recommended for the development of occupational standards.

Occupational standards define duties, activities and tasks to be performed by jobholders in the world of work. These occupational standards are helpful to employers for preparing job descriptions, recruitment processes, performance measures etc. However, there exist challenges to directly utilizing these occupational standards as inputs for preparation of TVET programs. In this context, the development of occupational training standards plays an important role.

Countries develop occupational training standards for objectively identifying competencies for TVET learning outcomes. First, countries use multiple data sources to identify training needs in specific sectors; and second, they work closely with industries and professional bodies to ascertain learning competencies as part of occupational training standards. The occupational training standards are then utilized for development of curriculum and learning materials. Occupational training standards help in ensuring the quality and relevance of the training delivery is in lines with industry expectations.

This study has conducted an in-depth benchmarking of various countries, including India, Philippines, Australia, Germany, Canada, the Caribbean nations and select African Union countries, on

occupational classifications, occupational training standards, regulatory standards for quality assurance and international best practices for TVET. Highlights include utilizing international or national industrial and occupational classification frameworks, setting up of Sector Skill Councils (SSCs) for industry-linkages, focus on greening TVET, gender mainstreaming and inclusivity, recognition of prior learning, effective Labour Management Information System (LMIS), dual TVET system, among others.

Along with international best practices, the study included understanding the Kenyan country context for identifying the needs for development of occupational training standards and additional regulatory standards for overall effectiveness of TVET.

Within the Kenyan context, this report provides the overview of the Kenyan TVET ecosystem, the various stakeholders and their roles, a mapping of existing standards in TVET and the impact of COVID-19 on TVET and the world of work. The study has conducted rigorous primary research for gap analysis and needs assessment for standards development. Stakeholder engagements through in-depth interviews, focus group discussions, surveys, Delphi study have been conducted to understand the current challenges and recommendations for strengthening the Kenyan TVET eco-system.

Feedback received from stakeholders indicates challenges such as skill gaps and skill mismatch; outdated TVET programs; lack of productivity in the workforce to adequately support the priority sectors and/or self-employment.

Though the stakeholders indicated that there are gaps between training and industry requirements; majority were unable to share specific lists for occupational training standards within their sector. This largely stems from the fact that there are currently no readily available and updated labour market information studies related to skill-shortage and training needs for specific sectors or occupations. Additionally, stakeholders shared challenges such as inadequate financing and other resource constraints, fragmented TVET eco-system, negative perception and challenges in access to TVET programs, inadequately

qualified trainers, gender marginalization, limited adoption of technology etc.

Despite the challenges, several promising initiatives are ongoing towards effective skills development in the country. These include the establishment of CBET, promotion of lifelong learning, setting up of Centers of Excellence, regional harmonization, training of trainers, industry linkages, among others.

Development partners such as the World Bank, African Development Bank, Mastercard Foundation, UNESCO, among several other country development agencies, are actively implementing projects within these sectors that are strengthening various aspects of TVET programs to meet sectoral and labour market needs.

The country's development agenda – Vision 2030 and the Big Four Agenda – guide the focus of TVET in the country. Priority sectors of focus include Agriculture, Manufacturing, Construction, Healthcare, ICT, Energy, Tourism, Mining and Quarrying, Finance and Insurance Services, Wholesale and Retail, Education, Transportation and Logistics, Water Supply, Public Service, Administration, Security and Support Services. This study has conducted situational analysis of each sector and its sub-sectors; focusing on sector definition, sector strategy, analyzing major trends, growth drivers, Government policies, SWOT analysis and human resource requirements with respect to national, regional and county development plans.

The study also reviews existing TVET standards and recommends priority standards (regulatory and occupational training standards) for development. It is also recommended that existing occupational standards be built upon to address gaps around assessments, training resources, trainer qualifications, supporting special needs learners etc., in guidance of TVETA, to develop these into occupational training standards that are then gazetted.

In conclusion, the study recommends a list of priority occupational training standards for key sectors. It also recommends an approach to adopt international standards from developed and developing countries to fast-track identification and development of industry aligned TVET programs. An additional database of international

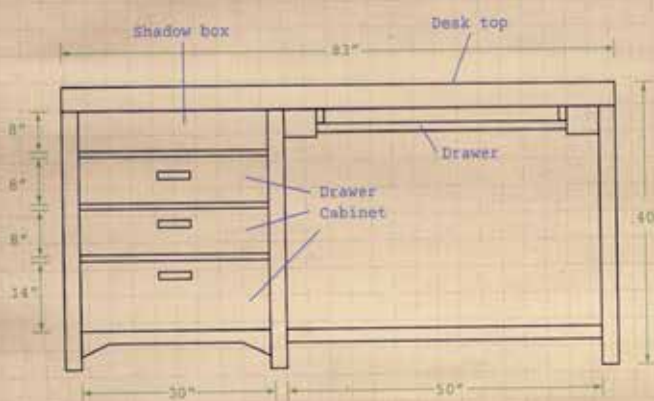
occupational standards has been curated that can facilitate development of occupational training standards in Kenya.

Factors suggested for consideration to prioritize development of occupational training standards for Kenya include national and sector-based needs, addressing emerging needs from COVID-19 pandemic, regional mobility, enhancing competitive advantage for Kenya to participate in forums such as the WorldSkills International Competition, promoting export of labour, self-employment and specific requests from industry and sector stakeholders. It is also recommended when developing and/ or adopting new occupational training standards, focus should be on basic competencies (21st Century skills, mindfulness etc.), transversal skills and job specific specialized skills that are shorter in duration and modular in nature. This shall allow trainees better career mobility across sectors and job roles.

Other recommendations for strengthening the TVET eco-system include the setting up of Sector Skills Councils (SSCs) for driving industry- linkages and providing regular and up- to-date standards and curricula that are market-driven as well as sector-specific labour market requirements and forecasting (in the interim, existing Sector Advisory Committees may be engaged for this purpose); implementing Continuous Professional Development (CPD) for TVET trainers to ensure upskilling and career pathways; national digital transformation strategy and framework for TVET for the post-COVID-19 world of skills and work; focus on entrepreneurship initiatives; export of labour; gender mainstreaming and inclusivity within TVET; a robust and up-to-date Labour Management Information System (LMIS), annual labour market studies, forecasting studies, tracer studies and sensitization and awareness communication with stakeholders on standards and wider TVET trends.



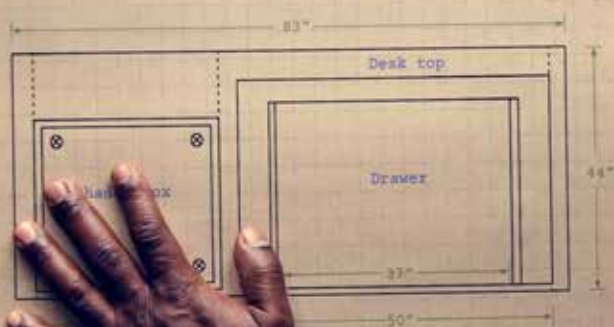
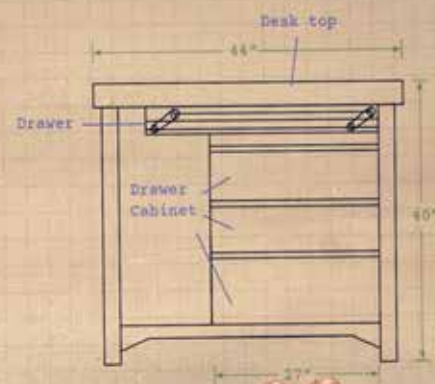
Working Desk: Overall Dimension



Top of the desk

Shadow box desk top attach on site are detachable

Wood choices include:
- Maple
- Walnut
- Cherry
- White Oak
- Ash
*or combination



1. BACKGROUND AND CONTEXT

This chapter introduces the role of standards in Technical and Vocational Education and Training (TVET). Standards provide a firm foundation towards ensuring the quality of training delivery that is critical for the smooth functioning of TVET. Quality in TVET includes industry-aligned, up-to-date and relevant training and consistency of delivery across public and private institutions, among other considerations.

1.1. STANDARDS IN TVET

Standards may be defined as “the minimum requirements or levels required, to be considered best practice.” Standards describe the nature of resources, processes, and outcomes that are considered necessary for a particular intervention to be deemed satisfactory.

Modelling: They capture the processes, arrangements, and outcomes deemed ideal or satisfactory at a point of time for a nation, and therefore, facilitate creating homogeneity of experiences across the different institutions following a particular standard.

Comparison: They help compare TVET practices globally and predict the extent to which the skills acquired are transferable or equivalent to skills acquired in another context.

Direction: Standards help communicate the purpose, philosophy, and spirit of the existing system, allowing stakeholders to review in light of the overarching objectives and their implications.

Review of global best practices in TVET sector indicate that standards can be classified into two broad categories:



Figure 1: Categorization of TVET Standards

1.2. REGULATORY STANDARDS FOR QUALITY ASSURANCE

TVET is often seen as “last choice education” because of several negative perceptions. Major factors leading to improved attractiveness of TVET are ensuring high quality of training programs and delivery, up-to-date facilities, inclusion of modern technologies and clear linkages with the job market, leading to enhanced employability.

Standards of quality assurance should be adhered to within the TVET eco-system. This can be done by seeking a certification from a standardization organization or by adopting quality assurance management mechanisms to ensure consistent quality of training.

Globally, the objective of TVET is to provide quality training to youth for the world of work. The TVET ecosystem comprises different stakeholders such as training institutes, trainers, institute management, employers and trainees. To ensure smooth functioning of the ecosystem, it is important to develop regulatory standards for these stakeholders to help understand and work towards common and desired outcomes.

Ensuring quality in TVET is important because it:

- Supports design and development of high-quality programs, provides strong links between institutions and industry, leading to better employability of graduates
- Provides a common reference to ensuring consistency amongst all stakeholders
- Creates transparent processes and procedures to ensure mutual understanding
- Creates an environment of familiarity among stakeholders
- Ensures capacity development of stakeholders

Regulatory standards for quality assurance consider the input, throughput and output of TVET ecosystem. These include, for example, standards for public and private TVET training operators, development of human resources, industry involvement in TVET, monitoring, evaluation, conducting tracer studies etc.

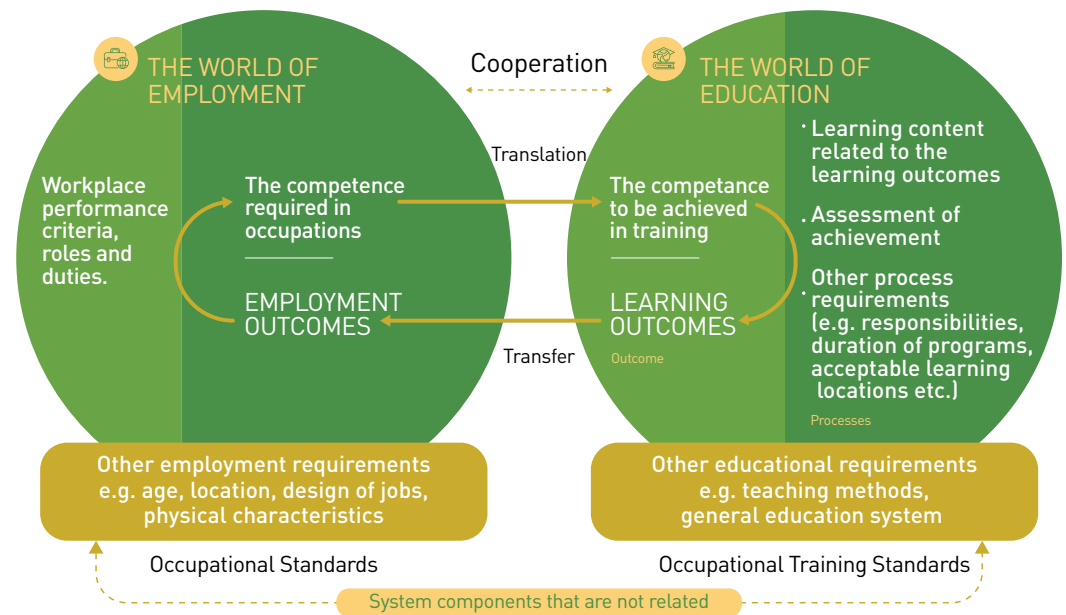


Figure 2: Translating occupational standards to occupational training standards

Source: WB and ETF, A Framework for Defining and Assessing Occupational and Training Standards in Developing Countries Information Series No. 386, Pg. 32.

1.3. OCCUPATIONAL TRAINING STANDARDS

For TVET programmes to be relevant to the world of work, they should be aligned to occupational standards. Occupational Standards are criteria based on identified needs of a workplace and occupational profile. These are aligned to industry requirements based on current and future needs of a specific occupation. These are the starting reference for competency-based training programme development. The purpose of TVET is to equip the trainees with the necessary competencies corresponding with the respective occupational standard.

Employers use occupational standards for the following reasons:

- Prepare job description and specification
- Determine recruitment criteria
- Set standards for workplace performance and procedures

Even though occupational standards are useful for multiple factors for the industry, these are not easily usable in the education and training context. There is a need to bridge the gaps between occupational standards from the world of work to effectively using them in the world of education. For this purpose, occupational training standards are developed, leading

to learning programmes that are suitable for employment. An **occupational training standard** is developed using occupational standards and is an intermediate step to curriculum development. Countries use various terminologies to refer to occupational training standards, such as programme standards, competence standards, training regulations, National Occupational Standards etc.

Occupational training standards:

- Assist in occupational profiling or training, which describes the group of work activities that must be undertaken and in what manner
- Provide assessment requirements that lay down the tasks to be undertaken during the training and the minimum level of knowledge and skill that must be demonstrated
- Define minimum entry requirements and pre-requisites
- Lead to the development of a curriculum that describes learning goals, theoretical and practical knowledge to be taught as well as the structure and length of individual sections and overall training course
- Assist in determining the criteria to award qualifications
- Provide the standard to approve, accredit and audit developed programmes
- Identify skill gaps and training needs after monitoring and evaluation



2. GLOBAL PERSPECTIVES

This chapter showcases global trends and approaches for development of occupational training standards and international best practices in TVET. The countries studied for international benchmarking of TVET ecosystems are India, Australia, Philippines, Canada, Germany, United Kingdom, European Union, Caribbean and selected countries within the African Union.

2.1. TRENDS IN TVET

Technical and Vocational Education and Training (TVET) is a vital tool for driving the development and progress of countries by empowering youth and adults through various skills, knowledge and competencies for sustainable livelihood opportunities.

The scope and relevance of TVET has expanded globally in view of technological advancements and shift towards an approach of lifelong learning. Focus has been on the quality and relevance of TVET in line with the current and upcoming trends in the world of work. Transition to greener economies and implementation of digital technologies are driving TVET systems to improve their capacity to identify the skills demand and to bridge the gap by providing relevant skills required.

The Fourth Industrial Revolution (4IR) is leading to increased automation and digitization with newer technologies such as Artificial Intelligence (AI), Robotics and Internet of Things (IoT). This is changing job roles and creating opportunities that require new skills.

The jobs of the future will require “transversal” and applied skills that are not linked to any specific field or are cross-sectoral and multi-dimensional. These include problem solving, critical thinking, digital or ICT skills, entrepreneurship, creativity, teamwork, collaboration and STEM (Science, Technology, Engineering and Mathematics). Socio-emotional skills such as empathy, self-regulation, listening skills, adaptability will also be of increasing importance in the workplace.

The approach for TVET needs to change on two fronts:

- Focus to be shifted from mastering “narrow skills” to mastering “broad competencies”
- Instead of focusing on vocational education as straightforward “vocational preparation,” the focus has to be on the “vocational development” of an individual’s lifelong process of building his/her career

Competency Based Education and Training (CBET) is now widely adopted and implemented in developing and emerging countries, analyzing skills, knowledge and competencies.

2.1.1. Industry - aligned TVET programmes using occupational training standards for skill development

There is a need for TVET programmes to be aligned to industry demands. Globalization of labour markets has increased the demand of having unified and comparable data for industries and occupations throughout the world.

International Labour Organization (ILO) has set standardized nomenclatures for identifying industries and occupations. ILO’s International Standards Industrial Classification (ISIC) Rev. 4, 2008 has been used widely nationally and internationally in classifying data according to the economic activity such as national income, production, population, employment and others. Countries adopt ISIC for national industrial classifications.

A ‘job’ is usually seen as a set of tasks designed to be performed by one individual in return for a wage or salary, while an ‘occupation’ is a set of jobs which are sufficiently similar in their main tasks such that they may be grouped together for classification (Australian Bureau of Statistics, 2009).

ILO’s International Standard Classification of Occupations, 2008 (ISCO-08) provides a system for classification of all occupational levels and classifies all jobs in the world in 436 unit-groups. The grouping levels are determined by the skills required for the job. Occupations are distributed across the groups according to the level and type of skills required to engage in them. Occupational classification schemes attempt to organize millions of jobs into discrete groups based upon their similarities as determined by the scheme’s classification principles (e.g skill level, skill type, etc.). Occupational classifications are used by government agencies, industrial and labour relations practitioners, students, job seekers, employers and so on.

There are multiple approaches for developing occupational standards. One approach used to develop these occupation standards is called job or task analysis, another ‘functional analysis’, and a third DACUM (Developing A Curriculum) (Fretwell et al., 2001). Job or task analysis is based on repeated onsite observations through which tasks are identified, which can then be generalized to the occupation.

It involves dividing and subdividing jobs and tasks into their constituent parts, in order to provide information for training. The DACUM approach uses guided group discussion with expert workers. Functional analysis starts with the identification of the key purpose of an occupation, identifying the main functions, breaking these in turn down to sub-functions, and identifying outcomes for each function.

Occupational classification, occupational standards and their linkage to TVET training: Relating occupational classification systems to standard setting and the provision of training are a complex activity. The classification of occupations in systems like the ILO's International System of Occupational Classification has different objectives. For instance, education and training drives towards a reduction in the number of occupations, while for labour market analysis purposes, a large number of occupations may be useful. The number of occupations in a system can vary from 200 to more than 1000. Complex clusterings of various tasks or detailed listings of narrow tasks may be useful for various analytical reasons; however, in countries with developed apprenticeship schemes, the number of training occupations is 200 to 400 (i.e. Germany 350, Switzerland 200), and in fact in Germany, around 60% of apprentices are trained in only 20 training occupations.

For practical reasons, for the purpose of training, the development of new occupations and revision to occupational profiles is better done in occupational families, clusters, or groups. Again, worldwide there are different approaches to cluster occupations to groups. In the international TVET practice, between 6 and 16 vocational subject areas or occupational clusters such as health care, construction industry, agriculture, manufacturing or business administration have emerged. For example, in Germany, there are 16 occupational families and in the UK there are 14 clusters (related to the social security system). The classification of occupations in Canada lists ten groups (management occupations; business, finance and administration occupations; natural and applied sciences and related occupations; health occupations; occupations in education, law and social, community and government services; occupations in art, culture, recreation and sport; sales and service occupations; trades, transport and equipment operators

and related occupations; natural resources, agriculture and related production occupations; occupations in manufacturing and utilities).

The Hangzhou Declaration, emanating from a UNESCO International Meeting on Innovation and Excellence in Teacher/Trainer Education, in Hangzhou in 2005, suggests the following clusters, for the purpose of defining competence in occupational/vocational fields: Business and Administration (production and distribution of goods, services, marketing, administration, finances, insurance, transportation, logistics, tourism); Production and Manufacturing (manufacturing, mechanical engineering design, supply engineering/ environmental engineering, automotive engineering); Civil Engineering (construction, wood, surface and coating technology); Electrical and Electronic Engineering and Information and Communication Technology (production systems, building equipment, information and communication technology, media technology); Process Engineering and Energy (applied sciences, energy conversion); Health Care and Social Care (health care, clinical care, personal hygiene, nursing); Education and Culture Travel (child and youth care, nursing education, adult education, special needs target groups, music and dance); Leisure, Travel and Tourism (travel, sports, tourist services, catering and hospitality); Agriculture, Food and Nutrition (agriculture, food production, domestic economy); Media and Information (printing, electronic-advertising, electronic-customer-service, sales promotion); Textile and Design (clothing production, fashion, interior design, art and craft); and Mining and Natural Resources (mining, oil and natural gas).

Approaches for identification of priorities: Skills for Trade and Economic Diversification (STED) is the ILO's development cooperation methodology to assist partner countries in meeting the skills needs of tradable sectors and reduce skill-gaps.

If tradable sectors in developing and emerging economies have access to the skills they need, then the business capabilities of those sectors will be strengthened, raising productivity and improving competitiveness of their firms, and they are likely thereby to be more successful in traded markets.



Figure 3: STED process methodology | Source: ILO, 2020

Linking TVET programmes and qualification standards: TVET programmes are globally designed to fulfill vacancies across industries using the national or the international framework. Additionally, educational standards for these training courses - International Standard

Classification of Education (ISCED) - is used as a benchmark for comparison of qualifications. UNESCO Institute for Statistics (UIS) has developed ISCED 2011 that entails informal and formal educational programmes offered at all stages of a person's life.



Figure 4: Aligning TVET programmes to industry-demands using occupational classification, occupational standards and occupational training standards

2.1.2. TVET in the post COVID-19 world

Innovations in TVET systems are important from social, economic and environmental contexts. TVET institutions can adopt global best practices. Skilled workers involved in activities such as designing, installing, operating and maintaining equipment, software or other technologies, can generate knowledge used for creating and implementing innovative practices.

Innovative models of Labour Market Information Systems (LMIS) are needed to collect, maintain and disseminate data on labour market demands. Countries in the European Union (EU), for example, have found innovative ways to use labour market information systems to facilitate the market demands from public and private players and aligning TVET focus areas accordingly.

During the ongoing COVID-19 pandemic and for a post-COVID-19 world, the entire education sector has been finding innovative ways to continue the learning process with the use of various digital media and technology. Online classes using video-conferencing have been suitable for theory-oriented courses, practical training in TVET requires state-of-the-art technological innovations for delivering such trainings.

The use of Augmented Reality (AR) and Virtual Reality (VR) is in focus and is considered to be the next generation technology to deliver practical training in TVET through virtual labs and workshop set-ups. However, continuing challenges of connectivity, poor Internet bandwidths and inadequate devices severely limit the dissemination and delivery of such technological innovations.

Spotlight on: COVID-19 pandemic and the future for TVET

Since the start of the COVID-19 pandemic, the numbers of those who are unemployed and underutilized have gone up dramatically across the globe. The ILO has highlighted that worldwide, two billion people work in the informal sector (mostly in emerging and developing economies) and are particularly at risk.

The shift towards distance learning – which has been accelerated due to the current

pandemic – offers the potential to rethink traditional face-to-face TVET by challenging educational practices that have excluded marginalized and remote learners due to high costs and limited flexibility.

Moving to a desired new normal for future resilient TVET requires changes across TVET systems, particularly to ensure the equitable access needed to meet global skills development needs. This blended new normal will require a changed mindset across all stakeholders within TVET systems, ranging from government agencies to learners. Suggested steps include:

- Develop new policies that drive the change to blended TVET, including Public Private Partnerships (PPPs)
- Upgrade ICT infrastructure including access to devices and connectivity
- Provide a national platform with high quality learning materials including simulations
- Change the mindset of trainers
- Change the mindset of trainees
- Managing change within TVET institutions including capacity building

Source: Virtual conference on skills for a resilient youth [UNESCO-UNEVOC and Commonwealth of Learning], 15th July 2020

2.1.3. Gender mainstreaming and inclusivity

The digital divide has impacted women more than men and more so, their access to quality education. Even when women are enrolled in courses, often the ones that are considered male dominated, the learning environments are not conducive to their specific needs, resulting in de-motivation. This results in no enrollments or dropouts.

While TVET courses specific to women are offered, they are often limited to a few traditional female oriented sectors such as food, hair and beauty, garment, health and service sectors.

Sustainable Development Goal 4 (SDG4) is to ensure inclusive and equitable quality education and promote lifelong learning opportunities for all, without gender disparity. In spite of some progress made on this front, globally, large numbers of girls remain out of school and women out of TVET. Lack of basic facilities such

as toilets, transportation facilities, safe environments, female trainers, continue to plague the TVET ecosystem in many countries.

Sustainable Development Goal 8 (SDG8) is towards promoting sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all. TVET must address the needs of women, especially those from economically and socially disadvantaged backgrounds, who wish to become skilled for employment or self-employed. Improving infrastructure as well as designing and promoting new integrated courses with focus on life skills can encourage women to participate in TVET and lifelong learning.

2.1.4. Displaced workers and migrant workers

Skilled workers in developing nations already face challenges in finding adequate jobs befitting their skills. Compounding that concern is the challenge of providing meaningful livelihood opportunities to displaced and migrant workers, including immigrants and refugees. TVET plays a major role in this aspect through opportunities for skilling of migrants and refugees. Most of the migrant workers voluntarily migrate, however many are victims of forced labour migration.

Refugees, environmental migrants or displaced people are not classified as 'labour migrants.' But once they arrive in the host countries, they wish to be a part of the country's labour market and expect to get livelihood opportunities. As per a UN report on migration of workers, 9 out of top 10 nations hosting most of such migrants are developing nations and accessing the labour market, education and trainings systems of the host country is often a difficult challenge.

2.1.5. Kenya's membership of the WorldSkills International (WSI)

WorldSkills Competition (WSC), often known as the "Skills Olympics," is a world championship of vocational skills, held every two years in different parts of the world. It is organized by WorldSkills International (WSI) that focuses on bringing together TVET stakeholders to promote the importance of skills and the need for skilled professionals.

Kenya was approved as a full member of WSI in 2020.



WorldSkills Occupational Standards

WorldSkills Occupational Standards reflect the global occupations or work roles that are represented by the WorldSkills Competition.

Within a framework to ensure their validity, clarity and consistency, the Standards:

- Cover the specialist, technical and generic skills that comprise intermediate work roles across the world
- Set out what a capable practitioner must know, understand, and do
- Are prepared, with guidance, by technical and vocational WorldSkills Experts
- Are consulted upon and updated biennially with industry and business worldwide
- Indicate the relative importance of each section of the standards, as advised by industry and business

The prime value of the Standards is threefold:

- As the reference points for the WSC, they establish the baseline from which to grow and reward authentic vocational performance
- Provide a benchmark for national and regional standards
- As economies and markets become increasingly international, the Standards support young people and adults to survive and thrive in the modern world

Source: <https://worldskills.org/what/projects/wsos/> (last accessed 18th September 2020)

2.2. INTERNATIONAL BENCHMARKING

2.2.1. India

With a population of over 1.3 billion, India derives significant value from TVET education for meeting the skill needs of a growing economy and providing employment opportunities to the largest youth population of the world.

The TVET system in India starts from the lower secondary (ISCED 2) with vocational programmes up till Tertiary (ISCED 5-8) with Bachelors of Vocational Education or Polytechnics. Apart from this formal system, various non-formal skills schemes are offered by various Ministries. For example, the Integrated Skills Development Scheme with support from the Ministry of Textiles; Employment through Skill Training Scheme with support from the Ministry of Housing and Urban Poverty Alleviation, among others.

The Ministry of Education (formerly, Ministry of Human Resources Development) and the Ministry of Skill Development and Entrepreneurship (MSDE) collectively strategize and develop TVET policies of the country. The National Skill Development Agency (NSDA) is an autonomous body, which coordinates and harmonizes skill development activities in India, including setting the National Skill Qualification Framework (NSQF) and Qualification Standards.

In 2018, the NSDA and the National Council of Vocational Training (NCVT) were brought under the National Council for Vocational Education and Training (NCVET). The NCVET sets standards for vocational training and accreditations in the country and supervises the functioning of recognized entities.

Technical Education in India, until recently, was monitored by the All India Council for Technical Education (AICTE). The AICTE was responsible for planning, formulation and maintenance of standards and norms of education through accreditation, funding in priority areas, maintaining parity in certification, monitoring and evaluation to ensure the development and management of technical education in India. The National Education Policy 2020 has replaced the AICTE with the overarching body of Higher Education Council of India (HECI), which shall monitor both technical and non-technical education in India, going forward.

The funding for TVET in the country is taken care of by a separate agency - National Skill Development Corporation (NSDC) - under the Ministry of Finance. NSDC incentivizes skill development programs through loans or equity, to selected private sector initiatives including for-profit private, non-profit NGO, non-profit industry associations. A separate National Skill Development Fund is set up for the financing needs of NSDC.

Spotlight on: Sector Skills Councils of India

About

A major pillar in the strengthening of the skills ecosystem in India are the Sector Skill Councils (SSCs), which play a vital role in bridging the gap between what the industry demands and what the skilling requirements ought to be.

The National Occupational Standards (NOS) in the country have been driven by the SSCs, which are national partnership organizations that bring together all the stakeholders - industry, labour and the academia.

The SSCs operate as an autonomous body that are incubated with initial seed funding by the National Skill Development Corporation (NSDC) to facilitate their growth and enable them to achieve self-sustainability in a time bound manner.

Role

The SSCs have been mandated with the following functions:

- Identification of skill development needs, including cataloguing types of skills, range and depth of skills to facilitate individuals to choose from them.
- Development of a sector skill development plan and maintaining skill inventory.
- Determining skills/competency standards & qualifications and getting them notified as per National Skills Qualification Framework (NSQF).
- Standardization of affiliation, accreditation, examination and certification process in accordance with NSQF as determined by National Skills Qualification Committee (NSQC).

- May also conduct skill-based assessment and certification for Qualification Packs (QP) / NOS aligned training programmes.
- Participation in the setting up of affiliation, accreditation, examination and certification norms for their respective sectors.
- Plan and facilitate the execution of 'Training of Trainers' along with NSDC and states.
- Promotion of academies of excellence.
- Paying particular attention to the skilling needs of minority groups and differently-abled groups.
- Ensuring that the persons trained and skilled in accordance with the norms laid down are assured of employment at decent wages.

Source: www.nsdcindia.org (last accessed on 20th September 2020)

Placements

The most critical outcome of skill training is employment, whether self or wage employment. To facilitate employment, SSCs have been encouraged to develop their own placement portal and mobile apps. These portals are linked to demand aggregation and are aimed at meeting the skill needs of the industry. The 360-degree interface of the portal connects candidates and training partners with recruitment firms and potential employers.

India has incubated 38 SSCs till date to facilitate the participation and ownership of industry to ensure needs-based training programmes. The development of National Occupational Standards (NOS) and Qualification Packs (QPs) for various job roles in the sectors has been the key responsibility of SSCs. As of date, across 37 sectors, SSCs have developed 2346 QPs and 13037 occupational standards out of which 6526 are unique occupational



Figure 5: 38 Sector Skills Councils of India.
Source: nsdcindia.org (last accessed on 28th October 2020)

standards. The maximum of these are in Level 4 amounting to 1089 occupational standards.

TVET in India aims to provide lifelong learning opportunities and develop a healthy attitude among trainees towards life and work, enhance their employability, and reduce the mismatch between the supply and demand of skilled labour.

A Recognition of Prior Learning (RPL) framework, linked to NSQF, has been developed that helps recognize the skills gained through formal or informal learning in the unorganized sector. Its process includes pre-assessment test, skill gap training and final assessment leading to the certification of the existing skills. It is an outcome-based qualification framework and is at par with other skill trainings certification in the country.

The Government has also successfully implemented a Labour Management Information System (LMIS) for the collection and dissemination of data to take rapid decisions with accuracy and transparency. LMIS will be a part of the National Portal which includes details on skills courses, content, trainers, assessors, sector reports, etc. All the data is maintained in gender-disaggregated form, enabling the authorities to make specific policy interventions for maintaining gender equality.

Based on the available data, Gender Mainstreaming Framework has been adopted by the country to promote gender diversity and give equitable

opportunities to women. In line with UNESCO's Gender Sensitivity Standards, NSDC has established Gender Sensitivity Framework. This outlines the expected behavior and practices to promote gender equity and setting up policies, incentives and penalties for it. The government has planned to mainstream gender roles by skilling of women in non-traditional roles by increasing gender sensitivity in workplace and education systems.

The Government has also been working on the export of labour, by creating linkages with other countries, assessing demand, training for the specific requirements and finally, facilitating placements for its youth overseas.

As the world population is ageing, leading to a shortage in workers around the world, India is seizing this opportunity with export of its large-scale skilled youth workforce. A focused team has been setup for the identification of countries where there are existing skill shortages or likely in the future. India has also partnered with WorldSkills International and other agencies across the world for the overseas placements of its skilled workforce.

Government has also focused on those youth who do not wish to continue with higher education, but rather attain livelihood options based on their attained skills. Separate skills courses have been developed appropriate to the NSQF level in the existing centers or schools in the evening hours to provide alternate career pathways for such students.



2.2.2. Philippines

TVET system of Philippines has been showing healthy growth in the past few years. The Technical Education and Skills Development Authority (TESDA) is the agency that manages and supervises the technical education and skills development in the Philippines.

TESDA consists of the Unified TVET Programme Registration and Accreditation System (UTPRAS) and the Philippine TVET Competency Assessment and Certification System (PTCACCS). The aim is to provide training for the priority industries, prepare workers for Industry 4.0, and promote social equity for the marginalized sections.

Apart from TESDA, there are seven government departments, which are also involved in the areas related to technical education and skills development in the country. These are Department of Labour and Employment, Department of Interior and Local Government, Department of Trade and Industry, Commission on Higher Education, Department of Education, Department of Agriculture and Department of Science and Technology.

TESDA has developed the National Technical and Education Skill Development Plan (NTESDP) 2018-2022 in cooperation with partners across various sectors in order to encourage participation of

industries, government units, labour sectors and other educational institutions to develop the human capital resources of Philippines.

TVET in Philippines has found healthy support in the labour and employment market of the various sectors such as Tourism, ICT, Health, Social and Community, Electronics, Metals and Engineering.

TESDA has recognized the demand for innovative and sustainable approaches in TVET, knowledge and skilled workforce, standards that are globally competitive and ease of access and mobility for TVET. Thus, NTESDP has addressed these elements to be added to the TVET system with five main objectives: Agility, Conduciveness, Flexibility, Integrity, Scalability and Sustainability.

Spotlight on: The Philippines focus on green jobs

The Philippine Green Jobs Act states that “the State shall identify needed skills, develop training programs, and train and certify workers for jobs in a range of industries that produce goods and render services for the benefit of the environment, conserve natural resources for the future generation, and ensure the sustainable development of the country and its transition into a green economy.”

TESDA Organizational Framework for Greening TVET



Figure 6: TESDA Organizational Framework for Greening TVET
Source: tesda.gov.ph (last accessed on 20th September 2020)

The Act specifies a “National Green Jobs Human Resource Development (HRD) Plan” where it will enable and sustain the transition into a green economy and the generation of green jobs. The Department of Labour and Employment (DOLE) takes the lead in the development of the National Green Jobs HRD Plan, as well as the maintenance of database of green careers, professions and skills, list of emerging business enterprises, which generate and sustain green jobs.

The following are the sectors where the green jobs HRD plan will be focused:

- Agriculture, Fishery, Forestry
- Manufacturing (Electronics and Automotive)
- Transportation
- Tourism
- Solid and Waste Water Management
- Energy
- Construction
- Brown Economies (Mining, Quarrying and Chemicals)

The TVET system of Philippines starts from Upper Secondary (ISCED 3) through National Certifications and ends with

Post-Secondary Non-Tertiary (ISCED 4) at Diploma level. These are derived in line with the Philippines Qualification Framework (PQF). PQF has been referenced against ASEAN Qualifications Framework and has been endorsed by the ASEAN member states for its role in the referencing of AQRF referencing report.

To ensure that all the needs of agencies and labour market needs are fulfilled appropriately, **TESDA Technology Institution (TTI) Advisory Councils** were created focusing on TVET planning, implementation and delivery in a way to avoid mismatch of skills at the local level. These include representation from Government, academia and industry experts. TTI advisory councils look at sector specific policy matters with a labour market driven approach. **Philippines has 549 QPs across 4 levels and 24 sectors under TESDA.**

TESDA has devised the TVET 4.0 framework which focuses on the strategies for aligning TVET core skills with the skillsets required by the 4th Industrial Revolution (4IR) identified as: STEM, essential skills and emotional skills.

This framework includes:

Philippines is considered one of the major sources for migrant workers in the world. Millions of Filipino workers move out to other countries in search of jobs and livelihoods. Filipino workers are present in more than 200 countries worldwide and increasing. The top few locations for overseas employment are Saudi Arabia, Japan, Hong Kong, UAE, Kuwait, Singapore, Brunei, Qatar, Italy and Taiwan.

This has been for skills such as nurses and household care activities which are women dominated activities. Philippines has been focusing on the gender mainstreaming of its workforce through TVET and has launched Philippine Magna Carta of Women (MCW) which promotes equality and empowerment of women in workforce.

It focuses on encouraging the enrolment of women in non-traditional skills training, promotion of gender sensitive training programs and gender responsive career counselling. MCW has required TESDA to adopt gender mainstreaming and eliminate discrimination from their systems, structures, policies, programs and processes.

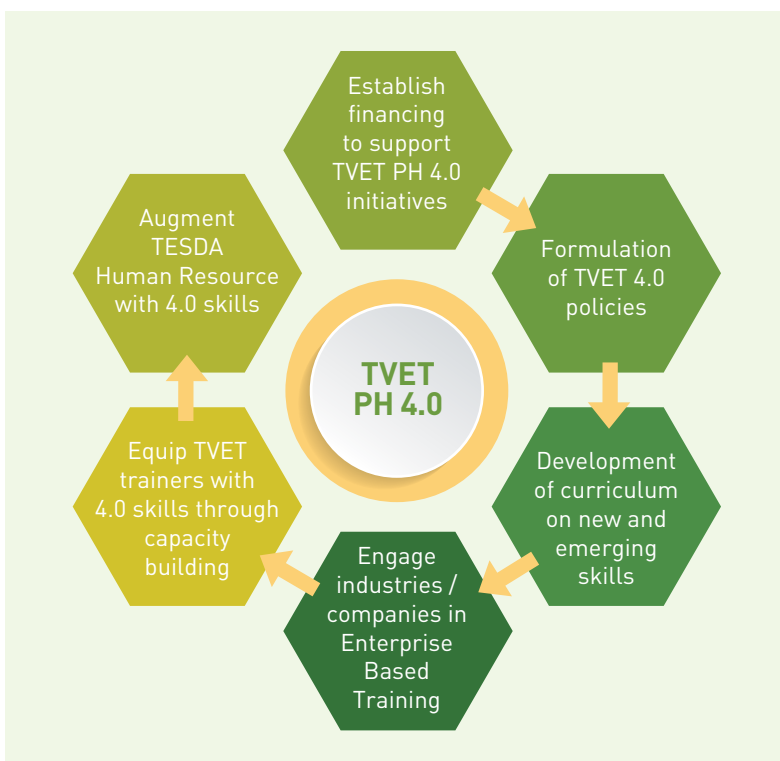


Figure 7: TESDA Fourth Industrial Revolution Framework
Source: tesda.gov.ph (last accessed on 20th September 2020)

2.2.3. Australia

Australian TVET system is a competency-based system which is highly recognized across the world and it is mainly due to its strong focus on skills application, industry demand and its scalability and flexibility. As of now, there are 4.2 million TVET trainees in Australia attending 4200 Registered Training Organizations (RTOs). The remarkable aspect of TVET in Australia is that its trainees represent 24% of the Australian population in the age of 15 to 64 years. The largest group amongst this is the 20 to 44 years old of which 57% are TVET trainees.

The National Centre for Vocational Education and Research (NCVER) has been responsible for the research and policy establishment of TVET. Australian Industry and Skills Committee (AISC), establishes the national policy and the government, then decides the local policies in line with the national policies. AISC and the Australian Skills and Quality Authority (ASQA) accredit qualifications; ASQA regulates RTOs while the state regulates apprenticeships.

Annually, AUD 5-6 billion is spent on the training and institutional fund requirements. This funding is taken care of by the national government and state government and Skilling Australians' Fund.

Australian VET system is an industry-led system and is one of the key stakeholders within the eco-system. Industry is an integral part of the consultations, policy development for training and assessment by RTO and also provides funds to the Skilling Australians' Fund. AISC has established 64 Industry Reference Committees (constituted of employer/employee organizations, industry regulators, and experts), which consult in national qualification and government policy development for VET systems.

The formal TVET system in Australia starts from Lower Secondary (ISCED 2) with Certificate 1 and 2, up to Tertiary level (ISCED 5-8) with Diploma, Advanced Diploma and even an associate degree course achieved within 3 years.

The informal TVET system comprises part-time, full-time, online, self-paced or even distance learning courses in line with the

Australian Qualification Framework (AQF). These informal trainings are offered by partnerships with various public, private, community and industry sector players.

Recognition of Prior Learning (RPL) can also be extended through this system. Individuals can make application to RTOs and get their skills assessed and recognized by providing evidence of their claimed competencies. Government has established Technical and Further Education Institutes (TAFE) which offer pathways for students to appear for certification based on their skills, irrespective of their prior education or training.

TAFE has several advantages over University, one of which is that TAFE courses have relatively relaxed admission processes and cut offs. Eligibility for enrolling in a TAFE institute is class 12 or equivalent. Even a student from class 10 can choose to get enrolled in a TAFE institute for pursuing advanced diploma in Australia and later migrate to a full-time degree course after gaining the necessary training for chosen career.

The AQF levels for TVET span across 8 levels with Graduate Diploma being the highest at level 8. There are a total of 1413 skills across these 8 levels and 52 sectors mentioned under the Australian Qualification Packs.

To promote women's participation in the work force, Women in Adult and Vocational Education (WAVE) has been set up, which is a network of women in VET, adult and community education and training. WAVE provides national advice, social justice, equity and a network for all women who want to work, study and have an interest in VET.

Another challenge for Australian TVET is that of the migrant workers. In the context of international migration, voluntary migrants, refugees and forced asylum seekers look for livelihoods through the VET system of the country. TAFE institutes in Australia have been very useful for such refugees and immigrants to attain a reliable certification to prove their skill set and become eligible for obtaining a livelihood.

Globalization has presented many opportunities to the world and Australia has been quick to make the most of these

opportunities. Among OECD countries, Australia has the highest intake in terms of the number of students for higher education amounting to 18.7%.

In the past few years, VET of Australia has taken the lead over higher education and

begun to internationalize. With the increase in offshore delivery, about two-thirds of the students studying in TVET courses in TAFE institutes were residing in China, Japan, Thailand, Indonesia and South Korea. The most common courses for such students were Diploma or Advanced Diploma courses.



2.2.4. Germany

Germany has one of the oldest traditions of technical and vocational education in the world. The German system is remarkable for its focus on what has been called the dual vocational training, in which vocational education and apprenticeship takes place simultaneously, allowing students to apply their knowledge as they learn.

About 1.3 million apprentices get trained every year in Germany in a dual system, which works in conjunction with small and medium size companies and public funded vocational schools and training centers. This training generally lasts about two to three-and-a-half years. 50% of the school leavers in Germany undergo VET provided by companies since it is considered as the best way to acquire skilled staff.

The two main authorities governing the educational system in Germany are the Federal Government and the States. The Federal Government is responsible for the policy making and legislation for out-of-school vocational training and continuing education. The Federal Institute of Vocational Training and Education provides consultancy to the government and VET training providers.

The Government, trade union and employers play an important role by getting involved in the decision-making process with regards to education. Due to this collaboration and partnership, the VET system of the country is greatly influenced and the requirements and interests of all parties are taken into account, which in turn give desirable outputs for all.

The German VET funding system has been a bit complex with participants from German Federal Ministry of Education and Research (BMBF), Federal Ministry of Economics and Technology, Federal Employment Agency and Federal Ministry of Labour and Social Affairs, all playing a role. The dual vocational training is financed by the Länder (States) and public funds of local authority, while the full-time vocational schools are solely funded by State Governments. Continuing VET is financed by yet another set of agencies including the State, Federal Employment Agencies and various private companies.

The formal VET system in Germany starts from secondary as lower secondary

education, which is along with the general education, then the vocational education and apprenticeships are separated in the secondary level (ISCED 2-3). At the tertiary level (ISCED 5-8), polytechnics are a part of VET system in Germany.

The informal TVET system comprises of continuing education offered by adult education centers, private institutions, municipal institutions, trade unions, chambers of industry and commerce, companies, public authorities, family education centers and technical colleges. Over the past few years, the number of distance education learners has increased on a large scale.

The digital revolution will bring about significant changes to occupational profiles and training regulations as well as to Continuing Vocational Education and Training (CVET), providing challenges that are already being addressed, for example, by the joint “Skills for the digital workplace of tomorrow” initiative of the Federal Ministry of Education and Research (BMBF) and the Federal Institute for Vocational Education and Training (BIBB).

For the sustained economic growth of the country, men and women must participate equally in the labour workforce in order to get the best outputs of economic growth for the country. However, women in particular, often face challenges and have limited choices when it comes to participating in the labour market. They also usually earn less for more work done.

With women having a better access to TVET, they can go a long way in achieving gender equality and reducing poverty. Germany Development Cooperation strives to achieve gender equality to reap these benefits and has been designing the VET systems and education such that men and women get equal opportunities. Gender budget has been used in the financing of TVET and specific formal and informal systems for sectors focusing on the employment of women and girls are setup.

Such interventions in the field of TVET are meant to improve the employability of individuals and give them chances to attain better livelihoods through their choice of skills. In this context, special emphasis has been laid on the marginalized groups comprising of persons with disabilities, refugees, immigrants and victims of wars

and conflicts. Skills for such people are kept in focus while designing policies for the VET system.

Germany has also focused on skills for green jobs. These include initiatives in conserving resources, achieving energy efficiency and usage of renewables.

For the placement of individuals, BIBB has tied up with various businesses and these businesses consider those who have undergone dual training as the most qualified for recruitment. Companies also provide on-job-trainings thereby saving costs, avoiding risk of hiring the wrong employee and increasing potential for success.

Spotlight on: Recognition in Germany portal

About

The Government's "Recognition in Germany" portal is aimed at improving labour market access for people from migrant backgrounds. The multilingual portal provides users with information about the procedures for recognition of professional qualifications acquired outside of Germany.

A pathway towards professional recognition is beneficial both for immigrants in their job searches and for the German economy which continues to face skills shortages. The portal also supports the staff of counselling services, job centres and employment agencies in their daily work.

Importance

Germany's Recognition Act entitles foreign skilled professionals to a review of their vocational qualifications for equivalence with the corresponding German professions. The goal of the portal 'Recognition in Germany' is to inform applicants about obtaining recognition of their qualifications in order to allow them to work in the occupation for which they are trained. The Act has proven effective: nine out of ten skilled professionals with foreign vocational qualifications find gainful employment after a successful recognition procedure.

Source: www.bmbf.de and unevoc.unesco.org (last accessed on 20th September 2020)



2.2.5. Canada

TVET in Canada is referred to as “skills development and adult learning” and is one of the four pillars of Learn Canada 2020 – Canada’s vision of learning.

Learn Canada 2020 is a framework used to provide quality lifelong learning opportunities to Canadians. Under the framework of Learn Canada 2020 four things have been given major importance:

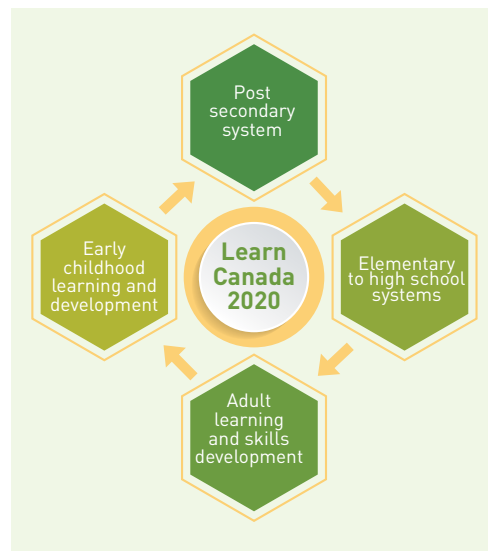


Figure 8: Learn Canada 2020

Canada does not have a separate ministry for education, but the Government of Canada is directly responsible for the skill development of Canadians through training and education. There are ministers of education in the government who are responsible for the formulation, planning, implementing and evaluation of policies across the thirteen jurisdictions of the country. The Council of Ministers of Education, Canada (CMEC) is a body comprising of ministers of education in the government. CMEC is made to give the ministers a common platform to discuss educational initiatives cooperatively.

The TVET policies and frameworks of Canada vary across provinces. TVET policies are driven by the needs of the labor market and feedback from the trainees. To maintain the quality of TVET across provinces Canada follows the National Qualifications Framework (NQF).

The formal TVET system in Canada starts from the secondary level (ISCED 2-3) with apprenticeship and goes on till tertiary (ISCED 5-8). VET is offered in secondary schools, postsecondary levels

in public colleges, private colleges and in workplaces for apprenticeships. The apprenticeship programmes typically last for four years whereas the vocational courses last for about two years. Non-formal TVET happens in the forms of job-related training, courses, and workshops.

Funding for the TVET programmes in Canada is done through the local, provincial and territorial governments, community and voluntary providers. Cost-sharing is also taken up by various players from the industry and business who wish to voluntarily contribute in the skill development activities for the nation.

Apprentices spend 80% of their time learning at work places in the industry and the remaining 20% of the time studying theoretical concepts at educational institutions. Alternate delivery options have also been devised for facilitating the training from far away locations with the use of online lectures, YouTube videos, innovative testing modules and offering a co-op placement at the end of the course in preferably the location of residence for the trainee.

Canadian TVET system has also been on the forefront of supporting other countries to empower their skill development mechanisms through partnerships. Colleges and Institutes Canada is one such body, which is a part of the UNEVOC network. It has partnered with more than 100 countries across the globe. It facilitates linkages between the private sector and TVET institutions by providing linkages and finding suitable employment. It is also committed to encourage girls to be a part of the TVET and empowers them by developing non-traditional women roles, sensitizing the trainees and the trainers in the institutes about gender discrimination and equality.



Vocational and Technical Training (VTT) in Québec

Under Canada’s Constitution, the Québec government has complete jurisdiction over its education system, which includes four levels: preschool and elementary, secondary, college, and university.

The Ministère de l’Éducation, du Loisir et du Sport (MELS) guides and supports VTT development by providing integrated program management, organizing program offerings, and ensuring universal access to education.

Developing VTT programs includes planning, design, development, implementation and follow-up. Québec offers close to 300 VTT programs designed to meet the needs of businesses and individuals. These programs all follow a competency-based approach. Programs are divided among 21 training sectors and cover all the occupations requiring vocational or technical training. 142 programs lead to a Diploma of Vocational Studies (DVS), 114 lead to a Diploma of College Studies (DCS), and 26 lead to an Attestation of Vocational Specialization (AVS).

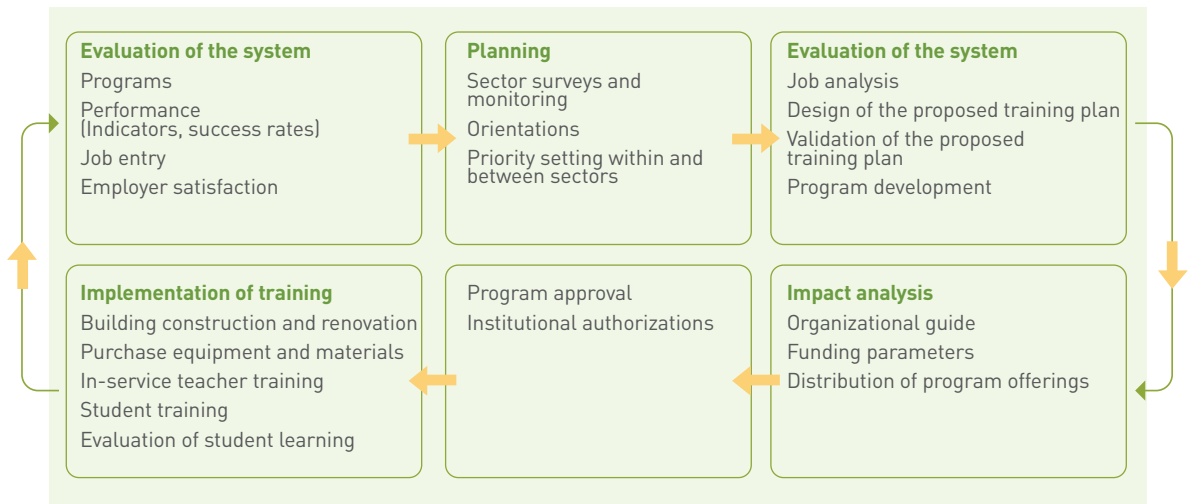


Figure 9: Training Program Development Process for VTT Québec



Table 1: Distribution of programs by educational path and training sector (Québec as a whole, 2006-2007)

Biomedical Analysis Technology	Geomatics Technology	Nuclear Medicine Technology
Building Appraisal and Assessment Technology	Industrial Controls Maintenance Mechanics	Moulding Machine Set-up and Operation
Cable and Circuit Assembly	Industrial Design Techniques	Sales Representation
Chemical Engineering Techniques	Industrial Drafting Industrial	Nursing
Chemical Processing Techniques	Industrial Machinery Operation	Pharmacy Technical Assistance
Composites Processing	Industrial Maintenance Technology	Physics Technology
Computer Science Techniques	Electronics Technology	Precision Sheet Metal Working
Computerized Systems Technology	Industrial Engineering Technology	Professional Sales
Construction Machine Mechanics	Insurance and Financial Services Consulting	Radiodiagnosis Technology
Dairy Production	Machining Techniques	Respiratory Therapy Techniques
Diemaking	Wood Products	Retail Butchery
Diesel (Injection and Electronic Controls)	Mass Production of Furniture	Numerical Control Machine Tool Operation
Early Childhood Education	Medical Electrophysiology Techniques	Secretarial Studies–Medical
Farm Management and Technology	Medical Laboratory Techniques	Sheet Metal Work
Fixed Machinery Mechanics	Medical Records	Toolmaking
Food Processing Technology	Metal Structure Assembly	Transportation Logistics
Furniture and Millwork Technology	Mould Making	Welding and Fitting

Source: MELS, The Top 50, DPD, 2006

Table 2: The 50 vocational and technical training programs offering the best job prospects (Québec as a whole, 2006) (Not all programs are offered in English.)

	DVS	AVS	DCS	Total
Administration, Commerce and Computer Technology	5	5	5	15
Agriculture and Fisheries	14	1	9	24
Arts	5	1	10	16
Beauty Care	2	1		3
Building and Public Works	24	2	6	32
Chemistry and Biology	1		5	6
Communications and Documentation	4		11	15
Electrotechnology	8	2	6	16
Fashion, Leather and Textiles	8		5	13
Food Services and Tourism	7	3	5	15
Forestry and Pulp and Paper	8		3	11
Health Services	5		20	25
Land Use Planning and the Environment	1		4	5
Maintenance Mechanics	6	3	1	10
Mechanical Manufacturing	9	4	6	19
Metallurgical Technology	8	1	1	10
Mining and Site Operations	8		3	12
Motorize Equipment Maintenance	9	2	2	13
Social, Educational and Legal Services	2		8	10
Transportation	2		3	5
Woodworking and Furniture Making	6	1	1	8
Total	142	26	114	283

Source: Ministère de l'Éducation, du Loisir et du Sport (MELS), Direction générale des programmes et du développement (DGPD), Direction de la planification (DPD), 2007

2.2.6. United Kingdom

United Kingdom (UK) has a long history of TVET, which dates back to the 12th Century focusing on skills development. The UK TVET system has recently undergone a lengthy and substantive reform process in line with today's global economy.

The National Qualifications Framework of the UK is one of the most diverse single NQF in the world containing levels from 1-8 and 26,450 national qualifications under it. There are 155 awarding organizations and more than 6,500 private and employer-training providers in UK that cater to more than 3.4 million TVET trainees annually.

In the United Kingdom, the TVET education system includes full-time training, part-time training, and apprenticeships, delivered by TVET colleges, independent training providers, and employers, aided by schools and universities. It focuses on core skills (numeracy, literacy, and ICT), employability skills (teamwork, problem-solving, etc.), and vocational skills (occupational/technical skills).

The professional skills system (TVET) in UK is a demand driven system, which focuses on the industry and the learner and uses a dynamic voluntary model for employee engagement.

The seamless dual model of UK's professional skills (TVET) system is an integrated model that allows trainees and workers to interact seamlessly between the pillars of vocational and academia. Both the workers and students can achieve vocational qualifications from levels 1 to 8, that includes Bachelor and Master's degrees in the workplace.

Professional skills system of UK is more flexible than the TVET systems of other countries. It allows both employers and training providers to develop a bespoke model of collaboration that delivers high impact and lasting skills to learners. To facilitate this, the UK has developed a model of Degree and Graduate Apprenticeships that assist trainees into the world of work and bridge the gaps by tailoring learning to specific business needs.

This degree apprenticeship program combines full-time paid work as well as part-time university study which offers candidates an opportunity to gain a full

Bachelors or Master's degree while completing practical, on-the-job training. Such degree apprenticeships programmes are created by partnerships between colleges or universities and employers and the period of course ranges from one to six years.

The UK TVET system also has policies for Accreditation of Prior Learning (APL), which assists trainees in gaining vocational, academic, or continuous professional development credits based on their prior learning and experience through informal or unorganized sectors. APL is a non-traditional entry route to further and higher education, though often not to the most prestigious courses, but gives a proper validation to immigrants and refugees residing in the UK.

One of the major changes in the UK Education and TVET sector is the establishment of Ofsted - Office for Standards in Education, Children's Services and Skills - that ensures accountability in the education system through its independent and impartial inspection of schools, institutions and pupils. The key reason for Ofsted assessment is to ensure that teaching and learning are working well and that trainees are benefiting from a deep and rich education.

Chartered Professional Bodies have been developed, that have a global reputation and are made to drive international standards of professionalism. These bodies provide opportunities for high value partnerships with universities, government and employers across the globe. Another advantage of associating with them is their critical role in helping economies to grow through capacity building, driving educational standards and innovation, and supporting common governance standards to support skill development.

The UK has slightly differing TVET policies and frameworks for England, Scotland, Wales, and Northern Ireland. All four emphasize apprenticeship, and a high level of involvement from the industry in the design, execution, and funding phases - through direct apprenticeships, partnerships with TVET colleges, or organizations such as Sector Skill Councils and National Skill Academies. There are multiple entry and exit options, such that a person can move flexibly between academic, apprenticeship, and vocational professional education.

National Vocational Qualifications in the UK

The approach includes identification of occupations and then describes competencies for each occupation as occupational standards. These are referred to as national occupational or skills standards, and they set out what are supposed to be measurable performance

outcomes for each occupation. The intention is usually for them to describe the skills, knowledge, and behaviour needed to perform competently in different occupational areas. These are the standards that provide the basis for the development of educational programmes as well as for assessment and certification (including the certification of smaller units of qualifications).



2.2.7. European Union

The role of TVET in the reduction of poverty has been given high importance in the Europe 2020 strategy. It has recognized skilling the workforce as the need of the hour and enrolment of more young people in TVET courses to reduce the risk of poverty and social exclusion.

The EU member states have increased dialogue, convergence and mutual recognition of their practices after the Lisbon Agenda. The European Commission (EC) has made interventions to mainstream and incorporate TVET into other socio-economic policies and sectors according to the specific priorities of the regions and countries.

Major focus was placed on coherence of various systems of TVET and strengthening quality by the introduction of National Qualification Framework (NQF) and Quality Assurance of VET (QAVET) through the mechanisms of national planning, assessment process and delivery.

TVET reforms have been made by the EC based on 11 countries with the help of various National Qualifications. To help the member states and stakeholders in documenting, developing, evaluating and monitoring the efficiencies of their TVET provision, EU has provided The European Quality Assurance Reference Framework for VET.

This framework is very well suited to assess the efficiency of VET provision since it can be applied at both VET provider and system levels. It is adaptable to the different national systems and can be used in accordance with national legislation and practice. It is accompanied by a set of 10 indicators which may be used as a “tool box” by countries as they work on adapting and developing their VET

systems. The indicators are not designed for benchmarking but rather to support a culture of quality assurance in VET. These indicators are:

Table 3: EQAVET Indicators’ Toolkit for EU Member States

INDICATOR	FOCUS AREA
Indicator 1	Relevance of quality assurance systems for VET providers
Indicator 2	Investment in training of trainers
Indicator 3	Participation rate in TVET programs
Indicator 4	Completion rate in TVET programs
Indicator 5	Placement rate in TVET programs
Indicator 6	Utilization of acquired skills at the workplace
Indicator 7	Unemployment rate
Indicator 8	Prevalence of vulnerable groups
Indicator 9	Mechanisms to identify training needs in the labour market
Indicator 10	Schemes used to promote better access to TVET

European Quality Assurance in Vocational Education and Training (EQAVET) quality indicators can be used to support the evaluation and quality improvement of TVET systems and/or TVET providers.



2.2.8. Caribbean

The role of Caribbean Association of National Training Agencies (CANTA) and its allied bodies within the Caribbean Single Market and Economy (CSME) is vital for the upliftment and development of TVET in the Caribbean nations.

The Caribbean region has shown unique characteristics in the Commonwealth for its competency in TVET systems. It has a regionally recognized, competency-based certification system called the Caribbean Vocational Qualification (CVQ).

The TVET community in the Caribbean nations has developed significant expertise and the credit for this goes to the capacity of

its system to accredit training institutions and programmes. The assessment and certification system has been developed comprehensively, including the aspects of Recognition of Prior Learning (RPL) and acquiring other competencies.

The regional economic growth has been achieved in the Caribbean through a four-pronged approach:

The Caribbean TVET has also been part of WorldSkills and taken significant advantage of the platform. Talented trainees from across the Caribbean region take part in the WorldSkills Competition and showcase their skills to gain opportunities for employment at the national, regional and international level.



Figure 10: Caribbean TVET approach



2.2.9. African Union

In Africa, around 10 million youth enter the job market annually, but only 3 million formal jobs are created every year. To bridge this gap, the African Union (AU) has developed a 'Continental TVET Strategy'. In this strategy, TVET is recognized as the most practical avenue for acquiring readily employable skills for the world of work.

The AU's TVET strategy takes into account recommendations on addressing policy issues; gaps and challenges in implementation of skills development on the African continent. It also promotes national development, social cohesion, political stability, poverty reduction and regional integration through the incorporation of TVET programmes.

At the heart of policy and reforms, is the need to address the institutional challenges that are faced by TVET. A legal framework is drawn with a coherent policy for TVET, which takes into account the factors listed below:

- Organisation of the private sector, particularly the TVET informal sector
- Description of consultation mechanisms at the three levels: national, regional continental
- Direct involvement of parliaments of AU Member States
- Creation of a TVET quality supervisory authority
- Establishment of an implementation body for the strategy
- Establishment of youth-friendly entrepreneurship funds
- The role of Member States is to create a TVET quality supervisory authority and as well ensure an enabling environment for guidance and counselling services of trainees
- A core condition for successful implementation of a national TVET strategy is the development of a national TVET policy that sets out the Government's vision for skills development

Most of the countries in Africa are agricultural economies and for that, the Agricultural Education and Skills Improvement Framework (AESIF) has been formed, which envisions transforming Africa's Agriculture Technical and

Vocational Education and Training (ATVET) to leverage the quantity and quality of skilled workforce needed for the agricultural growth and advancement. The Malabo Declaration has set targets for achievement on accelerated agricultural growth and transformation for improved livelihoods and shared prosperity.

















Innovation Centres are set up, where training of trainers is organized, based on best practices in delivering services targeted at different groups, such as farmers, workers in agri-business, processors, agripreneurs and start-ups. ICTs are important for disseminating information on innovations and best practices to enable distance learning and online classes for people residing in faraway locations. With the increasing access of mobile phones and Internet, people in rural areas can also benefit.

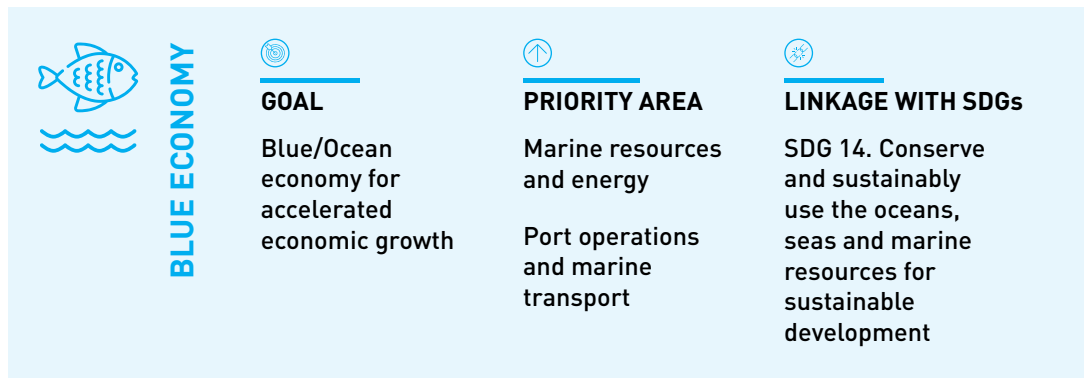
For the successful dissemination of these courses, curricula have to be developed that suit the regions and can respond to the interests of the youth by offering a wider range of courses that are attractive to youth. Various other structural changes to achieve high growth are as follows:

- Career paths may need to be structured around themes such as food security and nutrition, post-harvest storage and processing, agribusiness and entrepreneurship, bio-information and biotechnologies, natural resource management, rural finance, forecasting and risk management and other more appealing themes.
- Training opportunities need to be made more appealing by using guest lecturers from different spectrums of society that relate to agriculture to help raise awareness on the broad range of jobs available in the sector. Lastly, field trips, seminars, and more mobility across countries and regions should be used to motivate qualified students to select agriculture as their top priority.

Various countries in the AU follow their own TVET system based on their regional advantages and situations. In Nigeria, the National Board for Technical Education runs the formal TVET system running from lower secondary to tertiary. TVET in Nigeria aims to assist federal and state government authorities to revitalize and reform socio-economic needs of the country through skill development.

Spotlight on: African Union's Agenda 2063 relevant to TVET

 <p>OVERALL</p>	 <p>GOAL</p> <p>Well educated citizens and skills revolution underpinned by Science, Technology and Innovation</p>	 <p>PRIORITY AREA</p> <p>Education and Science, Technology and Innovation-driven skills driven revolution</p>	 <p>LINKAGE WITH SDGs</p> <p>SDG 4. Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all</p>
 <p>YOUTH EMPOWERMENT</p>	 <p>GOAL</p> <p>Engaged and empowered youth and children</p>	 <p>PRIORITY AREA</p> <p>Youth empowerment and children's rights</p>	 <p>LINKAGE WITH SDGs</p> <p>SDG 4. Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all</p> <p>SDG 5. Achieve gender equality and empower all women and girls</p>
 <p>MANUFACTURING</p>	 <p>GOAL</p> <p>Transformed economies</p>	 <p>PRIORITY AREA</p> <p>Science, Technology and Innovation-driven manufacturing, industrialization and value addition</p>	 <p>LINKAGE WITH SDGs</p> <p>SDG 8. Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all</p> <p>SDG 9. Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation</p>
 <p>AGRICULTURE</p>	 <p>GOAL</p> <p>Modern agriculture for increased productivity and production</p>	 <p>PRIORITY AREA</p> <p>Agricultural productivity and production</p>	 <p>LINKAGE WITH SDGs</p> <p>SDG 2. End hunger, achieve food security and improved nutrition and promote sustainable agriculture</p>



Source: au.int (last accessed on 20th September 2020)



Spotlight on: South Africa

The South African TVET system, also known as Further Education and Training, is used by the government to meet the human resource needs through learner mobility and integration of education and training.

TVET education starts at the senior secondary level after nine years of general education. Students opting for TVET must undergo three years of secondary TVET education, followed by training at the tertiary level. Education is monitored by the Department of Higher Education and Training (DHET) at the national level, which is also responsible for developing policy, standards and curricula. It is aided by the Sector Education and Training Authority (SETA) that gathers information on supply and demand for skills. TVET quality standards are set by the Quality Council for Trades and Occupations (QCTO) and the Council for Quality Assurance in General and Further Education and Training (UMALUSI).

A National Skills Fund is also established by the government of South Africa for supporting the priority skills and innovative research in high-level programmes from universities to the workplace. This fund is also called the 'catalytic' fund since it promotes strategic partnerships which is an innovation in project delivery for reaching maximum people in the country.



Spotlight on: Ghana

TVET starts in Ghana after 11 years of basic education. Students opting for TVET at the senior secondary level may opt for technical schools or technical institutes based on their previous academic performance. Following this, students move on to apprenticeship to enter the workforce or may choose to enter polytechnics for full-time vocational education.

Apart from formal TVET education, non-formal training is delivered through Master craftsman programs, seminars, and short courses run by NGOs. TVET education is monitored and managed by the Council for Technical and Vocational Education and Training (COTVET), under the Ministry of Education in Ghana. Training standards are set by the Training Quality Assurance Committee (TQAC), and the National TVET Qualifications Committee (NTVETQC).

The main framework guiding TVET in Ghana is the National TVET Qualifications Framework (NTVETQF), providing guidelines for qualifications at each level of technical and vocational education. It specifies the knowledge, skills, and attitudes required at every level of proficiency. In addition, twenty-three (23) CBT operational manuals have been designed for competency-based training.



3. KENYA CONTEXT

This chapter focuses on Kenya's country profile, the strategic vision for 2030, youth and employment trends, priority sector focus from a regional, national and county perspective. It provides an overview of the TVET system in Kenya and its role in providing quality and relevant trainings to youth for enhanced employability.

3.1. COUNTRY PROFILE

The Republic of Kenya is a democratic nation since its independence in the year 1963. Kenya is the second largest economy in Eastern African region after Ethiopia. Kenya is constituted of 47 counties and has a National Government and County Governments. United Nations Development Programme (UNDP) 2019 Human Development Index (HDI) ranked Kenya at position 147, with a HDI value of 0.579, suggesting it to be in medium development category.

Kenya Vision 2030 launched in 2008 is the long-term development blueprint for the country. It aims to create a globally competitive and prosperous nation with a high quality of life by 2030 through industrializing and transforming into a middle-income country. The Vision is based on three 'pillars' - Economic, Social, and Political.

Since 2008, various Medium Term Plans (MTPs) have been setup for keeping 5-year goals for the development of the Vision. Currently the Third Medium Term Plan (MTP III) is in action from 2018 - 2022. The MTP III is driven by the "Big Four Agenda" which focuses on the growth of manufacturing, food security, affordable housing and healthcare facilities available to all.

3.2. ECONOMIC OUTLOOK AND GROWTH SECTORS

Kenya contributes to more than 50% of the region's GDP and is ranked 56th in the Doing Business 2020 (World Bank report), taking a leapfrog from a rank of 100 five years ago.

Kenya had considerable growth in the past few years; the GDP grew at 5.4% in the year 2019 clocking a consistency with the past few years of growing at above 5%. Gross National Income (GNI) grew by 9.1% from Ksh. 8,745.3 billion in 2018 to Ksh. 9,544.0 billion in 2019. Similarly, Gross National Disposable Income (GNDI) grew by 9% to Ksh. 10,082.9 billion in 2019. The GDP per capita increased from Ksh. 191,789 in 2018 to Ksh. 204,783 in 2019, according to KNBS Economic Survey 2020.

Key sectors of the economy include agriculture, manufacturing, real estate and services. Although agriculture remains the mainstay of the economy at 30% of GDP, manufacturing's share of GDP has risen significantly over the years. At 10%, manufacturing is the second-largest contributor to GDP, with the processing of agricultural products a key factor in growth. In 2019, the growth was driven by household consumption and investment on the demand side and services on the supply side such as public administration, information technology, finance and insurance, transportation and storage.

The top sectors contributing in terms of GDP and wage employment are (This does not include the informal sector which contributes more than 60%):

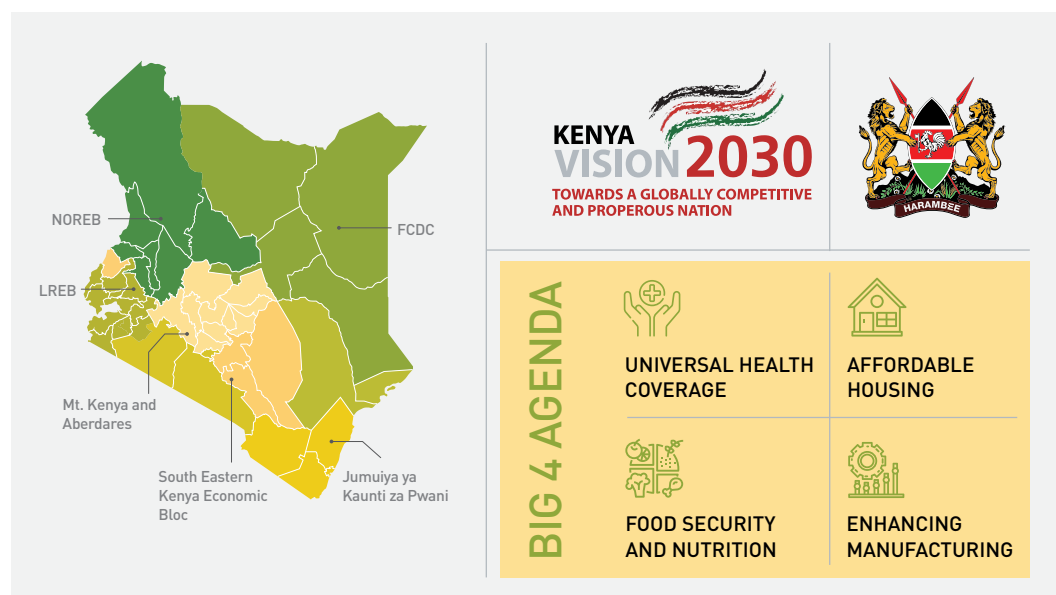


Figure 11: Vision 2030 and Big Four Agenda

Sectors	Nominal GDP (Ksh. Mn)					Wage employment ('000)				
	2015	2016	2017	2018	2019	2015	2016	2017	2018	2019
Agriculture, forestry and fishing	1,897,347	2,182,198	2,844,263	3,032,084	3,326,299	336.9	336.7	332.1	336.6	338.6
Transportation and storage	510,487	565,828	601,202	723,204	830,582	82.6	85.8	87.9	90.7	92.5
Manufacturing	588,895	654,456	659,140	690,592	734,609	336	341.5	343.8	347.9	353.3
Wholesale and retail trade; repairs	473,395	506,657	601,680	669,179	740,411	232	239.8	250.8	260.4	269.2
Real estate	474,317	532,668	575,069	625,859	675,302	4	4.1	4.2	4.3	4.4
Construction	307,562	360,802	453,332	485,582	541,760	186.3	207.1	213.4	218.4	221.5
Public administration and defense; compulsory social security	267,644	276,410	280,217	299,320	352,859	237.1	247.6	294.1	296.5	304.6
Education	308,128	309,513	326,553	385,263	413,611	528.4	546.3	561.7	579.1	598.1
Information and Communication Technology	91,200	104,765	109,110	115,103	116,355	111.6	117.1	124.3	131.2	132.3
Human health and social work activities	108,023	119,775	125,454	133,994	149,483	126	129.6	142.8	148.7	158

Table 4: GDP and Wage Employment contribution of key sectors over a 5-year period

Kenya has been consistently developing policies that promote the global and intra-African trade and investments through economic partnerships and bilateral arrangements. The Government has enacted the Public Private Partnership Act, 2013, the Business Registration Service Act, 2015 and the Special Economic Zones Act, 2015 to facilitate private sector investment and Foreign Direct Investment (FDI) in infrastructure and other sectors of the economy. The Competition Authority and the National Productivity Centre have been strengthened to enable them to effectively perform their mandates in order to enhance productivity and competitiveness in the economy.

The manufacturing sector is considered the most crucial for realizing Vision 2030 as it is the most important for job creation and has strong forward and backward linkages with the other sectors. The sector is responsible for the production of textiles, leather, construction material, agro-processing products and machinery. Micro and Small Enterprises (MSEs) that are characterized by low skilled jobs are the dominant part of this sector.

In order to achieve the objective of expanding and growing the sector, the following areas need attention: bringing down electricity costs and costs of raw materials, acquisition of appropriate skills, provision of tax incentives and improvement in infrastructure such as reliable water and electricity that can sustain and increase the competitiveness of locally manufactured goods against cheap imports.

The agricultural sector accounted for about 34% of the country's GDP in 2019, 75% of the country's labour force and more than 50% of the total revenue from exports. Kenya has ranked 85 out of 112 countries in the world and been termed as food insecure as per the Global Food Security Index (GFSI) of 2017. The survey was based on affordability, availability, quality and safety of food. Kenya's Agriculture sector has seen a downward trend in the past five years from 5.4% in 2013 to 3.6% in 2019 owing to a number of factors, namely, drought, low and declining soil fertility, limited agricultural land expansion, and inadequate use of quality seeds, delayed supply, high fertilizer costs and infestation by pests.

The government has targeted to achieve

100% Universal Health Coverage (UHC) by 2022 through scaling up of National Hospital Insurance Fund (NHIF) uptake. The initiatives proposed by the government towards the realization of UHC agenda for Kenya includes: leveraging on self-help groups and religious groups for advocacy, expansion of the 'Linda Mama' programme to mission hospitals; legal reforms to align NHIF with the UHC; driving NHIF uptake through enlisting 37,000-strong banking sector agent network, enlisting 100,000 Community Health Volunteers; adopting new health care financing models that include gradual increment of budgetary allocation to health from 7% in 2017 to 10% in 2022, introduction of Robin-Hood taxes on Real Time Gross Settlements (RTGS), mobile money transfers, and airfares; adoption of new low-cost service delivery model that leverages on technology such as eHealth for telemedicine, mHealth, and eHubs collection and dissemination of information.

The Government has undertaken to facilitate provision of 500,000 housing units by 2022, which directly and indirectly contributes to development of slums and poorly serviced informal settlements near the urban areas. In recent years, many significant efforts have been made to address the gaps in the country's infrastructure, which were mainly in transport and energy sectors. It is expected that improving the country's infrastructure will enhance production, trade and increase investments.

For achieving this transformation, major impetus has been put on the key social pillar of Kenya's Vision i.e. Education. With adequate education and skills training, Kenya is expected to move up to a middle-income nation by 2030.

This development and growth has been supported through technology and digital adoption. Nicknamed "Silicon Savannah," Kenya is one of the leading technology and innovation hubs in Africa, second only to South Africa, as per the latest Global Innovation Index (GII) 2019 report. The development of a large-scale telecommunications infrastructure in Kenya, capable of delivering efficient and affordable info-communications services is recognized as a critical prerequisite for the country's economic growth. Information, Communications Technology (ICT) has been identified as a key foundation sector

under Kenya Vision 2030. The sector will continue to play that role under the “Big Four” priorities. As Kenya prepares to take advantage of the “Fourth Industrial Revolution” that brings together digital, biological and physical technologies, it will increasingly depend on the quality of ICT in national infrastructure, regulatory and business environment, human capacity, ICT usage and investments among others.

It is imperative that the development be attained sustainably and keeping in mind the environment. Climate variability has led to significant economic loss and food insecurity. Kenya is globally recognised for its rich bio-diversity and iconic landscapes. Its economy and the livelihoods of its citizens depend on natural resources and nature-based tourism. Climate hazards have caused considerable losses across the country’s different sectors over the years.

Transitioning to a low emissions economy is a key component of Kenya’s Vision 2030. Government of Kenya is working to implement the National Climate Change Action Plan and Kenya is a flagship country for the U.S. Government’s Enhancing Capacity for Low Emissions Development Strategies (EC-LEDS). This program accelerates economic growth while slowing greenhouse gas emissions.

Kenya Industrial Transformation Programme (KITP) identifies that there is a lack of skills and capabilities in priority sectors:

- In apparel production, for example, design and embellishments are needed for seasonal goods and fast fashion.
- Low expertise to produce finished leather and leather products.
- There is a limited talent pool for engineers in key sectors, for example, construction, oil, mining and for qualified professionals for BPO.
- Limited SME know-how, access to market and credit, restrict growth and development.

Vision 2030	Kenya Industrial Transformation Programme (KITP)	Third Medium Term Plan (MTP III)	Big 4 Agenda
<ol style="list-style-type: none"> 1. Agriculture (Irrigation, Fisheries, Fertilizer) 2. Infrastructure 3. Tourism 4. Trade 5. Manufacturing (Agro-processing, Engineering, Iron and Steel) 6. Business Process Outsourcing (BPO) & Information and Communication Technology (ICT) 7. Financial Services 8. Education and Training 9. Oil, Minerals and other resources 	<ol style="list-style-type: none"> 1. Agro-processing (tea, horticulture, coffee) 2. Fisheries 3. Textile and Apparel, Leather 4. Construction services and materials 5. Tourism 6. Wholesale and retail 7. Oil, gas and mining services 8. IT related sectors 9. SMEs 	<ol style="list-style-type: none"> 1. Agriculture and livestock 2. Manufacturing 3. Tourism 4. Trade 5. Business Process Outsourcing (BPO) 6. Financial Services 7. Oil, Gas and Minerals 8. Blue Economy 9. Health 10. Education 11. Environment, water and sanitation 12. Sports, culture and arts 	<ol style="list-style-type: none"> 1. Food security 2. Affordable housing 3. Manufacturing 4. Healthcare

Figure 12: Sectors of growth

Mapping priority sectors for Kenya

A mapping of priority sectors for Kenya looked at sector focus of industry bodies, Government investment under KenInvest Strategic Plan, global investment inflow from World Bank and IFC, Investors' Guide to Kenya, County Integrated Development Plans, Employment in informal sector based on Informal Sectors, Skills and Occupations Survey (ISSOS) report of Ministry of Labour, gross monthly earnings of sectoral employment, GDP contribution of the sector and the growth rate of the sector in Kenya. Further, the short-term and long-term COVID-19 impact on sectors has been discussed. Based on research and analysis of these reports, a sector priority matrix has been developed.

Key for sector priority matrix	
1.	Sector focus of industry bodies
2.	Government investment under KenInvest Strategic Plan
3.	Global investment inflow from World Bank and IFC
4.	Investors' Guide to Kenya, 2018
5.	County Integrated Development Plans (CIDPs)
6.	Employment in informal sector based on ISSOS report
7.	Gross Monthly Earnings of Sectoral Employment
8.	GDP Contribution of the Sector, 2019
9.	GDP growth rate of the sector in Kenya in 2019



Sector priority matrix










	Sector/Sub - sector	1	2	3	4	5	6	7	8	9
	Agriculture, Forestry and Fishery	●	●	●	●	●	●	●	●	●
	Growing of crops								●	●
	Livestock and Husbandry				●	●			●	
	Forestry								●	●
	Fishery				●	●			●	●
	Manufacturing	●	●	●	●	●	●	●	●	●
	Leather Products	●	●	●	●	●				
	Timber, Wood and Furniture	●		●						
	Agro-processing	●	●	●	●	●			●	
	Chemical and Allied	●								
	Plastic and Rubber	●			●					
	Paper and Board	●			●					
	Automotive	●			●					
	Metal and Allied	●	●		●					
	Textile and Apparel	●	●		●					
	Pharmaceuticals & Medical	●								
	Construction and Infrastructure	●	●	●		●	●	●	●	●
	Housing & Real Estate				●	●				●
	Infra development				●	●				
	Commercial Construction				●	●				
	Financial Services and Insurance			●	●		●	●	●	●
	Hospitality and Tourism		●	●		●	●	●	●	●
	Energy	●	●	●		●	●	●	●	●
	Renewable Energy			●						
	Healthcare	●	●	●		●	●	●	●	●
	Wholesale and Retail Trade			●			●	●	●	●
	ICT		●	●	●	●	●	●	●	
	Telecommunication									●
	Education			●		●	●	●	●	●
	Transportation and Logistics		●				●	●	●	
	Mining and Quarrying	●	●	●			●	●	●	●
	Water Supply & Waste Management				●	●	●	●	●	●
	Administrative and Support Services						●	●	●	●

Table 5: Sector priority matrix, based on research and analysis of diverse reports

High ● Medium ● Low ●

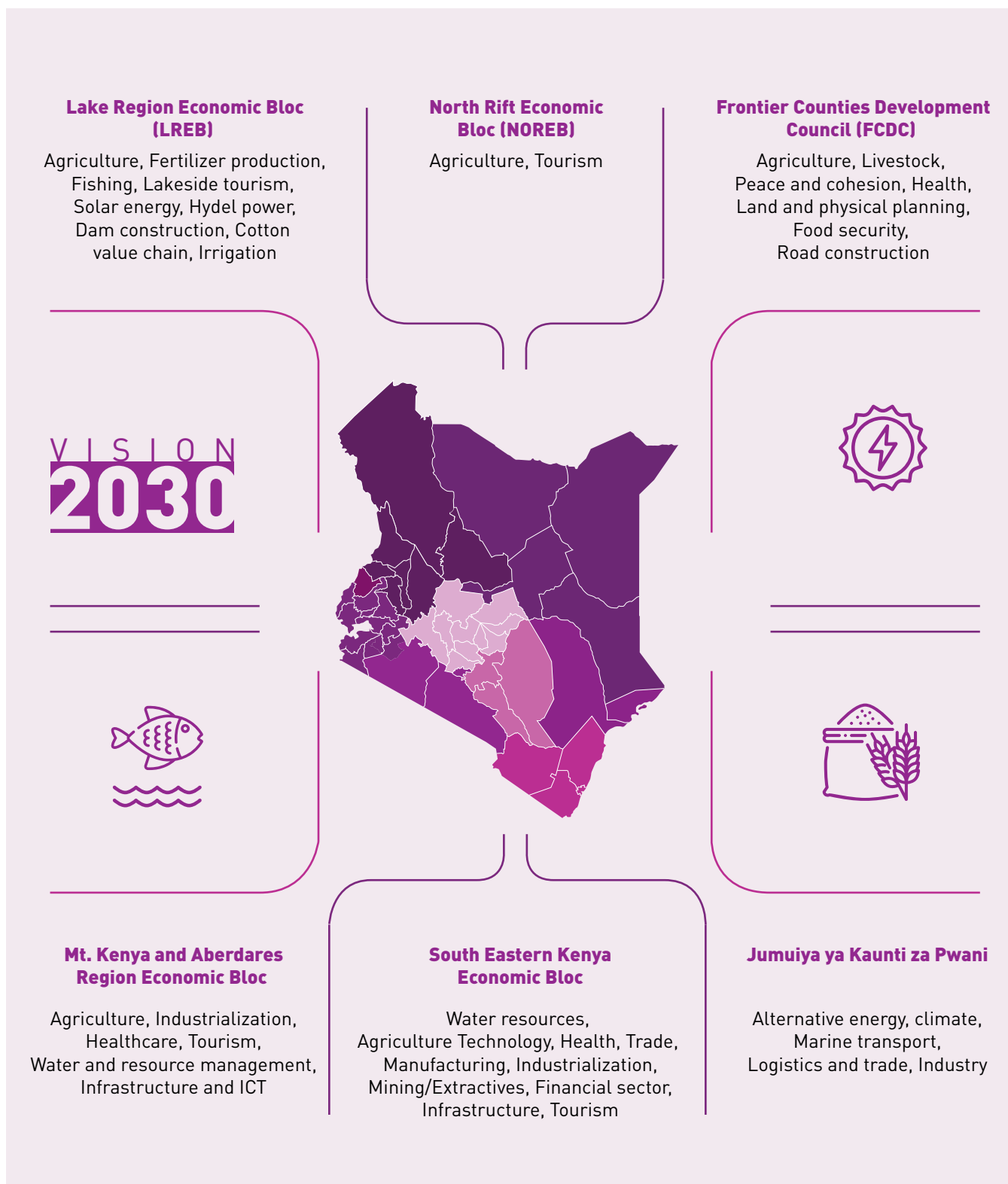


Figure 13: Regional blocs and priority sectors

Source: <http://www.devolution.go.ke/regional-economic-blocs/>

Priority sectors for counties

County governments have come together to make up regional blocs with an intent to spur economic growth within the respective regions through policy harmonization and resource mobilization. The Regional blocs have prepared respective development blueprints in-lines with Vision 2030.

3.3. IMPACT OF COVID-19 PANDEMIC

The novel Corona Virus Disease (COVID-19), which was declared by WHO as a pandemic has impacted countries globally. In Kenya, a number of measures were put in place to curb the spread of the disease. These included banning of all passenger flights, temporary closures of restaurants and bars, dusk to dawn curfew, cessation of movement into some high-risk counties, among others.

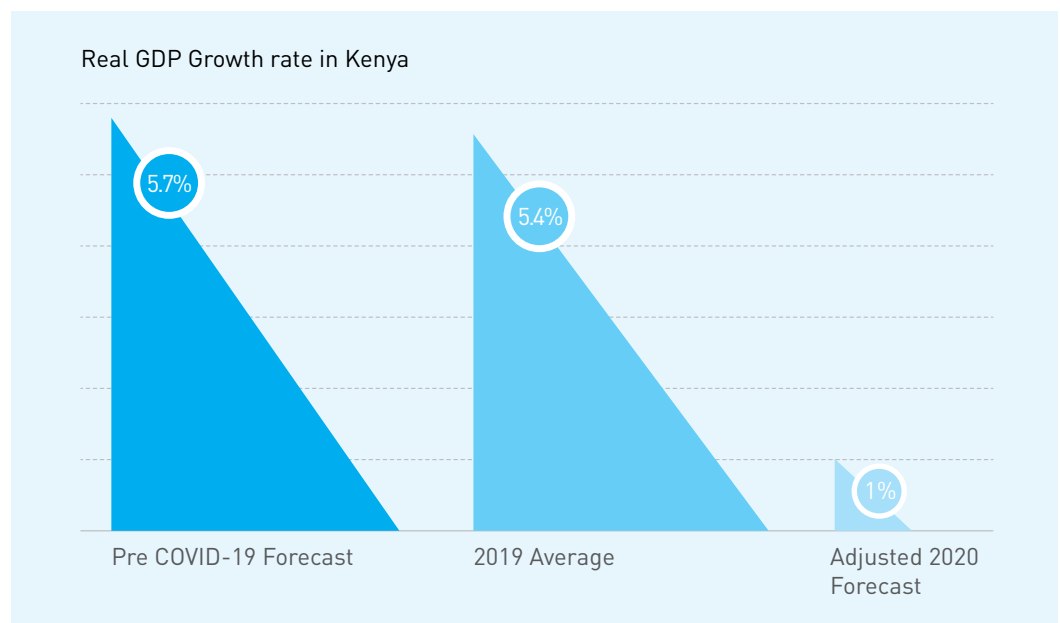
The COVID-19 pandemic has caused a large-scale impact on the economy of Kenya and the government's Big Four Agenda has also been impacted by it. GDP in this year is expected to decline to 1.8% - 2% due to the coronavirus pandemic from an estimate of over 6% earlier. The economy is expected to recover at a 6% growth in the year 2021.

Some of the services sub-sectors are projected to be severely impacted by ongoing measures to restrict mobility, closure of schools and public spaces, and broad social distancing to prevent widespread COVID-19. Specific sectors that could be hit hard by measures taken to contain the spread of COVID-19 and/or

external demand shocks include hotels and restaurants (i.e. hospitality); the transportation sector, especially Kenya Airways and other local airlines; the sports and entertainment sector; and SMEs.

The impact of the COVID-19 pandemic can be looked at from a short-term and a long-term perspective. The immediate and short-term impact included loss of lives, jobs, increase in poverty and potential disorder. However, the predicted long-term impact includes change in behaviours, consumption patterns leading to ripple effects across sectors of the economy. It is expected to lead to loss of human capital, infrastructure deterioration, expansion and reliance on informal sector, greater inequality and overall regression on progress on Sustainable Development Goals.

There is a need to ensure that TVET is relevant in this new-world order. Kenya's informal sector may grow further and there is a need to focus on providing trainings on entrepreneurial skills along with clear opportunities for continuous up-skilling and re-skilling.



Graph 1: Real GDP Growth Rate in Kenya
Source: IMF, Kenya at a Glance (last accessed on 30th June 2020)

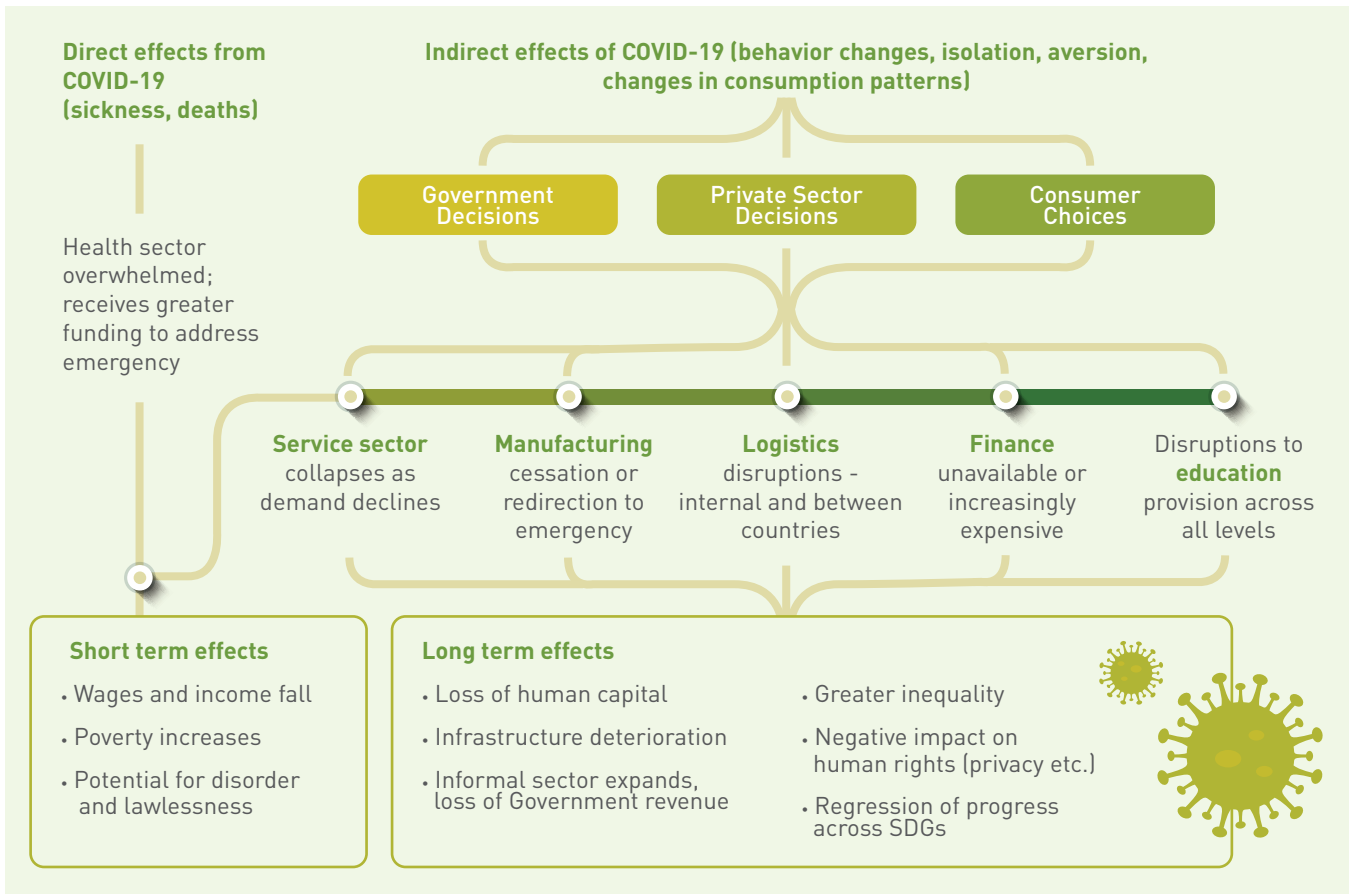



Figure 14: Short-term and long-term effects of COVID-19


Source: Adapted from Evans, D., and Over, M., (2020). "The Economic Impact of COVID-19 in Low- and Middle-Income Countries."

Even though the impact of the COVID-19 is still under assessment and shall continue for a longer period of time, the short-term effects seen on the Big Four Agenda due to the restrained economic activity are:




Manufacturing

Manufacturing has faced a mixed impact, where certain sub-sectors have seen increase in demand and others have suffered due to restrictions in the production capacity and reduced demand.




Construction

The construction industry has suffered significant losses as project financing has come to a standstill. With limited labour availability, the construction activities have been severely impacted.



Health

Investments in health sector have gone up significantly with the spread of the Covid-19 pandemic. The Government has scaled-up its initiatives of establishment of healthcare facilities and the achievement of the universal healthcare programme.



Agriculture

Agriculture sector has faced problems due to the restriction in export of coffee and other horticulture products. Flower, vegetables and fruits have also suffered due to limitations in export.

Figure 15: Impact of COVID-19 on the Big Four Agenda

3.4. TVET ECOSYSTEM IN KENYA

The functions of Technical and Vocational Education and Training (TVET) are shared between the National and County Governments as contained in Schedule 4 of the Constitution of Kenya (2010). The functions of the National Government are: education policy, standards, curriculum, examinations, granting of university charters, universities, tertiary educational institutions, institutions of research, higher learning, primary schools, special education, secondary schools, special education institutions and promotion of sports and sports education. The functions of the County Government in relation to education are: pre-primary education, vocational training centres, home-craft centres, farmers' training centres and childcare facilities.

TVET in Kenya has undergone changes and revisions on a large scale after the new constitution was adopted in the year 2010.

The Technical and Vocational Education and Training Act No. 29 of 2013 provides for establishment of technical and vocational education and training system, governance, management of institutions, assessment, examination and certification.

TVET in Kenya is under the Ministry of Education, and its State Department for Vocational and Technical Training. The State Department has two directorates i.e. the Directorate of Technical Education (DTE) and Directorate of Vocational Education and Training (DVET). Within the State Department for Vocational and Technical Training, there are four State Corporations or Semi-Autonomous Government Agencies (SAGAs) that are established under the TVET Act, 2013 and Kenya National Qualifications Framework Act, 2014 to streamline different mandates in the sector. These institutions have distinct roles/functions and are operating interdependently forming the entire TVET system in Kenya.

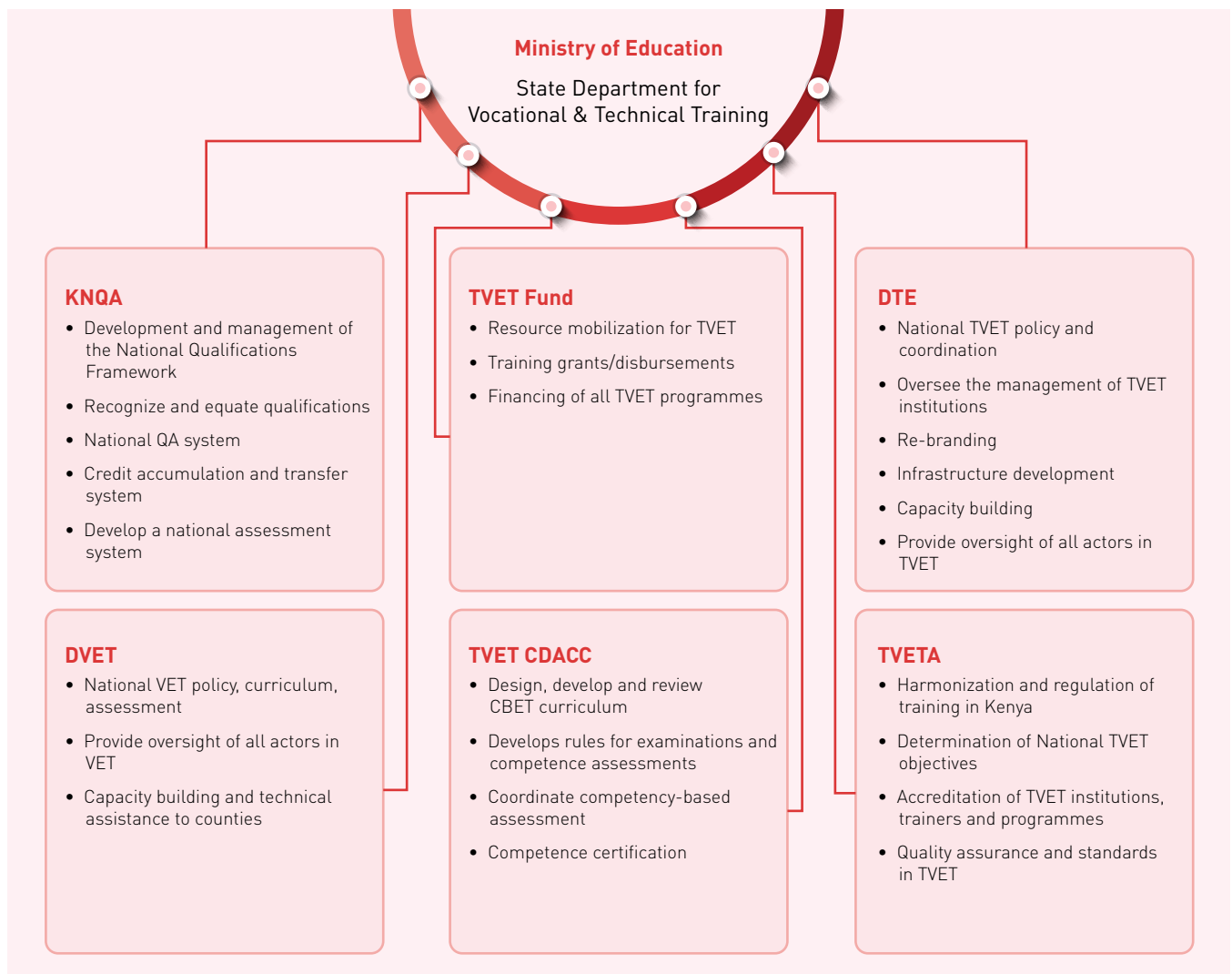


Figure 16: TVET in Kenya

Technical and Vocational Education and Training Authority (TVETA)

TVETA is a State Corporation established under the TVET Act, 2013, whose mandate is to regulate and coordinate the TVET sector in Kenya.

TVETA's mandate entails promulgation of policies, plans, programmes and guidelines for the effective implementation of the TVET Act, 2013; coordinate and monitor TVET system and skills development programmes; restructure the entire sector consisting of all institutions and programmes involved in the promotion and development of middle-level manpower; establish and administer a system of accreditation of both public and private institutions; determine and approve systematic procedures of accrediting trainers. This is aimed at increasing access, equity, quality and relevance of TVET in Kenya.

TVETA is therefore a regulator of TVET system whose functions include but are not limited to:

- Regulate and coordinate training under Technical and Vocational Education and Training Act No. 29 of 2013
- Accredite institutions, programmes and courses (through inspection and licensing)
- Advise and make recommendations to the Cabinet Secretary on all matters related to training
- Determine the national technical and vocational training objectives
- Promote access and relevance of training programmes within the framework of the overall national socio-economic development plans and policies
- Develop plans, and guidelines for the effective implementation of the provisions of the TVET Act
- Establish a training system, which meets the needs of both the formal and informal sectors as provided under the TVET Act
- Collect, examine and publish information relating to training
- Advise on the development of schemes of service for trainers
- Assure quality and relevance in programmes of training

- Liaise with the national and county governments and with the public and the private sector on matters relating to the TVET Act No. 29 of 2013
- Undertake, or cause to be undertaken, regular monitoring, evaluation and inspection of training and institutions to ensure compliance with set standards and guidelines
- Mobilize resources for development of training
- Ensure the maintenance of standards, quality and relevance in all aspects of training, including training by or through open, distance and electronic learning
- Approve the process of introduction of new training programmes and review existing programmes in Technical and Vocational Education and Training Board institutions
- Perform any other functions necessary for the better implementation of the TVET Act, 2013

Categories of TVET institutions

The TVET Act, 2013, categorizes institutions into:

1. Vocational Training Centers (VTCs) previously called Youth Polytechnics
2. Technical and Vocational Colleges (TVCs) which used to be Technical Training Institutes in the 1990s (TTIs)
3. National Polytechnics (NPs)



Figure 17: Categorization of TVET institutions in Kenya

3.5. EXISTING STANDARDS IN KENYA

Several national and sector specific standards are available in Kenya. As per the **Technical and Vocational Education and Training Act, 2013, TVETA** is mandated for the development of standards within the TVET ecosystem. It has developed and gazetted regulatory standards to strengthen quality of TVET education, such as Competency Based Education, Training and Assessment (CBETA), Center of Excellence, National Polytechnics, Prior Learning Assessment and Recognition etc. It is also in the process of developing occupational training standards that shall guide the development of curricula. These standards are developed in collaboration with experts and include competencies, performance criteria, assessment and provide details of training resources (trainer qualifications, tools, equipment, materials, infrastructure etc.) required for delivering the programme.

Additionally, in lines with the Big Four Agenda, **Kenya Bureau of Standards (KEBS)** is strongly committed to National Standardization Plan. This is a call for action to all stakeholders to participate and contribute towards addressing the current and future standardization needs and priorities. KEBS is working with multiple stakeholders to develop standards for educational sector - higher education, technical and vocational education and special needs education. It has also developed standards in the areas of information technology, occupational, safety and health standards.

Kenya National Qualifications Authority (KNQA) helps coordinate and harmonize the various levels of education; and to create a database of all qualifications in the country. KNQA has developed standards for quality assurance of assessment for registration of qualification. This includes competency-based approaches, level descriptors, progression pathways and volume of learning. It has also set guidelines for Qualifications Awarding Institutions (QAIs) and professional bodies.

Technical and Vocational Education and Training Curriculum Development, Assessment and Certification Council (TVET CDACC) under the Ministry of Education, is mandated to undertake design and development of curricula for the training institutions' examination,

assessment and competence certification. TVET CDACC has coordinated the development of occupational standards and CBET curricula by industry through the Sector Skills Advisory Committees.

Kenya Institute of Curriculum Development (KICD) has been at the forefront of technical and vocational education in the country. KICD courses provide clear career progression, however, these require standardization to align to Competency Based Education and Training (CBET). The **Kenya National Examinations Council (KNEC)** conducts assessment of these courses that range from artisan to diploma levels. KNEC has set out standards for conducting examinations and assessments.

National Industrial Training Authority (NITA) under the Ministry of Labour provides certificate courses for skilling and provides apprenticeships to people with any skill and education level. It conducts the Government Trade Test for certification. NITA has developed National Occupational Standards (NOS) and assessment guidelines in lines with Competency Based Education and Training (CBET) through its Sector Training Committees. These industrial trainings are for Artisan to Master Craftsmen levels.

Additionally, authorities such as National Construction Authority (NCA), Kenya Maritime Authority (KMA), Kenya Civil Aviation Authority (KCAA), Tourism Regulatory Authority (TRA), regulate their respective sectors and set standards for workers. Institutes such as East African School of Aviation (EASA), Kenya Institute of Bankers, Kenya Wildlife Services and Training Institute, Kenya Water Institute (KEWI), Railway Training Institute etc. work closely with respective authorities for delivering quality trainings. For example, as a contribution to the Vision 2030 priority projects on human resource capacity building, Kenya Maritime Authority (KMA) has the responsibility of planning, monitoring and evaluating maritime training programs. The sector is globally regulated by the International Maritime Organization (IMO) Convention on Standards of Training Certification and Watchkeeping that requires Kenya to establish structures for addressing training, recruitment and welfare of seafarers.

3.6. MAJOR CHALLENGES OF TVET IN KENYA

Interviews, focus group discussions and review of available standards suggests the following challenges in ensuring quality and relevant TVET programs in Kenya. The following are the key highlights of the needs assessment and gap analysis:

- Limited industry linkages of TVET programmes
- Limited labour market research and information
- Limited number of occupational training standards with need to revise and update existing occupational standards and curriculum for standardization
- Fragmented TVET eco-system
- Resource constraints
- Limited adoption of technology
- Negative perception and inadequate access to TVET programs
- Limited certifications amongst informal sector workforce

3.6.1. Limited industry linkages of TVET programmes

There is a mismatch between TVET programmes and labour market needs. There are several individual pilot projects and policy programmes to bridge the gap between industry and TVET, however the linkages between research, industry and TVET still remain weak.

Case study: Kenya Association of Manufacturers' support for TVET education

Society seems to put a higher value on college degrees, but the truth is that there are fewer job opportunities even after receiving a college degree. TVET education is devalued and has strong negative perception. This stems from the age-old narrative that TVET is for those who have failed academically and that individuals shall end up being in an environment with boring old machines, dirty greasy overalls and smoke-filled factories. These misconceptions have locked out many youths from availing economic opportunities that are lucrative and accessible in manufacturing.

However, legislation alone cannot address problems of perception and attitude that have impacted curriculum development and job opportunities. Industry needs to step in and demonstrate the worthiness of manufacturing jobs. Proactiveness by local companies in adopting mentorship programmes that integrate on-the-job training and lifelong learning will go a long way in reshaping the thinking around manufacturing sector as a whole. Industry itself needs to introduce cutting edge technologies to their day-to-day processes to change the image of traditional, obsolete, hard labour machines and illuminate the tech-savvy aspect of manufacturing jobs.

Additionally, companies need to be vigorously involved in shaping the future of industry by playing key roles in the planning and design of TVET programmes to include a global perspective of manufacturing trends, in line with our unique needs as a country. Industry linked training programmes are important. Participation of industry can be looked at for development of occupational standards, curriculum and job opportunities.

*Interviews conducted with KAM representatives between July - September 2020

Export of Labour from Kenya

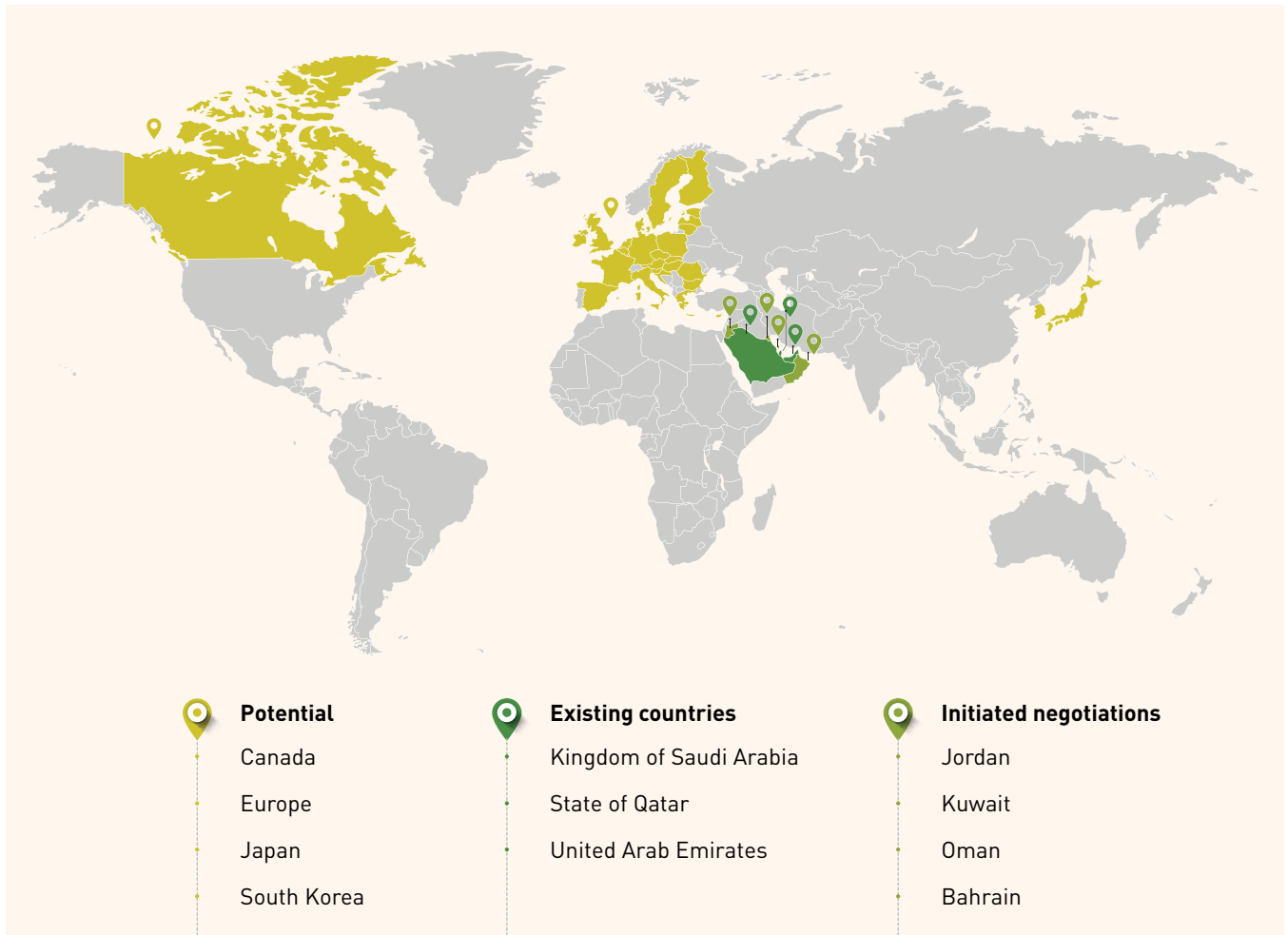
The National Employment Authority (NEA), established under the Ministry of Labour and Social Protection, was established in April, 2016 by an Act of Parliament that provided the legal framework and mandates for its operations.

NEA provides employment and internship services and plays a key role in facilitating foreign employment recruitment through private employment agencies. There are about 320 recruitment agencies accredited by the Authority.

Even though the number of Kenyans working abroad is high, there are often challenges of meeting international standards. There is a need to understand the export market requirement and train youth to meet these benchmark standards. Kenyans have immense potential to work in multiple countries and have better earning opportunities.

*Interviews conducted with KAM representatives between July - September 2020

Status of Kenya's bilateral labour agreements



Numbers at a glance



Figure 18: Kenya's bilateral labour agreements

3.6.2. Limited labour market research

The capacities for TVET and labour market research are underdeveloped. Lack of data on the skill needs, labour market information system, tracer studies, etc. and other research findings hamper the evidence-based policy making which is required for the growth of the system.

Limited labour market data

Labour market data plays an important role in accessing the needs and requirement of trained resources.

The Ministry of Labour is currently under process for adaptation of ISIC-08 and ISCO-08. The Kenya National Occupational Classification Standards (KNOCS) are now being upgraded.

Kenya National Bureau of Statistics (KNBS) also conducts studies periodically, however these studies are time consuming and require harmonization of activities.

Curriculum development by institutions like TVET CDACC and KICD is being undertaken based on stakeholder request. Stakeholders complete needs forms requesting for developing competency-based training programmes. For example, KICD has a vast number of TVET training programmes, however, this curriculum requires revisiting and aligning to updated industry requirements. Lack of a centralized and up-to-date Labour Management Information System provides a challenge for identifying programmes for TVET.

*Interviews conducted with various TVET stakeholders between July - September 2020

3.6.3. Lack of occupational training standards

Occupational training standards provide an intermediate step for the development of industry and market aligned TVET programmes. Occupational standards developed by industry and coordinated by the Ministry of Labour, are the starting point for the development of occupational training standards.

Currently available Kenya National Occupational Classification Standards (KNOCS 2000) are based on International Standard Classification of Occupations

(ISCO-88). This is being updated aligned to the latest revision of ISCO-08 published in 2008. Additionally, the Ministry of Labour and Social Protection is reviewing and adapting the ISIC-08 for classification of industries. This is part of the third Medium Term Plan (MTP III).

To meet industry demands, curriculum development institutions such as TVET CDACC, KICD and NITA have developed certain occupational standards ad hoc. There is a lack of synergy and harmonization in approach for identification of training needs and development processes.

3.6.4. Lack of comprehensiveness of skills

Trainees need to focus on skills that shall be beneficial for current and future jobs. Currently the Competency Based Education and Training (CBET) programmes consider basic skills, in addition to certain common and core competencies. However, trainees need to demonstrate and showcase skills that are cross-cutting across sectors and levels. This provides better career mobility.

3.6.5. Fragmented system

There are ample strategies and policies in Kenya for the promotion, implementation and development of TVET, however the vocational training system in Kenya faces certain challenges due to the lack of coordination between the multiple SAGAs and relevant ministries and departments which are responsible for the delivery of TVET. The large number of various providers and different standards for certification and curricula development has led to an uncoordinated system. There also exists a multiplicity of the certificates, diplomas and other qualifications.

Need to harmonize and synergize TVET activities across Kenya

100% of TVET stakeholders* agree that:

There are duplications in TVET and a lack of clear demarcation in implementation roles. There is a need to harmonize TVET activities across all key actors. Synergizing strengths shall accelerate taking TVET education in the country to global standards.

*Interviews conducted with various TVET stakeholders between July - September 2020

3.6.6. Resource constraints

There is a significant shortage in the TVET administrative staff in SAGAs and trainers in TVET institutions. Financial resources are not available to recruit sufficient number of trainers, purchase of teaching materials or for adequately equipping the training institutions for the effective delivery of TVET.

Resource mobilization and allocation has also been affected due to weak governance. Overall, lack of qualified trainers, poor infrastructure and training equipment results in inadequate delivery of training curriculum.

Resource constraints at VTCs

The Directorate of Technical and Vocational Education and Training (DTVET)* shared that Vocational Training Centers (VTCs) at the County level have been faced with challenges of maintaining quality of education. There are close to 1200+ VTCs across the country and it is imperative that quality standards are maintained across all training institutions.

At the VTC level, there is a general lack of quality trainers. Additional challenges include adequately remunerating trainers, motivating them for up-skilling and managing the high-attrition. Retention of good trainers is challenging as private and informal sector provides them with stable jobs and higher salary.

Overall, VTCs lack the budget for having proper infrastructure and training facilities. This compromises the quality of education that trainees are expected to attain. VTCs have old dilapidated infrastructure and limited capacity to have latest technology and equipment.

In most cases, VTCs are dependent on donation from partners, industry, churches and communities. TVET education requires high investment in equipment, tools and consumable materials. In the absence of these minimum facilities, trainees are not trained properly to meet industry standards. The grant from national government has been helpful but standardization for minimum requirement and regular inspections, audits and monitoring shall ensure better utilization of these resources.

With the onset of COVID-19 there are additional challenges for meeting technology requirements. Some VTCs are in remote locations and lack adequate skills and infrastructures.

VTCs provide training at lower than diploma levels. The trainees come from surrounding communities and have weak academic backgrounds. It is also important to ensure that trainings are relevant and short that makes trainees employable quickly.

*Interview conducted with DTVET representative on 29th July 2020

3.6.7. Limited adoption of technology

The use of technology and digital learning has been enhanced in education, especially in the wake of the COVID-19 pandemic. Online classrooms and digital learning methods have replaced physical infrastructure during the pandemic and may well result in blended learning methods even when educational institutions reopen.

TVET faces challenges in the adoption of digital technology and online learning as the standard feature of TVET is the imparting of practical skills, through hands-on learning. Challenges in technology integration include: Internet connectivity, high cost of Internet, frequent electricity blackouts, limited ICT literacy skills leading to lower participation.

COVID-19 impact on TVET in Kenya

Representatives from public and private TVET institutions shared that COVID-19 has accelerated the need for technology-enabled training at TVET institutions. Not only are there challenges for resources; trainers are inadequately equipped to conduct Competency Based Education through digital medium. There is an increasing disparity between TVET institutions in terms of meeting technology requirements and building a greater divide in terms of “haves” and “have nots.” Some institutions are struggling more than others to meet the unique challenges posed by COVID-19.

*Interviews conducted with various TVET stakeholders between July - September 2020

3.6.8. Negative perception and access to TVET programs

TVET has been perceived for those who have failed in academics. This poor reputation of TVET persists in the minds of parents and youth. There is currently no systematic vocational and career guidance in schools and there is very little general public awareness on the qualification paths and career opportunities that are presented by TVET.

This negative perception and lack of social recognition adversely affects the choice of the trainees and makes them seek alternatives to TVET.

Negative perception and challenges in access to TVET programmes

There is a need to change the perception of TVET trainings; however, it is an evolutionary process. TVET policies focus on equal opportunity and accessibility to quality education. There is a need to focus on ensuring training programmes cater to the needs and interest of the trainees.

There is a need to address access of TVET education for trainees across all walks of life. TVET should ensure gender mainstreaming and inclusivity for individuals with disabilities and marginalized or difficult backgrounds. There are some standards available for persons with disability, but for implementation, it requires public sensitization.

*Interviews conducted with various TVET stakeholders between July - September 2020

3.6.9. Large informal economy

The informal sector comprises the bulk of wage employment in Kenya. Informal sector employees are individuals who have not completed any formal training. Informal sector workers have a reduced potential to earn equitably. Their work is impermanent and may vary from season-to-season. A large bulk of the urban poor population is part of this informal sector who may have been internally displaced or are migrants.

Mainstreaming Kenya's Jua Kali sector

Jua Kali Associations, whose members are skilled artisans, are engaged in the production of goods and services in various sub-sectors with a structural network throughout Kenya. Majority of the sector's micro- and small-scale enterprises are divided into the following sub-sectors:

- Woodworkers/carpentry and joinery trades
- Wood/Handcrafts
- Metal and Allied/ Mechanical Engineering works
- Soapstone crafts
- Leatherworks
- Textile products (garment making, screen printing, batiks etc.)
- Clay/Pottery crafts
- Traditional Herbalists and Environmental Conservationists
- Chemical processing (detergents and paint manufacturing)
- Automotive Engineering
- Food Processing and Agribusiness
- Personal care services (Hairdressing and Beauty Therapy)
- Electrical/Electronics and ICT devices repair trades
- Construction fitting works, Interiors, Partitioning

One of the key challenges faced by the informal sector is the lack of formal training, up-skilling and certification. Most of the members are trained through master-craftsmen programmes. However, there is a need for moving into Competency Based Education and Training (CBET) that provides opportunity for workers to up-skill and earn certification. Recognition of Prior Learning and Assessment shall provide equal footing for all youths working in the skills sector.

*Interview conducted with representative of Kenya National Federation of Jua Kali Association (KNFJKA) on 20th August 2020

3. 8. DELPHI STUDY: KEY FINDINGS*

THEME: Sectors (and sub-sectors) that need prioritizing for TVET program delivery in line with the country's vision and changing COVID-19 world

- Need to conduct regular curriculum audits, with revisions made according to sectors for priority. These include Agriculture and Food Processing, Manufacturing, IT, Healthcare, Construction/Housing, Education, Oil and Gas, Renewable Energy (solar, wind etc.), among others.
- The informal sector (Jua Kali) with large numbers of workers should be a priority sector for TVET training.
- TVET should focus on entrepreneurship and innovations in TVET, along with employable workforce. CBET courses are the biggest opportunity.

THEME: Occupational training standards that TVETA should review or develop to address the labour market needs in Kenya

- Existing standards must be revised to include latest technology and trends. For e.g. upgrade electronics courses to include servicing and repair of digital equipment; upgrade automotive courses to include hybrid and electrical cars and motorbikes etc.
- There are occupational standards that have been developed; however, there is a need to now also focus on developing occupational training standards that will set the benchmarks and quality assurance for standardization of delivery of TVET training.
- All standards should be reviewed regularly in collaboration with industry and labour market needs to include current trends (technology, processes, innovation, entrepreneurship skills, soft skills, etc.)
- Trainers should be allowed certain flexibility to include topical content that may not be part of the curricula.

THEME: Regulatory standards that TVETA should develop for improving Access, Equity, Quality and Relevance of TVET in Kenya

- Develop or review existing training standards and guidelines for standardization and smooth functioning of TVET institutions every 5 years. For

e.g. Standards on trainer qualification requirements, adequate and relevant equipment and facilities including modern facilities and supply of training materials, quality standards maintenance, collaboration with employers and industry etc.

- Standards for PPP (collaboration between governments, industry and TVET institutions) should be developed to respond to the changing nature of the future of work.
- Develop standards for gender mainstreaming to encourage more women in TVET.
- Standards should be reviewed to identify occupations that are suitable for inclusivity of persons with special needs and then revised to provide a supporting training environment that encourages inclusivity.
- Standards should be developed for conducting labour market and tracer studies.

THEME: Overall improvement of TVET ecosystem in Kenya

- Provide continuous professional development (CPD) for trainers and all skilled workers for renewal of license.
- Establish Sector Skills Councils for industry participation in TVET for standards, guidelines and ensure transfer of latest technology and aligning to 4IR in the workplace.
- Improve Labour Information Management System (LMIS) for providing accurate and statistical information regarding labour market supply and demand.
- Harmonize standards and regulations across all levels and certifications (NITA, KNEC, TVET CDACC and others) offered within the TVET ecosystem in Kenya.
- Prioritize development of online and distance learning TVET programs.
- Focus on effective implementation of Prior Learning Assessment and Recognition (PLAR) at institution level.

*Study conducted between 14th August 2020 – 15th September 2020 with key experts in TVET in Kenya.

3.8. TVET PROJECTS

The Medium-Term Plan III (MTP III) under Kenya Vision 2030 has defined several flagship projects, programmes and policy reform objectives in the area of TVET. These focus on strengthening the link between the industry and training institutions, upgrading, expansion and revitalization of vocational training entities, the development of a national internship programme for graduates and skills development for small and micro enterprises. There are multiple development partner projects ongoing by the World Bank, African Development Bank and Mastercard Foundation, among others, and public-private partnership projects that are underway for the overall development of the TVET ecosystem.

3.8.1. World Bank: Key ongoing and upcoming projects in Kenya

East African Skills for Transformation and Regional Integration Project (EASTRIP)

The East Africa Skills for Transformation and Regional Integration Project (EASTRIP) has been setup to support the development and delivery of TVET programmes focused on key sectors in Kenya, Ethiopia and Tanzania. The aim of EASTRIP is to transform the TVET institutes to support short-term training recognized by the industry. The following are the focus areas:

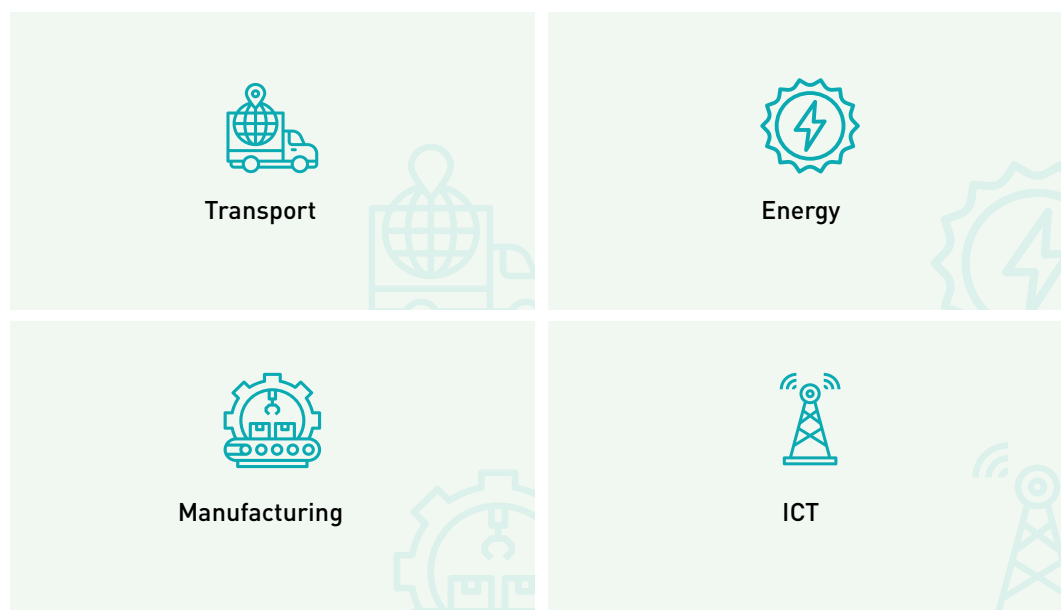


Figure 19: East African Skills for Transformation and Regional Integration Project (EASTRIP)
Source: www.eastrip.iucea.org

Kenya Youth Employment and Opportunities Project (KYEOP)

The Government of Kenya, in partnership with the World Bank, is implementing the Kenya Youth Employment and Opportunities Project (KYEOP) 2016 – 2021. The objective of KYEOP is to increase employment and earning opportunities among targeted youth across Kenya. The project aims to reach over 280,000 youth during the project period.

The main beneficiaries of the proposed project will be youth between 18 - 29 years of age (with some components extending up to 35 years) who are jobless and have experienced extended spells of unemployment or who are currently working in vulnerable jobs. The level of education of targeted beneficiaries will be up to Form 4. The project will reach youth within selected counties in urban and rural areas.

Additional specific focus areas also include:

- Agro-processing
- Construction
- Textile Technology
- Blue Economy

Formal sectors of training under KYEOP	
ICT	Banking
Catering	Carpentry
Fashion Design	Oil Pipeline Operations
Bee Keeping	Painting and Decoration
Hair Dressing	Motor Vehicle Mechanics
Solar PV Technology	Electrical Installation
Welding	Plant Operations
Beauty Therapy	Electricals
Dressmaking	Hospitality
Masonry	Food Processing
Plumbing	Horticulture
Firefighting	Waste Management
Mechanical Operations	

Table 6: Formal sectors of training under KYEOP
Source: mis.kyeop.go.ke

Informal sectors of training under KYEOP	
Agribusiness	Dressmaking
Agro-processing	Carpentry
Chemical Production	Weaving
Cobbler	Cleaning Services
Welding and Metal Fabrication	Landscaping
Motor Vehicle Mechanics	Painting
Panel Beating and Spraying	Handcrafts
Fashion and Design	Leatherwork
Event Planning	Cycle Repair
Plumbing	Photography
Masonry	Woodwork
Catering	Bio sand production
Bead making	ICT
Hairdressing	Bakery

Table 7: Informal sectors of training under KYEOP
Source: mis.kyeop.go.ke

Key recommendations*

- Need for regional harmonization of standards and curricula to ease mobility of skilled labour.
- Regular market surveys and inputs from industry advisory committees are required to guide the development of the standards and curricula that are aligned to industry's requirements for ensuring demand-driven training.
- Focus on entrepreneurship that can be introduced at school-level to encourage

youth to innovate and become their own employers.

- Trainers' capacity building must take place through continuous upskilling and exposure to new technologies, ICT skills etc. so that they can match up to pace with trainees.
- Prioritizing digital learning and digitization of TVET, including connectivity at County level.

*Interview conducted with World Bank representatives on 14th August 2020

3.8.2. African Development Bank: Key ongoing and upcoming projects in Kenya

High 5s

Priority Areas	Sectors in focus
Light Up and Power Africa	Renewable Energy
Feed Africa	Agriculture including Agro-Processing
Industrialize Africa	Manufacturing
Integrate Africa	Infrastructure
Improve the quality of life for the people of Africa	Health, Water and Sanitation

Table 8: Priority areas and sectors in focus under AFDB's High 5s

Source: www.afdb.org/en/high5s

Enable Youth Program

- Agriculture including Agro-Processing

Technical and Vocational Education Training and Entrepreneurship Project (TVETE)

- STEM (Science, Technology, Engineering and Mathematics)
- Entrepreneurship

Key recommendations*

- Some of the major sectors of focus include:
 - > Construction (including up-to-date skills in Welding, Plumbing, Roofing Technology and Design etc.)
 - > Renewable Energy (including local manufacturing, installation, repair and maintenance)
 - > Agro-processing (including value added services)
 - > Manufacturing (including Leather Technology, Metalwork, Woodwork)

- Existing standards to be reviewed to include up-to-date skills required in sectors.
- Modular approach to TVET with short courses introduced for specialization in particular fields. For example, there is Welding in Kenya but there are no specialists in Hyperbaric Welding (process of Welding at elevated pressures, normally underwater).
- The implementation of Recognition of Prior Learning is important, for which we must have a national framework.
- Lifelong learning must allow for skills upgradation through a flexi-class model so that those in the MSME or informal sector can learn at their own time, at their own pace.
- ICT skills are critical for both trainees and trainers.
- Regulations and standards should be developed for harmonization of skills.
- Entrepreneurship is important as a mindset that must be inculcated in young people from an early age.
- Encourage and promote local manufacturing, for example, electronics, basic equipment etc. can be made in Kenya.
- Need standards for workshop specifications and equipment at TVET institutions.
- Need standards for in-service training so that trainers can get regular industry exposure and are abreast of new technologies.
- Need standards for industry-linkages that include various facets of industry engagement with TVET institutions. These may include standards for learner attachments, review and revision of curricula to make it more industry-aligned, introduction of new courses in association with industry, research, regular training of trainers, supporting local production and MSME integration, among others.
- LMIS needs to be regularly updated and must capture both public and private sectors.
- Robust studies including Labour Market Studies within specific sectors must be conducted regularly.

*Interview conducted with AFDB representative on 01st September 2020

3.8.3. Mastercard Foundation: Key ongoing and upcoming projects in Kenya

Young Africa Works: Aligned to Government's Big Four Agenda sectors:

Priority Areas	Sectors in focus
Food Security	Agriculture
Affordable Housing	Infrastructure including Construction
Manufacturing	Manufacturing
Affordable Healthcare for all	Healthcare

Table 9: Priority areas and sectors in focus under Mastercard Foundation's Young Africa Works

Source: mastercardfdn.org/research/young-africa-works/

In addition, focusing on: ICT and Entrepreneurship.

Key recommendations*

- Some of the major sectors of focus include:
 - > Robotics and Automation
 - > Blue Economy
 - > Green Economy
 - > Construction (including Plumbing, Masonry, Welding etc.)
 - > Hospitality
 - > Agriculture
 - > Community Health
- Need to conduct regular curriculum audits, with revisions made according to market-driven skills.
- Integrating technology in TVET learning and training of trainers 21st Century skills, especially digital skills, is urgently required.
- Gender mainstreaming and inclusivity in TVET is required.
- Need standards covering all aspects of TVET institutions: including qualifications and criteria for management roles, types of curricula and how often these should be reviewed, upgrading of trainer skills / continuous

professional development of trainers, models for sustainability, standards for setting up workshops including equipment, clear scope and standards for both public and private TVET institutions etc.

- Focus on Entrepreneurship including supporting MSME's owned by youth and assisting in scaling up; start-up mentorship; access to Funds to incubate their ideas and innovations.
- Career progression within this rapidly changing world and future of work.
- Awareness campaigns and strategy for communicating reforms, new trends etc. within TVET to all stakeholders.

*Interview conducted with Mastercard Foundation representatives on 20th August 2020

Aligning to international standards for qualifications

The Kenya National Qualifications Authority (KNQA) was set up in 2015 to help coordinate and harmonize education, training, assessment and quality assurance of all qualifications awarded in the country; with the view to improving quality and international comparability. The Kenya National Qualifications Framework (KNQF) that the Authority has developed and is implementing, is part of the country's commitment to developing an accurate, reliable and robust database of all qualifications in Kenya. This will allow for comparability and information sharing in the education sector globally.

The KNQA Strategic Plan 2020-2025 brings together the various priorities and strategic plans of the entire education and training sector.

KNQA's mandate for 2020, among other things, is to develop a system of competence, lifelong learning, attainment of national qualifications and facilitate mobility and progression within education and training. KNQA launched the Recognition of Prior Learning (RPL) Policy in Kenya. The policy is critical in promoting access, employability, mobility, progression, and fair chances to education to the disadvantaged, discouraged and traditionally marginalized groups.

*Interview conducted with representative of Kenya National Qualifications Authority (KNQA) in August 2020

3.8.4. Public-private partnerships

The Inclusive Growth through Decent Work in the Great Rift Valley Project (2018 – 2022):

This is a public-private partnership in collaboration with the Swedish International Development Cooperation Agency (SIDA) and the International Labour Organization (ILO). The aim of this project is to support formal skills formation, decent employment, and business development in the counties of Narok and Nakuru. There has been a specific focus on working with local communities to build capacities, strategy development in TVET, engaging in sustainable, local economic development and development of political accountability in order to get improved access to social services.

Various ministries and bodies offer non-formal and informal TVET such as Ministry of Labour, East Africa Affairs and Social Protection, Ministry of Trade and Industry, Ministry of Water, Ministry of Tourism, and the Ministry of Public Service, Youth and Gender Affairs. Few such courses include training for Micro and Small Enterprise artisans to employ them under specific trades.





4. SECTOR FOCUS

This chapter focuses on the core sectors for Kenya's economic growth. These are sectors identified in the previous chapter based on Vision 2030, Big Four Agenda, MTP III, Kenya Industrial Transformation Program, sector reports, investment reports, regional and county development plans etc. Situational analysis of each sector has been conducted to identify strategic directions of the sector, trends, growth drivers, employment and human resource requirements.

AGRICULTURE

4.1 AGRICULTURE AND RELATED FIELDS

Introduction

This sector comprises of growing crops, raising and breeding animals, harvesting timber and other plants, animals from a farm or natural habitat (ISIC Rev. 4, 2008). According to FAO, Agriculture can be further sub-divided into Farming, Livestock, Agro-forestry, Fishing and Aquaculture, and Agro-Processing sub-sectors.

Global Trends

Agriculture plays a crucial role in the economy of developing countries, and provides the main source of food, income and employment. Roughly one quarter of the earth's terrestrial surface is now under cultivation with more land converted to crop production in the past three decades than ever before.

Growth in agriculture sector is two to four times more effective in raising incomes among the poorest people working in the sector as compared to other sectors. Thus, it is called the bread-earning sector for the poor in developing nations.

Sub-Saharan Africa is an agro-ecologically diverse region, abundant with land, accounting for 14% of global cropland and 21% of pasture. Nonetheless, the agricultural sector in many countries faces land shortages given high population density in rural areas, such that most available land is concentrated in few countries and/or is largely under forest cover. The region thus produced only 7% of the global value of agricultural and fish production in 2017 - 2019. This poses a major opportunity for the sector to skill its workforce and increase the productivity of the sector.

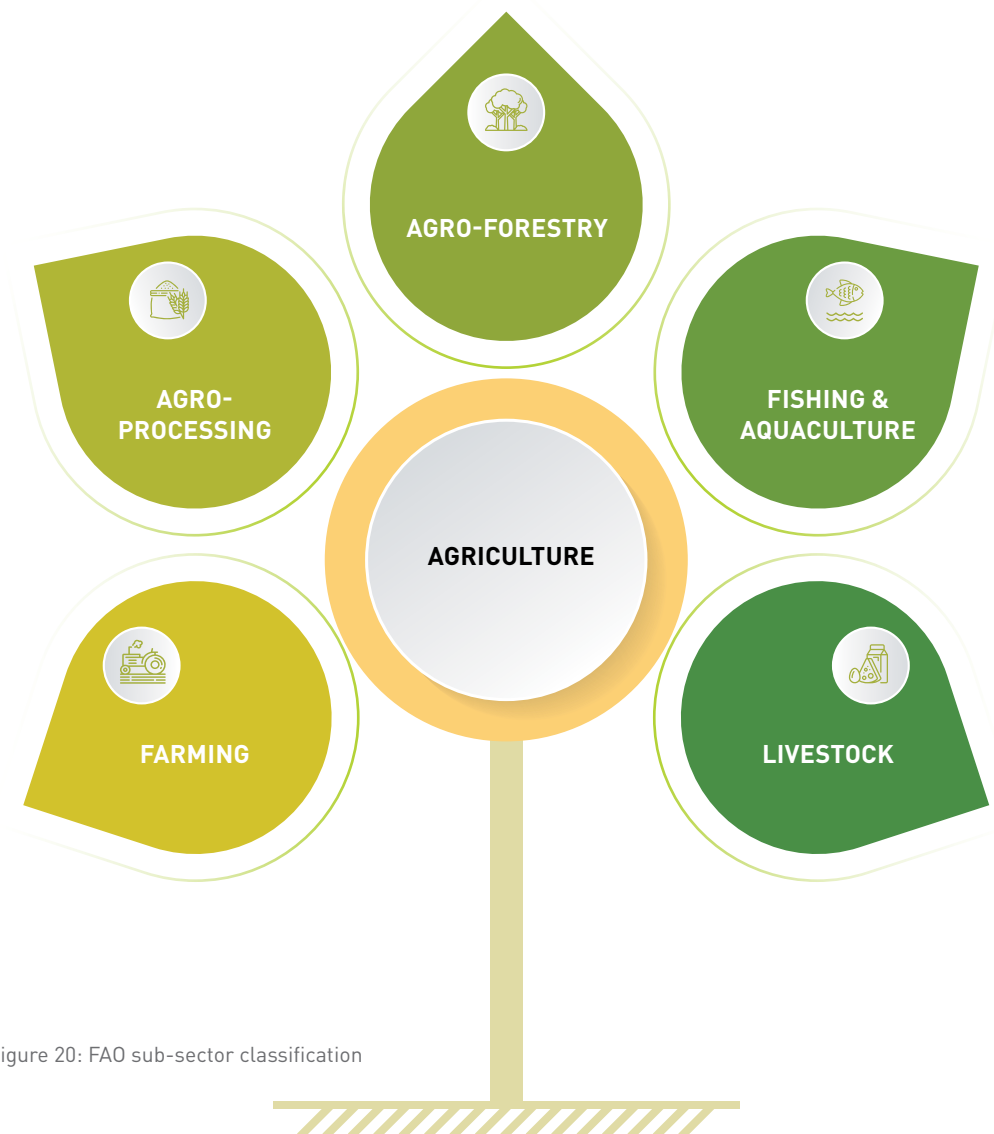


Figure 20: FAO sub-sector classification

Table 10: International Classification for Agriculture, Forestry and Fishery Sector

International Standard Industrial Classification of all Economic Activities (ISIC Rev. 4, 2008)		
Section A: Agriculture, forestry and fishery		
Division	Group	Class
Crop and animal production, hunting and related service activities	Growing of non-perennial crops	Growing of cereals (except rice), leguminous crops and oil seeds
		Growing of rice
		Growing of vegetables and melons, roots and tubers
		Growing of sugar cane
		Growing of tobacco
		Growing of fibre crops
		Growing of other non-perennial crops
	Growing of perennial crops	Growing of grapes
		Growing of tropical and subtropical fruits
		Growing of citrus fruits
		Growing of pome fruits and stone fruits
		Growing of other tree and bush fruits and nuts
		Growing of oleaginous fruits
		Growing of beverage crops
		Growing of spices, aromatic, drug and pharmaceutical crops
		Growing of other perennial crops
	Plant propagation	Plant propagation
	Animal production	Raising of cattle and buffaloes
		Raising of horses and other equines
		Raising of camels and camelids
		Raising of sheep and goats
		Raising of swine/pigs
		Raising of poultry
Raising of other animals		
Mixed farming	Mixed farming	
Support activities to agriculture and post-harvest crop activities	Support activities for crop production	
	Support activities for animal production	
	Post-harvest crop activities	
	Seed processing for propagation	
	Hunting, trapping and related service activities	
Forestry and logging		Silviculture and other forestry activities
		Logging
		Gathering of non-wood forest products
		Support services to forestry
Fishing and aquaculture	Fishing	Marine fishing
		Freshwater fishing
	Aquaculture	Marine aquaculture
		Freshwater aquaculture

International Standard Classification of Occupations (ISCO-08)		
As per ISCO-08, occupations within the sector are classified under major sector 9.		
Sub-Major	Minor Groups	
92 Agricultural, Forestry and Fishery Labourers	921	Agricultural, Forestry and Fishery Labourers
	9211	Crop Farm Labourers
	9212	Livestock Farm Labourers
	9213	Mixed Crop and Livestock Farm Labourers
	9214	Garden and Horticultural Labourers
	9215	Forestry Labourers
	9216	Fishery and Aquaculture Labourers
International Standard Classification of Education (ISCED-F 2013)		
Broad field	Narrow field	Detailed field
08 Agriculture, forestry, fisheries and veterinary	081 Agriculture	0811 Crop and livestock production
		0812 Horticulture
	082 Forestry	0821 Forestry
	083 Fisheries	0831 Fisheries
	084 Veterinary	0841 Veterinary

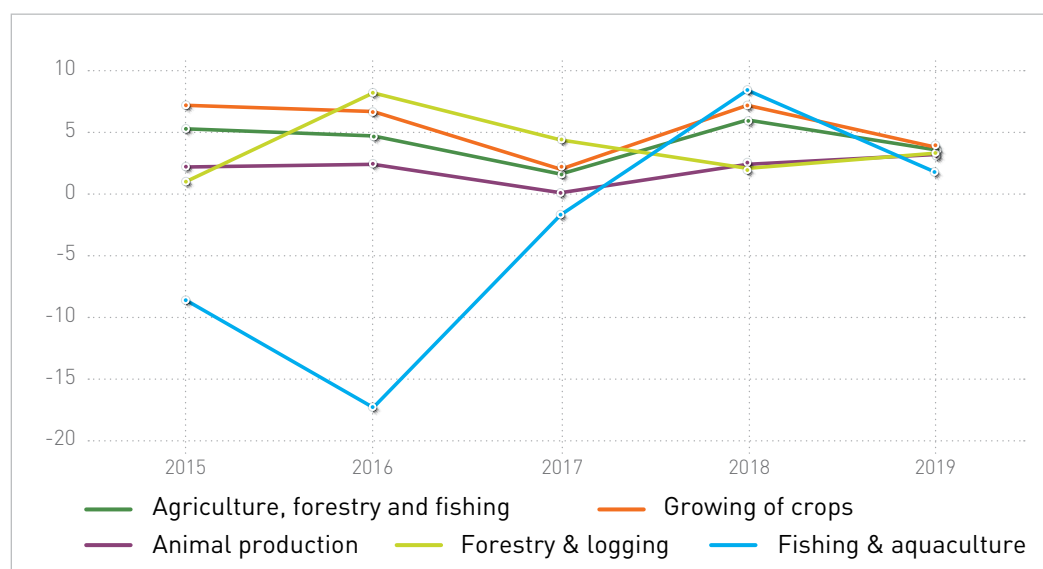
Trends in Kenya

Despite Kenya's impressive advances across the economy, in innovation and entrepreneurship, private sector enterprise, infrastructure, public service delivery and human capabilities, agriculture continues to be the bedrock of all development.

Today, there are approximately 4.5 million small-scale farmers in Kenya, including 3.5 million crop farmers, 600,000 pastoralists and 130,000 fisherfolk. Collectively, their output accounts for at least 63% of national produce on approximately 90% of Kenya's land under agriculture.

The sector has continued to grow at almost 5% annually and has huge potential for further growth. Kenya has one of the highest agricultural productivity levels in East Africa. 70% of the country's exports have an agricultural focus and the sector employs 85% of the rural workforce.

The sector provides critical supportive linkages to other sectors. It contributes approximately 75% of industrial raw materials, 65% of export earnings and 60% of the total employment. Among exports, tea remained a major foreign exchange earner at Ksh. 124.5 billion in 2016, from Ksh. 104.6 billion in 2013, representing 19% increase.



Graph 2: GDP Growth Rate of Agriculture, Forestry and Fishery Sector (%)
Source: Kenya Economic Report 2020

Over 18 million Kenyans earn their livelihood from agriculture. The country's economic growth therefore depends on enabling these people to achieve food and nutrition security, and contributing to the economy.

The importance of agriculture has been emphasized in Kenya through Vision 2030, the Medium-Term Plan III (MTP III), and in the Big Four Agenda, which emphasizes the importance of 100% food and nutrition security for all Kenyans. Growth of the sector will also enhance purchasing power of Kenyans, especially that of rural households and contribute to the goal of attainment of food and nutrition security.

With an estimated population of over 4.5 million cows, Kenya is well-known as one of Africa's biggest milk producers. With innovations in technology and evolving consumer preferences, the sector is expected to create more jobs in the field of storage facilities and processing. There is also a strong focus on improving productivity of small farms by providing mechanization services.

To address the effects of climate change on agricultural systems, the sector will develop and implement strategies for adaptation and mitigation including early warning, early preparedness and response, improved Climate Smart Agriculture (CSA) technologies and practices; and identify and promote suitable crop insurance products as a means of climate risk transfer.

To transform Kenya's agricultural sector and make it a regional powerhouse, the Government has formulated the Agricultural Sector Transformation and Growth Strategy (2019-2029) (ASTGS). The strategy is based on modernization of agriculture sector and providing food security.

The ASTGS has three anchors to drive Kenya's 10-year transformation. Specific target outcomes for the first five years are:

Anchor 1: Increase small-scale farmer, pastoralist and fisherfolk incomes

- Raise average annual small-scale farmer incomes from Ksh. 465/day to Ksh. 625/day (~35% increase)
- Directly benefit ~3.3 million Kenyan farming households.

Anchor 2: Increase agricultural output and value add

- Expand agricultural GDP from Ksh. 2.9 trillion to Ksh. 3.9 trillion (6% CAGR).
- Increase the contribution of agro-processing to GDP by Ksh. 130 billion over five years (50% increase over Ksh. 261 billion in 2018).

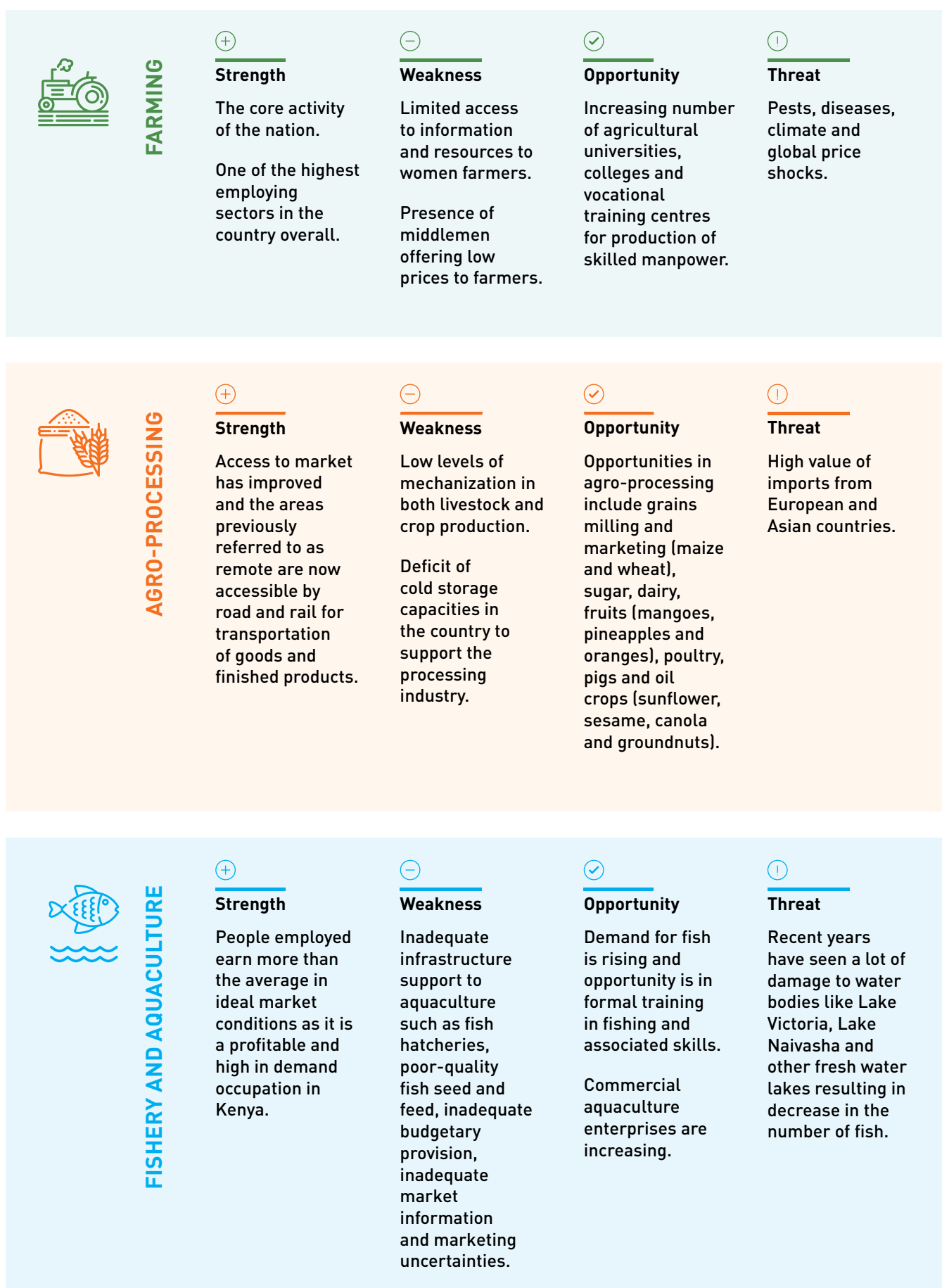
Anchor 3: Boost household food resilience

- Reduce the number of food-insecure Kenyans in the arid and semi-arid lands (ASAL) regions from an average 2.7 million to zero, while reducing the cost of food and improving nutrition.
- Protect households against environmental and fiscal shocks.

The Kenyan government continues to intervene in cereal markets, particularly in the supply of inputs. The fertilizer market was liberalized in the early 1990s, and the bulk of fertilizers are now imported and distributed by the private sector, but the government still procures and distributes substantial quantities through its subsidy programmes.

The Government has taken various programmes under its MTP III plan for the growth of the sector, including Agricultural Technology Development Programme, Comprehensive African Agricultural Development Program (CAADP), Traditional High Value Crops Programme, Pastoral Resilience Building Programme and Promotion of Investment and Cooperation in Agriculture.

Figure 21: SWOT Analysis of Agriculture, Forestry and Fishery Sector





LIVESTOCK & DAIRY



Strength

Many people employ themselves in dairy farming to provide milk products as it is a steady market for the country.



Weakness

Low productivity as appropriate modern skills and knowledge is missing.



Opportunity

Alternative dairy and livestock products such as camel milk, sheep, goat etc.



Threat

Beef production is affected by climate variability and animal diseases.

Human Resource Requirements

Agriculture, Forestry and Fishery is the highest employment sector in Kenya. However, the employment numbers have been almost constant in the past five years as per Kenya Economic Survey 2020.

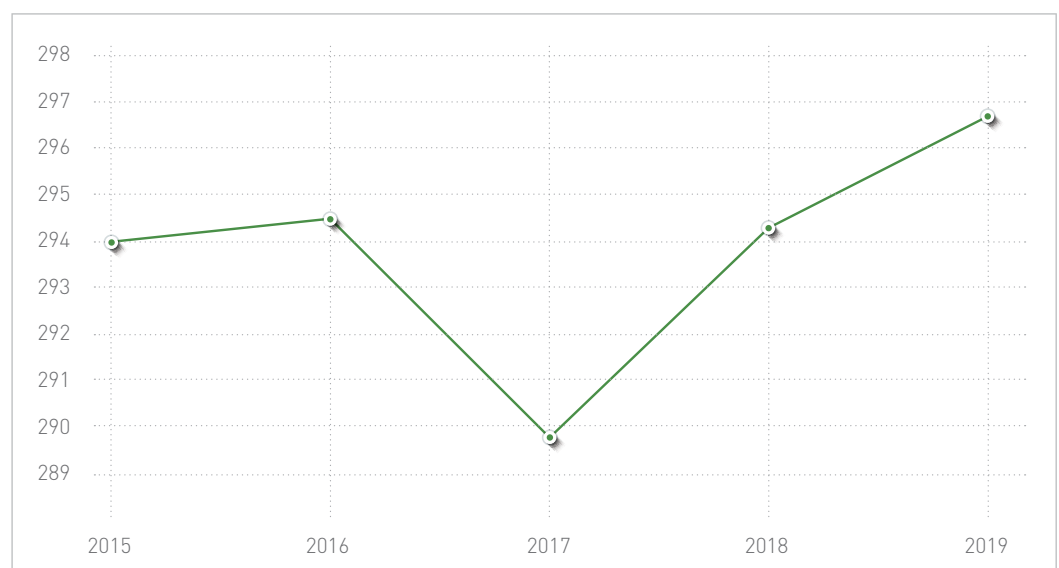
The sector employed 296,700 people in the year 2019. The employment numbers are growing at a mere 0.8% in this sector owing to small farms, workers moving to urban areas, climate changes and weather condition affecting the crop.

High investment potential in Kenya's agricultural sector

There is a high potential of attracting further investments in the agricultural sector, especially in large-scale farming and agro-processing. Challenges identified are a lack of technology awareness, inadequate entrepreneurship and

business skills among youth and the wider community. There is need for providing basic skills to youth that allow them to learn quickly and adapt to newer trends. Foreign investors in most cases bring expatriates for operational management and training. It is critical that youth are able to learn on the job. Focus should also be on developing short programs that allow communities to learn and apply their skills to setting up new businesses or managing existing business. These include, for example, cage fishing, utilization of agricultural waste material, export-oriented agricultural farming, food safety standards etc. The suggestions include working closely with counties and looking at County Integrated Development Plans, identifying local industry challenges and geographic conditions to align trainings.

*Focus Group Discussion conducted with representatives of Kenya Investment Authority on 10th August 2020.



Graph 3: Wage Employment in Agriculture, Forestry and Fishery Sector (in '000)
Source: Kenya Economic Report 2020

4.2. MANUFACTURING

Introduction

Manufacturing is understood as the physical or chemical transformation of raw materials into new products, whether the work is performed by power-driven machines or by hand, whether it is done in a factory or in the worker's home, and whether the products are sold at wholesale or retail. The output of a manufacturing process may be finished in that it is ready for utilization or consumption, or it may be semi-finished in that it is to become an input for further manufacturing (ISIC Rev. 4, 2008).

Global Trends

Since 1970s, there has been a reduction in total share of labour employment globally in the sector and increase in adoption of industry 4.0 technologies shall lead to higher manufacturing productivity and further downward trend in labour requirement. As developed economies continue to outsource low and medium skilled processes and heavily invest in adoption of newer technologies, there are

opportunities of gains for the emerging economies with cheaper workforce. The emerging economies can quickly find themselves as critical value-chain actors in the global supply chain and build self-reliance on producing for own consumption. As emerging countries invest in manufacturing setup, there is a need to critically keep a focus on technological changes. Workers need to have higher-level skills and there might be newer and unforeseen occupations in the future.

In 2018, the manufacturing sector accounted for 16.8% of the global GDP (World Bank, 2020). However, with COVID-19 pandemic, there is a disruption in economic and manufacturing activities. Global Economic Prospects (June 2020) provides both the immediate and near-term outlook for the impact of the pandemic and the long-term damage it has dealt to prospects for growth. United Nations Conference on Trade and Development (UNCTAD) estimates that there could be a global FDI shrink by 5% - 15%, due to the downfall in manufacturing sector coupled with factory shutdowns due to COVID-19.

Table 11: International Classification for Manufacturing Sector

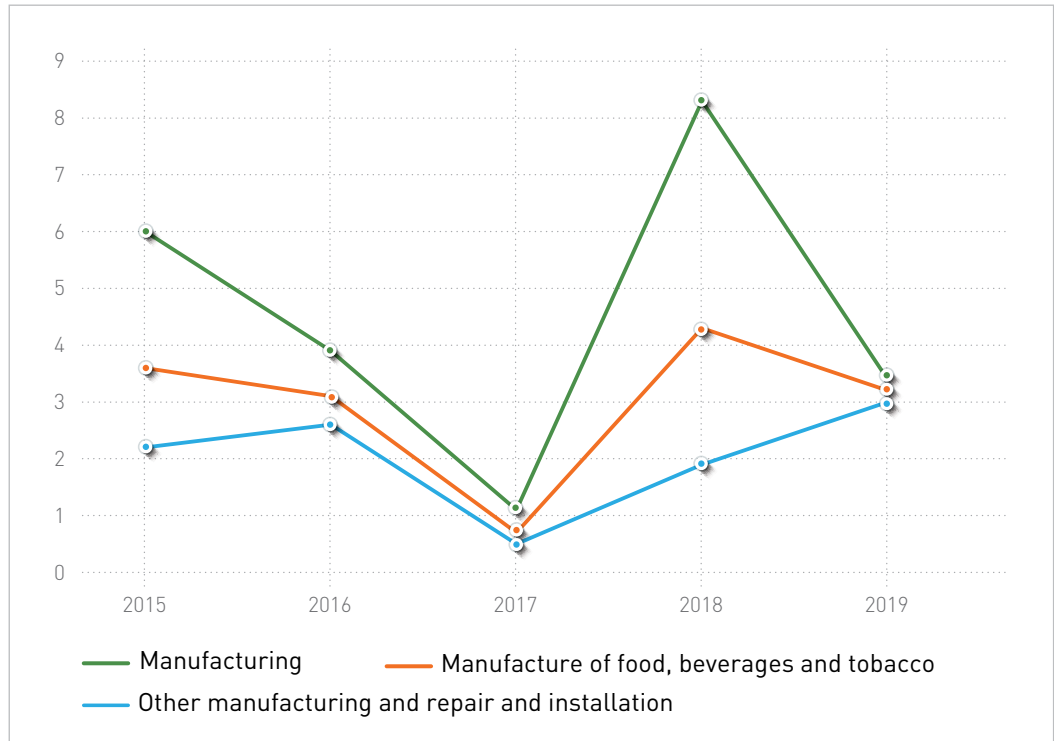
International Standard Industrial Classification of all Economic Activities (ISIC Rev. 4, 2008)	
Section C: Manufacturing	
Division	
Manufacture of food products	
Manufacture of leather and related products	
Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials	
Manufacture of paper and paper products	
Printing and reproduction of recorded media	
Manufacture of coke and refined petroleum products	
Manufacture of chemicals and chemical products	
Manufacture of pharmaceuticals, medicinal, chemical and botanical products	
Manufacture of rubber and plastics products	
Manufacture of other non-metallic mineral products	
Manufacture of optical instruments and photographic equipment	
Manufacture of electrical equipment	
Manufacture of machinery and equipment n.e.c.	
Manufacture of motor vehicles, trailers and semi-trailers	
Manufacture of furniture	
Repair and installation of machinery and equipment	

International Standard Classification of Occupations (ISCO-08)		
As per ISCO-08, occupations within the sector are classified under major groups 1, 3, 7 and 9.		
Sub-Major	Minor Groups	
13 Production and Specialized Services Managers	131	Production Managers in Agriculture, Forestry and Fisheries
	132	Manufacturing, Mining, Construction and Distribution Managers
31 Science and Engineering Associate Professionals	311	Physical and Engineering Science Technicians
	312	Mining, Manufacturing and Construction Supervisors
	313	Process Control Technicians
	314	Life Science Technicians and Related Associate Professionals
75 Food Processing, Woodworking, Garment and Other Craft and Related Trades Workers	751	Food Processing and Related Trades Workers
	752	Wood Treaters, Cabinet-makers and Related Trades Workers
	753	Garment and Related Trades Workers
73 Handicraft and Printing Workers	731	Handicraft Workers
	732	Printing Trades Workers
9 Elementary Occupations	93	Labourers in Mining, Construction, Manufacturing and Transport
	94	Food Preparation Assistants
International Standard Classification of Education (ISCED-F 2013)		
Broad field	Narrow field	Detailed field
07 Engineering, manufacturing and construction	071 Engineering and engineering trades	0711 Chemical engineering and processes
		0712 Environmental protection technology
		0713 Electricity and energy
		0714 Electronics and automation
		0715 Mechanics and metal trades
		0716 Motor vehicles, ships and aircraft
	072 Manufacturing and processing	0721 Food processing
		0722 Materials (glass, paper, plastic and wood)
		0723 Textiles (clothes, footwear and leather)

Trends in Kenya

Manufacturing can play a crucial role in Kenya's inclusive growth by absorbing large numbers of workers, including by creating many jobs indirectly through forward and backward linkages to agriculture, raising exports and transforming the economy through development and adoption of technological innovations.

Manufacturing is one of the key sectors of focus under Kenya Vision 2030 and the Big Four Agenda. Various sub-sectors in manufacturing, for example, textiles and apparels, iron and steel, agro-processing, among others, attract investments. The sector grew at a rate of 3.4% in 2019, compared to a high GDP growth rate of 8.3% in 2018 as per the Kenya Economic Survey 2020. The major contributor in this was manufacturing of foods, beverages and tobacco adding close to 22% to the GDP.



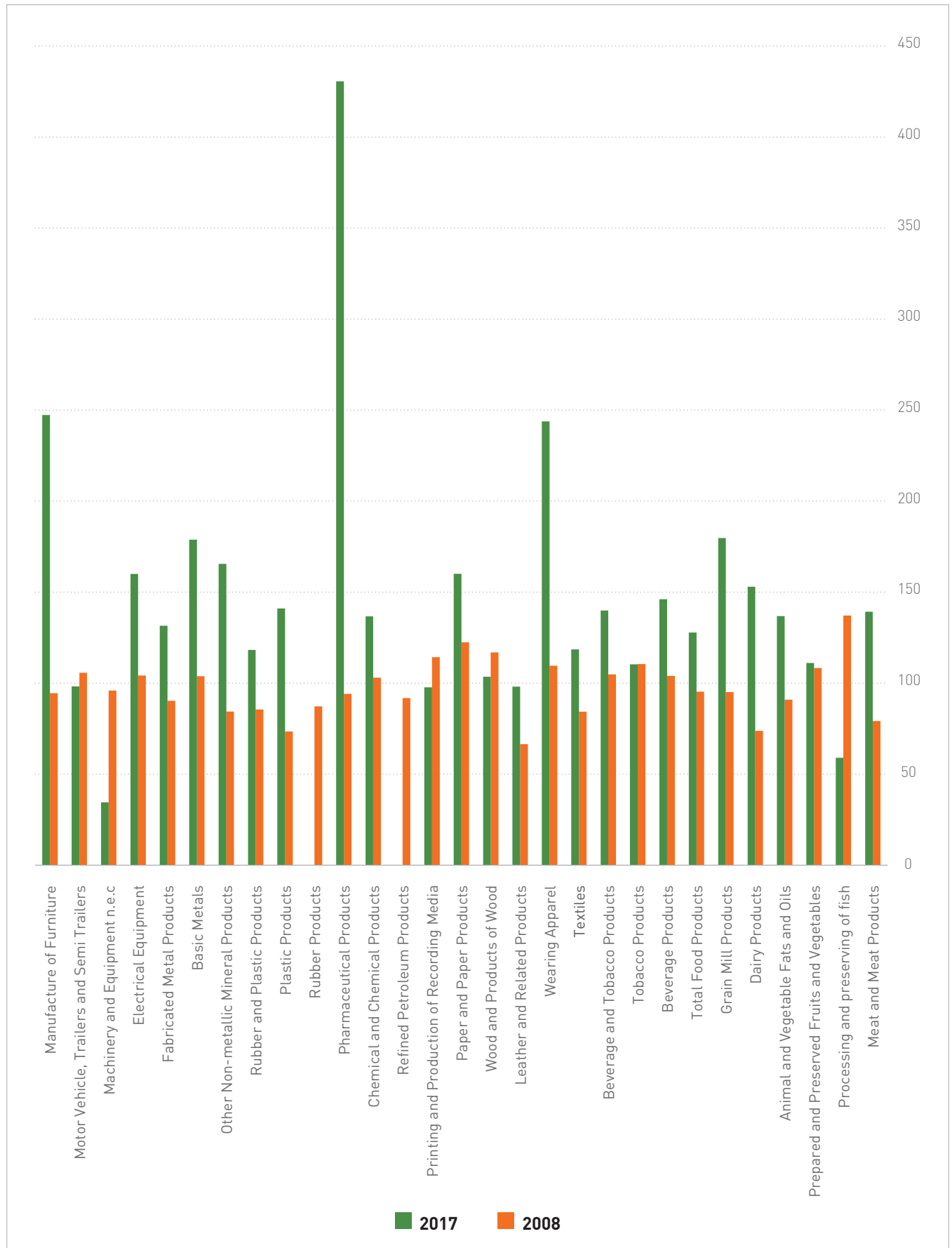
Graph 4: GDP Growth Rate of Manufacturing Sector (%)
Source: Kenya Economic Survey Report 2020

The Kenya National Bureau of Statistics (KNBS) Quantum Index, 2017, indicates that there is an improvement in manufacturing for all key sub-sectors as compared to

2008. The top three highest comparative growth is seen in pharmaceutical products, manufacturing of furniture and wearable apparels.



Manufacturing production 2008 vs. 2017 (KNBS Quantum Index)



Graph 5: KNBS Quantum Index (2017)

Kenya Association of Manufacturers (KAM) published the 'Sector Deep Dive Report' (2017) focusing on 14 sectors and their sub-sectors, opportunities and challenges that require to be addressed for holistic growth and overall improvement of manufacturing performance for the economy. Food and Beverage contributes 22% of the GDP and there is significant opportunity to develop primary and secondary agro-processing across the value chains. Vision 2030, Kenya Industrial Transformation Programme (KITP) and the Big Four Agenda have all been designed by the Government to revamp the manufacturing sector to create employment and wealth.

KAM's 'Supporting Economic Transformation (SET): Ten policy priorities for transforming manufacturing and creating jobs in Kenya (2017)' provides both the public and private sectors' and donors' perspective that have shaped the plan to transform Kenya's manufacturing sector. The 10-point plan aims to create 300,000 new jobs and double manufacturing in five years fundamentally through export and stabilization of local manufacturers.

African Growth and Opportunity Act (AGOA) and participation in the UNCTAD, WTO, among others, support the growth for manufacturing in Kenya. Additional factors for manufacturing growth include regional trade agreements, increased activity on unexploited resources (Iron ore and other minerals), increase in local consumption levels, regulatory changes, access to international markets due to port facility, quick adoption of technology and availability of workforce.

Additionally, government and industry players are trying to bridge the gap between skills education and industry requirements.

Kenya aims to have a robust, diversified and competitive Manufacturing Sector to transform the country into a middle-income economy by 2030. The Third Medium Term Plan (MTP-III) for 2018 to 2022 aims to focus on:

- Ease of doing business
- Strengthening local production capacity to increase domestically manufactured goods by increasing sector's productivity and value addition
- Raising the share of Kenyan products in

the regional market

- Developing niche products for which Kenya can achieve a global competitive advantage
- Increasing the share of Foreign Direct Investment (FDI) in the industrial sector
- Increasing the share of locally produced industrial components and spare parts
- Developing Special Economic Zones (SEZs) and Small and Medium Enterprises (SMEs) Industrial Parks
- Development of integrated Iron and Steel Mills
- Development of standard infrastructure
- Branding and marketing of Kenyan MSME products
- Establishing an Industrial Development Fund with a minimum of KES 10 billion for long term financing
- Increasing the share of manufacturing in total Micro, Small and Medium Enterprises (MSME) output
- Increasing the share of industries located outside major urban centres

In addition, the policy seeks to rationalize and streamline laws and regulations constraining industrialization and identifies the enablers of the sector as the following: physical infrastructure including transportation and related logistics, energy, water.

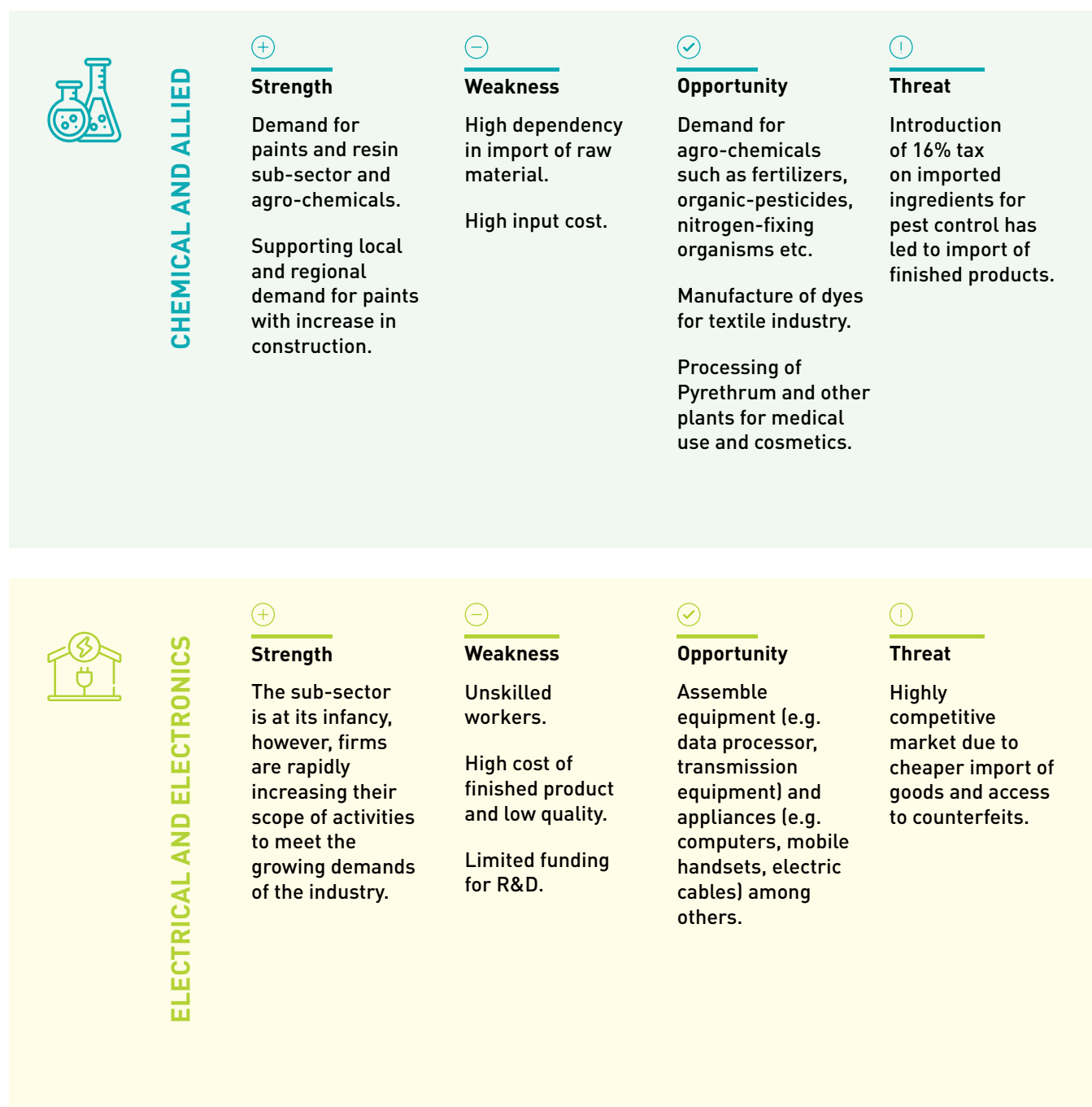
Some key regulatory institutions relevant for the manufacturing sector include: Kenya Bureau of Standards (KEBS) for standards, National Environmental Management Authority (NEMA) for environment, Kenya Plant Health and Inspectorate Services (KEPHIS) for ensuring sanitary and phytosanitary regulations, Kenya Investment Authority (KenInvest) for investment facilitation, Export Promotion Council (EPC) for export facilitation, Anti-Counterfeit Agency (ACA), Kenya Industrial Property Institute (KIPI) for intellectual property facilitation, Kenya Industrial Estates (KIE) for financial access facilitation, Kenya Power and Lighting Company (KPLC) for distribution of electricity, Electricity Regulatory Commission (ERC) for overseeing regulations in the energy sector, Numerical

Machining Complex (NMC) for machines calibrations, Export Processing Zone Authority (EPZA) for export promotion, Industrial Development Bank Capital (IDBC) for financial access facilitation, and the Kenya Revenue Authority (KRA) for tax-related regulations. These institutions are important in ensuring a conducive business environment for and

improved competitiveness of the general manufacturing sector in Kenya.

The manufacturing sector in Kenya has access to several incentives provided by the government under different export schemes in the form of tax, physical infrastructure and procedural incentives.

Figure 22: SWOT Analysis of Manufacturing Sector





FOOD AND BEVERAGES



Strength

High export revenue from European markets.

Availability of raw horticulture produce, beef, fish etc.



Weakness

Lack of a level playing field for local vs. foreign investors.

Poor infrastructure and security.



Opportunity

Processed products (e.g. canned, juice, concentrates, dehydrated products, oil) from local and imported raw materials.



Threat

High regional competition (e.g. Uganda, Tanzania) in agro-processed food.

Corruption.



LEATHER AND FOOTWEAR



Strength

Largest livestock herd in Africa.



Weakness

90% of Kenya's leather exports are unfinished wet blue leather.

Informal sector, limited skilled workers.



Opportunity

Investment in manufacture of high-quality footwear and other leather products for the American market under the AGOA facility.



Threat

High competition from China, Italy, and Vietnam across indicators, except availability of and access to raw materials.



METAL AND ALLIED



Strength

Local unexplored reserves of Iron ore.

Growth of railway, automotive and construction requirement for spare parts.



Weakness

Poor quality and high cost of electricity and infrastructure.

High finance costs, levy etc.

Lack of updated technology and skills.



Opportunity

Produce grinding metal balls, ductile iron rolls, casting, high strength reinforcement bar, component parts for railway, pipes, auto-parts etc.



Threat

Duty-free import on foreign funded projects impacting local manufacturers.



BUILDING AND CONSTRUCTION



Strength

National focus to increase exports to \$1 billion and ensuring 70% of the housing materials used in Kenya are locally produced.



Weakness

Unskilled workforce.

High cost of transport and logistics.



Opportunity

Raw material demand for residential, commercial and industrial buildings, including prefabricated low-cost buildings.



Threat

Lengthy procurement process, delayed payments, low completion rates of projects etc.



TIMBER, WOOD AND FURNITURE



Strength

Increased due to urbanization.

Logistical advantages for accessing regional and international markets.



Weakness

Limited skilled labour and poor production facilities.

Unable to meet local demand of timber and sawn wood.



Opportunity

Manufacture of knock down furniture for educational institutes, offices; quality furniture for export markets, chip board, sawn board etc.



Threat

Illicit trade.

Preference of imported furniture over locally manufactured ones.



TEXTILES AND APPAREL



Strength

Interest of global players to source from Kenya and export through AGOA.

Increased domestic share of wallet for new clothes.



Weakness

Skill mismatch and low productivity of workers.

High cost of industrial inputs.

Non-preference of locally made products to imported products.



Opportunity

Develop fashion sector and Kenyan brands.

Setting up of textile mills, yarn spinning, knitting, weaving for both local and export.



Threat

Illicit trade of textile and apparel.

Reliance on import of textile fibre, yarn for the sector.



PLASTICS AND RUBBER



Strength

Well-developed market supplying agro-food industries, hotels etc. with packaging products.



Weakness

Undeveloped production capacity of alternate products.

Ban on plastic bags.

High cost of electricity.



Opportunity

Move to manufacture quality household electrical appliances like sockets, automotive plastic spares, kitchen-ware, petroleum-based chemicals for textile industry etc.



Threat

Reliance on imported raw materials.

Competition from imports.



PHARMACEUTICAL AND MEDICAL EQUIPMENT



Strength

Growing market for medical equipment, supplies and generic drugs.

Indigenous medicines.



Weakness

Lack of professional pharmacists and medical practitioners.

Low capacity utilization (40%).



Opportunity

Manufacture disposable surgical gloves, condoms etc.

Low cost medical equipment.

Process raw material (such as sugar, salt, ethanol) for pharmaceutical industries.



Threat

Heavy reliance on imported raw materials and overall preference for imported finished products.



PAPER AND BOARD



Strength

30% increase in local paper production since 2008.



Weakness

More skilled professionals required for converting waste into paper products.



Opportunity

Supporting printing (officer and educational), advertising, packaging materials, labels etc.



Threat

Competition from imported packaging materials.



AUTOMOTIVE & SPARE PARTS



Strength

Growing demand for light and heavy vehicles propelled by sector development, including motorcycle, buses and passenger vehicles.



Weakness

Lack of coordination in automotive sector between formal and informal players.

Inadequate skills for automotive machinery handling and support services.

Limited R&D.



Opportunity

Assembly of vehicles for the domestic and export markets.

Reconditioning of old vehicles.



Threat

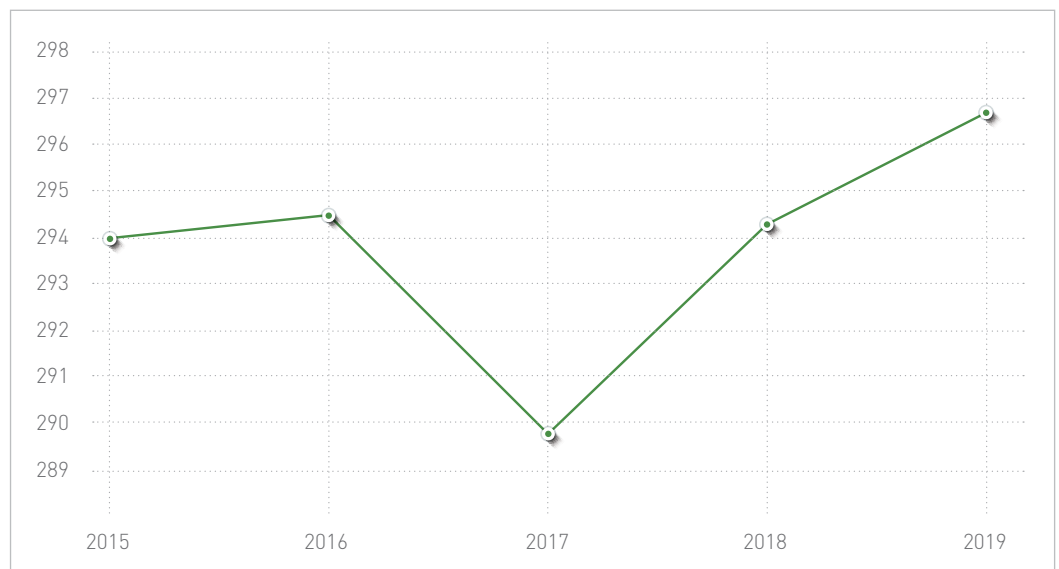
Expensive high end-technology.

Import of vehicles for second hand market.

Human resource requirements for the sector

Kenya Economic Survey (2020) indicates that manufacturing sector employs the highest number workers under formal wage employment and this figure has been rising at the rate of 2.4% since the past

five years and it shall continue to be one of the biggest employers in both formal and informal sectors. However, there are challenges of lack of collaboration and coordination of formal and informal sectors, followed by skill-shortage, skill-mismatch and un-skilled workforce.



Graph 6: Wage Employment in Manufacturing Sector ('000)
Source: Kenya Economic Survey (2020)

Labour productivity is essential for manufacturing competitiveness. It is critical that public and private sectors develop workers' skills and support innovation.

There is an urgent need to foster innovation for development of newer value-added products. For example, in agro-processing, tea is one of the major cash crops in Kenya

and is highly labour intensive. Kenyan black tea has been the largest export items. The major exporters globally are China, Sri Lanka and Kenya in third position. KAM study (2017) indicates that when export value is compared, Sri Lanka exports 11% less tea in quantity than Kenya but adds value to 50% of their tea production. Bulk tea export brings lesser foreign exchange income than value added

products. Globally, consumers are also moving away from preference of black tea to green and flavoured tea. Moving towards value addition strategies shall help Kenyan manufacturers become more competitive and significantly increase foreign exchange income.

Focusing on Research and Development (R&D) in core sectors such as agro-processing, plastics and rubber sub-sector, chemical and allied sub-sector, pharmaceutical and medical equipment and supplies sub-sectors is critical. Identification and development of new products, technology and introduction of standardization shall help in growth of the sub-sectors and further increase in waged employment.

Manufacturing sector is increasingly seeking for skilled workers who are able to shift away from 'old-line' manufacturing to more advanced technologically integrated processing lines. The sweeping changes are especially found in agro-processing units where foreign investors have been focusing on introducing mechanized agriculture. Local manufacturers are also readily adopting newer technology to be competitive.

As processing lines increasingly grow complex, there is a rising demand for specialized and adaptable workers who are able to grow and enhance their skills. Today, manufacturers need workers who either have a technical skill set or possess trade-based skills that machines cannot adequately perform.

Hence, workers, in addition to specialized technical skills, require cognitive skills of reasoning, problem solving, personal skills of flexibility, adaptability, communication, teamwork, attention to detail, and digital literacy. These skills are in demand for sub-sectors such as automotive, energy, electronics and electrical, metals and allied industries. Additionally, some of the sectors have poor supply for skilled labour, for example, furniture making, textile, fashion, leather and footwear industry etc. There is also an increasing need for trained professionals and technicians to support these sub-sectors.

Hence, it is critical to understand the changing nature of manufacturing sector and training and retraining workforce with higher productivity and awareness of Occupational Health and Safety.

Impact of COVID-19 on Kenya's manufacturing sector

The Kenya Private Sector Alliance (KEPSA) is a limited liability membership organisation registered in 2003 as the apex body of private sector in Kenya. KEPSA has been working closely with the industry to build the capacity of the workforce. It has focused on internship opportunities as part of KYEOP skill training program and working closely with the TVET SAGAs and institutions for development and delivery of quality training programs.

In March 2020, KEPSA brought together a team of key private sector leaders to create the Economic Management Framework for COVID-19 Response. The report published in April 2020 suggests that the vast majority of enterprises across all sectors and company sizes have been impacted by COVID-19 with small and mid-sized companies reporting the largest impact. Large companies had more information to prepare early and are better prepared to weather a crisis longer than small enterprises. All sectors reported pay-cuts and lay-offs. Manufacturing sector reported highest financial losses along with the Tourism sector.

KEPSA is also conducting a survey on the skill requirement of the human resources across the sector for the post-COVID-19 world. There is a need to map skill requirements and provide trainings that support revival of the sectors.

*Interview conducted with representative of Kenya Private Sector Alliance (KEPSA) on 19th August 2020.

4.3. HEALTHCARE AND SOCIAL SERVICES

Introduction

This sector includes health care provided by trained professionals in hospitals and other facilities. It also includes health care facilities provided in residential facilities (ISIC Rev. 4, 2008).

Global Trends

The healthcare and social services sector has been a core focus globally, tackling various outbreaks like HIV, Swine Flu, Ebola and the recent COVID-19 pandemic.

Healthcare and social work together accounted for more than 105 million jobs

worldwide in 2013, 130 million jobs in 2018 and an estimated 136 million jobs in 2020. This employment growth trend is projected to increase considerably with 18 out of the 30 fastest growing occupations in healthcare and related occupations. The sector is projected to generate 3.4 million jobs globally by 2028.

COVID-19 has increased the focus on this sector even further, leading to increased investments. Global healthcare spending is expected to grow at a CAGR of 5% in the period 2019 - 2023. The health sector is a major source of employment; in most regions, employment growth rates for health have been higher than for other sectors.

Table 12: International Classification for Healthcare and Social Services Sector

International Standard Industrial Classification of all Economic Activities (ISIC Rev. 4, 2008)		
Section Q: Human health and social work activities		
Division	Group	
Human health activities	Hospital activities	
	Medical and dental practice activities	
	Other human health activities	
Residential care activities	Residential nursing care facilities	
	Residential care activities for mental retardation, mental health & substance abuse	
	Residential care activities for the elderly and disabled	
	Other residential care activities	
Social work activities without accommodation	Social work activities without accommodation for the elderly and disabled	
	Other social work activities without accommodation	
International Standard Classification of Occupations (ISCO-08)		
As per ISCO-08, occupations within the sector are part of major group 2, 3 and 5.		
Sub-Major	Minor Groups	
22 Health Professionals	221	Medical Doctors
	222	Nursing and Midwifery Professionals
	223	Traditional and Complementary Medicine Professionals
	224	Paramedical Practitioners
	225	Veterinarians
	226	Other Health Professionals
32 Health Associate Professionals	321	Medical and Pharmaceutical Technicians
	322	Nursing and Midwifery Associate Professionals
	323	Traditional and Complementary Medicine Associate Professionals
	324	Veterinary Technicians and Assistants
	325	Other Health Associate Professionals

53 Personal Care Workers	531	Child Care Workers and Teachers' Aides	
	532	Personal Care Workers in Health Services	
International Standard Classification of Education (ISCED-F 2013)			
Broad field	Narrow field	Detailed field	
09 Health and welfare	091 Health	0911	Dental studies
		0912	Medicine
		0913	Nursing and midwifery
		0914	Medical diagnostic and treatment technology
		0915	Therapy and rehabilitation
		0916	Pharmacy
		0917	Traditional and complementary medicine and therapy

Trends in Kenya

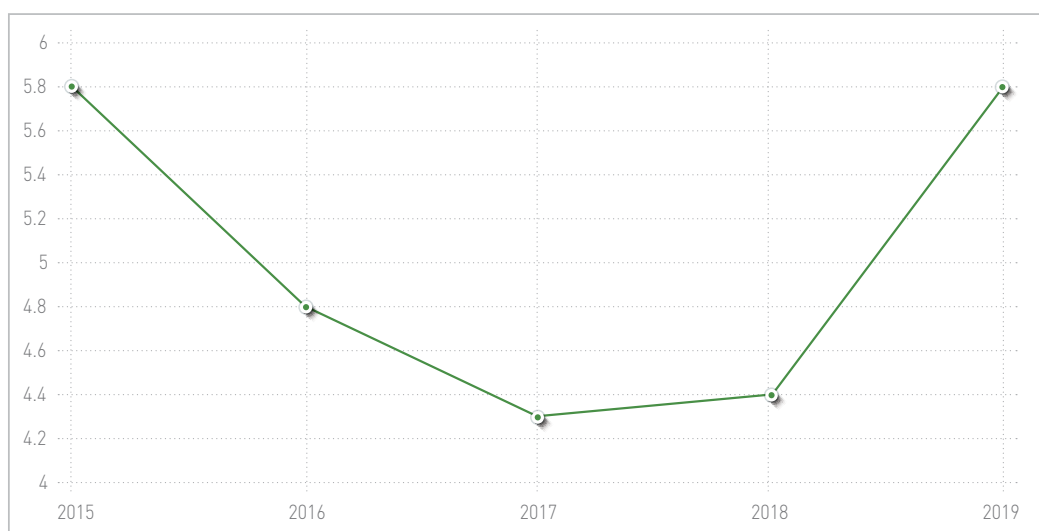
The healthcare and social services sector is key to ensuring that citizens are healthy and productive. The sector is key to the Government's Big Four Agenda with a particular focus on the achievement of Universal Health Coverage by implementing programmes that increase health insurance coverage, increase access to quality healthcare services and offer financial protection to people when accessing healthcare.

This will continue the transformative agenda initiated during the country's Mid-Term Plan I (MTP I) and furthered during Mid-Term Plan II (MTP II) by consolidating the gains made in the last five years and expanding them in line with Kenya Vision 2030.

Kenya's expenditure on health services has increased by 50.9% to KSh. 115.8 billion. The GDP contribution of the sector in 2019 was 1.5% amounting to KSh. 149 billion.

National Hospital Insurance Fund (NHIF) membership grew to 6.8 million in 2016 - 2017 which translates to 17 million Kenyans (principal contributors and their dependents), providing an overall coverage of 36%.

The healthcare and social services sector grew at a rate of 5.8% in 2019, highest in the past 5 years after a decline in the previous years, and is expected to grow even more due to large-scale investments in healthcare because of COVID-19. For example, the World Bank has invested USD 1 billion in Kenya towards COVID-19 response.



Graph 7: GDP Growth Rate of Healthcare and Social Services Sector (%)
Source: Kenya Economic Survey 2020

The Ministry of Industrialization, Trade and Enterprise development has also labeled healthcare and social services as the top 10 sectors that will attract most of the investments in Kenya. IFC investments data suggests that this sector is the 6th largest sector in terms of IFC investment attracting a sum total of USD 80 million in projects.

Private sector has been encouraged to participate in the vision of universal healthcare. Kenya wants to become a regional provider of the best healthcare facilities and open a new income generation activity through “health tourism.”

The Kenya Manufacturers’ Association (KAM) recognizes healthcare and manufacturing of pharmaceutical drugs and medical equipment as key sectors of growth. The sector however relies heavily on 95% imported raw material amounting to over KSh. 25 billion per annum.

The Kenya Health Policy 2014 - 2030 supports implementation of various

Medium-Term Plan III (MTP III) priorities in the healthcare and social services sector to address prevention, diagnosis and treatment leading to universal health care. The Government will also facilitate implementation of programmes and projects that will lead to the attainment of Sustainable Development Goal (SDG) No. 3 (Ensure healthy lives and promote well-being for all at all ages) and aspiration of African Union’s Agenda 2063.

The Constitution of Kenya, through the chapter on Bill of Rights, puts a heavy responsibility on the healthcare sector to ensure that the right to health is realized. For achieving the goal of Universal Health Care for all Kenyans by 2030, emphasis will need to be placed on some key areas such as the scaling up of maternal and child health, immunization coverage, prevention of non-communicable diseases, particularly diabetes and hypertension, prevention of water borne diseases, TB, HIV and other sexually transmitted diseases, among others.

The Kenyan health system has six levels of hierarchy, which are:

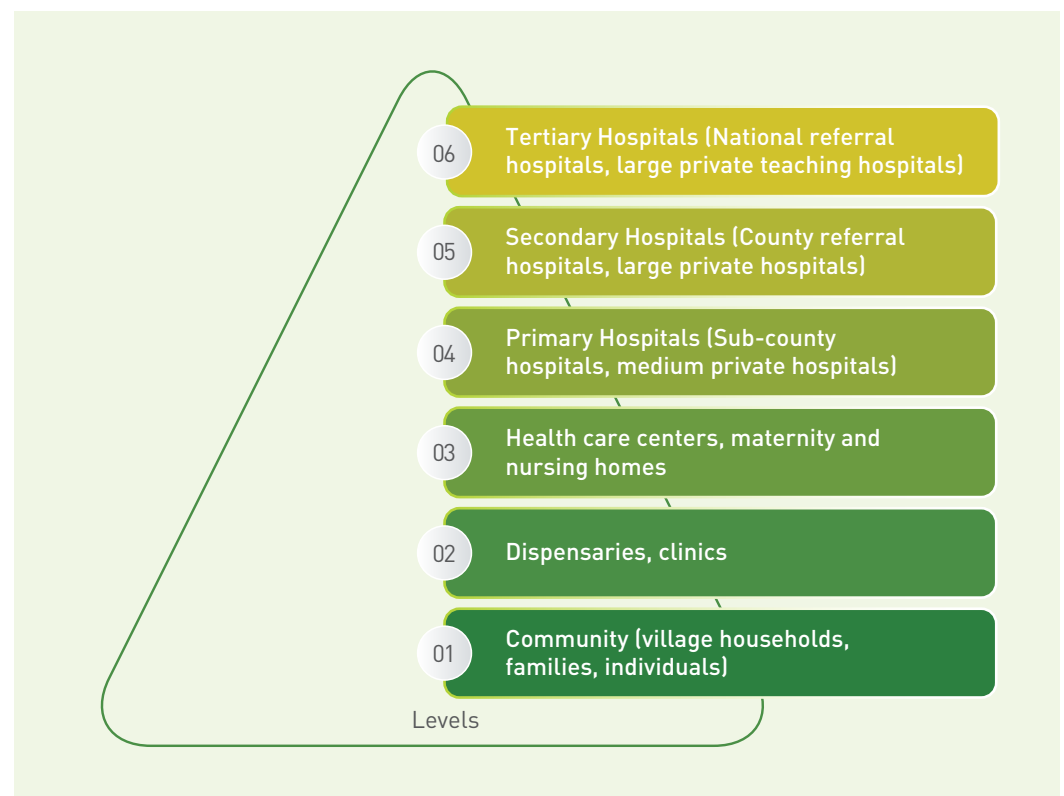


Figure 23: Old Healthcare System

Kenya Vision 2030 aims to change the health service delivery structure from 6 levels to 4 levels, to make quality facilities accessible to all.



Figure 24: New Healthcare System

Figure 25: SWOT Analysis of Healthcare and Social Services Sector

+	-	✓	⚠
Strength	Weakness	Opportunity	Threat
<p>Growing population and rising disposable income will push the demand for healthcare upwards.</p>	<p>More than one-third (38%) of Kenyans still live more than five kilometers from a health facility.</p> <p>Underdeveloped healthcare infrastructure.</p> <p>Lack of sufficient sector professionals.</p> <p>Low wages for informal sector workers as compared to other sectors.</p>	<p>Skills to develop the healthcare facilities and generate revenue through “healthcare tourism.”</p> <p>The devolved health financing system creates an opportunity to cross-subsidize across richer and poorer counties, providing finance to propel growth and employment.</p>	<p>Havoc of deadly outbreaks like HIV, Swine Flu, Ebola, COVID-19 and the country’s lack of capacity to treat them can cause trust deficit for the workers.</p>

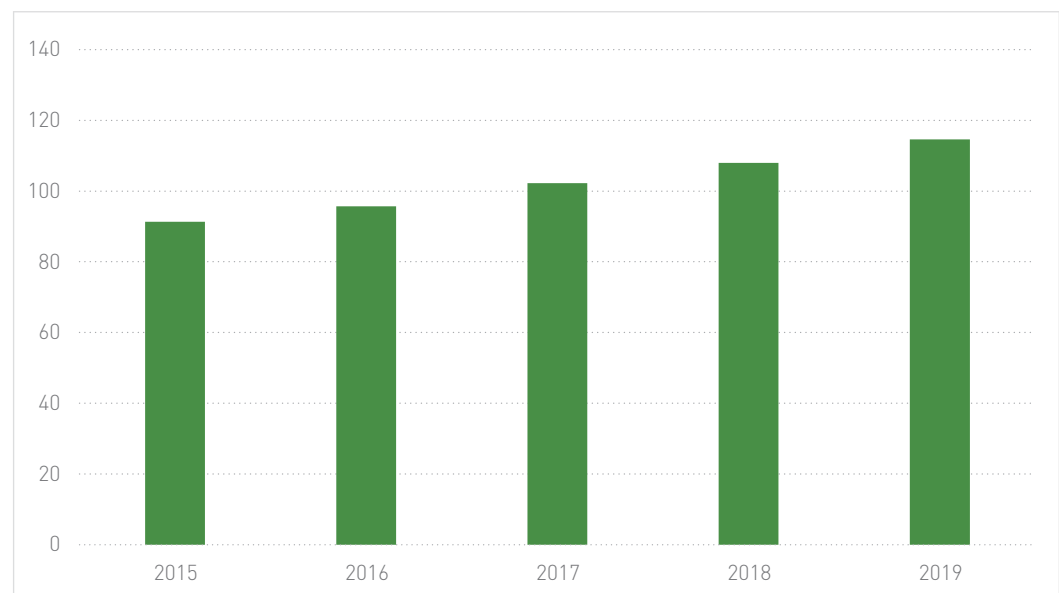
Human Resource Requirements

According to the Kenya Economic Survey 2020, the year-on-year employment increase in the sector was 6.1% during the period 2015 – 2019, employing 114,600 workers in the private and 43,400 workers in the public sector.

The informal sector contributes to a large workforce in Kenya comprising up to 82.7% of the workforce, however, the

wage earning is low in comparison to other industries.

There is an urgent need to develop skills of workers in the healthcare sector, to cater to demands nationally and internationally. Healthcare services provide opportunity for export of labour to high-income countries in Europe and Middle East, especially for childcare, mother care and geriatric care services.



Graph 8: Wage Employment in Healthcare Sector ('000)
Source: Kenya Economic Survey Report (2020)

Supporting growth in Kenya's healthcare and social services sector

Kenya's healthcare workers are at the frontline to battle the COVID-19 pandemic. There is a need to urgently address the gaps in trained manpower in this sector, especially in support services such as **assistant nurses, receptionists, ambulance drivers, health support staff, caregivers, nutritionists** etc. Additionally, there is an increased demand of trained **healthcare information system operators and medical data analysts. Psychologists and counselors** are also critical for ensuring after-care services and rising needs of mental-wellbeing.

Other trained professionals required include **community workers, midwives, chemists, pharmacists, multi-skilled laboratory technicians and healthcare administrative support staff**. Critical skills identified for training and retraining include focusing on hygiene practices.

Training healthcare workers in ICT skills is the need of the hour as healthcare systems are increasingly being digitized and more technology is used in everyday work.

*Focus group discussion conducted with representatives of Kenya Medical Laboratory Technician and Technologist Boards, Kenya Nutritionist and Dietician Institute, Nursing Council of Kenya on 6th August 2020.

4.4. CONSTRUCTION AND INFRASTRUCTURE

Introduction

Construction sector includes general construction and specialized construction activities for buildings and civil engineering works. Other aspects of the construction sector also include new work, repair and alteration, the erection of prefabricated buildings and construction of temporary structures (ISIC Rev. 4, 2008).

Global Trends

Construction is an activity as old as humankind and it has grown from time to time. With the increase in production of steel in the Industrial Revolution, construction ushered in projects of large bridges, railways and skyscrapers using steel and concrete for large-scale infrastructure projects. Over the past 50 years, construction has shown very little adoption of technology and there is a high reliance on manual labor and mechanical tools. With Industry 4.0 and the rise of various technologies like prefabrication, 3D printing and automated robotic

equipment, the landscape of construction industry is about to change drastically.

However, for the large number of developing countries, the reliance will still remain largely on manual labour and the sector will continue high employment in the coming years.

Globally, the residential construction industry in value terms increased at a CAGR of 6% during 2015 - 2019, whereas the commercial building construction market in value terms is expected to record a CAGR of 6.8% over the forecast period. The infrastructure construction was estimated to be USD 3.3 billion in 2019, posting a CAGR of 4.8% during the same period.

Notably, the growth of the construction industry in Middle East and North Africa (MENA) region is estimated to be the fastest worldwide in 2019, with a rate of 7.5%. In sub-Saharan Africa, growth in the construction industry is expected to grow to 3.5% in 2019, up from 3% in 2018. In Africa, transport infrastructure continues to lead the way with almost 40% of the total number of projects, with the help of Chinese financing and construction, mainly through its Belt and Road Initiative (BRI).

Table 13: International Classification for Construction and Infrastructure Sector

International Standard Industrial Classification of all Economic Activities (ISIC Rev. 4, 2008)		
Section F: Construction		
Division	Group	Class
Construction of buildings	Construction of buildings	
	Construction of roads and railways	
	Construction of utility projects	
Civil engineering	Construction of other civil engineering projects	
	Demolition and site preparation	Demolition, site preparation
Specialized construction activities	Electrical, plumbing and other construction installation activities	Electrical installation
		Plumbing
		Heat and air-conditioning installation
		Other construction installation
	Building completion and finishing	Building completion and finishing
	Other specialized construction activities	Other specialized construction activities
Section L: Real Estate Activities		
Real estate activities	Real estate activities with own or leased property	Real estate activities with own or leased property
	Real estate activities on a fee or contract basis	Real estate activities on a fee or contract basis

International Standard Classification of Occupations (ISCO-08)			
As per ISCO-08, occupations within the sector are under major group 7.			
Sub-Major	Minor Groups		
71 Building and Related Trades Workers (excluding Electricians)	711	Building Frame and Related Trades Workers	
	712	Building Finishers and Related Trades Workers	
	713	Painters, Building Structure Cleaners and Related Trades Workers	
International Standard Classification of Education (ISCED-F 2013)			
Broad field	Narrow field	Detailed field	
07 Engineering, manufacturing and construction	073 Architecture and construction	0731	Architecture and town planning
		0732	Building and civil engineering

Trends in Kenya

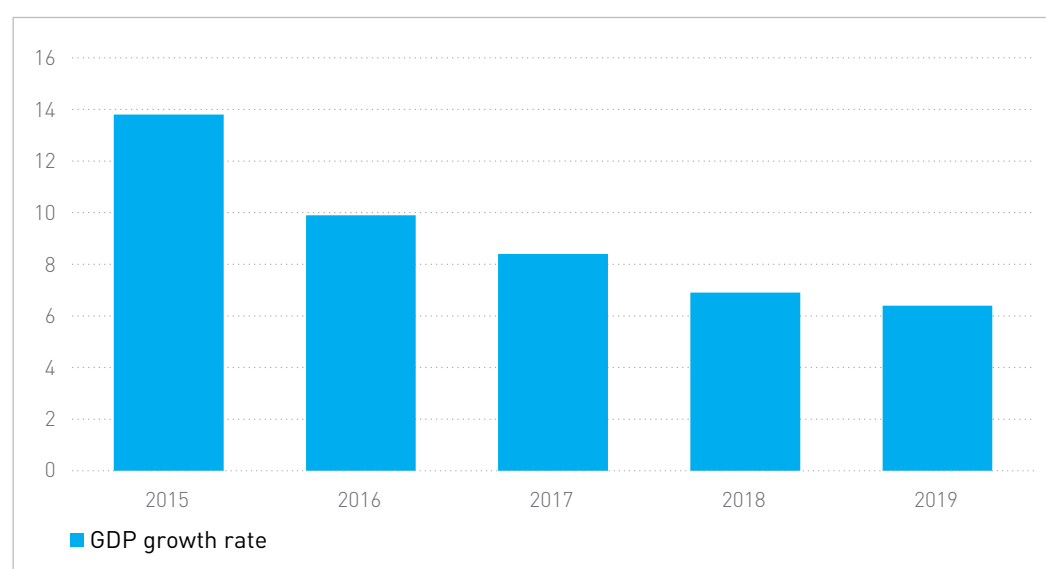
Infrastructure in Kenya attracts a lot of workers from in and around the country.

Kenya faces shortage of adequate infrastructure in terms of decent and affordable housing for its rapidly growing population, high rural-urban migration, high dependency ratio and increasing youth population.

Kenya's existing road network in 2019, comprises 63,575 kilometers of

classified roads and 114,225 kilometers of unclassified roads. Out of the total 177,800 kilometers of road networks, both classified and unclassified, only about 16,902 kilometers is paved with the rest unpaved.

The GDP growth rate in the construction sector has been on a down-hill in the past five years, yet it remains one of the fastest growing sectors in Kenya as shown in the graph below.



Graph 9: GDP Growth Rate of Construction and Infrastructure Sector (%)
Source: Kenya Economic Survey, 2020

The construction industry in Kenya is driven primarily by two key infrastructure sectors: transportation and building/housing.

The building construction industry in Kenya is expected to record a CAGR of 6.1% to reach Ksh. 604.3 billion by 2024 according to research by Estate Cloud.

Kenya Vision 2030 has identified housing as one of the “Big Four” initiatives and targets to facilitate construction of at least 500,000 affordable and decent houses in this Plan period. This is expected to provide decent homes for Kenyans, create an additional 350,000 jobs, provide market for manufacturers and building materials suppliers, and raise real estate and construction sector contribution from 6.4% in 2019 to 14% by 2022. A total of 5,681 kilometers of road network has been identified for various interventions including rehabilitating, dividing, resealing and tarmacking under Vision 2030.

The construction and infrastructure industry in Kenya is primarily divided into following sub-sectors:

- Road Infrastructure
- Airport Infrastructure
- Maritime Infrastructure
- Rail Infrastructure
- Commercial and Residential Construction

The Kenyan construction sector will continue to be supported by the growing real estate sector, particularly hotel and retail developments, as investors continue to enter the East African region. Developments are focused on increasing bed capacity as well as providing conference facilities in order to adequately cater to business needs.

A report by consultancy firm PwC in 2019, estimates that the number of available rooms will increase from 18,600 in 2016 to 21,000 in 2021, a 2.5% compounded annual increase. Nairobi currently is the largest mall development hotspot with around 470,000 sq. m. of shopping center space in the pipeline, though smaller cities including Kisumu and Eldoret are also seeing significant development as retail space in the capital city becomes saturated.

Kenya’s growing consumer class and

improved domestic economic conditions aimed at bringing inflation down, thanks to tighter monetary policy by the Central Bank of Kenya, continue to provide the impetus for growth in the construction industry. However, the high cost of building materials and bank credit is, to an extent, still constraining demand for new development.

Kenya Vision 2030 aspires for a country firmly interconnected through a network of roads, railways, ports, airports, and water and sanitation facilities. By 2030, no part of the country should be called ‘remote’.





Government intervention in partnership with other players is critical for the provision of affordable and decent houses for all.

The government has put into action various flagship programs and projects that will lead to larger numbers of job creation. Some of these projects are:

- Kenya Informal Settlement Improvement Project Phase II which will construct informal settlement including access roads, footpaths, sewerage systems, storm water drainage, security floodlights in 33 counties.
- Facilitation of a 24-hour economy by establishing street lighting, CCTV cameras and high mast security lights in urban and metropolitan regions.
- Urban Social Infrastructure, which will involve development of markets, modern recreation and water front facilities.
- Urban Mass Transport Infrastructure, through the development of terminal facilities (bus/lorry parks), access roads, missing link roads, high mast lighting and street lighting, improvement of railway stations, and Non-Motorized Transport (NMT).

Other policy reforms include lowering cost of housing, National Slum Upgrading and Prevention Policy, Building Maintenance Policy and National Urban Development Policy.

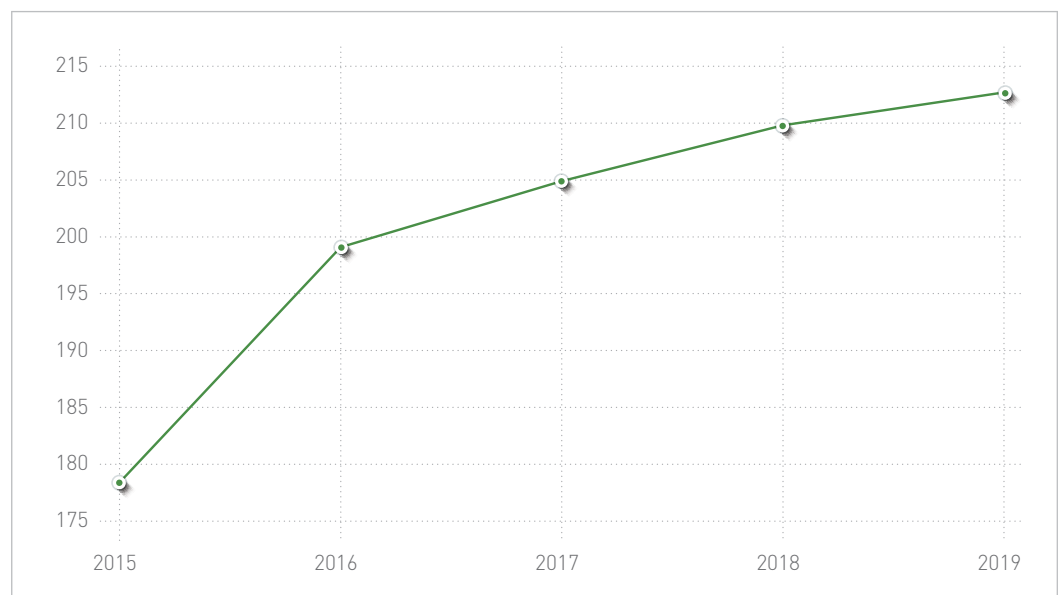
Figure 26: SWOT Analysis of Construction and Infrastructure Sector

 Strength	 Weakness	 Opportunity	 Threat
<p>Increased focus on affordable housing. E.g. Vision to construct 500,000 affordable houses by 2030.</p> <p>Rising demand for commercial and residential buildings due to the high population growth has been attracting more jobs.</p>	<p>According to National Construction Authority, 83% of construction workers have no formal training.</p> <p>Inadequate design of structures. People must be trained in design engineering by use of AutoCAD and drawing tool software to better the design and using technology for approval process.</p> <p>Use of counterfeit construction materials that end up compromising the quality of the workmanship and the structural integrity of the building elements.</p>	<p>Kenya Vision 2030 has given focus to large-scale infrastructure project development. To facilitate this, talent needs to be developed in the infrastructure sector for roads, bridges, airport construction, etc.</p> <p>There is a large need of talent in other construction activities like Plumbing, Heating and Air-Conditioning installation.</p> <p>The construction industry has witnessed high influx of foreign contractors in infrastructure projects. This needs to be changed by skilling local manpower in the country.</p>	<p>Kenyan firms have, for a long time, complained about their Chinese rivals' competitive advantage, both in large public infrastructure contracts and smaller-scale private sector projects.</p> <p>The imposition of higher levies, charges and taxes by many of Kenya's 47 counties is causing increased concern to traders, consumers and investors because of the impact on business costs and the threat of higher inflation affecting growth and employment in the sector.</p>

Human Resource Requirements

The construction sector employs 212,700 people in the private sector and 8800 people in the public sector, amounting to

one of the largest sectors for employment in Kenya, whereas the real estate sector employs about 4400 people in formal wage employment according to Kenya Economic Survey 2020.



Graph 10: Wage Employment in Construction and Infrastructure Sector ('000)
Source: Kenya Economic Report, 2020

The construction sector, additionally, also has one of the highest employment in informal jobs. Hence, from a skills and employment perspective, for a growing country like Kenya, it is imperative to train workers in the construction and infrastructure industry.

By targeting MSMEs along the green building and construction value chain, the ILO Green Building Initiative project is creating decent green jobs as well as improving the quality of existing jobs particularly for women and young entrepreneurs.

The project has created synergies and collaborations with the private sector, county governments and other business support providers to promote skills for green jobs, access to finance, markets, business linkages and business development services.

High demand jobs in the sector

The types of jobs and self-employment ventures that have been created in green building and retrofitting processes include block/brick making and masonry skills, the installation of biogas and solar energy units and maintenance skills, water tank installation and pipe fitting, and general construction.

Various mainstream construction jobs like mason, foreman, scaffolder, surveyor, foreman, draughtsman and other supporting skills such as plumbing, fabrication are much in demand in Kenya to support its high growth plan in the sector.

Apart from these existing skills, new age skills will also need to be a part of the workforce with the advent of technology and the Fourth Industrial Revolution. Various skills such as 3D printing and automated robotic equipment handling, Building Information Modeling (BIM), 3D rendering, AR/VR and cloud solutions need to become a part of the industry to stay relevant to the trends.

Focusing on skills development for construction and infrastructure

National Construction Authority (NCA) set up a taskforce in 2016 to define the occupational standards of craftsmen and construction site supervisors. The taskforce used experience of members, questionnaires and interviews as the main methods of data collections. A total of 55 trades were identified; 14 in building works, 8 in civil works, 17 trades in mechanical works, 16 trades in electrical works, and 12 life skills.

NCA has developed occupational standards and competency-based curricula. However, the majority of workforce in the construction industry falls within lower levels for training. It is suggested that occupational standards and curricula be developed for lower skill levels at KNQA Level 2 to 4. Following are some of the identified priority occupations within the sector.

- Masonry sub-trades: Tile Layers, Concrete Workers
- Steel Fixers
- Scaffold Fitters
- Plumbers
- Welders
- Painters and Decorators
- Aluminum Fabricators, especially for interior commercial works
- Structural Cabling
- EHS - Environment, Health and Safety Officers across all trades
- Asphalt Layerers
- Roof Installers- Timber and Steel Truss systems
- Solar Installers
- Steel Fabricators

NCA suggests that there is a need for developing industry aligned courses that provide opportunity for workers to reskill and up-skill to be in tandem with technology changes, green building concepts etc.

*Interview conducted with representatives of National Construction Authority (NCA) on 20th August 2020

4.5. HOSPITALITY AND TOURISM

Introduction

Within the broader hospitality and tourism sector, the accommodation division mainly comprises the provision of short-stay accommodation for visitors and other travelers and the provision of complete meals and drinks fit for immediate consumption.

The food services division includes food and beverage serving activities providing complete meals or drinks fit for immediate consumption, whether in traditional restaurants, self-service or take-away restaurants, whether as permanent or temporary stands with or without seating.

The travel agency, tour operator, reservation service and related activities division includes the activity of selling travel, tour, transportation and accommodation services to the general public and commercial clients and the activity of arranging and assembling tours that are sold through travel agencies or directly by agents such as tour operators, as well as other travel-related services including reservation services (ISIC Rev. 4, 2008).

Global Trends

1.5 billion international tourist arrivals were recorded across the world in 2019, a 4% increase on the previous year. Against a backdrop of global economic slowdown, tourism spending continued to grow, most notably among the world's top ten spenders including countries such as the United States and France.

In 2020, this sector is one of the worst affected by the global COVID-19 pandemic. United Nations World Tourism Organization (UNWTO) indicates that the COVID-19 pandemic has caused a 22% fall in international tourist arrivals during the first quarter of 2020. According to the United Nations, the crisis could lead to an annual decline of between 60% and 80% when compared with 2019 figures.

Table 14: International Classification for Hospitality and Tourism Sector

International Standard Industrial Classification of all Economic Activities (ISIC Rev. 4, 2008)		
Section I: Accommodation and food services activities		
Division	Group	Class
Accommodation	Short term accommodation activities	
	Camping grounds, recreational vehicle parks and trailer parks	
Food and beverage service activities	Restaurants and mobile food service activities	Event catering
	Event catering and other food service activities	Other food service activities Beverage serving activities
Section N: Administrative and support services activities		
Division	Group	Class
Travel agency, tour operator, reservation service & related activities	Travel agency and tour operator activities	Travel agency activities Tour operator activities
	Other reservation service and related activities	

International Standard Classification of Occupations (ISCO-08)			
As per ISCO-08, occupations within the tourism sector are classified under major group 1 for Managers and major group 5 for Services and Sales workers.			
Sub-Major	Minor Groups		
14 Hotel and Restaurant Managers	Hotel Managers		
	Restaurant Managers		
	Other Services Managers		
	Travel Attendants, Conductors and Guides, Cooks		
51 Personal Services Workers	Waiters and Bartenders		
	Building and Housekeeping Supervisors		
	Other Personal Services Workers		
International Standard Classification of Education (ISCED-F 2013)			
Broad field	Narrow field	Detailed field	
10 Services	101 Personal services	1013	Hotel, restaurants and catering
		1015	Travel, tourism and leisure

Trends in Kenya

Tourism is one of the six main economic pillars, which will see Kenya grow to a middle level country by 2030. The sector is an enabler to the achievement of the country's 'Big Four Agenda' and is aligned to Sustainable Development Goals (8, 14, 15) as well as aspiration 1 and 5 of African Union's Agenda 2063.

In June 2018, the Government released a plan to achieve the country's long-term vision to develop its tourism industry. The National Tourism Blueprint (NTB) 2030 aims to transform the sector, dealing with all components of the value chain to create a comprehensive set of offerings that both increase visitor numbers and assure sustainability. The country is targeting 5 million yearly tourist arrivals by 2030, KSh. 200 billion (\$2bn) of public revenue and 3 million jobs in the sector. It is also seeking to expand domestic tourism, with 26.4 million visitors per year by 2030. The NTB focuses on four key areas: product strategy, tourism marketing (including digital), investment promotion and infrastructure.

A total of 14 strategic initiatives have been identified, with specific plans to construct a six-lane highway to parallel the Madaraka Express and 13 new hotels. Coastal beach tourism, wildlife safari, business tourism, cultural heritage tourism and resort cities development is being taken up aggressively by the Government. The Ministry of

Tourism and Wildlife has also embarked on hotel classification, an exercise aimed at ensuring high standards for tourist hotels.

Tourism investment refers to the creation of capital or goods that are capable of producing other goods or services in the tourism industry towards earning higher profits in the private sector or the revitalization and growth for public purposes.





Tourism earnings grew by 3.9% from KSh. 157.4 billion in 2018 to KSh. 163.6 billion in 2019. The slowed growth was evident in the marginal growth of 0.4% in the number of international visitor arrivals to stand at 2.1 million visitors in 2019. Hotel bed night occupancy increased from 8.6 million in 2018 to 9.2 million in 2019. Further, the sector's performance was boosted by conference tourism that expanded by 14% in 2019. The number of visitors to national parks and game reserves grew by 3.7% while the number of visitors to museums, snake parks and historical sites declined slightly by 1.6% in 2019.

The global COVID-19 crisis severely impacted the sector in Kenya as all travel was stopped, putting the livelihood of thousands at risk. Research conducted by the Ministry of Tourism and Wildlife (June, 2020) on the impact of COVID-19 pandemic indicates the following:

Short-Term Impact of COVID-19 (January- June 2020)	Intermediate Impact of COVID-19 (June- December 2020)	Long-Term Impact of COVID-19 (Beyond 2020)
<ul style="list-style-type: none"> Reduction of the numbers of employees in the form of unpaid leaves. Freeing of temporary workers. Implementation of pay cuts. Severe loss of revenues. Unpaid cost of operating the businesses such as unpaid rent and utilities. Temporary closure of travel, tourism, and hospitality organizations. 	<ul style="list-style-type: none"> Reduced international tourists' bookings. Low business even without COVID-19. Low capital to get back the business to normal operations. Eviction from current premises due to unpaid running costs. Further loss of revenues. Increased job losses. Challenges in maintaining overheads. Total business closure. Increased borrowings to sustain the businesses. 	<ul style="list-style-type: none"> Business closures. Low business even without COVID-19. Low capital to get back business to normal operations. Eviction from current premises due to unpaid running costs. Decreased number of bookings. Slow resumption of tourism business. Global economic recession delaying international tourism arrivals. Increased marketing activities and thus increased costs of running the businesses. Change in consumer behaviour and expectations in social behaviour. Loss of international licenses on the side of travel agents due to non-payments.

Source: Impact of COVID-19 on Tourism in Kenya, the Measures Taken and the Recovery Pathways, Ministry of Tourism and Wildlife (June 2020).

Figure 27: SWOT Analysis of Hospitality and Tourism Sector

 Strength	 Weakness	 Opportunity	 Threat
<p>Increasing spend in domestic tourism.</p> <p>Kenya has good international air capacity, easing the travel and adding to its growth and employment.</p> <p>Called a 'tourism hub' with diverse landscape and multiple tourist destinations.</p> <p>Multiple job aspects have been developed from core to support activities in the sector for its growth and sustainability.</p>	<p>Failure to adapt and innovate in line with global trends and the changing world.</p> <p>Develop talent and skills in tourism services.</p> <p>Highly seasonal sector, resulting in unsteady flow of income.</p> <p>Weak promotional and marketing activities.</p>	<p>Business tourism.</p> <p>Coastal tourism including cruise shipping, water and adventure sports.</p> <p>Untapped international markets and segments.</p> <p>Kenya as a year-round tourism destination.</p>	<p>COVID-19 pandemic.</p> <p>Global economic instability.</p> <p>Safety and security incidents.</p> <p>Degradation of the natural environment and climate change.</p>

Human Resource Requirements

COVID-19 crisis notwithstanding, tourism is one of the key sectors of Kenya that shall have to adapt to the “new normal”, innovate and spur economic growth. Total contribution of travel and tourism to employment, including wider effects from investment, the supply chain and induced income impacts was 1,072,500 jobs in 2016 (9.2% of total employment), and is forecasted to reach 1,475,000 jobs (8.9% of total employment) by 2027, an increase of 2.9% per annum over the period.

Strengthening human resources for hospitality and tourism sector

The tourism industry globally, and in Kenya, is hard hit by the COVID-19 crisis. Its impact is still being assessed but over a million jobs may be at risk with many employees sent on unpaid leaves and given salary cuts. Significant numbers of establishments and businesses are in dire state and impending closure. Currently, the country’s focus is on supporting the sector and ensuring training and skilling of staff for observing health safety protocols as some businesses cautiously re-open. The sector is resilient and shall recover in due course.

Tourism Regulatory Authority (TRA) is mandated to regulate the Tourism and Hospitality training in Kenya as per the Tourism Act Cap 28 of 2011. Section 7 of the Tourism Act gives the Authority the function of formulating guidelines for sustainable tourism throughout the country; training being one of them.

In identifying areas in need for training, the Standards and Quality Assurance department referred to Schedule 2 of the approved Guidelines for Tourism and Hospitality Training Institutions 2018 that identifies tourism and hospitality occupations (and career titles) in the Tourism and Hospitality sector in Kenya.

Some of the priority training standards, according to TRA, are in Spa and Wellness. In addition, TRA emphasizes the important to improve overall customer service and etiquette, health and food safety for tourism and hospitality establishments’ staff, tour operators, guides and taxi operators.

TRA also made reference to the developed guidelines for the Tourism and Hospitality Catering and Accommodation facilities listed below:

National Standard guidelines for:

- Food Safety and Hygiene
- National Safety and Security Standard for Hospitality Establishments

Codes of practice for:

- Tours and Travel operators
- Hotel and Restaurants Operators

Minimum Standards for:

- Tours and Travel operators/ establishments
- Accommodation and catering establishments
- Halal Compliance
- Adventure Sports Tourism

TRA has also planned to prepare a skill-map for the sector through its workforce survey. The importance of training has been highlighted in the changing landscape of the sector. It is critical that employees are reskilled and skilled to address behavioural changes of travellers, health safety measures etc. It was also emphasized that trainings should align to industry needs and ensure adherence to minimum standards, code of practices etc.

* Interview conducted with representative of the Tourism Regulatory Authority on 27th August 2020.

ICT

4.6. INFORMATION AND COMMUNICATION TECHNOLOGY (ICT)

Introduction

This section includes the production and distribution of information and cultural products, the provision of the means to transmit or distribute these products, as well as data or communications, information technology activities and the processing of data and other information service activities (ISIC Rev. 4, 2008).

Global Trends

Businesses across the globe are taking measures to imbibe innovation in their operations to save cost while increasing efficiency and effectiveness. The Information Technology (IT) and

Information Technology Enabled Services (ITeS) sector has played an important role in helping organizations achieve this objective.

The dynamic growth of the sector globally, along with rapid advances in Information and Communication Technology (ICT), are creating new opportunities for economic growth, social empowerment and grassroots innovation in developing countries. It has been estimated that ICT-based services represent a \$500 billion market, of which only about 20% has been realized.

The IT services sector now accounts for 70% of employment and 73% of GDP in developed countries and for 35% of employment and 51% of GDP in developing countries.



Table 15: International Classification for ICT Sector

International Standard Industrial Classification of all Economic Activities (ISIC Rev. 4, 2008)		
Section J: Information and Communication		
Division	Group	Class
Publishing Activities	Publishing of books, periodicals and other publishing activities	Book publishing
		Publishing of directories and mailing lists
		Publishing of newspapers, journals and periodicals
		Other publishing activities
	Software publishing	Software publishing
Motion picture, video and television programme production, sound recording and music	Motion picture, video and television programme activities	Motion picture, video and television programme production activities
		Motion picture, video and television programme post-production activities
		Motion picture, video and television programme
		Motion picture, video and television programme distribution activities
		Motion picture projection activities
Publishing activities	Sound recording and music publishing activities	Sound recording and music publishing activities
Programming and broadcasting activities	Radio broadcasting	Radio broadcasting
	Television programming and broadcasting activities	Television programming and broadcasting activities
Telecommunications	Wired telecommunications activities	Wired telecommunications activities
		Wireless telecommunications activities
	Satellite telecommunications activities	Other telecommunications activities
Computer programming, consultancy and related activities	Computer programming activities	Computer programming activities
		Computer consultancy and computer facilities management activities
		Other information technology and computer service activities
Information service activities	Data processing, hosting and related activities; web portals	Data processing, hosting and related activities
		Web portals
	Other information service activities	News agency activities
		Other information service activities n.e.c.

International Standard Classification of Occupations (ISCO-08)			
As per ISCO-08, occupations within the sector are under major group 7.			
Sub-Major	Minor Groups		
35 Information and Communications Technicians	351	Information and Communications Technology Operations and User Support Technicians	
	352	Telecommunications and Broadcasting Technicians	
International Standard Classification of Education (ISCED-F 2013)			
Broad field	Narrow field	Detailed field	
06 Information and Communication Technologies (ICTs)	061 Information and Communication Technologies (ICTs)	0611	Computer use
		0612	Database and network design and administration
		0613	Software and applications development and analysis

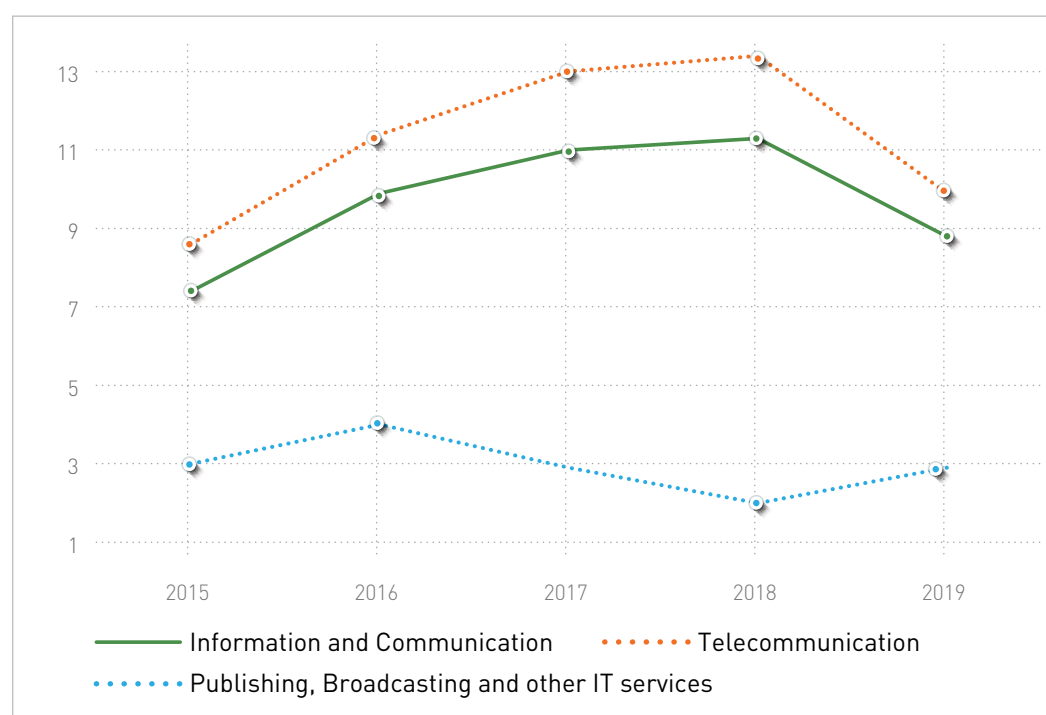
Trends in Kenya

Information and Communication Technology (ICT) has been an important sector of East Africa's economic growth over the last 15 years. The penetration rate for mobile subscriptions increased from 74.9% in 2013 to 91.9% in 2017; Internet subscriptions per 100 inhabitants (wireless and fixed) increased from 31.6% in 2013 to 58.5% in 2016; broadband subscriptions per 100 inhabitants (wireless and fixed) increased from 5.9% in 2013 to 28% in 2016.

According to the World Bank, Kenya's ICT sector's growth has outperformed every

other sector, expanding by 23% annually during the last decade. The sector is now six times larger than it was at the beginning of the decade. This remarkable growth can be attributed in part to innovations, such as the introduction of mobile money.

The GDP growth rate in the sector has been on a very high trend with the telecommunication sector contributing majorly to it. ICT sector grew at 8.8% in the year 2019, telecommunications grew at 9.9% and Publishing, Broadcasting and IT services at 2.9% in the same year.



Graph 11: GDP Growth Rate of ICT Sector (%)
Source: Kenya Economic Survey 2020

Kenya Vision 2030 identifies ICT sector as a sector of huge growth potential to propel the country to a middle-income economy by the year 2030. The ICT sector in Kenya has grown tremendously due to the efforts by the government of Kenya in liberalizing the telecommunications sector and a robust regulatory environment. For the realization of the Big Four Agenda, the wheels are identified as “digital” wheels, which will drive the growth of manufacturing, affordable housing, healthcare and food security.

The emergence of new technologies (social media, mobile, analytics and cloud, rapid consumerization of IT and the penetration of technology even in the remotest areas are driving the sector’s growth adding to employment in the sector.

According to the Communications Authority (CA), as of June 2018, Kenya had 45.6 million mobile subscribers, giving a national mobile penetration rate of 97.8%. In contrast, the fixed-line market had a mere 70,000 subscribers. The Internet data subscriptions stood at 41.1 million, of which 20.5 million were broadband subscriptions.

Total international Internet bandwidth available in the country stood at 3,278 Gbps, with only 28% utilization of this capacity. The total number of registered Internet domain names stood at 75,000, of which ‘.co.ke’ comprised 93%.

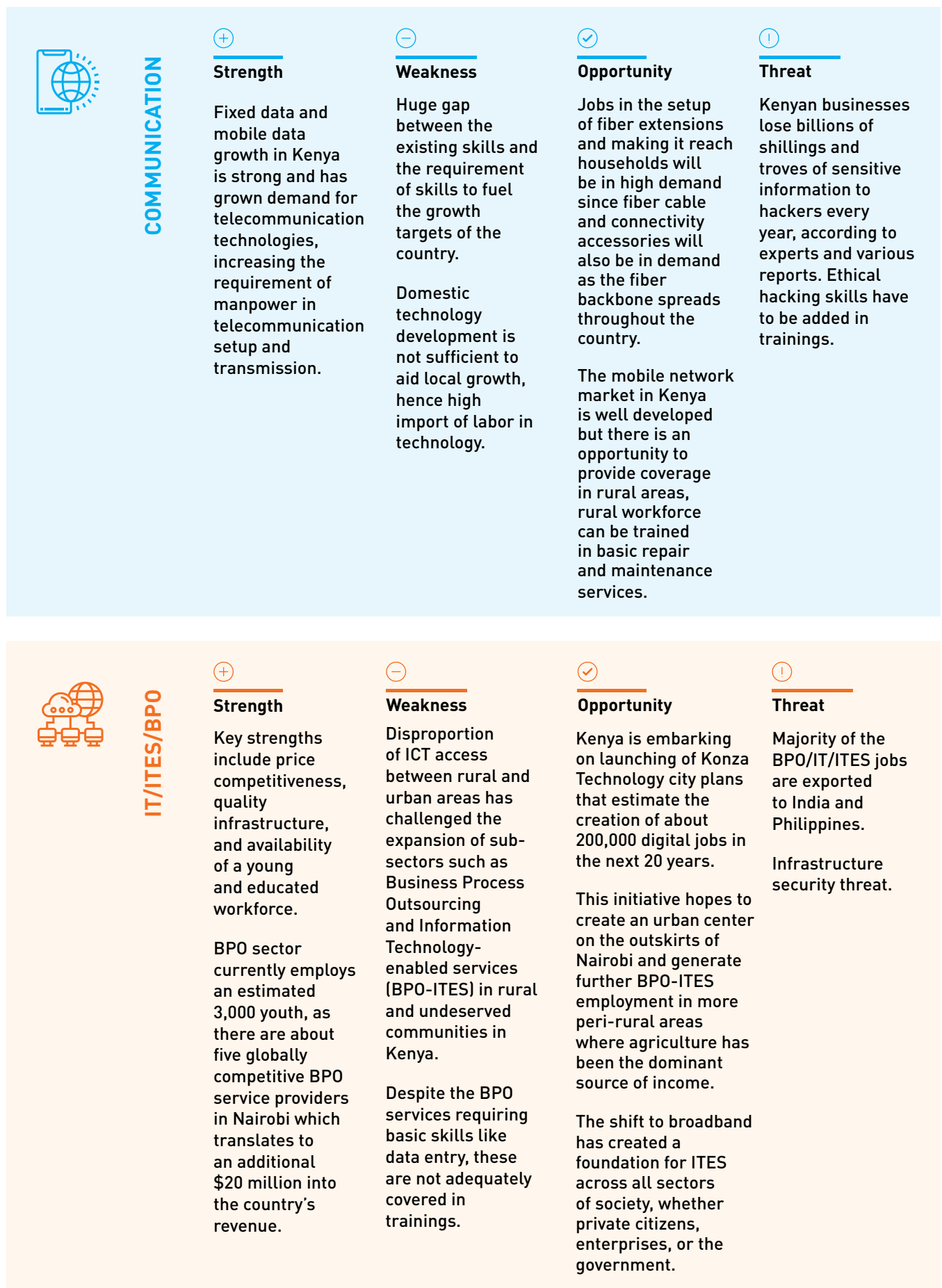
The Critical Infrastructure Bill and ICT Authority Act are the important and crucial legal and policy frameworks for the sector in Kenya. They focus on infrastructure sharing facility, industry code practice, network integrity, trust, security and e-commerce. Some of the key policies to be considered for the implementation in the master plan are:

- National Broadband Strategy (2018-2023)
- Big Four Agenda Blueprint
- Vision 2030/MTP III Plan
- ICT Authority Strategic Plan
- Smart Africa 2063
- Ministry of ICT Strategic Plan (2019-2023)
- National ICT Policy

The Government and the private sector developed 60% of the National ICT infrastructure to improve universal access to ICT services. This involved connecting Kenya to the international broadband highway as well as connecting all major towns in the country.



Figure 28: SWOT Analysis of ICT sector

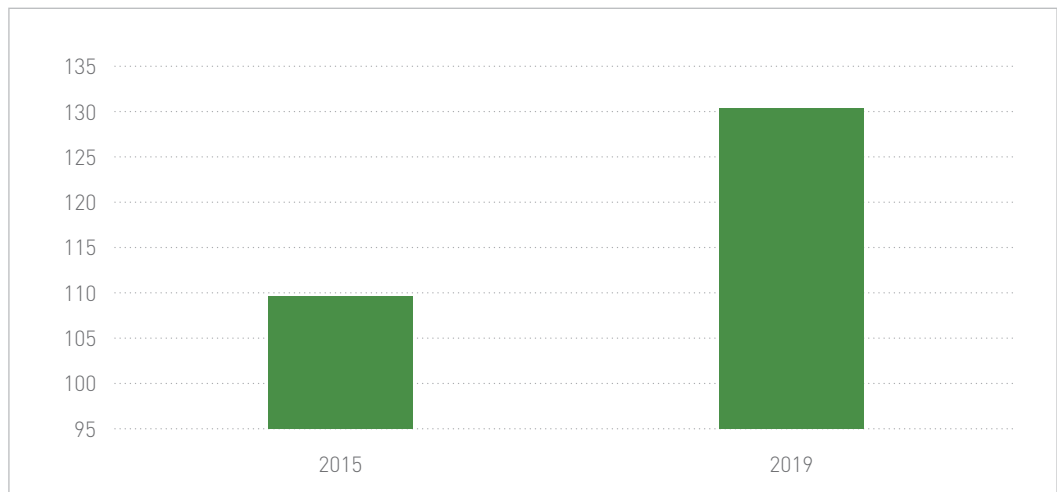


Human Resource Requirements

The small and medium enterprise (SME) sector constitutes the largest proportion of businesses in Kenya. Employment in the informal sector accounts for 83.4% of total employment in 2017. The ICT technology most widely used by the small and informal businesses surveyed in Kenya is the mobile phone, with 71.6% of respondents using

their private mobile phones for business, and only 3.7% having a dedicated business phone.

As per Kenya Economic Survey 2020, the Information and Communication (ICT) sector was responsible for 130,400 jobs in 2019, up from 109,700 in 2015 in private formal jobs.



Graph 12: Wage Employment in ICT Sector ('000)
Source: Kenya Economic Survey 2020

Urgent focus on training Kenyans in digital skills

We are living in a world where technology is going to support all aspects of industry. As a country, we need to ensure that youth are well equipped to work with technology in future. There is a need to build capability through skills such as coding and big data-analytics. Such skills should not only focus on the technical and vocational areas but be part of the basic education. It is critical that TVET trainings are aligned to industry and real-world requirements.

Kenya's rapidly evolving media sector

Key occupations of focus for Kenya*

- Multimedia Developer
- Social Media Manager
- Web Content Manager
- Technical / Scientific Writer
- Digital Producer / Digital Campaign Manager
- Animator
- Graphic Designer & Illustrator

- Blogger / Vlogger
- Media Researcher / Media Analyst

Key recommendations*

- The Internet is the biggest platform for media consumption, more so in the post-COVID-19 world. Training in ICT skills is critical as it is a mandatory skill in today's job market.
- Behavioural skills, integrity, objectivity, ethics, inclusivity are important and should be included in the curricula.
- Conflict resolution skills, moderating and presentation skills, interviewing skills, writing skills are important to develop.

*Interview with representative for Kenya National Chamber of Commerce and Industry (KNCCI) on 5th August 2020

MINING

4.7. MINING AND QUARRYING

Introduction

This sector includes the extraction of minerals occurring naturally as solids (coal and ores), liquids (petroleum) or gases (natural gas). Extraction can be achieved by different methods such as underground or surface mining, well operation, seabed mining etc. This sector also includes supplementary activities aimed at preparing the crude materials for marketing, for example, crushing, grinding, cleaning, drying, sorting, concentrating ores, liquefaction of natural gas and agglomeration of solid fuels. These operations are often carried out by the units that extracted the resource and/or others located nearby (ISIC Rev. 4 2008).

Global Trends

With the on-going COVID-19 pandemic, the industry is facing the downside of global supply chains, ultra-lean operations and specialisation. However, these times have

highlighted the sector's resilience and the role workers play in the broader economy.

Digital transformations and disruptive technologies are impacting the industry. New technologies like automation and drones are likely to replace labour. Others like Artificial Intelligence, the Internet of Things, smart sensors and machine learning will boost productivity without significant job losses.

New jobs will be required in areas such as data processing, GIS mapping and software design. These are better-paid jobs than the jobs they replace, such as trucking, drilling and blasting. Additionally, miners of the future will control machines remotely.

Utilizing these new-age technologies can transform the way the industry operates and make it safer, cleaner, efficient and sustainable.

Table 16: International Classification for Mining and Quarrying Sector

International Standard Industrial Classification of all Economic Activities (ISIC Rev. 4, 2008)		
Section B: Mining and Quarrying		
Division	Group	Class
Mining of coal and lignite	Mining of hard coal	
Extraction of crude petroleum and natural gas	Mining of lignite	
	Extraction of crude petroleum	
	Extraction of natural gas	
	Mining of iron ores	
Mining of metal ores	Mining of non-ferrous metal ores	Mining of uranium and thorium ores Mining of other non-ferrous metal ores
	Quarrying of stone, sand and clay	Quarrying of stone, sand and clay
	Mining and quarrying n.e.c.	Mining of chemical and fertilizer minerals
		Extraction of peat
		Extraction of salt
		Other mining and quarrying n.e.c.
Mining support service activities	Support activities for petroleum and natural gas extraction	Support activities for petroleum and natural gas extraction
	Support activities for other mining and quarrying	Support activities for other mining and quarrying

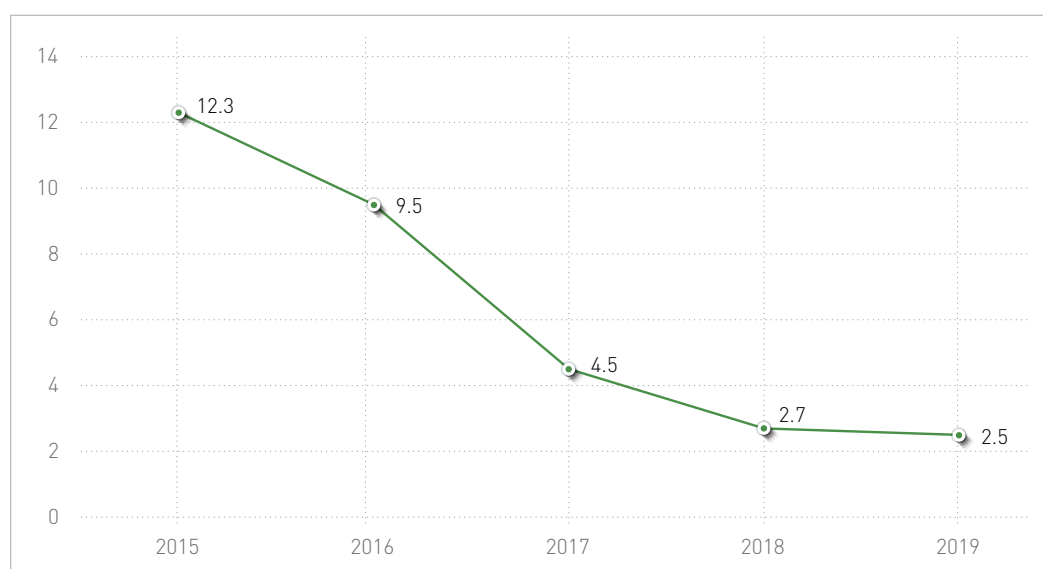
International Standard Classification of Occupations (ISCO-08)			
As per ISCO-08, occupations within the mining and quarrying are classified under major group 1, 3, 8, 9.			
Sub-Major	Minor Groups		
13 Production and Specialized Services Managers	132	Manufacturing, Mining, Construction and Distribution Managers	
31 Science and Engineering Associate Professionals	312	Mining, Manufacturing and Construction Supervisors	
81 Stationary Plant and Machine Operators	811	Mining and Mineral Processing Plant Operators (Miners and Quarries, Mineral and Stone Processing Plant Operators, Well Drillers and Borers and Related Workers, Cement, Stone and Other Mineral Products Machine Operators)	
93 Laborers in Mining, Construction, Manufacturing and Transport	931	Mining and Construction Laborers (Mining and Quarrying Laborers, Civil Engineering Laborers)	
International Standard Classification of Education (ISCED-F 2013)			
Broad field	Narrow field	Detailed field	
07 Engineering, manufacturing and construction	072 Manufacturing and processing	0724	Mining and extraction

Trends in Kenya

The oil and other mineral resources sector was identified as an additional priority sector under the Economic Pillar of Kenya Vision 2030. Kenya has huge untapped mineral deposits and has the potential to become a leading exporter in key minerals in the next decade. With a growing domestic consumption base, Kenya is looking for industries that can process the metals into finished products. This shall provide

broader social development, and a major spur for infrastructure development and job creation.

In 2019, mining and quarrying accounted for 0.7% of the GDP of Kenya, down from 0.9% in 2015. The GDP growth rate of the sector has also been showing tremendous down trend in the last 5 years. In 2015, the GDP growth rate was 12.3% and in 2019 it was 2.5%.



Graph 13: GDP Growth Rate of Mining and Quarrying Sector (%)
Source: Kenya Economic Survey 2020

Mining investment is fundamentally driven by the attractiveness of the country's geology and inextricably linked to this is the availability of data on the geology. Rift Valley counties and parts of Nyanza have registered deposits of gold along with gemstones, gypsum, chromite, soda ash etc. Coast counties such as Kwale have deposits of rare earth metals. Extraction of minerals is highly manpower intensive. This provides employment opportunities to the local community.

There has been increased interest in upstream fossil fuel activities in the country. Currently, 21 International Oil Companies (IOCs) and National Oil Corporation of Kenya (NOCK) are carrying out exploration activities in the 41 licensed blocks employing a large number of people in the industry. Commercialization of the oil and gas discoveries has invited drilling of production and re-injection wells; drilling of exploratory and appraisal wells; gas exploration, production and utilization while ensuring environmental integrity; and Government backed participation in oil producing blocks which will attract thousands of jobs in the sector.

The Government of Kenya has recognized the potential that exists in this sector and has directed efforts to improve mineral exploitation by establishing a Ministry dedicated to the development of the mining sector. In April 2016, Ministry of Mining

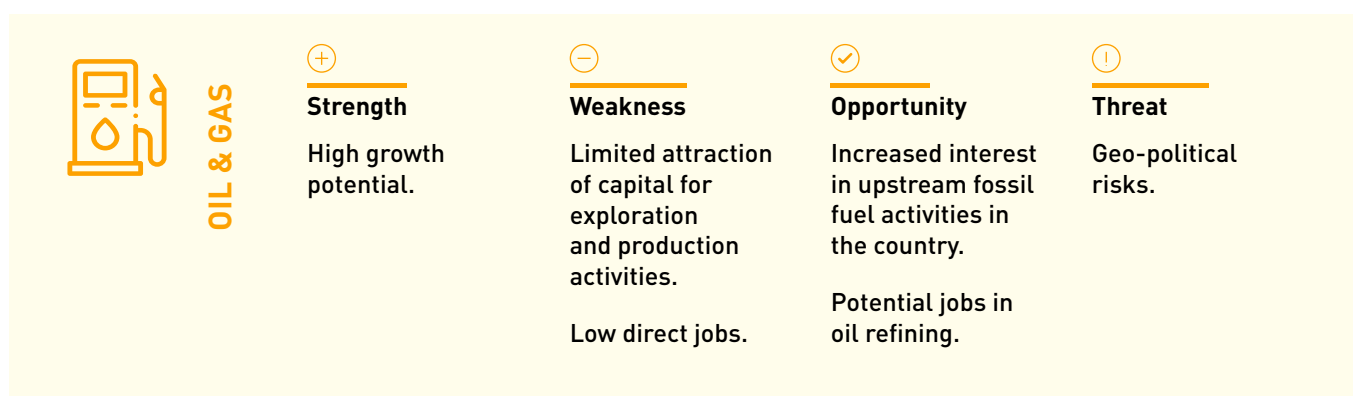
launched the Mining and Minerals Policy that sets out the framework for mining activity through the new Mining Act, 2016. The policy takes a holistic approach to the sector, ensuring that key issues related to sustainable exploitation of natural resources such as community engagement, environmental issues are addressed.

Few of the important policy and legal acts that have changed the mining and quarrying sector in Kenya are as follows:

- Mining Act No. 2 of 2016
- Mining (Dealings in Diamonds) Regulations, 2019
- Mining (Mineral Development Agreement) Regulations, 2019
- Mining (Conversion of Artisanal Mining Permit to Small Scale Permit) Regulations, 2019
- Public Finance Management (Mineral Royalty Fund) Regulations, 2019

The Early Oil Pilot Scheme (EOPS) is an initiative by the Government of Kenya. The key objectives of EOPS are to enable Full Field Development and establish Kenya an oil exporter, commencing with testing the international market for Turkana crude oil. Apart from the monetary benefits, a lot of non-monetary benefits including employment and benefits for stakeholders will be achieved through this.

Figure 29: SWOT Analysis of Mining and Quarrying Sector





MINERALS MINING



Strength

Diverse range of minerals such as soda ash, fluorspar, diatomite, gemstone, limestone, barite, gypsum, dimension stones, rare earth elements, pyroclore, titanium and coal.



Weakness

Lack of coordination between mining companies and the local governance structures.

Shortage of specialized local manpower in the field of mining, petroleum geology, geo-physics and reservoir and production engineering.



Opportunity

Decentralization provides opportunities for County growth and development.



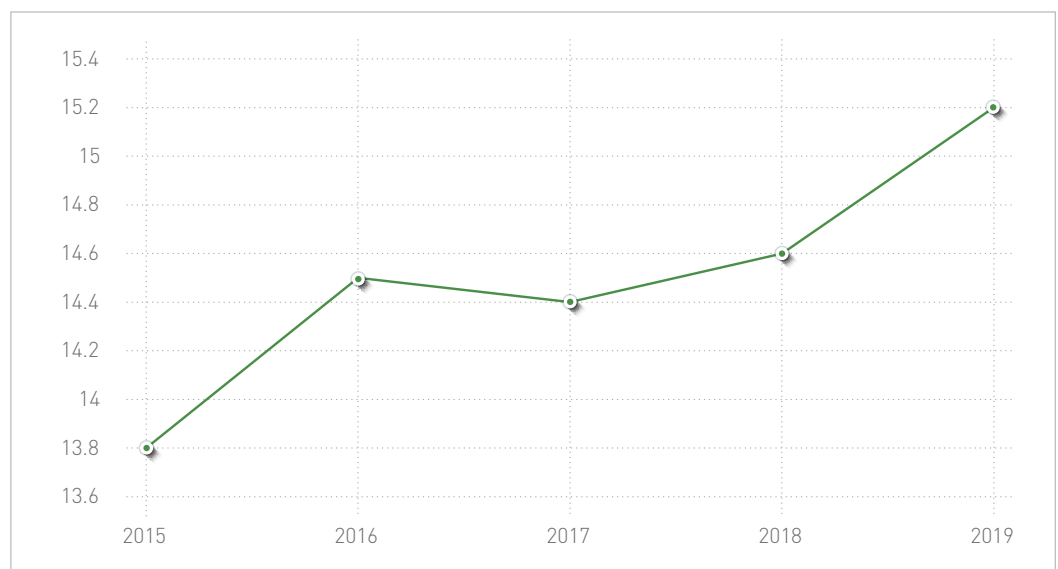
Threat

Volatility in international market prices for oil, gas and other minerals.

Human Resource Requirements

Mining and quarrying employed 15,200 people in the year 2019 in the private sector, up from 13,800 in 2015. The sector has seen a growth of 4.1% in terms of

employment. As per report from Ministry of Labour and Social Protection, the informal sector employment accounts for only 5,572 workers. A consistent growth has been seen in the sector in the past five years as shown in the graph below:



Graph 14: Wage Employment in Mining and Quarrying Sector ('000)
Source: Kenya Economic Survey 2020

ENERGY

4.8. ENERGY

Introduction

This sector is also named as electricity, gas, steam and air conditioning supply and includes the activity of providing electric power, natural gas, steam, hot water and the like through a permanent infrastructure (network) of lines, mains and pipes. The energy industry also includes integrated power utility companies such as renewable energy and coal (ISIC Rev. 4, 2008).

Global Trends

The global energy demand increased by 0.9% in 2019, i.e. 120 million tonnes of oil equivalent, 40% the rate of growth observed in 2018. Global GDP growth fell from 3.6% in 2018 to 2.9% in 2019, curbing energy demand growth. The economic slowdown was felt across almost all economies. In advanced economies, average economic growth fell nearly 25% between 2018 and 2019. The economic slowdown restricted

energy demand growth, particularly in India, where economic growth fell from 6.8% in 2018 to 4.8% in 2019, well below the average of 7% since 2010.

The energy industry is classified based on how the energy is sourced such as:

- Non-renewables or fossil fuels
- Renewables such as solar, wind etc.

The energy sector value chain starts from getting the fuel for energy generation, which can be conventional or a renewable energy source. Then the electricity is generated, followed by transmission, distribution and service.

Table 17: International Classification for Energy Sector

International Standard Industrial Classification of all Economic Activities (ISIC Rev. 4, 2008)			
Section D: Electricity, gas, steam and air conditioning supply			
Division	Group		
Electricity, gas, steam and air conditioning supply	Electric power generation, transmission and distribution		
	Manufacture of gas; distribution of gaseous fuels through mains		
	Steam and air conditioning supply		
International Standard Classification of Occupations (ISCO-08)			
As per ISCO-08, occupations within the sector are classified under major groups 7 and 8.			
Sub-Major	Minor Groups		
74 Electrical and Electronics Trades Workers	741	Electrical Equipment Installers and Repairers	
	742	Electronics and Telecommunications Installers and Repairers	
82 Assemblers	821	Assemblers	
International Standard Classification of Education (ISCED-F 2013)			
Broad field	Narrow field	Detailed field	
07 Engineering, manufacturing and construction	071 Engineering and engineering trades	0713	Electricity and energy

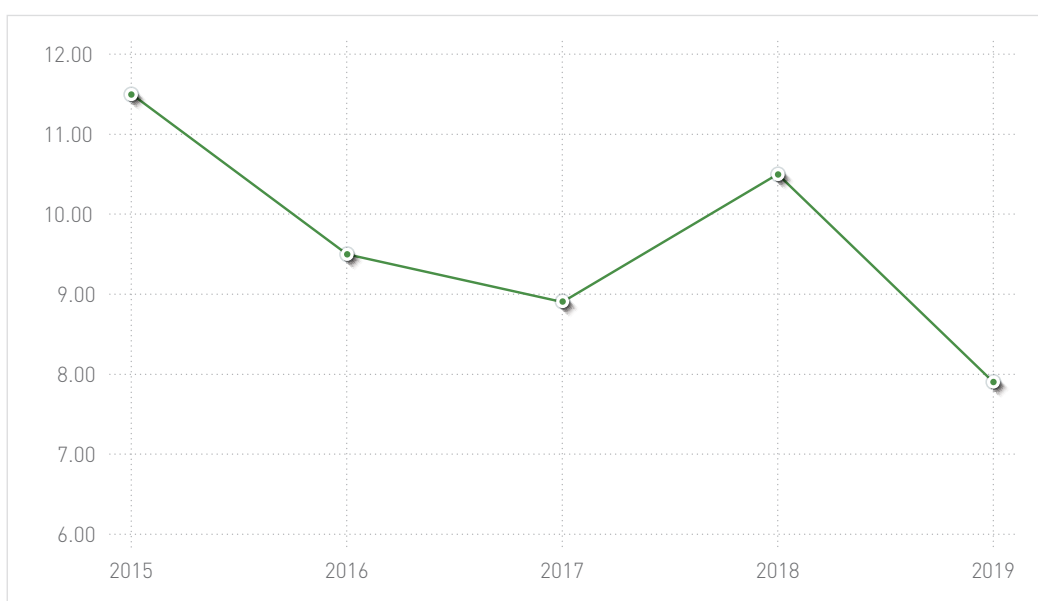
Trends in Kenya

The Kenyan energy and power sector is a true success story in sub-Saharan Africa, with strong leadership at the highest levels of Government, long-standing participation of the private sector in generation, impressive growth in access, and a strong enabling environment for innovation in off-grid solutions.

Kenya has seen one of the fastest increases in electrification rates within sub-Saharan Africa since 2013. By 2018, 75% of the population had access to electricity and the

GDP contribution of energy sector in Kenya for the year 2019 is 1.7%, which has been constant since the last three years.

Electricity supply grew by 7.9% compared to a growth of 10.5% in 2018. The slowed growth was evident in the slowdown in total electricity generation, which increased by 3.2% in 2019 compared to 9.1% growth in 2018. This was largely on account of 19.6% decline in electricity generated from hydroelectric sources, mainly due to insufficient rainfall experienced during the long rains season that considerably affected production.



Graph 15: GDP Growth Rate of Electricity, Gas, Steam and Air Conditioning Supply Sector (%)
Source: Kenya Economic Survey 2020

The COVID-19 crisis and measures taken to slow its spread have had a profound impact on energy demand, the likes of which have not been seen for 70 years. The energy industry is feeling the financial impact throughout value chains, with most energy companies losing substantial revenues.

A combination of cheap gas and weakening demand have also led to power prices declining by one-third to one-half in liberalized wholesale markets.

Kenya Vision 2030 is aimed at enabling the country to achieve middle-income status by 2030. The strategy foresees annual GDP growth of 10%, which will trigger a significant rise in electricity demand. The increase is projected to reach between 11.9% and 15.3% per annum by 2030. Peak

demand is expected to hit 15,000 MW at that time.

To meet future demand, the country needs to gradually extend its generating capacity to 19,200 MW by 2030. In this scenario, renewable energy will play an even more important role in the country's electricity mix. Kenya is one of the few countries to develop geothermal energy; by 2040, it will account for almost 50% of Kenya's power generation.

Figure 30: SWOT Analysis of Energy Sector

+	-	✓	!
Strength	Weakness	Opportunity	Threat
<p>Multiple rounds of power sector reforms leading to stability in the sector and adding confidence to the workers.</p> <p>An aggressive Last Mile Connectivity campaign and a thriving off-grid solar market, which have pushed access from roughly 20% six years ago to above 50% in 2018 creating thousands of jobs in renewable energy.</p> <p>A highly diversified power mix that includes geothermal power.</p> <p>High investment across the sector has added jobs in generation, transmission, distribution and electrification.</p>	<p>Inadequate access to project financing, especially early stage risk capital.</p> <p>Land risks, right of way, and community engagement impacts both generation and transmission.</p> <p>Long procedures and inconsistency in approval of Power Purchase Agreements (PPAs) deters new players to enter the industry, causing loss of employment.</p>	<p>Donors have contributed to more than US\$3 billion in grants and loans to support the development of new generation capacity, adding scope of skill development in generation of electricity.</p> <p>Government of Kenya's flagship last mile electrification program has attracted US\$770 million from the donor community, including World Bank support for the Kenya Electricity Modernization Project which will increase the scope of transmission of electricity skills.</p>	<p>Allegations of corruption erode consumer confidence.</p> <p>Policy and regulatory uncertainty reigns and lack of regulatory framework is a threat for the industry.</p>

Challenges in Kenya's energy sector

KPLC shared that there is inadequate manpower to support the operations within this sector in Kenya. Key challenges are in the areas for **revenue collection, fraud detection, fraud mitigation, and technicians with skills to address transformer failure**

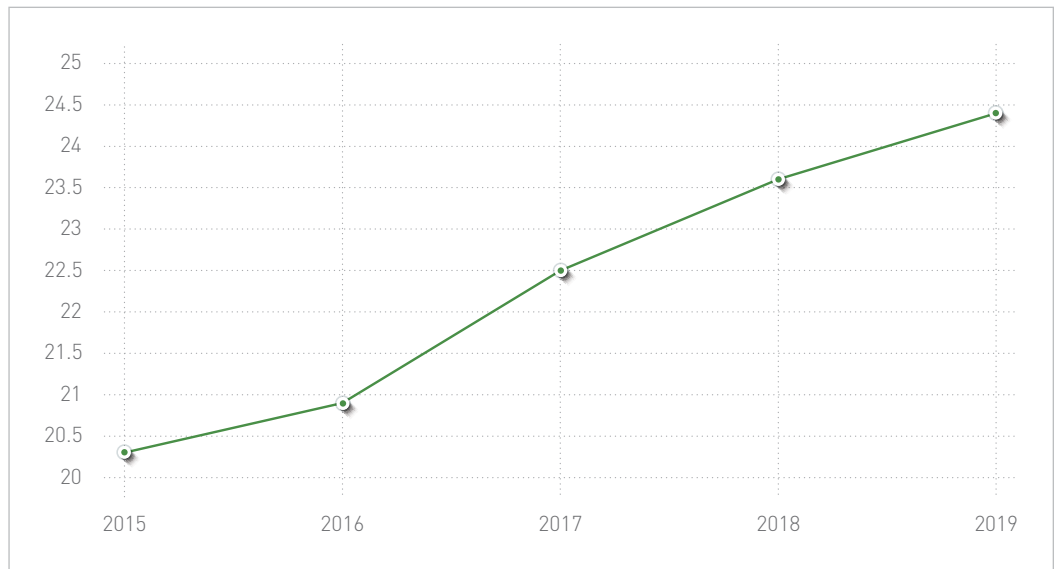
and circuit breaks. KPLC currently focuses on non-renewable power, but emphasized that future trainees should be trained in **renewable sources of energy, especially to support rural areas.**

*Focus Group Discussion conducted with representative of Kenya Power and Lighting Company (KPLC) on 6th August 2020

Human Resource Requirements

In 2019, the sector accounted for 18,500 direct jobs in the public sector and another 5300 jobs in the private sector, giving a 2% increase in employment numbers as compared to 2018 as per Kenya Economic Survey 2020. This is a difficult job sector to accurately assess, but estimates suggest

that in 2017, the Decentralized Renewable Energy (DRE) sub-sector accounted for 15,000 direct informal jobs in Kenya and by 2022 – 2023, the sector could provide as many as 30,000 informal jobs in Kenya. The graph below shows the formal wage employment in private and public sector in the past five years.



Graph 16: Wage Employment in Electricity, Gas, Steam and Air Conditioning Supply ('000)
Source: Kenya Economic Survey 2020



WATER

4.9. WATER SUPPLY, SEWERAGE, IRRIGATION AND WASTE MANAGEMENT

Introduction

This sector includes management (including collection, treatment and disposal) of various forms of waste, such as solid or non-solid industrial or household waste, as well as contaminated sites. The output of the waste or sewage treatment process can either be disposed of or become an input into other production processes. Activities of water supply are also grouped in this section, since they are often carried out in connection with, or by units also engaged in, the treatment of sewage (ISIC Rev. 4 2008).

Global Trends

Water is essential for life but for years, some parts of the world have taken their water supply for granted. And it's easy to understand why. Crystal clear drinking water flows in abundance from the taps in our homes, schools, and workplaces. But for most of the world, clean drinking water is a precious commodity. Although water covers about 70% of the Earth's surface, we must rely on annual precipitation for our actual water supply. About two-thirds of annual precipitation evaporates into the atmosphere, and another 20-25% flows into waterways and is not fit for human use. This leaves only 10% of all rainfall available for personal, agricultural and industrial use.

Table 18: International Classification for Water Supply, Sewerage, Irrigation and Waste Management Activities Sector

International Standard Industrial Classification of all Economic Activities (ISIC Rev. 4, 2008)			
Section E: Water supply; sewerage, waste management and remediation activities			
Division	Group		Class
Water collection, treatment and supply			
Sewerage Waste collection, treatment and disposal activities; materials recovery	Waste collection		Collection of non-hazardous waste
	Waste treatment and disposal		Collection of hazardous waste
	Materials recovery		Treatment and disposal of non-hazardous waste
Remediation activities and other waste management services			
International Standard Classification of Occupations (ISCO-08)			
As per ISCO-08, occupations within this sector are classified under major groups 2, 3.			
Sub-Major	Minor Groups		
31 Science and Engineering Associate Professionals	3132	Incinerator and Water Treatment Plant Operators	
214 Engineering Professionals (excluding Electrotechnology)	2143	Environmental Engineers (Waterwaste process engineers)	
International Standard Classification of Education (ISCED-F 2013)			
Broad field	Narrow field	Detailed field	
07 Engineering, manufacturing and construction	073 Architecture and construction	0732	Water supply and sewerage engineering Water technology and engineering
05 Natural sciences, mathematics and statistics	052 Environment	0521	Environmental sciences
10 Services	102 Hygiene and occupational health services	1021	Community sanitation (Waste management, Water supply (service))

Trends in Kenya

The country's development agenda as expounded in Vision 2030, is to transform it into a newly industrialized, middle-income country providing a high quality of life to its citizens with access to clean and safe water while, simultaneously, meeting the Sustainable Development Goals. SDG 6 aims to ensure availability and sustainable management of water and sanitation for all.

The sector grew at second highest rate in the last five years in Kenya, recording a GDP growth rate of 4.8% in year 2019 as compared to a low of 2% in 2018.

Approximately 270 kilometres of urban rivers were rehabilitated; land reclaimed along the riparian zones at the Michuki Memorial Park; river bank embankments constructed; 270,000 indigenous trees planted along Mathare, Ngong, Nairobi, and Sosian river banks, that attracted a large number of rural employment.

The key megatrends that are shaping the water market, and calls for investment opportunities that are arising from these trends include:

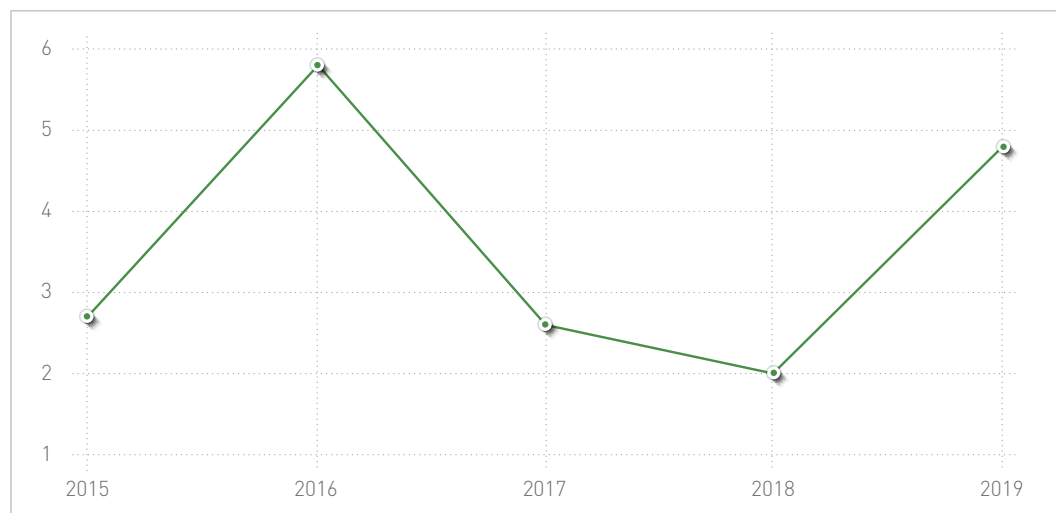
- Population growth
- Aging infrastructure
- Water quality improvements are necessary in many places
- Climate change is altering the availability of water resources

According to Medium-Term Plan III (MTP III) of Vision 2030, the sector is going to focus on conservation and management of water catchments, and management of wetlands, restoration of degraded land, green economy, waste management, pollution control, integrated regional development, water resources management, increase in access to water and sanitation and mitigation and adaptation to the effects of climate change.

The rehabilitation of urban rivers will continue and attract more employment in activities such as riverbank embankment on reclaimed land areas and growing of trees on the banks.

The Ministry of Water and Sanitation targets to enhance reliable and adequate water harvesting and storage capacity to meet domestic, irrigation, industrial, hydropower generation, flood control and environmental needs through the construction of dams and water harvesting structures. This will facilitate construction of 57 multi-purpose medium size dams and 500 small dams/water pans across the country to increase water storage per capita from the current level of 4.5 to 14 cubic meter volume.

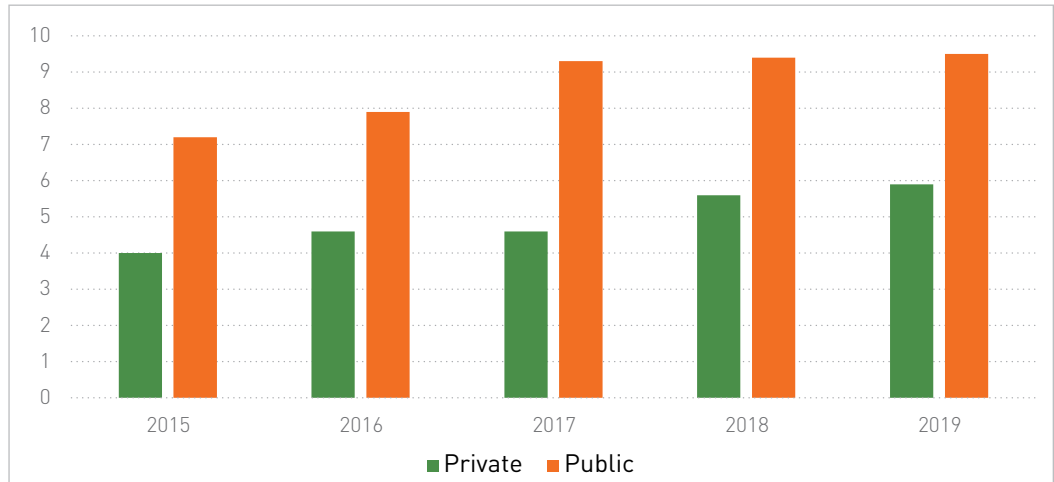
The Government endeavors to provide universal access to sewerage facilities in urban centers by 2030. According to the Ministry of Water and Sanitation Strategic Plan (2018-2022), the Ministry will increase the percentage of urban population with access to improved sanitation from 67.5% to 85%, and that of rural population from 52% to 76% during the plan period.



Graph 17: GDP Growth Rate of Water Supply, Sewerage and Waste Management Sector (%)
Source: Kenya Economic Survey Report 2020

Figure 31: SWOT Analysis of Water Supply, Sewerage, Irrigation and Waste Management Sector





Graph 18: Wage Employment in Water Supply, Sewerage and Waste Management Sector ('000)
Source: Kenya Economic Survey 2020

Human Resource Requirements

As per the Economic Survey 2020, the sector employed 5900 people in private sector and 9500 people in the public sector. The private sector wage employment grew at a rate of 5.4% in 2019.

Skilling requirements for the sector

Kenya Water Institute (KEWI) indicated that focus of trainings is in the areas of **supply, sanitation and operation management**. Programs offered are for Diploma, Certificate and Bridging courses ranging from 3 years to 1-year operator courses. KEWI emphasized the importance for introducing **digital courses** and courses focusing on the areas of **water drilling, rainwater harvesting and management courses**.

National Environment Management Authority (NEMA) is a Semi-Autonomous Government Agency (SAGA) in the Ministry of Environment and Forestry, established under the Environment Management and Coordination Act (EMCA, CAP 387) as the Government's principal instrument in implementation of all environmental policies in Kenya. NEMA seeks to

ensure a clean, healthy, and sustainable environment in Kenya through supervision and coordination of all matters relating to the environment.

NEMA emphasized the importance of reviewing and ensuring the focus of **environment management** in all TVET courses. Some of the critical areas include introduction of **green jobs**, skilling and upkilling workers in **green technology** across sectors. Newer training standards identified include **green building construction, service and maintenance of septic tanks, sanitation etc.**

*Focus Group Discussion conducted with representative of Kenya Water Institute on 6th August 2020. Interview conducted with representative of National Environment Management Authority (NEMA) on 15th August 2020.

4.10. TRANSPORTATION AND LOGISTICS

Introduction

This sector includes the provision of passenger or freight transport, whether scheduled or not, by rail, pipeline, road, water or air and associated activities such as terminal and parking facilities, cargo handling, storage etc. It includes renting of transport equipment with driver or operator. It also includes postal and courier activities (ISIC Rev. 4 2008).

Global Trends

There are a number of distinct business models in the industry, although they can

overlap, and individual companies may operate under more than one model. Customers in the logistics industry comprise of both business-to-business (B2B) and business-to-customer (B2C) segments. The major part of the total market can be linked to B2B transactions. According to a report by IMARC Group, 2019, the global logistics market size reached a value of US\$ 4,963 billion in 2019. The 3 major components in the sector are:

- Land transport
- Air transport including support services
- All other transport including postal and courier activities

Table 19: International Classification for Transportation and Logistics Sector

International Standard Industrial Classification of all Economic Activities (ISIC Rev. 4, 2008)		
Section G: Transportation and storage		
Division	Group	Class
Land transport and transport via pipelines	Transport via railways	Passenger rail transport, interurban Freight rail transport Urban and suburban passenger land transport
	Other land transport	Other passenger land transport Freight transport by road
	Transport via pipeline	Transport via pipeline
Water transport	Sea and coastal water transport	Sea and coastal passenger water transport Sea and coastal freight water transport
	Inland water transport	Inland passenger water transport Inland freight water transport
Air transport	Passenger air transport	Passenger air transport
	Freight air transport	Freight air transport
Support activities for transportation	Warehousing and storage	Service activities incidental to land transportation
	Support activities for transportation	Service activities incidental to water transportation
		Service activities incidental to air transportation
		Cargo handling
Support activities for transportation		Other transportation support activities

International Standard Classification of Occupations (ISCO-08)			
As per ISCO-08, occupations within Transportation and Logistics Sector are classified under major group 9.			
Sub-Major	Minor Groups		
93 Laborers in Mining, Construction, Manufacturing and Transport	933	Transport and Storage Labourers (Hand and Pedal Vehicle Drivers, Drivers of Animal-drawn Vehicles and Machinery, Freight Handlers, Shelf Fillers)	
International Standard Classification of Education (ISCED-F 2013)			
Broad field	Narrow field	Detailed field	
10 Services	104 Transport services	1041	Transport services

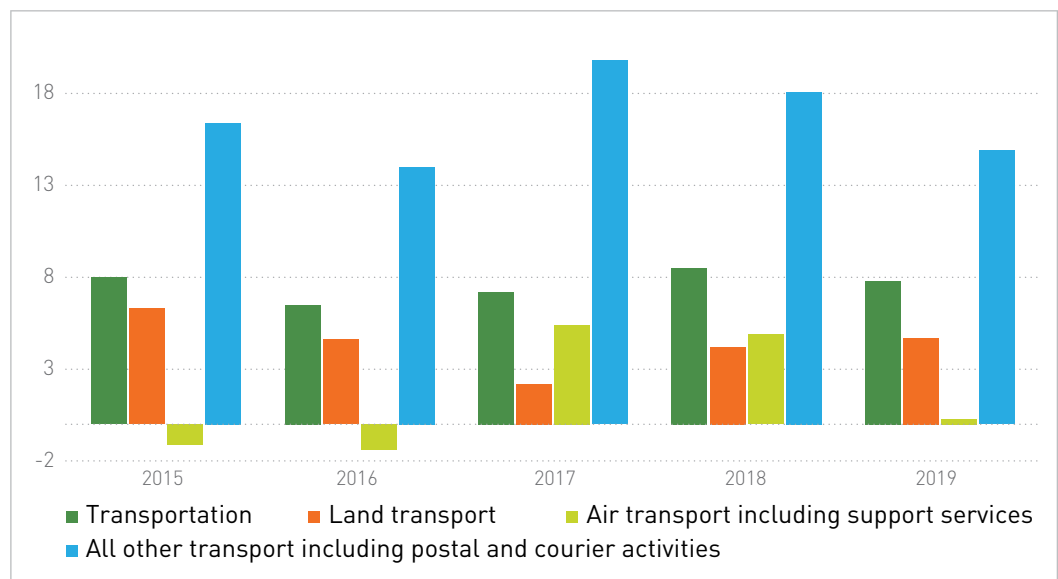
Trends in Kenya

Under Kenya Vision 2030, priority sectors were identified which included transportation and logistics to increase the infrastructure of the country and make Kenya a gateway to the countries who want to invest in East Africa.

With the introduction of the new Standard Gauge Railway (SGR) and improved foreign trade ties, the logistics sector in Kenya experienced high growth in 2018. Improving infrastructure in the country is a

key growth driver for the logistics industry. The government of Kenya has allocated approximately USD 2.5 billion for transport developmental projects. The willingness of international players to enter the market has made Kenya step up its logistics infrastructure and spending in the sector.

This sector has been growing rapidly in Kenya since the past five years and the postal and courier activities sub-sector has shown the highest growth at 14.9% in 2019. The overall sector grew at 7.8% as per the Kenya Economic Survey 2020 report.

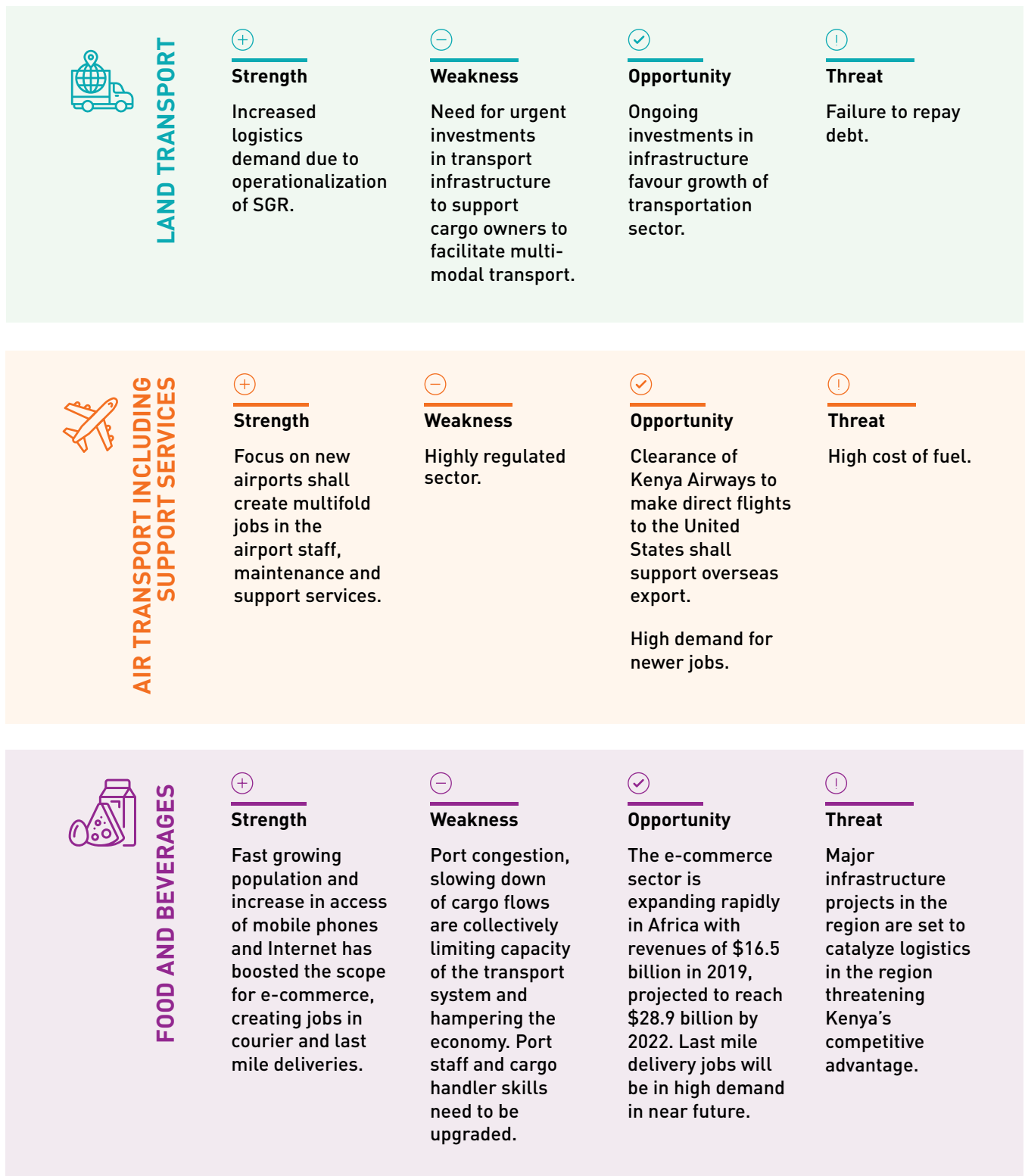


Graph 19: GDP Growth Rate of Transportation Sector (%)
Source: Kenya Economic Survey 2020

The roads and railways network is the key driver accelerating growth in the country's logistics sector, estimated to reach \$5 billion (Sh500 billion) by 2023. Other central factors are harmonized levies for foreign investors, increasing retail and e-commerce and Kenya's strategic

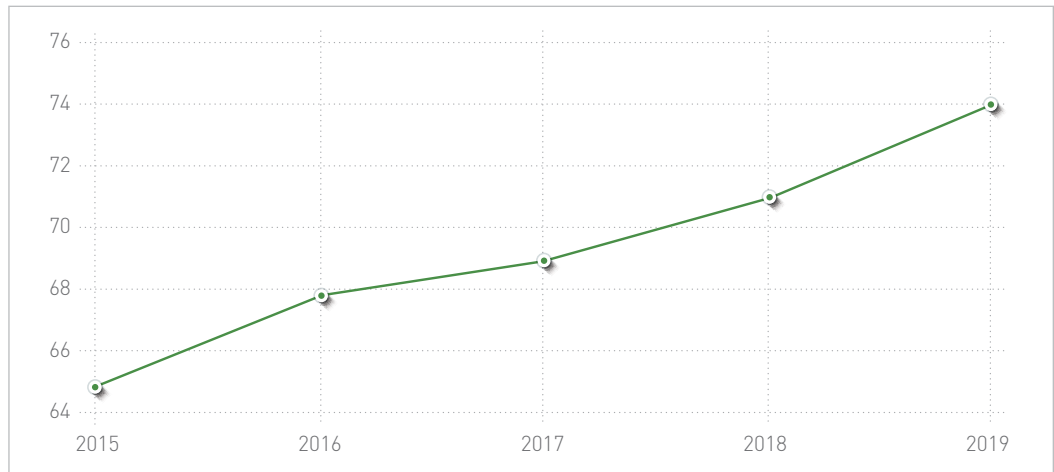
location as per Ken-Research report. The report notes that the KSh. 180.9 billion was allocated for on-going roads construction projects as well as the rehabilitation and maintenance of roads across the country and will propel growth of the logistics sector.

Figure 32: SWOT Analysis of Transportation and Logistics Sector



Human Resource Requirements

Jobs in transportation and logistics industry grew by 4.1% in the year 2019 and reached 73,900 in the private sector, whereas the public sector saw a decline of 5.5% and employed 18,500 people in the industry.



Graph 20: Wage Employment in Transportation and Logistics Sector ('000)
Source: Kenya Economic Survey Report 2020

Skilling for Transport and Logistics sector in Kenya

Kenya's Railway Training Institute is one of the oldest institutions in East Africa. However in its long colonial history, service disruptions, privatization etc., worker trainings have been largely unstructured and neglected. Currently, Kenya is in the process of SGR operational handover. It is critical that the sector focuses on skilling to adequately meet its current and future demands for workforce.

Railway Training Institute has been working to introduce new courses and re-skilling programs in the areas of locomotive technology, wired and non-wired communication, locomotive maintenance and support; but development of these programmes has been largely ad hoc in nature. There is a need for mapping the sector to international best practices, regional trends and national priority requirements, and developing occupational standards, occupational training standards and curricula accordingly.

Blue economy has great potential for the country. The Kenya Maritime Authority has been focused on developing standards aligned to global and regulatory practices for marine engineering.

The East African School of Aviation is focused on delivering industry-aligned courses for the sector. EASA has conducted research studies to understand some of the key skill gaps in the sector. Personnel Licensing (PEL) department within the Directorate of Aviation Safety, Security and Regulations (DASSR) is responsible for licensing in the areas of flight crew, aircraft maintenance personnel, air traffic controller, etc. Kenya Civil Aviation Authority has standards related to job such as **Aircraft Maintenance Engineer**. There is a growth in private aviation players and a need to focus on large-scale training needs surveys, including tracer studies, to understand holistically the training needs for ground level services.

*Focus Group Discussion conducted with representative of Railway Training Institute, Kenya Maritime Authority on 6th August 2020. Interview with East African School of Aviation (EASA) on 19th August 2020.

TRADE

4.11. WHOLESALE AND RETAIL TRADE

Introduction

This sector includes wholesale and retail sale (i.e. sale without transformation) of any type of goods and the rendering of services incidental to the sale of these goods, as well as repair and maintenance of motor vehicles and motorcycles (ISIC Rev. 4 2008).

Global Trends

The wholesale and retail industry is an integral part of every industry's supply chain in the world. The wave of digital shopping poses a significant threat to the brick-and-mortar formats of the retail industry, however, no decline in the retail market in brick-and-mortar

stores indicates the existing demand from customers for physical experience. The wholesale and retail industry as a whole is very important to world economic growth. By 2022, the wholesale and retail market is expected to grow to \$76 trillion.

The retail market consists of sales of goods to consumers by entities (organizations, sole traders and partnerships) that provide the service of making goods available to consumers in convenient quantities and locations.

The wholesale market consists of sales by wholesalers. These entities (organizations, sole traders and partnerships) deal in wholesale merchandise including the outputs of agriculture, mining, manufacturing, and certain information industries, such as publishing.

Table 20: International Classification for Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles

International Standard Industrial Classification of all Economic Activities (ISIC Rev. 4, 2008)			
Section G: Wholesale and retail trade; repair of motor vehicles and motorcycles			
Division	Group	Class	
Wholesale and retail trade and repair of motor vehicles and motorcycles	Sale of motor vehicles		
	Maintenance and repair of motor vehicles		
	Sale of motor vehicle parts and accessories		
	Sale, maintenance and repair of motorcycles and related parts and accessories		
Wholesale trade, except of motor vehicles and motorcycles	Wholesale on a fee or contract basis		
	Wholesale of agricultural raw materials and live animals		
	Wholesale of food, beverages and tobacco		
	Wholesale of household goods	Wholesale of textiles, clothing and footwear	
		Wholesale of other household goods	
	Wholesale of machinery, equipment and supplies	Wholesale of computers, computer peripheral equipment and software	
		Wholesale of electronic and telecommunications equipment and parts	
		Wholesale of agricultural machinery, equipment and supplies	
		Wholesale of other machinery and equipment	

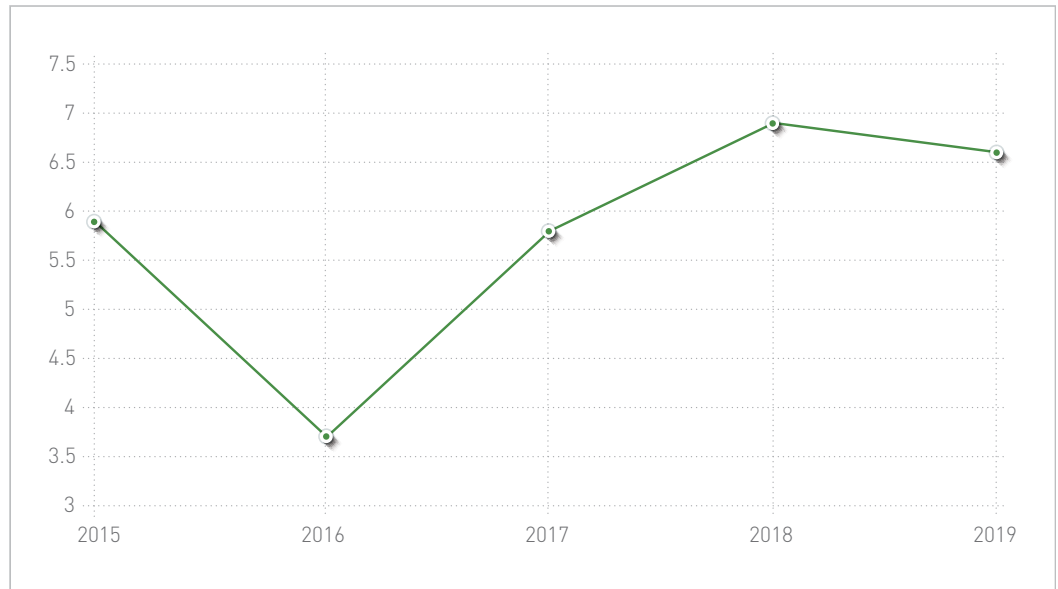
	Other specialized wholesale	Wholesale of solid, liquid and gaseous fuels and related products
		Wholesale of metals and metal ores
		Wholesale of construction materials, hardware, plumbing and heating equipment and supplies
		Wholesale of waste and scrap and other products n.e.c.
	Non-specialized wholesale trade	Non-specialized wholesale trade
Retail trade, except of motor vehicles and motorcycles	Retail sale in non-specialized stores	Retail sale in non-specialized stores with food, beverages or tobacco predominating
		Other retail sale in non-specialized stores
	Retail sale of food, beverages and tobacco in specialized stores	Retail sale of food in specialized stores
		Retail sale of beverages in specialized stores
		Retail sale of tobacco products in specialized stores
	Retail sale of automotive fuel in specialized stores	Retail sale of automotive fuel in specialized stores
	Retail sale of information and communications equipment in specialized stores	Retail sale of computers, peripheral units, software and telecommunications equipment in specialized stores
		Retail sale of audio and video equipment in specialized stores
	Retail sale of other household equipment in specialized stores	Retail sale of textiles in specialized stores
		Retail sale of hardware, paints and glass in specialized stores
		Retail sale of carpets, rugs, wall and floor coverings in specialized stores
	Retail sale of other household equipment in specialized stores	Retail sale of electrical household appliances, furniture, lighting equipment and other household articles in specialized stores
	Retail sale of cultural and recreation goods in specialized stores	Retail sale of books, newspapers and stationery in specialized stores
		Retail sale of music and video recordings in specialized stores
		Retail sale of sporting equipment in specialized stores
		Retail sale of games and toys in specialized stores

	Retail sale of other goods in specialized stores	Retail sale of clothing, footwear and leather articles in specialized stores
		Retail sale of pharmaceutical and medical goods, cosmetic and toilet articles in specialized stores
		Other retail sale of new goods in specialized stores
		Retail sale of second-hand goods
	Retail sale via stalls and markets	Retail sale via stalls and markets of food, beverages and tobacco products
		Retail sale via stalls and markets of textiles, clothing and footwear
		Retail sale via stalls and markets of other goods
	Retail trade not in stores, stalls or markets	Retail sale via mail order houses or via Internet
		Other retail sale not in stores, stalls or markets
	International Standard Classification of Occupations (ISCO-08)	
As per ISCO-08, occupations within this sector are classified under major group 4, 5, 9.		
Sub-Major	Minor Groups	
44 Other Clerical Support Workers	432	Material Recording and Transport Clerks (Stock clerks, production clerks, transport clerks)
52 Sales Workers	521	Street and Market Salespersons
	522	Shop Salespersons
	523	Cashiers and Ticket Clerks
	524	Other Sales Workers (Fashion and other models, sales demonstrators, door-to-door sales, contact centre sales person, service station attendants)
95 Street and Related Sales and Services Workers	951	Street and Related Services Workers
	952	Street Vendors (excluding Food)
International Standard Classification of Education (ISCED-F 2013)		
Broad field	Narrow field	Detailed field
04 Business, administration and law	041 Business and administration	0416 Wholesale and retail sales

Trends in Kenya

This is evidenced by the major supermarkets that have emerged since the launch of Vision 2030, with branches scattered in major cities throughout the country.

Kenya's competitiveness in ease of doing business improved from position 129 in 2013 out of the 185 countries to position 80 in 2017 out of 190 countries. The value of domestic trade increased from Ksh. 380.6 billion in 2013 to Ksh. 588.5 billion 2017. However, its share contribution to GDP declined from 8% in 2013 to 6.6% in 2019 as shown in the graph below:



Graph 21: GDP Growth Rate of Wholesale and Retail Trade Services Sector (%)
 Source: Kenya Economic Report 2020

There has been a decline in export value of the sector due to increase in exports from Uganda and Rwanda. The Common Market for Eastern and Southern Africa (COMESA) remained a major export market for Kenya accounting for 74.3% of the total exports to Africa in 2017.


The significance of the retail trade as an engine for Kenya’s economic growth is detailed in Vision 2030, with the government targeting to raise the share of products sold through the formal retail channels, such as supermarkets.

During the medium term, the sector will continue to support the structural

transformation of the economy by increasing the share of exports to the GDP. Building a pilot Wholesale Hub in Maragua to serve as a model for the private sector has been a call for action for workers in the sector to upgrade their skills to work in better facilities with more opportunities.

E-commerce will serve as a major growth driver in the sector in the upcoming years. E-commerce is at a very nascent stage currently, however in the short-term, it will show increasingly high growth and become one of the fastest growing sub-sector. Realizing this, the government has also made a policy for E-Commerce.

Figure 33: SWOT Analysis of Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles Sector

 WHOLESALE	<p>+</p> <p>Strength</p> <p>Wholesale hubs have been developed in Kenya to support and cater to the supply chain creating large number of jobs in the sector.</p>	<p>-</p> <p>Weakness</p> <p>Delayed wage payments.</p> <p>Poor governance leading to closures of supermarkets and severe job losses.</p>	<p>✓</p> <p>Opportunity</p> <p>Arrival of international supermarkets and big box players.</p>	<p>⚠</p> <p>Threat</p> <p>International competition to small, local businesses.</p>
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RETAIL



Strength

High retail penetration.



Weakness

Market saturation in catchment areas.

Low job attractiveness due to late payments.



Opportunity

Attractive destination for international retail, creating employment in areas such as cash collections, aisle maintenance and other store operations.



Threat

International competition to small, local businesses

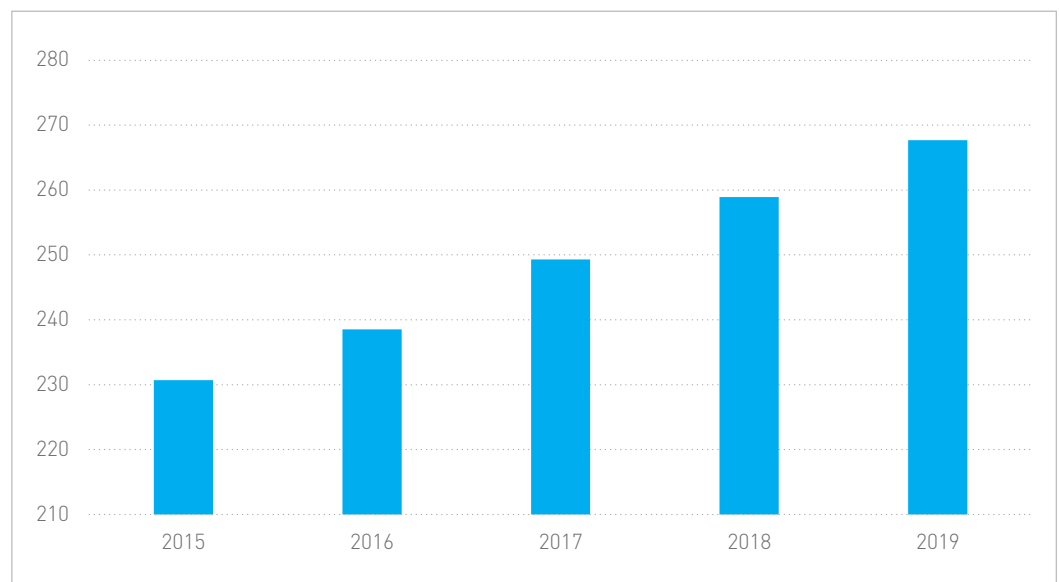
Human Resource Requirements

A majority of Kenyans work in this sector, notwithstanding high unemployment and inactivity rates. However, the productivity level of workers is low and stagnated.

The urban formal wage sector employs less than 900,000 people – less than one quarter of the workforce – while 2.5 million workers are either in informal wage employment

or engaged in self-employment or unpaid work for other family members, mostly in the wholesale and retail trade sector.

Four out of five jobs in urban areas are in the services sector. Wholesale and retail trade (29%) and other services related jobs (54%) make up the vast majority of urban jobs. In 2019, there were 267,000 wholesale and retail trade jobs in Kenya, making up the second highest jobs after Agriculture.



Graph 22: Wage Employment in Wholesale and Retail Trade Sector ('000)
Source: Kenya Economic Survey 2020



BLUE ECONOMY



Blue Economy encompasses the sustainable use and conservation of the oceans, seas, lakes, rivers and other water resources. These resources present potential for sustainable and inclusive development. Industries based on the Blue Economy such as Fisheries, Maritime, Renewable Energy, Tourism, Waste Management, have the potential to deliver growth and jobs. In delivering the UN's 2030 Agenda for Sustainable Development, Blue Economy sectors have the potential to unlock opportunities for all with a specific focus on:

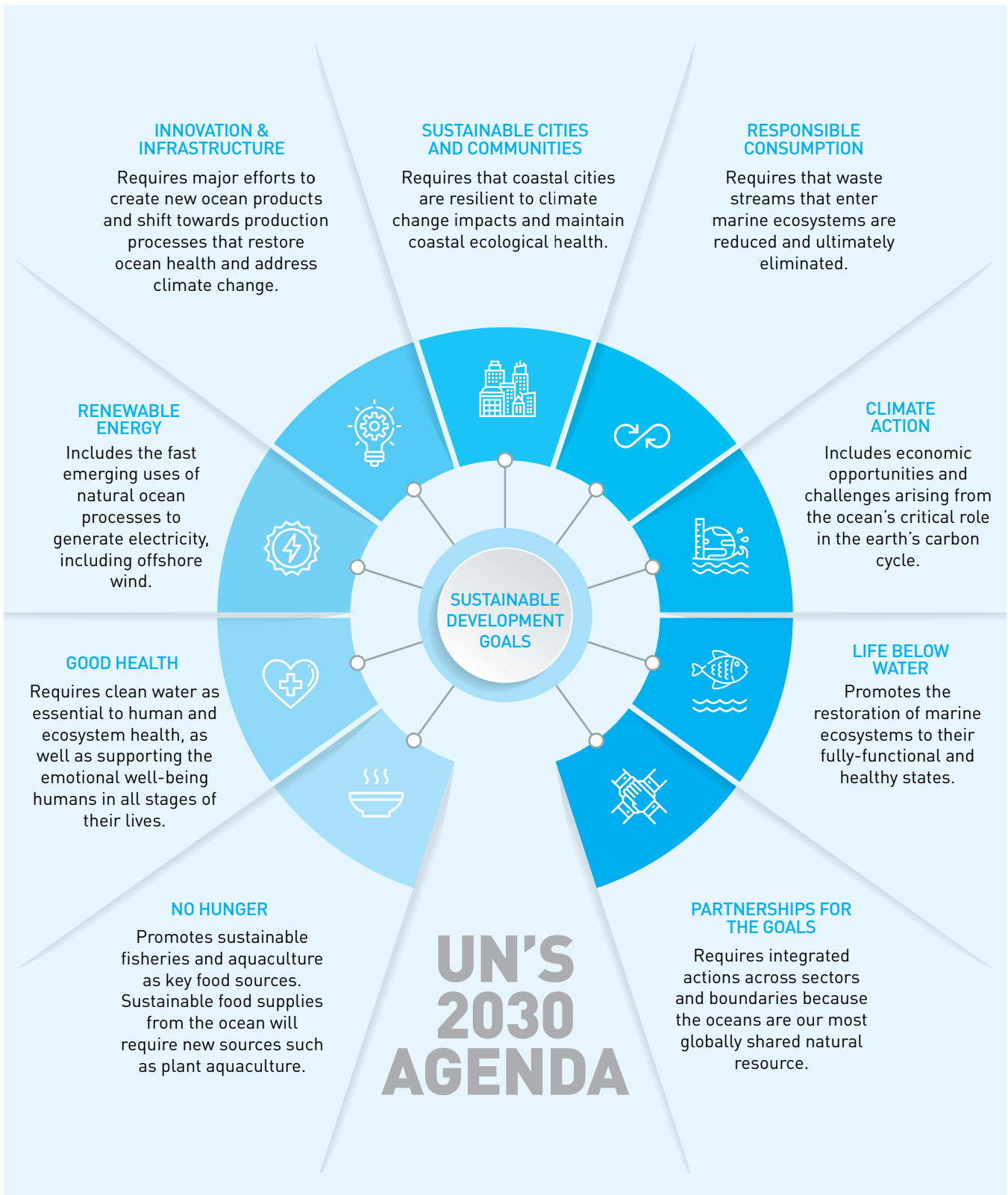


Figure 34: Implications for the Blue Economy and Blue Economic Development
Source: www.middlebury.edu (last accessed on 20th October 2020)

BLUE ECONOMY SECTORS

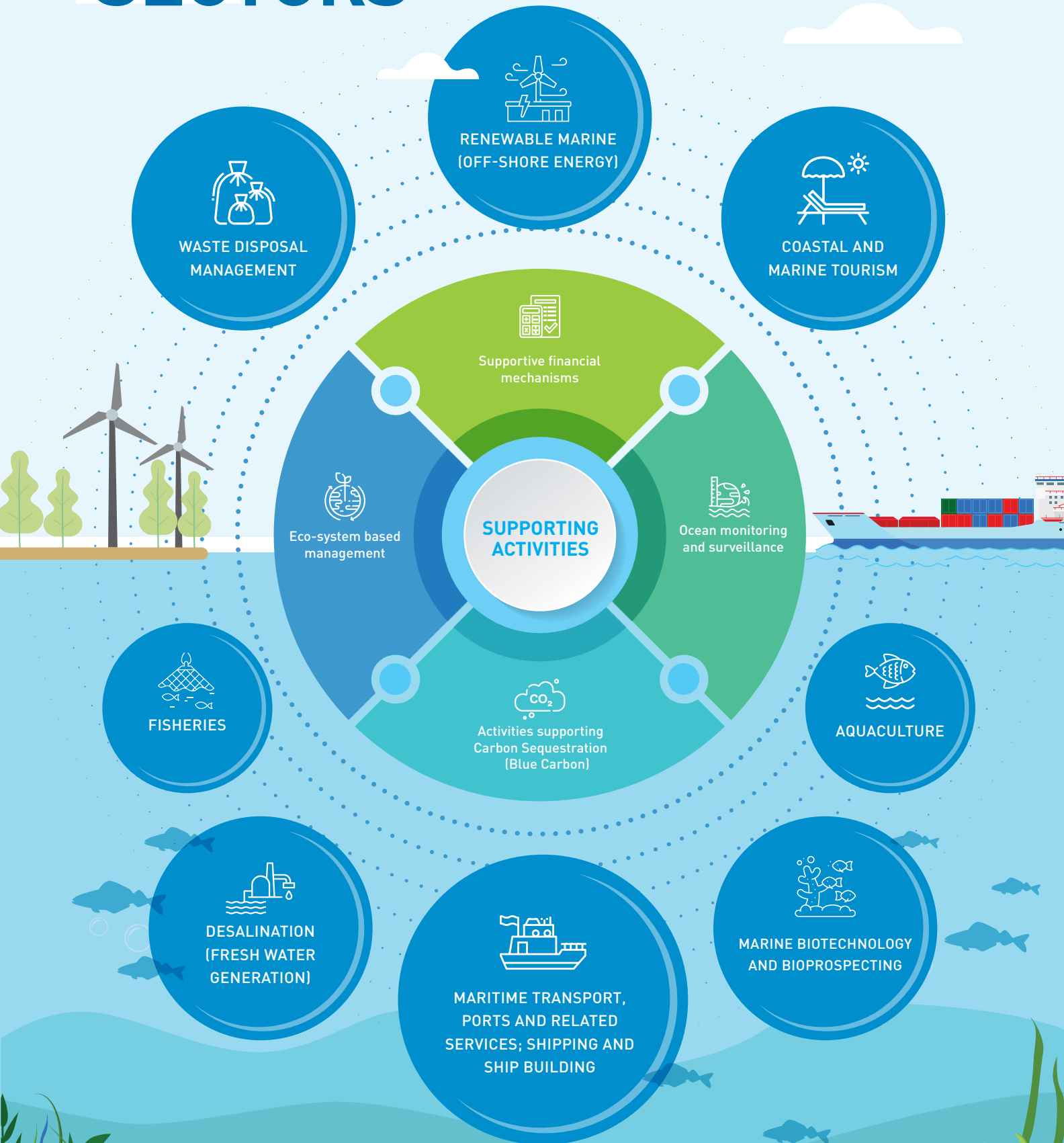


Figure 35: Blue Economy cross-cutting sectors and supporting activities
 Source: Adapted from 'The Potential of the Blue Economy, World Bank Report (2017). (last accessed on 25th July 2020)

FOCUS AREAS

01

HEALTHY AND PROTECTIVE WATERS

- Climate action, agriculture waste management and pollution-free oceans
- Managing and sustaining marine life and conservation
- Smart shipping, ports, transportation and global connectivity

02

BUILDING SAFE AND RESILIENT COMMUNITIES

- Ending hunger, securing food supplies and promoting good health and sustainable fisheries
- Cities, tourism, resilient coasts and infrastructure
- Maritime security, safety and regulatory enforcement

03

INCLUSIVE AND SUSTAINABLE ECONOMIC GROWTH

- People, culture, communities and societies
- Employment, job creation and poverty eradication
- Sustainable energy, mineral resources and innovative industries

CROSS-CUTTING AREAS

New Technologies and Innovation for Oceans, Seas, Lakes and Rivers

Financing for Blue Economy

Women, Youth and The Blue Economy

Challenges, Potential Opportunities, Priorities and Partnerships

Figure 36: Focus areas and sub-themes of the Blue Economy
 Source: www.blueeconomyconference.go.ke/wp-content/uploads/2018/11/Main-compressed.pdf (last accessed on 10th November 2020)

Blue Economy contributes US\$1.5 trillion per annum globally (3% of global GDP) and creates approximately 350 million jobs in fishing, aquaculture, coastal and marine tourism and research activities.

The activities of the Blue Economy include harvesting of living resources such as sea food and marine biotechnology, extraction of non-living resources (seabed mining), and generation of new resources (energy and fresh water). Kenya has only focused on fisheries both for domestic and export markets.

Fisheries account for only about 0.5% of Kenya's GDP and generate employment for over two million Kenyans through fishing, boat building, equipment repair, fish processing, and other ancillary activities. The full economic potential of marine resources has not been exploited, given that Kenya has a maritime territory of 230,000 square kilometres and a distance of 200 nautical miles offshore, which is equivalent to 31 of the 47 counties.

PRIORITY TRAINING STANDARDS RECOMMENDED

- Fish Seed Grower
- Hatchery Operator
- Cage Fish Farmer
- Seaweed Cultivator
- Pearl Culture Technician
- Cold Water Aquaculture Farmer
- Seafood Farmer
- Artisanal Fishing
- Deep Sea Fishing
- Net Mending and Repairs
- Salt Farmer
- Fish Retailer
- Seafood Packager
- Cold Chain Process Management Specialist
- Perishable Product Handling Specialist
- Warehouse Quality Checker
- Marine Fitter and Rigger
- Pipefitter (Shipbuilding)
- Ship Joiner
- Ship Maintenance Technician
- Ship Repairer
- Ship Safety Inspector
- Hull and Engine Maintenance (Small Fishing Boats)
- Pre-cleaning Technician (Ship Breaking)
- Ship and Vessel Cleaner
- Technician (Ship Scrapper)
- Ship and Yard Planning Supervisor
- Container Repairer
- Cargo Handlers
- Cargo Logistics
- Wastewater Treatment Plant Technician
- Desludging Operator
- Pipe Laying Technician
- Quality Monitoring Technician (Water and Wastewater)
- Fish and Seafood Processing Technician
- Insurance Officer (Ship and Other Vessel)
- Vessel Registration Officer
- Dock Yard Security Personnel
- Marine Surveyor
- Marine Biotechnologist
- Marine Conservationist
- Mangrove and Environmental Education Technician
- Marine Tourism and Recreation Manager
- Cruise Ship Caterer
- Adventure and Water Sport Operator
- Recreational Fishing Operator
- Reef Tourism Operator
- Lifeguard
- Lifeboat and Survival Officer



5. RECOMMENDATIONS

This chapter summarizes the recommendations and way forward for National TVET standards in Kenya.

5.1. HARMONIZATION OF STANDARDS

Multiple projects and activities conducted by different stakeholders within the Kenyan TVET ecosystem are often in silos, with limited possibility to scale at national and regional levels. These include activities like development of TVET occupational standards, curricula, assessments etc. A harmonized approach, as provided in CBETA requirements and guidelines, to these activities, shall ensure standardization, improving the quality and relevance of TVET programmes, positively contributing to national and regional agendas and facilitating seamless labour mobility across the region.

5.2. REVISION OF EXISTING OCCUPATIONAL STANDARDS TO OCCUPATIONAL TRAINING STANDARDS

A gap-analysis for existing occupational training standards was conducted using a customized Occupational Training Standard Checklist (OTSC) and Occupational Training Standard Validation Tool (OTS Validation Tool) that were developed for Kenya. Gap-analysis indicates that different institutions in Kenya are focusing on developing industry-linked occupational standards. However, no Occupational Training Standards exist.

Occupational Training Standards bridge the gap between the world of work and the world of education. These are used to effectively develop curricula and ensure relevance of TVET programmes.

Existing occupational standards can be revised with guidance from TVETA to Occupational Training Standards by addressing the gap areas. These include detailing for tools and equipment, assessments (diagnostic, formative, summative), trainer qualifications, training infrastructure, special needs training specification, industry validation etc. These should subsequently be gazetted as Occupational Training Standards.

5.3. PRIORITY OCCUPATIONAL TRAINING STANDARDS FOR KENYA

A database of occupational training standards has been identified for Kenya (Annexure I) based on international benchmarking and competitiveness, national agenda, regional priorities, industry and sectoral growth potential in Kenya, promotion for entrepreneurship, inclusive training and cross-border mobility

Competency Framework Approach for Occupational Training Standards



Figure 37: Competency Framework Approach for Occupational Training Standards

through export of labour. Occupational training standards can also guide the development of short courses, promoting life-long learning.

When developing or adopting new occupational training standards, focus should be on core competencies (21st Century skills, mindfulness etc.), transversal skills and job specific skills. Transversal skills can be used in a wide variety of situations and work settings (for example, organizational skills, report writing, customer support). Identifying transversal skills shall enable cross-movement of trainees and support better employability opportunities.

TVETA's CBETA Requirements and Guidelines provide the approach and standardization required in the following processes and outputs in Kenya and should be adhered to when:

- Developing a new curriculum, occupational training standard or learning material
- Adopting an international occupational training standard within the Kenyan TVET context
- Validating an occupational training standard

As part of occupational training standards revision, development and adoption, Kenya can create a national competency repository, similar to countries like Australia and Philippines. Such repositories enable ease in accessing or knowing gaps in gazetted occupational training standards, identification of prior learning, mobility across TVET programmes and overall capacity development.

The following section lists priority occupational training standards for each sector that have been identified as critical for Kenya's growth and meeting workforce demands.



Source: www.kbc.co.ke

EXISTING OCCUPATIONAL STANDARDS

- Agricultural Extension
- Agripreneurship
- Apiary Attendant
- Apiculture Management
- Aquaculture
- Beehives and Equipment Construction
- Dairy Farm Management
- Fisheries Technology (fishing operations)
- Forestry Management
- Horticulture Nursery Management
- Horticulture Production
- Agricultural Engineering
- Agriculture Machinery and Equipment
- Integrated Pest Management
- Pig Production
- Poultry Breeding and Hatchery Operations
- Poultry Broiler Production Operations
- Poultry Hatchery Operations
- Poultry Kienyeji Production
- Poultry Layer Production

PRIORITY TRAINING STANDARDS RECOMMENDED

- Coffee Plantation Worker
- Tea Plantation Worker
- Packhouse Worker
- Warehouse Worker
- Bamboo Grower
- Cage Culture Fish Farmer
- Crab Farmer
- Camel Rearer
- Feed Technician
- Flower Handler — Packaging and Palletizing
- Harvesting Machine Operator
- Hydroponics Technician
- Irrigation Service Technician
- Pearl Culture Technician
- Agriculture Warehouse Supervisor
- Cold Storage Supervisor
- Soil & Water Testing Lab Analyst
- Veterinary Clinical Assistant

MANUFACTURING SECTOR

EXISTING OCCUPATIONAL STANDARDS

- Automotive Engineering
- Automotive Mechatronics Technology
- Baking Technology (Cake Production and Decoration)
- Baking Technology (Production of Cakes and Pastry Products)
- Baking Technology (Production of Yeast Products and Cakes)
- Bee Products Processing
- Carpentry and Joinery
- Ceramics Technology
- Chemical Engineering
- Dairy Plant Management
- Dairy Processing
- Electronics
- Electronics Engineering
- Fabric Formation
- Fashion Design (Dress Making)
- Fashion Design (Tailoring)
- Fashion Design Management
- Fisheries Technology
- Fisheries Technology (Dry Dock Operations)
- Food Processing Technology
- Footwear Production
- Horticultural Produce Processing Management

PRIORITY TRAINING STANDARDS RECOMMENDED

- Vehicle Assembly Fitter
- Assembly Line Supervisor
- Maintenance Technician (Electrical and Mechanical)
- Smartphone Assembly Inspector
- Quality Control Inspector (Leather)
- Production/ Manufacturing Chemist - Life Sciences
- Quality Assurance Chemist
- Sourcing Lead and Vendor Development Executive
- Electroplating Operator
- Plasma Cutter- Manual
- Calibration Technician
- Installer - Additive Manufacturing (3D Printing)
- Fitter: Hydraulic & Pneumatic System
- Locomotive Driver
- Control Room Operator
- Bamboo Basket Maker
- Industrial Production Worker – Food
- Packing Machine Worker – Food Processing
- Assistant Lab Technician - Food and Agricultural Commodities
- Fish and Sea Food Processing Technician
- Fruit Pulp Processing Technician

EXISTING OCCUPATIONAL STANDARDS

- Industrial Automation and Robotics
- Industrial Controls Installations
- Industrial Mechatronics Technology
- Industrial Plant Operations
- Instrumentation and Control (Simple Automation Control Inspection Option)
- Instrumentation and Control (Calibrations and Measurements)
- Instrumentation and Control (Industrial Pneumatics)
- Leather Goods Production
- Leather Processing (Tanning)
- Leather Technology
- Marine Engineering (Ship Construction)
- Meat Abattoir Operations
- Meat Based Product Processing
- Meat Butchery Operations
- Meat Processing
- Meat Slaughterhouse Operations
- Mechanical Plant Technology
- Mechanical Production (Grinding & Fabrication) (Lathe & Fabrication)
- Mechanical Production Technology
- Mechanical Technology (Production)
- Mechanical Technology and Maintenance
- Mechatronic Technician
- Medical Engineering
- Optical technology
- Pharmaceutical technology
- Plant and Service Engineering
- Poultry Processing Operations
- Soft Furnishing
- Spinning
- Textile Engineering
- Textile Processing
- Automotive Mechanic, Technician
- Motorcycle Mechanics

PRIORITY TRAINING STANDARDS RECOMMENDED

- Fruits and Vegetables Canning Technician
- Fruits and Vegetables Drying/ Dehydration Technician
- Ice Cream Processing Technician
- Jam, Jelly and Ketchup Processing Technician
- Milk Powder Manufacturing Technician
- Embroidery Machine Operator (Zigzag Machine)
- Fabric Checker
- Sewing Machine Operator
- Sewing Machine Operator- Knits
- Advance Pattern Maker (CAD/CAM)
- Export Executive
- Machine Maintenance Mechanic- Sewing machine
- Quality Assessor
- Folding Machine Operator
- Assembler-Modular Furniture
- Finisher-Bamboo Furniture
- Carpenter Wooden Furniture
- Delivery and Installation Executive - Furniture and Fitting
- Fitter- Modular Furniture
- Sheet Metal Worker
- Environment and Occupational Health Inspector/ Associate
- Four-Wheeler Service Assistant
- Automotive Engine Repair Technician

HEALTHCARE AND SOCIAL WORK SECTOR



Source: WHO

EXISTING OCCUPATIONAL STANDARDS

- Community Health
- Counseling Psychology
- Health Records and Information
- Health Services Support
- Herbal Medicine
- Home Care Management
- Marriage and Family Therapy
- Medical Laboratory Technician
- Nutrition and Dietetics
- Perioperative Theatre Technology
- Science Laboratory Technician
- Sign Language
- Social Work and Community Development

PRIORITY TRAINING STANDARDS RECOMMENDED

- Ambulance Driver
- Front Line Health Worker
- Anesthesia Technician
- Physiotherapist
- Paramedics
- Blood Bank Technician
- Cardiac Care Technician
- Dental Assistant
- Emergency Medical Technician
- General Duty Assistant
- Geriatric Care Assistant
- Hospital Front Desk Coordinator
- Pharmacy Assistant
- Radiology Technician
- Telehealth Services Coordinator
- Vision Assistant
- Radiation Therapy Technologist
- Regulatory Medical Writer
- Data Quality Assurance Executive
- Field Executive - Data and Document



Source: Enhanced Mortgaging and Housing Africa

EXISTING OCCUPATIONAL STANDARDS

- Architectural Draftsmanship
- Architectural Technology
- Building Artisan
- Building Technician
- Civil Engineering
- Concrete Construction
- Concrete Field Testing
- Construction Management
- Construction Plant Engineering
- Construction Survey
- Electrical Engineering
- Electrical Installation
- Electrical Operations
- Highway Engineering
- Interior Design Finishing
- Masonry
- Mechanical Heavy and Light Machinery
- Operations (Earth Moving)
- Mechanical Heavy and Light Machinery
- Operations (Mobile Crane Operations)
- Welding
- Plumbing

PRIORITY TRAINING STANDARDS RECOMMENDED

- Assistant Bar Bender and Steel Fixer
- Assistant Precast Erection
- Foreman - Roads & Runways
- Foreman - Fabrication
- Junior Batching Plant Operator
- Tower Crane Operator
- Painter and Decorator
- Protective and Marine Painter
- Building Automation Specialist
- CCTV Installation Technician
- Plasterer
- Scaffolding
- EHS - Environment, Health & Safety Officers
- Asphalt
- Roof Installers - Timber and Steel Truss
- Solar Installers
- Green Building Developer
- Tile Layerer
- Concrete Worker
- Aluminium Fabricator
- Structural Cabling Technician
- Asphalt Layerer
- Roof Installer - Timber and Steel Truss Systems
- Steel Fabricator

HOSPITALITY AND TOURISM SECTOR



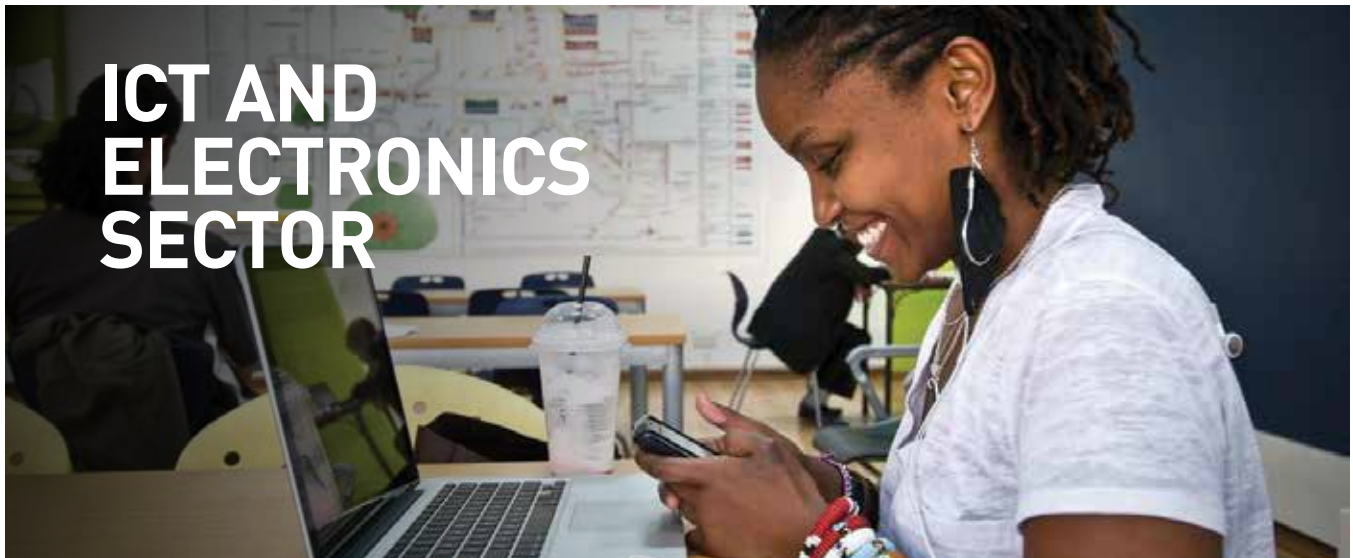
Source: International Hotel & Tourism Institute

EXISTING OCCUPATIONAL STANDARDS

- Bartender
- Food and Beverage Production (Culinary Arts)
- Food Beverage Sales and Service
- Management
- Front Office Operations
- Housekeeping and Accommodation
- Laundry and Dry-Cleaning Operations
- Tour Guide
- Tourism and Travel Management
- Baking

PRIORITY TRAINING STANDARDS RECOMMENDED

- Spa/ Wellness Therapist
- Food Safety Supervisor
- Property Supervisor
- Multi-skilled Technician for Property
- Waiter
- Cruise Ship Executive
- Ship Cook/ Chef
- Ship Stewards
- Multi-functional Administration Executive
- Travel Insurance Executive
- Ticketing Consultant
- Lifeguard (Swimming/Diving)
- Digital Marketer



Source: iHub

EXISTING OCCUPATIONAL STANDARDS

- Animation and Digital Media
- Artificial Intelligence
- Broadcast Journalism
- Computer Applications
- Computer Programming
- Computer Operator
- Computer Science
- Cyber Security
- Data Management and Analytics
- Digital Journalism
- Film Production
- Graphic Design
- ICT Technician
- Music Technology
- Network and System Administration
- Post-Press Printing Technology
- Pre- Press Printing Technology
- Press Printing Technology
- Print Journalism
- Printing Technology
- Telecommunication Engineering
- Computer and Mobile Repair

PRIORITY TRAINING STANDARDS RECOMMENDED

- Sound Technician
- Art Director (Animation and Gaming)
- Camera Operator
- Multimedia Developer
- Technical Writer
- Remote Helpdesk Technician
- Data Networking and Cable Technician
- Web Developer
- Junior Software Developer
- IoT - Control Room Operator
- Tower Technician
- Fault Management Technician
- Network Management Technician
- E-Waste Collector
- Bioinformatics Associate/ Analyst
- Call Center Customer Care Executive
- Domestic Biometric Data Operator
- Domestic Data Entry Operator
- Field Technician - Computing and Peripherals
- Digital Content Developer
- Social Media Manager
- Service Technician - Home Appliances
- Security Systems Installer

MINING AND QUARRYING SECTOR



EXISTING OCCUPATIONAL STANDARDS

- Cartography
- Gemology
- Geographical Information System (GIS) Technology
- Geophysical Exploration Technology
- Land Surveying
- Mining Technology
- Oil Pipeline Fire Operations
- Oil Pipeline Instrumentation and Control
- Oil Pipeline Laboratory Technology
- Oil Pipeline Mechanical Maintenance
- Oil Pipeline Operations
- Petroleum Management
- Photogrammetry and Remote Sensing
- Quantity Surveying
- Salt Processing
- Slinging and Rigging Operations

PRIORITY TRAINING STANDARDS RECOMMENDED

- Handmade Jewellery (Gold) Designer
- Polisher and Cleaner
- Technician Drilling (Oil & Gas)
- Industrial Electrician (Oil & Gas)
- Industrial Welder (Oil & Gas)
- Pipe Fitter (Oil & Gas)
- Retail Outlet Attendant (Oil & Gas)
- Mine Welder
- Ore Processing Operator
- Mineral and Stone Processing Plant Operator



ENERGY SECTOR

EXISTING OCCUPATIONAL STANDARDS

- Refrigeration and Air Conditioning
- Solar PV Installation
- Electrical Engineering

PRIORITY TRAINING STANDARDS RECOMMENDED

- Assistant Technician - Street Light Installation and Maintenance
- Assistant - Tower Erection Power Transmission
- Billing and Cash Collector
- Consumer Energy Meter Technician
- Attendant Sub-Station Power Distribution
- Pipe Fitters
- Lineman Distribution (Multi-Skilled)
- Power System Technician (Transmission)
- Technician Railway Track Electrification
- Construction Technician (Civil) - Wind Power Plant
- O&M Electrical & Instrumentation Technician - Wind Power Plant
- O&M Mechanical Technician - Wind Power Plant
- Solar Thermal Plant Installation and Maintenance Technician
- Rooftop Solar Grid Technician



WATER SUPPLY SEWERAGE, IRRIGATION AND WASTE MANAGEMENT SECTOR

Source: www.worldagroforestry.org

EXISTING OCCUPATIONAL STANDARDS

- Environmental Management
- Environmental Science
- Irrigation and Drainage Engineering Technology
- Wastewater and Sanitation Engineering Technology
- Water Engineering
- Water Laboratory Technology
- Water Resource Management Technology

PRIORITY TRAINING STANDARDS RECOMMENDED

- Wastewater Treatment Plant Helper
- Desludging Operator
- Rainwater Harvesting Technician
- Hazardous Waste Technician



EXISTING OCCUPATIONAL STANDARDS

- Aeronautical Engineering- Air frame and power plant option
- Aeronautical Engineering- Avionics option
- Air Cargo Management
- Air Cargo Operations
- Airport operations
- Clearing and Forwarding
- Customs Administration
- Flight dispatch
- Freight Management
- Freight Operations
- Maritime Transport and Logistics
- Road Transport Management
- Road Transport Operations

PRIORITY TRAINING STANDARDS RECOMMENDED

- Aerospace Materials Specialist
- Aircraft Structures Technician
- Aviation Painter
- Locomotive Technician
- Track & Bridge Maintenance Worker
- Incidence and Accident Investigator
- Handlers for Dangerous Goods
- Warehouse Quality Checker
- Cold Chain Process Management Specialist
- E-commerce Team Lead
- Perishable Product Handling Specialist
- Utility Hand (Skilled Marine)
- Ship Scrapper - Technician
- Ship and Yard Planning Supervisor
- Marine Search and Rescue Operators
- Naval Vessel Construction and Repair Technician
- Naval Architects (Designers, Fitters, Boiler makers, Welders, Boat Builders and Repairers)
- Marine Transport and Logistics (Shore-based) Operator
- Nautical Science – Navigation Officers
- Nautical Science – Deck Ratings Technician
- Marine Engineering – Ship Technician
- Marine Engineering – Engine Rating Technician

FINANCIAL SERVICES AND INSURANCE SECTOR



Source: fsdkenya.org

EXISTING OCCUPATIONAL STANDARDS

- Banking and finance
- Cooperative management
- Credit management
- Credit Officer
- Financial Sales Services
- Forex and securities
- Insurance
- Investment Management
- Islamic Banking
- Tax Administrator
- Tax Clerk

PRIORITY TRAINING STANDARDS RECOMMENDED

- Microfinance Executive
- Debt Recovery Agent
- Loan Approval Officer
- Loan Processing Officer
- Financial Data Analyst
- Cyber-Security Specialist
- Financial Advisors and Trainers



WHOLESALE AND RETAIL TRADE SECTOR

Source: nation.africa

EXISTING OCCUPATIONAL STANDARDS

- Distributed Sales
- Storekeeping Management

PRIORITY TRAINING STANDARDS RECOMMENDED

- Visual Merchandiser
- Technical and Commercial Sales Representative
- Sales Executive
- Commodity Broker
- E-commerce Manager
- Cashiers
- Customer Service Representative



Source: Xinhua

EXISTING OCCUPATIONAL STANDARDS

- Drawing and Painting
- Fine Arts
- Music Art
- Music Performance
- Theatre Arts
- Library and Information Science
- Records and Archive Management
- Fitness Instructor
- Sports Instructor Technology
- Sports Science Technology

PRIORITY TRAINING STANDARDS RECOMMENDED

- Sports Counselor
- Industrial Products (Artistic) Designer
- Indigenous Craftsman



Source: securex africa.com

EXISTING OCCUPATIONAL STANDARDS

- Human Resource Management
- Marketing Management
- Office Administration
- Office Assistance
- Security Guarding
- Security Management
- Supply Chain Management
- Beauty Therapy
- Hairdressing
- Christian Ministry

PRIORITY TRAINING STANDARDS RECOMMENDED

- Police Officer
- Police Surveillance Officer
- Firefighter
- Personal Security Officer
- Security Supervisor
- Child Caretaker (Non-Clinical)
- Elderly Caretaker (Non-Clinical)
- Caregiver - Mother and Newborn
- Caregiver - Person with Disability (Non-Clinical)
- Logistics Management
- Recruitment Executive

EDUCATION SECTOR



EXISTING OCCUPATIONAL STANDARDS

- Technical Trainer
- Instructor
- Manager
- Programme Developer
- Assessor
- Verifiers

PRIORITY TRAINING STANDARDS RECOMMENDED

- Training Materials Developer
- Pre-primary Teachers
- Education Researcher and Evaluators
- Adult Literacy Trainers
- Educational Institute Auditors
- Educational Data Analyst
- Driving Instructor
- Special Needs Educator Trainer
- Information Technology Trainer
- Language Trainer
- Migrant Education Trainer
- Career Counsellors

5.4. REQUIREMENT AND GUIDELINES STANDARDS FOR QUALITY ASSURANCE

TVETA has prepared and gazetted certain requirement and guidelines standards for quality assurance. These standards were reviewed for gap-analysis and benchmarked with international best practices.

TVETA standards are relatively recent and currently in early stages of implementation. The review of existing standards shows that TVETA's standards have focused on primary stakeholders that are training institutions, SAGAs etc. The standards were found to be comprehensive with few suggested improvements based on international best practices that can be considered for better clarity, guidance and seamless implementation.

Based on international benchmarking, gap-analysis, and interaction with stakeholders, following are the recommendations to enhance the overall quality of the TVET eco-system in Kenya.

- **Ranking of training institutes:** Globally, institutions are ranked as part of their registration on adherence to standard requirements using graded norms. Such approaches ensure standardization of training delivery on multiple factors. Each trainee should have equal opportunity to access basic training infrastructure irrespective of the institution. Ranking ensures that institutions are focusing not just on meeting minimum standards but moving beyond, towards excellence. Ranking promotes constructive competition that eventually translates into betterment of TVET system. The institutional quality ranking system can encapsulate the existing TVETA standards for VTCs, TVCs, National Polytechnics (NPs) and Centers of Excellence (COEs).
- **Requirement and guidelines for Regional Centers of Excellence:** Support development of Regional Centers of Excellence for East African Community and County based epicenters. Here, the Center of Excellence is focused on regional industry demands based on Gross Domestic Contribution (GDP) of the region, for example, looking at mining and blue economy regional blocs for Regional Centers of Excellence. Center of Excellence Standards and Guidelines developed by TVETA can be revised as per requirements.
- **Requirement and guidelines for TVET institutes to identify and deliver training programmes aligned to local needs:** Establishing specialized TVET programs that shall support local and regional needs. For example, focusing on jewellery and gems programs in mining regions, textile and leather production in counties with high production capacity etc.
- **Requirement and guidelines standards for PPP for TVET programmes:** Providing standards for TVET institutes to partner with industries. Many corporates are keen to closely partner and work with TVET institutions. Standards can provide how TVET institutes can work with private organizations using the Public Private Partnership (PPP) model.
- **Requirement and guidelines standards for attachment programmes and placements of trainees:** For example, Germany conducts its dual system of training in cooperation with small and medium sized companies and vocational and training centers. More than 1.3 million apprenticeship trainings take place every year in the country.

5.5. CROSS-CUTTING RECOMMENDATIONS ENHANCING QUALITY AND RELEVANCE FOR TVET IN KENYA

In addition to occupational training standards and requirement and guidelines standards for quality assurance for TVET, the following recommendations have been listed for enhancing TVET in Kenya.

These recommendations are based on best practices in the TVET ecosystem globally, suggestions and feedbacks from stakeholders and review of existing standards. Implementation of these shall be critical in overall enhancement of TVET in Kenya.

- Awareness creation and sensitization
- Sector Skills Councils (SSCs)
- Continuous Professional Development (CPD)
- Digital transformation of TVET
- Entrepreneurship
- Export of Labour
- Gender mainstreaming and inclusivity in TVET
- Annual labour market reports and updated LMIS

5.5.1. Awareness creation and sensitization

A positive perception and image of TVET can only evolve if it ties in with a good quality of TVET, functioning labour markets and appropriate rates of return at a rational level as well as positive projections into the future with respect to identity, cultural perception and behavioural patterns on an emotional level.

There is a need to regularly sensitize key stakeholders regarding TVETA's work. Specifically, it is important that standards developed by TVETA have better sensitization and visibility to stakeholders. For example, most TVET institutions are trying to cope in times of COVID-19 by using technology for continuing classroom learning. However, a vast number of stakeholders are unaware of the Open and Distance Education Learning (ODEL) Standards developed by TVETA.

Easy to read documents, Frequently Asked Questions (FAQs), brochures and sensitization workshops / seminars / webinars shall support larger sensitization and greater uptake for implementation at both public and private TVET institution levels. Implementing stakeholder sensitization on standards shall help in creating dialogues for standardization, quality and relevance of TVET trainings.

Stakeholders have also highlighted that Standards developed must be easy to access and available freely without any cost implications.

Key recommendations:

- Regular stakeholder engagements and sensitization on new trends in TVET and TVETA initiatives including standards, through webinars and workshops.
- Specifically, conduct awareness campaigns on standards in TVET.

5.5.2. Sector Skills Councils (SSCs)

The collaboration of industry in the setting up of TVET occupational training standards is a vital aspect for ensuring skills gaps and skills mismatch are identified and appropriately addressed; skills forecasting is done based on labour market needs; training is industry-aligned.

Sector Skills Councils (SSCs) have been successfully established by many countries such as India, Australia, and

United Kingdom as an effective measure to increase the participation of the industry and different stakeholders in the TVET ecosystem.

The SSCs operate as independent, employer-led organizations or autonomous bodies that seek to build a skills system that is driven by employer demand. Their main aim is to reduce skills gaps and shortages; improve productivity and ensure structured participation of industry in the TVET ecosystem.

SSCs apply to specific economic sectors and are usually mandated with the following core functions:

- Identification of skill development needs including preparing a catalogue of types of skills, range and depth of skills to facilitate individuals to choose from them.
- Development of a sector skill development plan and maintaining skill inventory.
- Determining skills/ competency standards and qualifications
- Standardization of affiliation, accreditation, examination and certification process
- May also conduct skill-based assessment and certification for training programmes.
- Participation in the setting up of affiliation, accreditation, examination and certification norms for their respective sectors.
- Plan and facilitate the execution of Training of Trainers.
- Promotion of academies of excellence.
- Paying particular attention to the skilling needs of women, marginalized groups, differently-abled and minority groups.
- Ensuring decent wage and employment for formal and informal sector workers.

Key recommendations:

- For Kenya to achieve comprehensive and sustainable skills development, it is recommended that Sector Skills Councils (SSCs) for the key economic sectors be established. They can be provided with initial seed funding to incubate and facilitate their growth and enable them to achieve self-sustainability in a time bound manner.

- In the interim, TVETA may also establish Sector Skills Advisory Committees (SSAC) for each of the key economic sectors, or make use of existing Committees already in existence.

5.5.3. Continuing Professional Development (CPD)

Continuing Professional Development (CPD) is a holistic human resource management approach that enables broadening of knowledge, skills of trainers. It also helps in improving personal qualities and overall efficiency in meeting professional duties.

Trainers are the main stakeholder in delivering TVET and are responsible for developing a competent workforce. The quality of education, and in particular Technical and Vocational Education and Training (TVET), is strongly dependent on the competence of trainers.

The need for introducing a system for continuing professional development has been shared by stakeholders of SAGAs closely working in TVET ecosystem, representative of training institutes and industry players like KAM, TRA etc. When trainers are updated with skills and latest industry practices, the output quality of trainees shall be better.

The competence of trainers is however dependent on how well they continue to learn and update their knowledge and skills. Training for trainers has been recognized as an important intervention in many countries globally. For instance, Germany has detailed rules for training of trainers in the Ordinance for the examination leading to the recognized advanced training qualification of Certified Vocational Educator.

Through Continuing Professional Development (CPD), TVET trainers should be encouraged to upskill and reskill as per the curriculum requirement to meet labour market needs. Standards for Continuing Professional Development (CPD) should focus on renewal of training licenses using credit point reward mechanism track, monitor trainer's lifelong learning and developmental journey and recognize exceptional talent.

Development of standards for Continuous Professional Development (CPD) should involve all stakeholders using

a participatory approach. For example, Europe has developed a policy with two major objectives, one for the promotion of continuing personal and professional development of trainers and the other being the improvement of career development and reward system.

Key recommendations:

- Develop policy, framework and standards for Continuing Professional Development (CPD) of TVET trainers and the wider administrative personnel within TVET ecosystem. This can include specifying trainer qualifications, revising competency framework for TVET to include career progression and personal development, providing standards for industry interactions for trainers, among others.
- Provide for mandatory ICT skills development for TVET trainers to upskill them for digital teaching-learning processes in the post COVID-19 world.

5.5.4. Digital transformation of TVET

While online and distance educational learning standards have been partly covered in the TVETA ODeL - Regulation and Guidelines (2019), the COVID-19 pandemic has led to various challenges, including forcing TVET institutions to remain closed.

One of the effective ways to continue skilling is to reinforce online-based learning. This has important implications for vocational education, which is mostly hands-on and practice-driven. Clear standards need to be set in terms of how technical vocational courses may be delivered in a remote mode, along with specification for connectivity, platform, course content, assessment and evaluation requirements. Stakeholders shared that there is a need to set guidelines for supporting online delivery of TVET programs.

Traditionally, TVET education has been focused on hands-on practical learning, however, newer technologies such as Augmented Reality (AR) and Virtual Reality (VR) can provide alternate solutions. Technology-led delivery of programs should be standardized across the TVET ecosystem for democratizing access to education.

With the advent of technology, it is important that TVETA provides guidelines for security and data provision requirements to be

followed by TVET institutions. The Data Provision Requirements 2012 in Australia, there is a requirement for standards and guidelines for the nature of the records and data to be stored by institutions, the format, the security, and their regular review of utilization in policy decisions and for obsolescence.

Key recommendations:

- Develop a national digital transformation strategy and framework for TVET for the post-COVID-19 world of skills and work.
- Review ODeL Regulations and Guidelines and update them for a post-COVID-19 world.
- Develop standards for using learning management systems and other e-learning platforms.
- Develop standards for digital content development.
- Develop standards for assessments for courses that are digitally delivered or through blended learning.
- Develop standards for data protection and security for TVET institutions using digital modes of teaching and learning.

5.5.5. Entrepreneurship

In today's world, TVET has become more than mere skill acquisition. It has stronger links with the labour market and strategies have to be developed to stay relevant in the fast-changing world of work.

Apart from employment-linked programs, specific focus is also needed on Entrepreneurship. The goal of economic self-sufficiency can be achieved by the implementation of Entrepreneurship as an employability strategy.

This can be achieved by developing new programmes and policies for fostering innovation in different sectors of the economy, providing platforms and collaboration opportunities for different stakeholders, creating awareness and creating an umbrella structure to oversee innovation ecosystem of the country.

As early stage hand holders, incubators act as an integral part of the start-up ecosystem. They act as a catalyst for both regional and national economic development. These dedicated innovation workspaces can build an ecosystem to mentor, guide, nurture and support innovations in their pursuit

to become scalable and sustainable. Incubation support may take various forms, for example, dedicated facilities and co-working space, network and linkages, mentoring and advisory support services, initial growth funds, angel investments and venture capital, among others.

Key recommendations:

- Carrying out an international benchmarking and national stakeholder engagement study, providing a detailed review of international best practices and national entrepreneurship potential with a recommendation of initiatives for Kenya.
- Develop a national policy, framework and standards for entrepreneurship and incubators.
- Set up startup and enterprise development incubation centers at National Polytechnics to promote innovation and entrepreneurship across Kenya. These can focus on specific sectors based on the region and county.
- Review entrepreneurship curriculum and add short courses on entrepreneurship. For example, the youth can be trained on organizational skills including time management, leadership development and interpersonal skills as all of these are highly transferrable skills that are in demand.
- Provide start-up kits to potential entrepreneurs for financial support in the form of grants, loans etc.

5.5.6. Export of Labour

Kenya is a young country with ~75% of its population below the age of 35 years. This demographic dividend presents an opportunity that can be leveraged to create a high-quality skilled workforce for the rest of the world, especially those nations which have an ageing or declining national population.

Export of labour from Kenya can cater to the global workforce demand and promote regional and global mobility, strengthen the Kenyan skilling ecosystem, and encourage collaborations and knowledge sharing with other developing and developed economies.

For example, in United Arab Emirates (UAE), Saudi Arabia and Qatar, skilled workforce is required across major sectors

such as Construction, Wholesale and Retail Trade, Real Estate, Rental and Business Services etc. In Germany, Netherlands, UK, Sweden, Switzerland, it is required across major sectors such as Health and Social Care, Manufacturing etc. In Singapore, Australia, New Zealand, Canada, USA, Japan and Malaysia, it is required across major sectors such as Health Care and Social Assistance, Construction etc.

Key recommendations:

- Carry out an international benchmarking and skilled workforce needs assessment study, providing a detailed review of international best practices with recommendations for export of labour from Kenya.
- Develop a national policy, framework and standards for export of labour.
- Develop Government to Government (G2G) and Business to Business (B2B) workforce mobility collaborations with countries like GCC (Gulf Countries), Canada, Australia, Finland, Morocco, Sweden, Russia, Jordan, Maldives, Japan, among others.

5.5.7. Gender mainstreaming and inclusivity in TVET

Studies show low participation of women in TVET programs leading to gender imbalance. Standards should be developed for ensuring TVET institutes support participation of more women in different courses. For example, Philippines has been focusing on the gender mainstreaming of its workforce through TVET and has launched Philippine Magna Carta of Women which promotes equality and empowerment of women in workforce. It encourages the enrolment of women in non-traditional skills training, promotion of gender sensitive training programs and gender responsive career counselling.

Training institutions should also provide support systems for female trainees such as day-care for young children, adequate sanitation facilities and introduction of short courses appealing to women for entrepreneurship and employment. These could be, for example, knitting, crocheting, agro-processing etc. Various life skills and soft skills should also be provided that can enable women trainees to develop wider skills for better access to and competitiveness in the job market.

Another important aspect for skill development is to support mainstreaming of individuals with special needs. There are different occupations that can be performed by an individual with special needs. For example, India focuses on occupational training standards suitable for people with disabilities.

Key recommendations:

- Develop a national policy or strategy on disability inclusive skills development, based on the principles of equal opportunity and non-discrimination, and equality between men and women.
- Develop standards for gender mainstreaming in TVET.
- Develop standards for inclusivity in TVET including occupational training standards suitable for persons with disabilities.

5.5.8. Annual labour market reports and updated LMIS

One of the biggest challenges within TVET is the lack of structured data to forecast workforce demands.

Annual labour market studies, tracer studies, forecasting studies, etc. can help in identifying areas of demand for skilled workforce. This can ensure that the Government focuses more on training to meet that demand. An up-to-date and modern LMIS can also support in data and needs collection and planning for skilled resources.

Having a standard approach to conducting these studies and consolidating employer feedbacks for trainees shall benefit in providing a feedback-loop for occupational training standards and curriculum, quality of training delivery, uptake of trainees and overall trainee quality.

Key recommendations:

- Develop standards for conducting labour market and forecasting studies.
- Develop standards for conducting tracer studies.
- Develop a new, improved and modern Labour Market Information System (LMIS) that is updated regularly in real-time and develop standards for its use.

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S. No.	Occupational Training Standards	ISCED-F 2013
1	Dairy Farmer	Agriculture, forestry, fisheries and veterinary
2	Livestock Rearer	Agriculture, forestry, fisheries and veterinary
3	Tractor Operation and Maintenance Technician	Agriculture, forestry, fisheries and veterinary
4	Tilapia Producer	Agriculture, forestry, fisheries and veterinary
5	Fish Handler and Processor	Agriculture, forestry, fisheries and veterinary
6	Agricultural Crops Producer	Agriculture, forestry, fisheries and veterinary
7	Fish Capturer	Agriculture, forestry, fisheries and veterinary
8	Agricultural Machinery Operator	Agriculture, forestry, fisheries and veterinary
9	Pest Management Technician	Agriculture, forestry, fisheries and veterinary
10	Bamboo Producer	Agriculture, forestry, fisheries and veterinary
11	Coffee Plantation Worker	Agriculture, forestry, fisheries and veterinary
12	Harvest Machinery Operations	Agriculture, forestry, fisheries and veterinary
13	Seaweeds Farmer	Agriculture, forestry, fisheries and veterinary
14	Sugarcane Producer	Agriculture, forestry, fisheries and veterinary
15	Tea Plantation Worker	Agriculture, forestry, fisheries and veterinary
16	Aquaculture Worker	Agriculture, forestry, fisheries and veterinary
17	Artificial Insemination Technician	Agriculture, forestry, fisheries and veterinary
18	Gardener	Agriculture, forestry, fisheries and veterinary
19	Groundskeeper	Agriculture, forestry, fisheries and veterinary
20	Interior Landscaper	Agriculture, forestry, fisheries and veterinary
21	Agronomist	Agriculture, forestry, fisheries and veterinary
22	Fisheries Extension Associate	Agriculture, forestry, fisheries and veterinary
23	Fishing Boat Maintenance Worker	Agriculture, forestry, fisheries and veterinary
24	Fishing Gear Repair and Maintenance Technician	Agriculture, forestry, fisheries and veterinary
25	Greenhouse Installer and Operator	Agriculture, forestry, fisheries and veterinary
26	Hatchery Operator	Agriculture, forestry, fisheries and veterinary
27	Hatchery Production Worker	Agriculture, forestry, fisheries and veterinary
28	Plant Nutritionist	Agriculture, forestry, fisheries and veterinary
29	Post-Harvest Program Implementer	Agriculture, forestry, fisheries and veterinary
30	Environmentalist	Agriculture, forestry, fisheries and veterinary
31	Non-Timber Forest Produce Collector	Agriculture, forestry, fisheries and veterinary
32	Nursery Worker	Agriculture, forestry, fisheries and veterinary
33	Orchard Worker	Agriculture, forestry, fisheries and veterinary

S. No.	Occupational Training Standards	ISCED-F 2013
34	Pack-house Worker	Agriculture, forestry, fisheries and veterinary
35	Seed Processing Worker	Agriculture, forestry, fisheries and veterinary
36	Soil Sampler/Collector	Agriculture, forestry, fisheries and veterinary
37	Stud Farm Worker	Agriculture, forestry, fisheries and veterinary
38	Warehouse Worker	Agriculture, forestry, fisheries and veterinary
39	Watershed Assistant	Agriculture, forestry, fisheries and veterinary
40	Agriculture Commodity Fumigation Operator	Agriculture, forestry, fisheries and veterinary
41	Agriculture Extension Service Provider	Agriculture, forestry, fisheries and veterinary
42	Agriculture Field Officer	Agriculture, forestry, fisheries and veterinary
43	Agro Entrepreneur	Agriculture, forestry, fisheries and veterinary
44	Aquaculture Fabricator	Agriculture, forestry, fisheries and veterinary
45	Aquarium Technician	Agriculture, forestry, fisheries and veterinary
46	Aquatic Animal Health Lab Assistant	Agriculture, forestry, fisheries and veterinary
47	Bamboo Grower	Agriculture, forestry, fisheries and veterinary
48	Banana Farmer	Agriculture, forestry, fisheries and veterinary
49	Barefoot Technician	Agriculture, forestry, fisheries and veterinary
50	Beekeeper	Agriculture, forestry, fisheries and veterinary
51	Brackish Water Aquaculture Farmer	Agriculture, forestry, fisheries and veterinary
52	Bulb Crop Cultivator	Agriculture, forestry, fisheries and veterinary
53	Bulk Milk Cooler (BMC) Operator	Agriculture, forestry, fisheries and veterinary
54	Cage Culture Fish Farmer	Agriculture, forestry, fisheries and veterinary
55	Chick Sexing and Grading Technician	Agriculture, forestry, fisheries and veterinary
56	Chilling Plant Technician	Agriculture, forestry, fisheries and veterinary
57	Citrus Fruit Grower	Agriculture, forestry, fisheries and veterinary
58	Coconut Grower	Agriculture, forestry, fisheries and veterinary
59	Cotton Cultivator	Agriculture, forestry, fisheries and veterinary
60	Crab Farmer	Agriculture, forestry, fisheries and veterinary
61	Deep Sea Fisher	Agriculture, forestry, fisheries and veterinary
62	Feed Technician	Agriculture, forestry, fisheries and veterinary
63	Fishing Boat Driver (Small Mechanized Vessels)	Agriculture, forestry, fisheries and veterinary
64	Fishing Boat Mechanic	Agriculture, forestry, fisheries and veterinary
65	Fishing Equipment Technician (Electronics)	Agriculture, forestry, fisheries and veterinary
66	Fishing Gear Technician	Agriculture, forestry, fisheries and veterinary
67	Floriculturist - Open cultivation	Agriculture, forestry, fisheries and veterinary

S. No.	Occupational Training Standards	ISCED-F 2013
68	Floriculturist - Protected cultivation	Agriculture, forestry, fisheries and veterinary
69	Flower Handler - Packaging and Palletising	Agriculture, forestry, fisheries and veterinary
70	Forest Nursery Raiser	Agriculture, forestry, fisheries and veterinary
71	Freshwater Aquaculture Farmer	Agriculture, forestry, fisheries and veterinary
72	Garden Operator	Agriculture, forestry, fisheries and veterinary
73	Group Farming Practitioner	Agriculture, forestry, fisheries and veterinary
74	Harvesting Machine Operator	Agriculture, forestry, fisheries and veterinary
75	Hydroponics Technician	Agriculture, forestry, fisheries and veterinary
76	Irrigation Service Technician	Agriculture, forestry, fisheries and veterinary
77	Laboratory Animal Attendant	Agriculture, forestry, fisheries and veterinary
78	Maize Cultivator	Agriculture, forestry, fisheries and veterinary
79	Mango Grower	Agriculture, forestry, fisheries and veterinary
80	Mariculture Operator	Agriculture, forestry, fisheries and veterinary
81	Marine Capture Fisherman cum Primary Processor	Agriculture, forestry, fisheries and veterinary
82	Medicinal Plants Grower	Agriculture, forestry, fisheries and veterinary
83	Micro Irrigation Technician	Agriculture, forestry, fisheries and veterinary
84	Milk Tester	Agriculture, forestry, fisheries and veterinary
85	Mushroom Grower	Agriculture, forestry, fisheries and veterinary
86	Operator - Reaper Thresher and Crop Residue Machinery	Agriculture, forestry, fisheries and veterinary
87	Organic Grower	Agriculture, forestry, fisheries and veterinary
88	Pearl Culture Technician	Agriculture, forestry, fisheries and veterinary
89	Pesticide and Fertilizer Applicator	Agriculture, forestry, fisheries and veterinary
90	Plant Tissue Culture Technician	Agriculture, forestry, fisheries and veterinary
91	Pulses Cultivator	Agriculture, forestry, fisheries and veterinary
92	Quality Seed Grower	Agriculture, forestry, fisheries and veterinary
93	Ripening Chamber Operator	Agriculture, forestry, fisheries and veterinary
94	Roof Top Gardener	Agriculture, forestry, fisheries and veterinary
95	Seaweed Cultivator	Agriculture, forestry, fisheries and veterinary
96	Seed Processing Plant Technician	Agriculture, forestry, fisheries and veterinary
97	Sericulturist	Agriculture, forestry, fisheries and veterinary
98	Service and Maintenance Technician - Farm Machinery	Agriculture, forestry, fisheries and veterinary
99	Service Technician - Watershed	Agriculture, forestry, fisheries and veterinary
100	Shrimp Farmer	Agriculture, forestry, fisheries and veterinary

S. No.	Occupational Training Standards	ISCED-F 2013
101	Soil and Water Testing Lab Assistant	Agriculture, forestry, fisheries and veterinary
102	Spice Crop Cultivator	Agriculture, forestry, fisheries and veterinary
103	Sugarcane Cultivator	Agriculture, forestry, fisheries and veterinary
104	Supply Chain Field Assistant	Agriculture, forestry, fisheries and veterinary
105	Timber Grower	Agriculture, forestry, fisheries and veterinary
106	Tuber Crop Cultivator	Agriculture, forestry, fisheries and veterinary
107	Vermicompost Producer	Agriculture, forestry, fisheries and veterinary
108	Milk Collection Center In-charge	Agriculture, forestry, fisheries and veterinary
109	Wheat Cultivator	Agriculture, forestry, fisheries and veterinary
110	Agriculture Commodity Quality Assayer	Agriculture, forestry, fisheries and veterinary
111	Agriculture Warehouse Supervisor	Agriculture, forestry, fisheries and veterinary
112	Aquaculture Technician	Agriculture, forestry, fisheries and veterinary
113	Controlled Atmosphere (CA) Store Technician	Agriculture, forestry, fisheries and veterinary
114	Canine Trainer and Handler	Agriculture, forestry, fisheries and veterinary
115	Cold Storage Supervisor	Agriculture, forestry, fisheries and veterinary
116	Commodity Account Manager	Agriculture, forestry, fisheries and veterinary
117	Custom Hiring Service Provider	Agriculture, forestry, fisheries and veterinary
118	Electronic Trading Supervisor - Agriculture Commodity	Agriculture, forestry, fisheries and veterinary
119	Farm Workshop Foreman/Supervisor	Agriculture, forestry, fisheries and veterinary
120	Fish Seed Grower	Agriculture, forestry, fisheries and veterinary
121	Seed Analysis In-charge	Agriculture, forestry, fisheries and veterinary
122	Seed Plant Production Supervisor	Agriculture, forestry, fisheries and veterinary
123	Soil and Water Testing Lab Analyst	Agriculture, forestry, fisheries and veterinary
124	Veterinary Clinical Assistant	Agriculture, forestry, fisheries and veterinary
125	Veterinary Field Assistant	Agriculture, forestry, fisheries and veterinary
126	Watershed Supervisor	Agriculture, forestry, fisheries and veterinary
127	Aquaculture Grow Out Operators	Agriculture, forestry, fisheries and veterinary
128	Cricket Pitch and Maintenance Operators	Agriculture, forestry, fisheries and veterinary
129	Butcher	Agriculture, forestry, fisheries and veterinary
130	Agriculture Food Operators	Agriculture, forestry, fisheries and veterinary
131	Conservation and Land Management Assistant	Agriculture, forestry, fisheries and veterinary
132	Irrigation Technician	Agriculture, forestry, fisheries and veterinary
133	Landscape Construction Technician	Agriculture, forestry, fisheries and veterinary

S. No.	Occupational Training Standards	ISCED-F 2013
134	Retail Nursery Operator	Agriculture, forestry, fisheries and veterinary
135	Seed Production Technician	Agriculture, forestry, fisheries and veterinary
136	Seed Testing Technician	Agriculture, forestry, fisheries and veterinary
137	Veterinary Nurse	Agriculture, forestry, fisheries and veterinary
138	Fisheries Compliance Support	Agriculture, forestry, fisheries and veterinary
139	Seafood Post Harvest Operator	Agriculture, forestry, fisheries and veterinary
140	Fisheries Compliance Officer	Agriculture, forestry, fisheries and veterinary
141	Hatchery Incharge - Poultry	Agriculture, forestry, fisheries and veterinary
142	Poultry feed, Food safety and Labelling Supervisor	Agriculture, forestry, fisheries and veterinary
143	Actor	Arts and humanities
144	Entertainment and Events Technology Technician	Arts and humanities
145	Photographer	Arts and humanities
146	Musical Performer	Arts and humanities
147	Community Cultural Performer	Arts and humanities
148	Arts Administrator	Arts and humanities
149	Dancer	Arts and humanities
150	Ceramics Operator	Arts and humanities
151	Professional Writer and Editor	Arts and humanities
152	Visual Arts	Arts and humanities
153	Ball Maker (Glassware)	Arts and humanities
154	Bamboo Artwork Maker	Arts and humanities
155	Bamboo Mat Weaver	Arts and humanities
156	Carpet Weaver	Arts and humanities
157	Stonemason	Arts and humanities
158	Crochet Lace Tailor	Arts and humanities
159	Cutting, Sanding and Planning Operator	Arts and humanities
160	Design Tracer	Arts and humanities
161	Engraving/ Carving/ Etching Assistant	Arts and humanities
162	Filing Artisan (Metalware)	Arts and humanities
163	Designer and Sketcher	Arts and humanities
164	Engraving Artisan (Metal Handicrafts)	Arts and humanities
165	Etching Artisan (Metalware)	Arts and humanities
166	Character Designer	Arts and humanities

S. No.	Occupational Training Standards	ISCED-F 2013
167	Modeller	Arts and humanities
168	Production Assistant	Arts and humanities
169	Prosthetics Artist	Arts and humanities
170	Rendering Artist	Arts and humanities
171	Voice Over Artist	Arts and humanities
172	Props Master	Arts and humanities
173	Script Researcher	Arts and humanities
174	Set Decorator	Arts and humanities
175	Theatrical and Media Make-up Artist	Arts and humanities
176	Business Facilitator	Business, administration and law
177	Microfinance Executive	Business, administration and law
178	Accounts Executive (Accounts Payable & Receivable)	Business, administration and law
179	Accounts Executive (Payroll)	Business, administration and law
180	Accounts Executive (Recording and Reporting)	Business, administration and law
181	Accounts Executive (Statutory Compliance)	Business, administration and law
182	Debt Recovery Agent	Business, administration and law
183	Equity Dealer	Business, administration and law
184	Front Desk Officer - Financial Institutions	Business, administration and law
185	Insurance Agent	Business, administration and law
186	Life Insurance Agent	Business, administration and law
187	Loan Approval Officer	Business, administration and law
188	Mutual Fund Agent	Business, administration and law
189	Operations Executive - Lending	Business, administration and law
190	Process Executive - Financial Institutions	Business, administration and law
191	Tax Accounts Assistant	Business, administration and law
192	Accounts Executive	Business, administration and law
193	Dealer - Financial Institutions	Business, administration and law
194	Insolvency & Bankruptcy Associate	Business, administration and law
195	Loan Processing Officer	Business, administration and law
196	Research Officer - Financial Institutions	Business, administration and law
197	Financial Data Analyst	Business, administration and law
198	Cyber Security Specialist	Business, administration and law
199	Financial Advisor and Trainer	Business, administration and law
200	Financial Counselling	Business, administration and law

S. No.	Occupational Training Standards	ISCED-F 2013
201	Retail Store Operation Assistant	Business, administration and law
202	Cashier	Business, administration and law
203	Digital Cataloguer	Business, administration and law
204	Distributor Salesman	Business, administration and law
205	Individual Sales Professional	Business, administration and law
206	Sales Associate	Business, administration and law
207	Self-employed e-tailer	Business, administration and law
208	Retail Team Leader	Business, administration and law
209	Visual Merchandiser	Business, administration and law
210	Technical and Commercial Sales Executive	Business, administration and law
211	Commodity Broker	Business, administration and law
212	E-commerce Manager	Business, administration and law
213	Customer Service Representative	Business, administration and law
214	Retail Cosmetics Executive	Business, administration and law
215	Marketing Assistant	Business, administration and law
216	Business Sales Executive	Business, administration and law
217	Franchising Executive	Business, administration and law
218	International Trade and Business Executive	Business, administration and law
219	Business Administrator	Business, administration and law
220	Custom Services Executive	Business, administration and law
221	Para-Legal Services Executive	Business, administration and law
222	Governance Executive	Business, administration and law
223	Human Resources Manager	Business, administration and law
224	Project Manager	Business, administration and law
225	Work Health and Safety Officer	Business, administration and law
226	Payroll Administration Executive	Business, administration and law
227	Office Operations Executive	Business, administration and law
228	Recruitment Executive	Business, administration and law
229	Multifunctional Administration Executive	Business, administration and law
230	Immigration Detention Operations Executive	Business, administration and law
231	Paralegal Associate - Legal Documentation	Business, administration and law
232	Early Childhood Education and Caregiver	Education
233	Dance Teacher	Education
234	Primary Years Physical Activity Facilitator	Education

S. No.	Occupational Training Standards	ISCED-F 2013
235	Demonstrator cum Instructor	Education
236	Training Coordinator	Education
237	Assessor	Education
238	Trainer	Education
239	Training Materials Developer	Education
240	Assessment Developers	Education
241	Training Design and Developer	Education
242	Vocational Education and Trainer	Education
243	Early Years Physical Activity Facilitator	Education
244	Drying and Milling Plant Servicing Technician	Engineering, manufacturing and construction
245	Essential Oil Extractor	Engineering, manufacturing and construction
246	Fish Retailer	Engineering, manufacturing and construction
247	Agro Food Processer	Engineering, manufacturing and construction
248	Automotive Paintshop Assistant	Engineering, manufacturing and construction
249	Highway Toll Traffic Channelizer	Engineering, manufacturing and construction
250	Welding Assistant	Engineering, manufacturing and construction
251	Auto Body Technician	Engineering, manufacturing and construction
252	Casting Technician	Engineering, manufacturing and construction
253	CNC Operator / Machining Technician	Engineering, manufacturing and construction
254	Maintenance Technician-Electrical	Engineering, manufacturing and construction
255	Maintenance Technician-Mechanical	Engineering, manufacturing and construction
256	Spare Parts Operator Executive	Engineering, manufacturing and construction
257	AC Specialist	Engineering, manufacturing and construction
258	Accessory Fitter	Engineering, manufacturing and construction
259	Ambulance Driver	Engineering, manufacturing and construction
260	Auto Component Assembly Fitter	Engineering, manufacturing and construction
261	3-wheelers Driver	Engineering, manufacturing and construction
262	Automotive Electrician	Engineering, manufacturing and construction
263	Automotive Engine Repair Technician	Engineering, manufacturing and construction
264	Automotive Service Technician (2,3,4 wheeler)	Engineering, manufacturing and construction
265	Brake Specialist	Engineering, manufacturing and construction
266	Clutch Specialist	Engineering, manufacturing and construction
267	Commercial Vehicle Driver	Engineering, manufacturing and construction
268	Draughtsman/Draughtsperson	Engineering, manufacturing and construction

S. No.	Occupational Training Standards	ISCED-F 2013
269	Forging Operator	Engineering, manufacturing and construction
270	Forklift Operator	Engineering, manufacturing and construction
271	Heat Treatment Technician/Furnace Operator	Engineering, manufacturing and construction
272	Industrial Technician(Workstation Design)	Engineering, manufacturing and construction
273	Lathe Operator	Engineering, manufacturing and construction
274	PDC Casting Operator	Engineering, manufacturing and construction
275	Plastic Moulding Operator/Technician	Engineering, manufacturing and construction
276	Press Shop Operator	Engineering, manufacturing and construction
277	Process Tryout Technician	Engineering, manufacturing and construction
278	Quality Control Inspector	Engineering, manufacturing and construction
279	Sales Consultant (Automotive finance)	Engineering, manufacturing and construction
280	Sales Officer (Auto Components)	Engineering, manufacturing and construction
281	Soldering and Brazing Technician	Engineering, manufacturing and construction
282	Surface Treatment Technician	Engineering, manufacturing and construction
283	Vehicle Assembly Fitter	Engineering, manufacturing and construction
284	Warranty Processor	Engineering, manufacturing and construction
285	Welding Technician	Engineering, manufacturing and construction
286	Assembly Line Supervisor	Engineering, manufacturing and construction
287	Casting Line Supervisor	Engineering, manufacturing and construction
288	Equipment Designer	Engineering, manufacturing and construction
289	Spare Parts Operator Executive	Engineering, manufacturing and construction
290	Supervisor R&D Testing	Engineering, manufacturing and construction
291	Test Technologist-Product/Vehicle	Engineering, manufacturing and construction
292	Tool Room Supervisor	Engineering, manufacturing and construction
293	Vehicle Test Driver	Engineering, manufacturing and construction
294	Welding Supervisor	Engineering, manufacturing and construction
295	Heavy Vehicle Technician	Engineering, manufacturing and construction
296	Assembly Operator - PLC	Engineering, manufacturing and construction
297	Box-building Assembly Technician	Engineering, manufacturing and construction
298	Capping Operator	Engineering, manufacturing and construction
299	Component Preparation Operator	Engineering, manufacturing and construction
300	Cutting, Crimping and Connector Assembly Operator	Engineering, manufacturing and construction
301	Electrical Assembly Operator – Control Panel	Engineering, manufacturing and construction
302	Energy Meter Assembly Operator	Engineering, manufacturing and construction

S. No.	Occupational Training Standards	ISCED-F 2013
303	Assembly Operator - Magnetics	Engineering, manufacturing and construction
304	Functional Tester	Engineering, manufacturing and construction
305	Incoming Inspection Technician	Engineering, manufacturing and construction
306	Installation Technician - Computing and Peripherals	Engineering, manufacturing and construction
307	Manual Insertion Operator	Engineering, manufacturing and construction
308	Manual Soldering Technician	Engineering, manufacturing and construction
309	Masking Machine Operator	Engineering, manufacturing and construction
310	Mechanical Fitter – Control Panel	Engineering, manufacturing and construction
311	POS Terminal Machine Installer	Engineering, manufacturing and construction
312	Pressing Machine Operator	Engineering, manufacturing and construction
313	Reflow -oven Soldering Operator	Engineering, manufacturing and construction
314	Reliability Tester	Engineering, manufacturing and construction
315	Safety Testing Technician	Engineering, manufacturing and construction
316	Silicon Painting Operator	Engineering, manufacturing and construction
317	Solder Masking & Legend Printing Operator	Engineering, manufacturing and construction
318	Stencil Printing Operator	Engineering, manufacturing and construction
319	UPS Assembly Operator	Engineering, manufacturing and construction
320	Vacuum Plant Operator	Engineering, manufacturing and construction
321	Wave Soldering Machine Operator	Engineering, manufacturing and construction
322	Wireman – Control Panel	Engineering, manufacturing and construction
323	Access Controls Installation Technician	Engineering, manufacturing and construction
324	Assembly Line Operator	Engineering, manufacturing and construction
325	Assembly Operator - PMD and X-Ray	Engineering, manufacturing and construction
326	Assembly Operator Capacitor	Engineering, manufacturing and construction
327	Auto Tester - Capacitor	Engineering, manufacturing and construction
328	Automated Optical Inspection (AOI) Machine Operator	Engineering, manufacturing and construction
329	Bare Board Testing Operator	Engineering, manufacturing and construction
330	Box Assembly Operator	Engineering, manufacturing and construction
331	Calibration Technologist	Engineering, manufacturing and construction
332	CCTV Installation Technician	Engineering, manufacturing and construction
333	Circuit Imaging Operator	Engineering, manufacturing and construction
334	Coating, Curing and Marking Operator	Engineering, manufacturing and construction
335	Customer Inspection Technician	Engineering, manufacturing and construction
336	Broadband Technician	Engineering, manufacturing and construction

S. No.	Occupational Training Standards	ISCED-F 2013
337	Data Networking and Cable Technician	Engineering, manufacturing and construction
338	Die Bonding Operator	Engineering, manufacturing and construction
339	Digital Cable Technician	Engineering, manufacturing and construction
340	Disk Duplicator	Engineering, manufacturing and construction
341	Drilling Operator	Engineering, manufacturing and construction
342	Electrical Design Developer	Engineering, manufacturing and construction
343	Electronic Assembly Technician	Engineering, manufacturing and construction
344	Encapsulation Operator	Engineering, manufacturing and construction
345	Field Technician - TV	Engineering, manufacturing and construction
346	Field Technician - Air Conditioner	Engineering, manufacturing and construction
347	Field Technician - Digital Camera	Engineering, manufacturing and construction
348	Field Technician - Networking and Storage	Engineering, manufacturing and construction
349	Field Technician - Refrigerator	Engineering, manufacturing and construction
350	Field Technician - UPS and Inverter	Engineering, manufacturing and construction
351	Field Technician - Washing Machine	Engineering, manufacturing and construction
352	Final Product Quality Control Technician	Engineering, manufacturing and construction
353	Final Testing Technician	Engineering, manufacturing and construction
354	Functional Tester - Medical Devices	Engineering, manufacturing and construction
355	Functional Testing Technician	Engineering, manufacturing and construction
356	HVAC Technician	Engineering, manufacturing and construction
357	In-circuit Testing Machine Operator	Engineering, manufacturing and construction
358	Incoming Materials Inspector - Electronics Items	Engineering, manufacturing and construction
359	Injection Moulding Operator	Engineering, manufacturing and construction
360	Inner Layer and Pressing Operator	Engineering, manufacturing and construction
361	Installation and Service Technician	Engineering, manufacturing and construction
362	IT Coordinator in School	Engineering, manufacturing and construction
363	LED Light Repair Technician	Engineering, manufacturing and construction
364	LED Luminaries Testing & Measurement Technician	Engineering, manufacturing and construction
365	Machine Maintenance Technician	Engineering, manufacturing and construction
366	Material Inspector	Engineering, manufacturing and construction
367	Mechanical Assembly Operator	Engineering, manufacturing and construction
368	PCB Assembly Operator	Engineering, manufacturing and construction
369	PCB Design Technician	Engineering, manufacturing and construction
370	Performance and Safety Testing Technician	Engineering, manufacturing and construction

S. No.	Occupational Training Standards	ISCED-F 2013
371	Performance Tester	Engineering, manufacturing and construction
372	Pick and Place Assembly Operator	Engineering, manufacturing and construction
373	Potting and Curing Operator	Engineering, manufacturing and construction
374	PV System Maintenance Technician	Engineering, manufacturing and construction
375	Repair Assistant Switches	Engineering, manufacturing and construction
376	Routing Operator	Engineering, manufacturing and construction
377	Sales Executive-Consumer Electronics and IT Hardware	Engineering, manufacturing and construction
378	Security System Installation Technician	Engineering, manufacturing and construction
379	Service Technician – Home Appliances	Engineering, manufacturing and construction
380	Site Technician– Control Panel	Engineering, manufacturing and construction
381	Smartphone Assembly Technician	Engineering, manufacturing and construction
382	Solar LED Technician	Engineering, manufacturing and construction
383	Sorting Operator	Engineering, manufacturing and construction
384	Test and Repair Technician	Engineering, manufacturing and construction
385	Through Hole Assembly Operator	Engineering, manufacturing and construction
386	Through Hole Technician	Engineering, manufacturing and construction
387	Welding Operator	Engineering, manufacturing and construction
388	Winding Operator	Engineering, manufacturing and construction
389	Wire Bonding Operator	Engineering, manufacturing and construction
390	Assembly Supervisor	Engineering, manufacturing and construction
391	Design for Manufacture Technologist	Engineering, manufacturing and construction
392	Design for Test Technologist	Engineering, manufacturing and construction
393	Draftsman	Engineering, manufacturing and construction
394	Electronic Hardware Design Technician	Engineering, manufacturing and construction
395	Embedded Software Technician	Engineering, manufacturing and construction
396	Application Developer	Engineering, manufacturing and construction
397	Field Technician - RACW	Engineering, manufacturing and construction
398	Incoming QC Technician	Engineering, manufacturing and construction
399	In-process and Final Quality Technician	Engineering, manufacturing and construction
400	IoT Hardware Analyst	Engineering, manufacturing and construction
401	LED Light Design Technician	Engineering, manufacturing and construction
402	LED Light Design Validation Technician	Engineering, manufacturing and construction
403	Physical Design Technician	Engineering, manufacturing and construction
404	PPC Technician	Engineering, manufacturing and construction

S. No.	Occupational Training Standards	ISCED-F 2013
405	Pre Sales Solar Technical Support Technician	Engineering, manufacturing and construction
406	Product Technician	Engineering, manufacturing and construction
407	Purchase Executive	Engineering, manufacturing and construction
408	Quality Manager	Engineering, manufacturing and construction
409	Security System Service Technician	Engineering, manufacturing and construction
410	Smartphone Assembly Inspector	Engineering, manufacturing and construction
411	Solar PV System Installation Technician	Engineering, manufacturing and construction
412	Systems Analyst (PCB Design)	Engineering, manufacturing and construction
413	Systems Design Executive	Engineering, manufacturing and construction
414	Testing and Validation Technician	Engineering, manufacturing and construction
415	Verification Technician	Engineering, manufacturing and construction
416	VLSI Design Technician	Engineering, manufacturing and construction
417	Antennae Equipment Technician	Engineering, manufacturing and construction
418	Data and Voice Communications Officer	Engineering, manufacturing and construction
419	Fire Alarms Servicing Technician	Engineering, manufacturing and construction
420	Split Air-conditioning and Heat Pump Systems Technician	Engineering, manufacturing and construction
421	Photovoltaic Systems Technician	Engineering, manufacturing and construction
422	Rail Signalling (Electrical) Technician	Engineering, manufacturing and construction
423	Renewable Energy Technician	Engineering, manufacturing and construction
424	Electrical Equipment and Systems Technician	Engineering, manufacturing and construction
425	Energy Management and Control Technician	Engineering, manufacturing and construction
426	Finishing Operation (Goods & Garments) Technician	Engineering, manufacturing and construction
427	Wet Operations (Multiskilled) Technician	Engineering, manufacturing and construction
428	Buffing Operator	Engineering, manufacturing and construction
429	CAD/CAM Operator (Footwear)	Engineering, manufacturing and construction
430	CAD/CAM Operator (Garments)	Engineering, manufacturing and construction
431	CAD/CAM Operator (Goods)	Engineering, manufacturing and construction
432	Cutter Footwear	Engineering, manufacturing and construction
433	Cutter Goods & Garments	Engineering, manufacturing and construction
434	Drum Operator	Engineering, manufacturing and construction
435	Finishing Operator (Roller Coater, Machine Spray, Hand Spray)	Engineering, manufacturing and construction
436	Finishing Operator	Engineering, manufacturing and construction
437	Fleshing Operator	Engineering, manufacturing and construction

S. No.	Occupational Training Standards	ISCED-F 2013
438	Footwear and Allied Goods Repairer	Engineering, manufacturing and construction
439	Glazing Operator	Engineering, manufacturing and construction
440	Harness Maker	Engineering, manufacturing and construction
441	Heel Attacher	Engineering, manufacturing and construction
442	Heel Builder	Engineering, manufacturing and construction
443	Lasting Operator	Engineering, manufacturing and construction
444	Moulding Operator	Engineering, manufacturing and construction
445	Pattern Cutter (Footwear)	Engineering, manufacturing and construction
446	Pattern Cutter (Goods and Garments)	Engineering, manufacturing and construction
447	Post Tanning Machine Operator	Engineering, manufacturing and construction
448	Pre- Assembly Operator	Engineering, manufacturing and construction
449	Product Developer (Footwear)	Engineering, manufacturing and construction
450	Saddle Maker	Engineering, manufacturing and construction
451	Sample Maker (Footwear)	Engineering, manufacturing and construction
452	Sample Maker (Goods and Garments)	Engineering, manufacturing and construction
453	Scudding Operator (Machine)	Engineering, manufacturing and construction
454	Setting Operator	Engineering, manufacturing and construction
455	Sewing Machine Operator (Saddlery)	Engineering, manufacturing and construction
456	Shaving Operator	Engineering, manufacturing and construction
457	Skiving Operator	Engineering, manufacturing and construction
458	Splitting and Sammying Operator	Engineering, manufacturing and construction
459	Stitching Operator	Engineering, manufacturing and construction
460	Store In charge	Engineering, manufacturing and construction
461	Line Supervisor	Engineering, manufacturing and construction
462	Quality Control Inspector (Footwear)	Engineering, manufacturing and construction
463	Quality Control Inspector (Goods and Garments)	Engineering, manufacturing and construction
464	Quality Control Inspector (Saddlery)	Engineering, manufacturing and construction
465	Quality Control Inspector (Non Leather)	Engineering, manufacturing and construction
466	Shoe Maker	Engineering, manufacturing and construction
467	Laboratory Technologist (Life Sciences)	Engineering, manufacturing and construction
468	Manufacturing Assistant (Life Sciences)	Engineering, manufacturing and construction
469	Packaging Assistant (Life Sciences)	Engineering, manufacturing and construction
470	Fitter Mechanical (Life Sciences)	Engineering, manufacturing and construction
471	Lab Technician (Life Sciences)	Engineering, manufacturing and construction

S. No.	Occupational Training Standards	ISCED-F 2013
472	Maintenance Assistant (Life Sciences)	Engineering, manufacturing and construction
473	Visual Inspector (Life Sciences)	Engineering, manufacturing and construction
474	Store Assistant (Life Sciences)	Engineering, manufacturing and construction
475	Bioinformatics Associate/ Analyst	Engineering, manufacturing and construction
476	Clean Room Technician	Engineering, manufacturing and construction
477	Data Entry Operator (Life Sciences)	Engineering, manufacturing and construction
478	Market Research Specialist (Life Sciences)	Engineering, manufacturing and construction
479	Medical Sales Representative	Engineering, manufacturing and construction
480	Pharmacovigilance Associate	Engineering, manufacturing and construction
481	Production/ Machine Operator (Life Sciences)	Engineering, manufacturing and construction
482	Supply Chain Management Executive (Life Sciences)	Engineering, manufacturing and construction
483	Store Chemist - Finished Goods (Life Sciences)	Engineering, manufacturing and construction
484	Store Chemist - Packaging Material (Life Sciences)	Engineering, manufacturing and construction
485	Store Chemist - Raw Materials (Life Sciences)	Engineering, manufacturing and construction
486	Telesales Executive (Life Sciences)	Engineering, manufacturing and construction
487	Validation Supervisor (Life Sciences)	Engineering, manufacturing and construction
488	Bio Process Technician	Engineering, manufacturing and construction
489	Bioinformatics Scientist	Engineering, manufacturing and construction
490	Clinical Research Associate	Engineering, manufacturing and construction
491	Drug Regulatory Affairs Chemist	Engineering, manufacturing and construction
492	Maintenance Supervisor - Gases (Life Sciences)	Engineering, manufacturing and construction
493	Maintenance Supervisor - HVAC (Life Sciences)	Engineering, manufacturing and construction
494	Maintenance Supervisor - Steam (Life Sciences)	Engineering, manufacturing and construction
495	Maintenance Supervisor - Water (Life Sciences)	Engineering, manufacturing and construction
496	Maintenance Supervisor - Electricity (Life Sciences)	Engineering, manufacturing and construction
497	Packaging Supervisor (Life Sciences)	Engineering, manufacturing and construction
498	Production Planning Supervisor (Life Sciences)	Engineering, manufacturing and construction
499	Production Supervisor (Life Sciences)	Engineering, manufacturing and construction
500	Production/ Manufacturing Biologist (Life Sciences)	Engineering, manufacturing and construction
501	Production/ Manufacturing Chemist (Life Sciences)	Engineering, manufacturing and construction

S. No.	Occupational Training Standards	ISCED-F 2013
502	QA Chemist Equipment Validation (Life Sciences)	Engineering, manufacturing and construction
503	QA Chemist Process Validation (Life Sciences)	Engineering, manufacturing and construction
504	Quality Assurance Chemist (Life Sciences)	Engineering, manufacturing and construction
505	Quality Control Biologist (Life Sciences)	Engineering, manufacturing and construction
506	Quality Control Chemist (Life Sciences)	Engineering, manufacturing and construction
507	Quality Control Chemist Microbiology (Life Sciences)	Engineering, manufacturing and construction
508	Quality Management System In-charge (Life Sciences)	Engineering, manufacturing and construction
509	Regulatory Medical Writer (Life Sciences)	Engineering, manufacturing and construction
510	Research Associate - Medicinal Chemistry (Life Sciences)	Engineering, manufacturing and construction
511	Research Associate - Process Development (Life Sciences)	Engineering, manufacturing and construction
512	Scientific Medical Writer (Life Sciences)	Engineering, manufacturing and construction
513	Stability Specialist (Life Sciences)	Engineering, manufacturing and construction
514	Vendor and Internal Audit In-charge (Life Sciences)	Engineering, manufacturing and construction
515	Pulp and Paper Process Manager	Engineering, manufacturing and construction
516	Manual Metal Arc/ Shielded Metal Arc Welding Welder	Engineering, manufacturing and construction
517	Boring Machine Operator	Engineering, manufacturing and construction
518	Electroplating Operator	Engineering, manufacturing and construction
519	Grinder (Hand & Hand Held Power Tools)	Engineering, manufacturing and construction
520	Heat Treatment Operator	Engineering, manufacturing and construction
521	Operator - Broaching Machine	Engineering, manufacturing and construction
522	Operator - Conventional Milling	Engineering, manufacturing and construction
523	Operator - Conventional Surface Grinding Machines	Engineering, manufacturing and construction
524	Operator - Conventional Turning	Engineering, manufacturing and construction
525	Operator - Plate Bending Machine	Engineering, manufacturing and construction
526	Operator - Shot Blasting and Grit Blasting	Engineering, manufacturing and construction
527	Painting Technician (Spray Painting)	Engineering, manufacturing and construction
528	Polisher - Machine and Manual	Engineering, manufacturing and construction
529	Sheet Metal Worker	Engineering, manufacturing and construction
530	CNC Operator - Grinding Machine Centre	Engineering, manufacturing and construction
531	CNC Operator - Turning	Engineering, manufacturing and construction
532	CNC Operator - Vertical Machining Centre	Engineering, manufacturing and construction

S. No.	Occupational Training Standards	ISCED-F 2013
533	Fitter – Electrical and Electronic Assembly	Engineering, manufacturing and construction
534	Fitter Fabrication	Engineering, manufacturing and construction
535	Fitter Mechanical Assembly	Engineering, manufacturing and construction
536	Forger	Engineering, manufacturing and construction
537	Oxy Fuel Gas Cutter	Engineering, manufacturing and construction
538	Plasma Cutter Manual	Engineering, manufacturing and construction
539	Resistance Spot Welding Machine Operator	Engineering, manufacturing and construction
540	Calibration Technician	Engineering, manufacturing and construction
541	CNC Programmer	Engineering, manufacturing and construction
542	CNC Setter and Operator	Engineering, manufacturing and construction
543	CNC Setter and Operator - Turning	Engineering, manufacturing and construction
544	Draughtsman - Mechanical	Engineering, manufacturing and construction
545	Draughtsman - Piping	Engineering, manufacturing and construction
546	Flux Cored Arc Welder (Semi-Automatic)	Engineering, manufacturing and construction
547	Lab Technician - Metal Testing	Engineering, manufacturing and construction
548	Lab Technician - Radiographic Testing	Engineering, manufacturing and construction
549	Maintenance Fitter - Mechanical	Engineering, manufacturing and construction
550	MIG/MAG/GMAW Welder	Engineering, manufacturing and construction
551	Quality Inspector - Forged, Casted or Machined Components	Engineering, manufacturing and construction
552	Service Technician - Installation and Commissioning	Engineering, manufacturing and construction
553	Stud Welding Operator	Engineering, manufacturing and construction
554	Submerged Arc Welder (SAW)	Engineering, manufacturing and construction
555	Technician Instrumentation	Engineering, manufacturing and construction
556	Tungsten Inert Gas Welder (GTAW)	Engineering, manufacturing and construction
557	CNC Setter and Operator - Vertical Machining Centre	Engineering, manufacturing and construction
558	Designer - Mechanical	Engineering, manufacturing and construction
559	Production Technician	Engineering, manufacturing and construction
560	Service Technician - Breakdown Service	Engineering, manufacturing and construction
561	Stainless Steel Fabricator	Engineering, manufacturing and construction
562	Tool and Die Maker	Engineering, manufacturing and construction
563	Programmable Logic Controller (PLC) Programmer and Troubleshooter	Engineering, manufacturing and construction
564	Cabling Technician	Engineering, manufacturing and construction

S. No.	Occupational Training Standards	ISCED-F 2013
565	Calibration Technician (Thermal)	Engineering, manufacturing and construction
566	Industrial Automation Technician	Engineering, manufacturing and construction
567	Installation And Commissioning Technician (AM /FM Radio Station)	Engineering, manufacturing and construction
568	Installer - Additive Manufacturing (3D Printing)	Engineering, manufacturing and construction
569	Instrumentation Technician (Control Valves)	Engineering, manufacturing and construction
570	Instrumentation Technician (Process Control)	Engineering, manufacturing and construction
571	Industrial Automation Specialist	Engineering, manufacturing and construction
572	Iron and Steel Utility Hand Plant Operator	Engineering, manufacturing and construction
573	Raw Material Handling Operator	Engineering, manufacturing and construction
574	Cast House Operator	Engineering, manufacturing and construction
575	Marker and Signage Painter	Engineering, manufacturing and construction
576	Manual Packaging and Marking Operator	Engineering, manufacturing and construction
577	Reversing System Maintenance Technician	Engineering, manufacturing and construction
578	Bearing Maintenance Technician	Engineering, manufacturing and construction
579	Coil Packaging Machine Operator (Rolling Mills)	Engineering, manufacturing and construction
580	Conveyor and Other Bulk Material Handling Technician	Engineering, manufacturing and construction
581	Conveyor Operation and Maintenance Technician	Engineering, manufacturing and construction
582	Overhead Crane Operator	Engineering, manufacturing and construction
583	Fitter - Instrumentation	Engineering, manufacturing and construction
584	Fitter - Levelling, Alignment and Balancing	Engineering, manufacturing and construction
585	Fitter - Electrical Assembly	Engineering, manufacturing and construction
586	Fitter - Electronic Assembly	Engineering, manufacturing and construction
587	Fitter - Heating Insulation	Engineering, manufacturing and construction
588	Fitter Maintenance (Ferro Alloys)	Engineering, manufacturing and construction
589	Iron and Steel Machinist	Engineering, manufacturing and construction
590	Laboratory Technician (Physical)	Engineering, manufacturing and construction
591	Lancing and Scarfing Operator	Engineering, manufacturing and construction
592	Mobile Equipment Maintenance Technician	Engineering, manufacturing and construction
593	Mobile Equipment Operator	Engineering, manufacturing and construction
594	Pipe Line Fitter & Maintenance Technician	Engineering, manufacturing and construction
595	Refractory Bricks Layer	Engineering, manufacturing and construction
596	Rigger - Rigging of Heavy material	Engineering, manufacturing and construction

S. No.	Occupational Training Standards	ISCED-F 2013
597	Screen and Crusher Operator	Engineering, manufacturing and construction
598	Stacker / Reclaimer Operator	Engineering, manufacturing and construction
599	Stoking Car Operator (Ferro Alloys)	Engineering, manufacturing and construction
600	Battery Anchorage Regulator	Engineering, manufacturing and construction
601	Cast House Senior Operator	Engineering, manufacturing and construction
602	Fitter and Maintenance Water Cooling System Technician	Engineering, manufacturing and construction
603	Fitter - Hydraulic & Pneumatic System	Engineering, manufacturing and construction
604	Fluid Management Operator (Rolling Mills)	Engineering, manufacturing and construction
605	Furnace Operator (Ferro Alloys)	Engineering, manufacturing and construction
606	Heating Regulator	Engineering, manufacturing and construction
607	Iron and Steel - Dumper Operator	Engineering, manufacturing and construction
608	Iron and Steel- Plasma Cutter (Manual)	Engineering, manufacturing and construction
609	Locomotive Driver	Engineering, manufacturing and construction
610	Technician Furnace Transformer (Ferro Alloys)	Engineering, manufacturing and construction
611	Battery Operator	Engineering, manufacturing and construction
612	Control Room Operator	Engineering, manufacturing and construction
613	Iron and Steel - Control Room Operator for Agglomeration	Engineering, manufacturing and construction
614	Process Operator Rolling Mills	Engineering, manufacturing and construction
615	Shift In-Charge Furnace (Ferro Alloys)	Engineering, manufacturing and construction
616	Refractory Brick Layer	Engineering, manufacturing and construction
617	Industrial Control Technologist	Engineering, manufacturing and construction
618	Plastics Processing Technician	Engineering, manufacturing and construction
619	Tool Room (Plastic) Supervisor	Engineering, manufacturing and construction
620	Maintenance of Machinery - Assistant (Plastics)	Engineering, manufacturing and construction
621	Assistant Plastics Processing	Engineering, manufacturing and construction
622	Assistant Testing & Quality Control for (Plastics)	Engineering, manufacturing and construction
623	Advanced Plastics Mould Manufacturing Assistant	Engineering, manufacturing and construction
624	Furniture Assembler	Engineering, manufacturing and construction
625	General Worker (CENEX)	Engineering, manufacturing and construction
626	General Worker (Ribbed Smoked Sheet Trading)	Engineering, manufacturing and construction
627	Machine Operator Assistant – Blow Moulding	Engineering, manufacturing and construction

S. No.	Occupational Training Standards	ISCED-F 2013
628	Machine Operator Assistant – Plastics Extrusion	Engineering, manufacturing and construction
629	Machine Operator Assistant – Plastics Processing	Engineering, manufacturing and construction
630	Machine Operator Assistant – Plastics Recycling	Engineering, manufacturing and construction
631	Machine Operator Assistant – Plastics Sacks	Engineering, manufacturing and construction
632	Machine Operator Assistant– Injection Moulding	Engineering, manufacturing and construction
633	Plastics Mould Manufacturing Assistant	Engineering, manufacturing and construction
634	Plastics Product & Mould Designer	Engineering, manufacturing and construction
635	Processing Assistant Technically Specified Rubber	Engineering, manufacturing and construction
636	Rubber Product Assembler	Engineering, manufacturing and construction
637	Storage Assistant	Engineering, manufacturing and construction
638	Autoclave Operator	Engineering, manufacturing and construction
639	Autoclave Operator – Rubber Reclaim	Engineering, manufacturing and construction
640	Bead Room Operator	Engineering, manufacturing and construction
641	Bladder Assembly Operator	Engineering, manufacturing and construction
642	Bladder Curing Operator	Engineering, manufacturing and construction
643	Building Operator - Hoses	Engineering, manufacturing and construction
644	Building Operator - Cables	Engineering, manufacturing and construction
645	Building Operator - Conveyor Belts	Engineering, manufacturing and construction
646	Building Operator - Footwear	Engineering, manufacturing and construction
647	Building Operator - Hoses	Engineering, manufacturing and construction
648	Building Operator - Rubber Roller	Engineering, manufacturing and construction
649	Building Operator - Rubber to Metal Bonding	Engineering, manufacturing and construction
650	Building Operator - Sports Goods	Engineering, manufacturing and construction
651	Building Operator - V belts for Transmission	Engineering, manufacturing and construction
652	Coagulant Bath Operator	Engineering, manufacturing and construction
653	Compression Moulding Operator	Engineering, manufacturing and construction
654	Continuous Foaming Machine Operator	Engineering, manufacturing and construction
655	Cracker Operator	Engineering, manufacturing and construction
656	Creel Room Operator	Engineering, manufacturing and construction
657	Curing Chamber Operator	Engineering, manufacturing and construction
658	Dip Solution Preparation Operator	Engineering, manufacturing and construction
659	Dipping Plant Operator	Engineering, manufacturing and construction

S. No.	Occupational Training Standards	ISCED-F 2013
660	Dispatch Operator	Engineering, manufacturing and construction
661	Dispersion Maker	Engineering, manufacturing and construction
662	Emulsion Maker	Engineering, manufacturing and construction
663	Extruder Operator	Engineering, manufacturing and construction
664	Final Inspection Operator (Retreaded Tyre)	Engineering, manufacturing and construction
665	Finishing Operator (Non Tyre)	Engineering, manufacturing and construction
666	Finishing Operator (Tyre)	Engineering, manufacturing and construction
667	Grader (Ribbed Smoked Sheet Trading)	Engineering, manufacturing and construction
668	Grinding Operator	Engineering, manufacturing and construction
669	Kneader Operator	Engineering, manufacturing and construction
670	Latex Dipping Plant Operator	Engineering, manufacturing and construction
671	Machine Operator	Engineering, manufacturing and construction
672	Machine Operator – Injection Moulding	Engineering, manufacturing and construction
673	Machine Operator – Plastics Extrusion	Engineering, manufacturing and construction
674	Machine Operator – Plastics Processing	Engineering, manufacturing and construction
675	Machine Operator – Plastics Recycling	Engineering, manufacturing and construction
676	Machine Operator – Plastics Sacks	Engineering, manufacturing and construction
677	Machine Operator – Blow Moulding	Engineering, manufacturing and construction
678	Machine Operator - Tool Room	Engineering, manufacturing and construction
679	Maintenance of Machinery - Technician	Engineering, manufacturing and construction
680	Material Handling and Storage Operator	Engineering, manufacturing and construction
681	Mould Inspection, Cleaning, Storage and Handling Operator	Engineering, manufacturing and construction
682	Packaging Operator	Engineering, manufacturing and construction
683	Planetary Mixer Operator	Engineering, manufacturing and construction
684	Ply Cutting Operator	Engineering, manufacturing and construction
685	Pneumatic Tyre Moulding Operator	Engineering, manufacturing and construction
686	Pre and Post Tyre Moulding Operator	Engineering, manufacturing and construction
687	Pre-refining Operator	Engineering, manufacturing and construction
688	Processing Technician - Rubber Sheeting	Engineering, manufacturing and construction
689	Quality Control Inspector-Dimension Check	Engineering, manufacturing and construction
690	Radial Building Operator	Engineering, manufacturing and construction
691	Refining Operator	Engineering, manufacturing and construction
692	Retreaded Tyre Curing Operator	Engineering, manufacturing and construction
693	Rubber Adhesive Fabric Dipping Operator	Engineering, manufacturing and construction

S. No.	Occupational Training Standards	ISCED-F 2013
694	Rubber Adhesive/Cement Mixing Operator	Engineering, manufacturing and construction
695	Rubber Autoclave Operator	Engineering, manufacturing and construction
696	Rubber Calendering Operator	Engineering, manufacturing and construction
697	Rubber Compression Moulding Operator	Engineering, manufacturing and construction
698	Rubber Curing Operator	Engineering, manufacturing and construction
699	Rubber Extruder Operator	Engineering, manufacturing and construction
700	Rubber Foaming Machine Operator	Engineering, manufacturing and construction
701	Rubber Injection Moulding Operator	Engineering, manufacturing and construction
702	Rubber Internal Mixer Operator	Engineering, manufacturing and construction
703	Rubber Mill Operator	Engineering, manufacturing and construction
704	Rubber Pre-Mixing Operator	Engineering, manufacturing and construction
705	Rubber Product Finishing Operator	Engineering, manufacturing and construction
706	Rubber Product Reclaim Operator	Engineering, manufacturing and construction
707	Rubber Technician	Engineering, manufacturing and construction
708	Rubber Tube Extruder Operator	Engineering, manufacturing and construction
709	Saw Mill Technician	Engineering, manufacturing and construction
710	Slitting Operator	Engineering, manufacturing and construction
711	Solid Tyre Moulding Operator	Engineering, manufacturing and construction
712	Sorting/Packing Operator (Latex)	Engineering, manufacturing and construction
713	Storage Assistant (RSS Trading)	Engineering, manufacturing and construction
714	Storage Operator	Engineering, manufacturing and construction
715	Straining Operator	Engineering, manufacturing and construction
716	Stripping Unit Operator	Engineering, manufacturing and construction
717	Synthetic Cord Dipping Operator	Engineering, manufacturing and construction
718	Transfer Moulding Operator	Engineering, manufacturing and construction
719	Tyre Balancing Operator	Engineering, manufacturing and construction
720	Tyre Building Operator	Engineering, manufacturing and construction
721	Tyre Casing Buffing Operator	Engineering, manufacturing and construction
722	Tyre Casing Inspection Operator	Engineering, manufacturing and construction
723	Tyre Component Stock Preparation Operator	Engineering, manufacturing and construction
724	Tyre Fitter	Engineering, manufacturing and construction
725	Tyre Post Cure Operator	Engineering, manufacturing and construction
726	Tyre Retreading - Building and Curing Operator	Engineering, manufacturing and construction

S. No.	Occupational Training Standards	ISCED-F 2013
727	Tyre Retreading Inspection and Buffing Operator	Engineering, manufacturing and construction
728	Tyre Tread Preparation and Building Operator	Engineering, manufacturing and construction
729	Tyre Uniformity Operator	Engineering, manufacturing and construction
730	Tyre Wheel Balancing and Alignment Operator	Engineering, manufacturing and construction
731	Whole Tyre Reclaim Operator	Engineering, manufacturing and construction
732	Wire Cutting Operator	Engineering, manufacturing and construction
733	Calendering Supervisor	Engineering, manufacturing and construction
734	Extrusion Supervisor	Engineering, manufacturing and construction
735	Finishing Supervisor	Engineering, manufacturing and construction
736	Pack Mixing Supervisor	Engineering, manufacturing and construction
737	Moulding /Curing Supervisor	Engineering, manufacturing and construction
738	Processing Supervisor - Rubber Sheeting	Engineering, manufacturing and construction
739	QA Supervisor	Engineering, manufacturing and construction
740	Quality Control Inspector - Calendering	Engineering, manufacturing and construction
741	Quality Control Inspector - Extrusion	Engineering, manufacturing and construction
742	Quality Control Inspector - Visual Inspection	Engineering, manufacturing and construction
743	Quality Controller - Technically Specified Rubber	Engineering, manufacturing and construction
744	Rubber Product Finishing Supervisor	Engineering, manufacturing and construction
745	Stock-Component-Bead Preparation Supervisor	Engineering, manufacturing and construction
746	Meat Processing (Rendering) Technician	Engineering, manufacturing and construction
747	Meat Processing (Slaughtering) Technician	Engineering, manufacturing and construction
748	Meat Processing (Meat Safety) Associate	Engineering, manufacturing and construction
749	Meat Processing (Quality Assurance) Associate	Engineering, manufacturing and construction
750	Meat Retailer	Engineering, manufacturing and construction
751	Industrial Production Worker – Food Processing	Engineering, manufacturing and construction
752	Packing Machine Worker – Food Processing	Engineering, manufacturing and construction
753	Fruits and Vegetables Selection In-Charge	Engineering, manufacturing and construction
754	Assistant Lab Technician - Food Processing	Engineering, manufacturing and construction
755	Baking Technician/Operative	Engineering, manufacturing and construction
756	Butter and Ghee Processing Operator	Engineering, manufacturing and construction
757	Cold Storage Technician	Engineering, manufacturing and construction
758	Convenience Food Maker	Engineering, manufacturing and construction

S. No.	Occupational Training Standards	ISCED-F 2013
759	Corn Starch Manufacturing Technician	Engineering, manufacturing and construction
760	Cheese Maker	Engineering, manufacturing and construction
761	Craft Baker	Engineering, manufacturing and construction
762	Dairy Processing Equipment Operator	Engineering, manufacturing and construction
763	Extruder Operator- Food Processing	Engineering, manufacturing and construction
764	Fish and Sea Food Processing Technician	Engineering, manufacturing and construction
765	Fruit Pulp Processing Technician	Engineering, manufacturing and construction
766	Fruit Ripening Technician	Engineering, manufacturing and construction
767	Fruits and Vegetables Canning Technician	Engineering, manufacturing and construction
768	Fruits and Vegetables Drying/ Dehydration Technician	Engineering, manufacturing and construction
769	Grain Mill Operator	Engineering, manufacturing and construction
770	Ice Cream Processing Technician	Engineering, manufacturing and construction
771	Jam, Jelly and Ketchup Processing Technician	Engineering, manufacturing and construction
772	Meat and Poultry Processor	Engineering, manufacturing and construction
773	Milk Powder Manufacturing Technician	Engineering, manufacturing and construction
774	Mixing Technician	Engineering, manufacturing and construction
775	Modified Atmosphere Storage Technician	Engineering, manufacturing and construction
776	Multi Skill Technician (Food Processing)	Engineering, manufacturing and construction
777	Offal Collector and Utilizer	Engineering, manufacturing and construction
778	Pickle Making Technician	Engineering, manufacturing and construction
779	Plant Biscuit Production Specialist	Engineering, manufacturing and construction
780	Pulse Processing Technician	Engineering, manufacturing and construction
781	Spice Processing Technician	Engineering, manufacturing and construction
782	Squash and Juice Processing Technician	Engineering, manufacturing and construction
783	Snack and Savoury Maker	Engineering, manufacturing and construction
784	Dairy Products Processor	Engineering, manufacturing and construction
785	Food Products Packaging Technician	Engineering, manufacturing and construction
786	Milling Technician	Engineering, manufacturing and construction
787	Supervisor - Dairy Products Processing	Engineering, manufacturing and construction
788	Supervisor - Fruits and Vegetable Processing	Engineering, manufacturing and construction
789	Supervisor - Meat and Poultry Processing	Engineering, manufacturing and construction
790	Baker	Engineering, manufacturing and construction
791	Pharmaceutical Manufacturing Technician	Engineering, manufacturing and construction

S. No.	Occupational Training Standards	ISCED-F 2013
792	Sugar Milling Technician	Engineering, manufacturing and construction
793	Flour Milling Technician	Engineering, manufacturing and construction
794	Food Safety Auditor	Engineering, manufacturing and construction
795	Food Science Technologist	Engineering, manufacturing and construction
796	Designer - Home Furnishing	Engineering, manufacturing and construction
797	Embroidery Machine Operator (Zigzag Machine)	Engineering, manufacturing and construction
798	Export Assistant	Engineering, manufacturing and construction
799	Fabric Checker	Engineering, manufacturing and construction
800	Fabric Cutter - Apparel, Made-Ups & Home Furnishing	Engineering, manufacturing and construction
801	Finisher	Engineering, manufacturing and construction
802	Framer - Computerized Embroidery Machine	Engineering, manufacturing and construction
803	Garment Cutter - CAM	Engineering, manufacturing and construction
804	Hand Embroiderer	Engineering, manufacturing and construction
805	Measurement Checker	Engineering, manufacturing and construction
806	Pressman	Engineering, manufacturing and construction
807	Self Employed Tailor	Engineering, manufacturing and construction
808	Sewing Machine Operator	Engineering, manufacturing and construction
809	Sewing Machine Operator - Knits	Engineering, manufacturing and construction
810	Specialized Sewing Machine Operator	Engineering, manufacturing and construction
811	Washing Machine Operator	Engineering, manufacturing and construction
812	Advance Pattern Maker (CAD/CAM)	Engineering, manufacturing and construction
813	Cutting Supervisor	Engineering, manufacturing and construction
814	Export Executive	Engineering, manufacturing and construction
815	Fashion Designer	Engineering, manufacturing and construction
816	Line Supervisor Stitching	Engineering, manufacturing and construction
817	Machine Maintenance Mechanic- Sewing Machine	Engineering, manufacturing and construction
818	Merchandiser - Made-ups & Home Furnishing	Engineering, manufacturing and construction
819	Pattern Master	Engineering, manufacturing and construction
820	Processing Supervisor (Dyeing and Printing)	Engineering, manufacturing and construction
821	Production Supervisor Sewing	Engineering, manufacturing and construction
822	QC Executive - Sewing Line	Engineering, manufacturing and construction
823	Quality Assessor	Engineering, manufacturing and construction
824	Cotton Grader (Ginning)	Engineering, manufacturing and construction

S. No.	Occupational Training Standards	ISCED-F 2013
825	Beam Carrier - Loader	Engineering, manufacturing and construction
826	Card Puncher (Automatic Machine)	Engineering, manufacturing and construction
827	Fabric Mender	Engineering, manufacturing and construction
828	Hand Operated Knitting Machine Operator	Engineering, manufacturing and construction
829	Shuttle Loom Operator	Engineering, manufacturing and construction
830	Blowroom Operator	Engineering, manufacturing and construction
831	Calendaring Machine Operator	Engineering, manufacturing and construction
832	Carding Operator	Engineering, manufacturing and construction
833	Combing operator	Engineering, manufacturing and construction
834	Compacting Machine Operator	Engineering, manufacturing and construction
835	Continuous Bleaching Range Operator	Engineering, manufacturing and construction
836	Drawframe Operator	Engineering, manufacturing and construction
837	Drying Range Machine Operator	Engineering, manufacturing and construction
838	Dyestuff & Chemical Preparation Operator	Engineering, manufacturing and construction
839	Finishing Machine Operator	Engineering, manufacturing and construction
840	Folding Machine Operator	Engineering, manufacturing and construction
841	Jigger Machine Operator	Engineering, manufacturing and construction
842	Knitting Machine Operator – Circular Knitting	Engineering, manufacturing and construction
843	Knitting Machine Operator – Flat Bed Knitting	Engineering, manufacturing and construction
844	Knitting Machine Operator – Warp Knitting	Engineering, manufacturing and construction
845	Knotting Machine Operator	Engineering, manufacturing and construction
846	Loin Loom Weaver	Engineering, manufacturing and construction
847	Open End Spinning Tenter	Engineering, manufacturing and construction
848	Package Dyeing Machine Operator	Engineering, manufacturing and construction
849	Packing Checker	Engineering, manufacturing and construction
850	Pirn Winding Machine Operator	Engineering, manufacturing and construction
851	Power Loom Operator	Engineering, manufacturing and construction
852	Printing Machine Operator	Engineering, manufacturing and construction
853	Relax Dryer Operator	Engineering, manufacturing and construction
854	Ring Frame Tenter	Engineering, manufacturing and construction
855	Shuttleless Loom Weaver	Engineering, manufacturing and construction
856	Singeing & De-sizing Machine Operator	Engineering, manufacturing and construction
857	Sizing Machine Operator	Engineering, manufacturing and construction
858	Soft Flow Dyeing Machine Operator	Engineering, manufacturing and construction

S. No.	Occupational Training Standards	ISCED-F 2013
859	Speed Frame Operator – Tenter & Doffer	Engineering, manufacturing and construction
860	Stenter Machine Operator	Engineering, manufacturing and construction
861	Tape Plant Operator	Engineering, manufacturing and construction
862	Tape Winder	Engineering, manufacturing and construction
863	Textile Designer- Handloom Jacquard	Engineering, manufacturing and construction
864	Washing Range Operator	Engineering, manufacturing and construction
865	Fitter - Auto Loom Weaving Machine	Engineering, manufacturing and construction
866	Fitter - Post Spinning	Engineering, manufacturing and construction
867	Fitter - Processing	Engineering, manufacturing and construction
868	Fitter - Ring Spinning	Engineering, manufacturing and construction
869	Fitter - Shuttleless Weaving Machine	Engineering, manufacturing and construction
870	Fitter - Weaving Preparatory	Engineering, manufacturing and construction
871	Fitter- Spinning Preparatory	Engineering, manufacturing and construction
872	Forest and Forest Products Processor	Engineering, manufacturing and construction
873	Sawmilling and Processing Technician	Engineering, manufacturing and construction
874	Timber Manufactured Products Operator	Engineering, manufacturing and construction
875	Forest Growing and Management Associate	Engineering, manufacturing and construction
876	Harvesting and Haulage Technician	Engineering, manufacturing and construction
877	Saw Technology Operator	Engineering, manufacturing and construction
878	Wood Machining Operator	Engineering, manufacturing and construction
879	Wood Panel Products Operator	Engineering, manufacturing and construction
880	Forest Operations Manager	Engineering, manufacturing and construction
881	Timber Processing Technician	Engineering, manufacturing and construction
882	Assistant Carpenter- Wooden Furniture	Engineering, manufacturing and construction
883	Assembler - Modular Furniture	Engineering, manufacturing and construction
884	Assistant Carpenter - Wooden Furniture	Engineering, manufacturing and construction
885	Bent Laminated Furniture Maker	Engineering, manufacturing and construction
886	Cabinet Maker - Modular Furniture Kitchen	Engineering, manufacturing and construction
887	Cane Seat Weaver	Engineering, manufacturing and construction
888	Finisher - Bamboo Furniture	Engineering, manufacturing and construction
889	Machine Operator - Bamboo Slivering	Engineering, manufacturing and construction
890	Assistant Designer (Furniture)	Engineering, manufacturing and construction
891	Carpenter Wooden Furniture	Engineering, manufacturing and construction
892	Delivery and Installation Executive	Engineering, manufacturing and construction

S. No.	Occupational Training Standards	ISCED-F 2013
893	Fitter - Modular Furniture	Engineering, manufacturing and construction
894	Interior Designer	Engineering, manufacturing and construction
895	Road Maintenance Worker	Engineering, manufacturing and construction
896	Home Energy Efficiency and Sustainability Technician	Engineering, manufacturing and construction
897	Access Consultant	Engineering, manufacturing and construction
898	Building Designer	Engineering, manufacturing and construction
899	Residential Building Energy Assessment Technician	Engineering, manufacturing and construction
900	Real Estate Services	Engineering, manufacturing and construction
901	Bar Bender & Steel Fixer	Engineering, manufacturing and construction
902	Fabricator	Engineering, manufacturing and construction
903	Interior Finisher	Engineering, manufacturing and construction
904	Mason	Engineering, manufacturing and construction
905	Shuttering Carpenter	Engineering, manufacturing and construction
906	Construction Fitter	Engineering, manufacturing and construction
907	Construction Painter & Decorator	Engineering, manufacturing and construction
908	Façade Installer	Engineering, manufacturing and construction
909	False Ceiling and Drywall Installer	Engineering, manufacturing and construction
910	Scaffolder	Engineering, manufacturing and construction
911	Surveyor	Engineering, manufacturing and construction
912	Technician - Prestress	Engineering, manufacturing and construction
913	Gas Cutter - Construction	Engineering, manufacturing and construction
914	Store Assistant - Construction	Engineering, manufacturing and construction
915	Electrician	Engineering, manufacturing and construction
916	Doors & Windows Fixer	Engineering, manufacturing and construction
917	Grinder Construction	Engineering, manufacturing and construction
918	Multi Skill Technician - Fabrication	Engineering, manufacturing and construction
919	Rigger - Precast Erection	Engineering, manufacturing and construction
920	Rigger - Structural Erection	Engineering, manufacturing and construction
921	Structural Steel NDT Tester	Engineering, manufacturing and construction
922	Tack Welder	Engineering, manufacturing and construction
923	Draughtsman	Engineering, manufacturing and construction
924	EHS Steward	Engineering, manufacturing and construction
925	Mason Form Finished & Special Concrete	Engineering, manufacturing and construction

S. No.	Occupational Training Standards	ISCED-F 2013
926	Mason Tiling	Engineering, manufacturing and construction
927	Pavement Layer	Engineering, manufacturing and construction
928	Plasma Cutter	Engineering, manufacturing and construction
929	Reinforcement Fitter	Engineering, manufacturing and construction
930	Rigger - Piling	Engineering, manufacturing and construction
931	Rigger - Precast Erection	Engineering, manufacturing and construction
932	Foreman - Roads & Runways	Engineering, manufacturing and construction
933	Backhoe Operator	Engineering, manufacturing and construction
934	Batching Plant Operator	Engineering, manufacturing and construction
935	Bore Well Drilling Machine Operator	Engineering, manufacturing and construction
936	Crusher Operator	Engineering, manufacturing and construction
937	Excavator Operator	Engineering, manufacturing and construction
938	Hot Mix Plant Operator	Engineering, manufacturing and construction
939	Operator Crane	Engineering, manufacturing and construction
940	Paver Operator	Engineering, manufacturing and construction
941	Aerial Work Platform Operator	Engineering, manufacturing and construction
942	Crawler Crane Operator	Engineering, manufacturing and construction
943	Mechanic (Electrical/Electronics/ Instrumentation)	Engineering, manufacturing and construction
944	Mechanic (Engine)	Engineering, manufacturing and construction
945	Mechanic (Hydraulic)	Engineering, manufacturing and construction
946	Skid Steer Loader Operator	Engineering, manufacturing and construction
947	Tower Crane Operator	Engineering, manufacturing and construction
948	Transit and Self-Loading Mixer Operator	Engineering, manufacturing and construction
949	Transit Mixer Operator	Engineering, manufacturing and construction
950	Tyre Mounted Crane Operator	Engineering, manufacturing and construction
951	Wheel Loader Operator	Engineering, manufacturing and construction
952	Extrusion Operator	Engineering, manufacturing and construction
953	Filling and Packing Operator	Engineering, manufacturing and construction
954	Tumbling Operator	Engineering, manufacturing and construction
955	Air Classification Mill Operator	Engineering, manufacturing and construction
956	General Industrial (Liquid) Painter	Engineering, manufacturing and construction
957	Liquid Paint Processing Operator	Engineering, manufacturing and construction
958	Powder Coater	Engineering, manufacturing and construction

S. No.	Occupational Training Standards	ISCED-F 2013
959	Protective and Marine Painter	Engineering, manufacturing and construction
960	Shop Tinting Assistant	Engineering, manufacturing and construction
961	Tinting Operator	Engineering, manufacturing and construction
962	Wood Polisher	Engineering, manufacturing and construction
963	Plumber (General)	Engineering, manufacturing and construction
964	Plumber (Maintenance and Servicing) Assistant	Engineering, manufacturing and construction
965	Plumbing Products Sales Assistant	Engineering, manufacturing and construction
966	Plumber (Welder)	Engineering, manufacturing and construction
967	Plumber (After Sales Service)	Engineering, manufacturing and construction
968	Plumbing Mason	Engineering, manufacturing and construction
969	Plumber (Pumps and E/M Mechanic)	Engineering, manufacturing and construction
970	Plumbing Draftsman	Engineering, manufacturing and construction
971	Plumbing Foreman	Engineering, manufacturing and construction
972	Architectural Stonemason	Engineering, manufacturing and construction
973	Bricklayer	Engineering, manufacturing and construction
974	Concrete Construction Worker	Engineering, manufacturing and construction
975	Construction Metal Worker	Engineering, manufacturing and construction
976	Electrical Installations Technician	Engineering, manufacturing and construction
977	Joiner	Engineering, manufacturing and construction
978	Mechanical CAD Technician	Engineering, manufacturing and construction
979	Building Automation Specialist	Engineering, manufacturing and construction
980	Handmade (Gold) Jeweller	Engineering, manufacturing and construction
981	Jewellery Polisher and Cleaner	Engineering, manufacturing and construction
982	Gemstone Processing Technician	Engineering, manufacturing and construction
983	Jewellery and Object Designer	Engineering, manufacturing and construction
984	Process Plant Operations Technician	Engineering, manufacturing and construction
985	Excavator - Pipeline	Engineering, manufacturing and construction
986	Gas Meter Reader	Engineering, manufacturing and construction
987	Line Patrolling Man (Oil & Gas)	Engineering, manufacturing and construction
988	Technician –Drilling (Oil & Gas)	Engineering, manufacturing and construction
989	Technician – Production (Oil & Gas)	Engineering, manufacturing and construction
990	Fire Safety Technician (Oil & Gas)	Engineering, manufacturing and construction
991	Industrial Electrician (Oil & Gas)	Engineering, manufacturing and construction

S. No.	Occupational Training Standards	ISCED-F 2013
992	Industrial Welder (Oil & Gas)	Engineering, manufacturing and construction
993	Liquefied Petroleum Gas (LPG) Mechanic	Engineering, manufacturing and construction
994	Pipe Fitter (Oil & Gas)	Engineering, manufacturing and construction
995	Pipeline Maintenance Technician (Mechanical)	Engineering, manufacturing and construction
996	Process Instrument Operator (Oil & Gas)	Engineering, manufacturing and construction
997	Tank Truck Driver – Petroleum Products	Engineering, manufacturing and construction
998	Retail Outlet Supervisor (Oil & Gas)	Engineering, manufacturing and construction
999	Scuba Diver	Engineering, manufacturing and construction
1000	Assistant Support Underground Mines	Engineering, manufacturing and construction
1001	Assistant Support Open Cast Mines	Engineering, manufacturing and construction
1002	Explosives Handler	Engineering, manufacturing and construction
1003	Geospatial Technician	Engineering, manufacturing and construction
1004	Mining - Mechanic / Fitter	Engineering, manufacturing and construction
1005	Sampler	Engineering, manufacturing and construction
1006	Bulldozer Operator	Engineering, manufacturing and construction
1007	Driver Special Vehicle (Explosive & Sprinkler)	Engineering, manufacturing and construction
1008	Dumper/Tipper Operator	Engineering, manufacturing and construction
1009	Geospatial Surveyor	Engineering, manufacturing and construction
1010	Heavy Earth Moving Machinery (HEMM) Mechanic	Engineering, manufacturing and construction
1011	Jack Hammer Operator	Engineering, manufacturing and construction
1012	Jumbo Drill Operator	Engineering, manufacturing and construction
1013	Loader Operator	Engineering, manufacturing and construction
1014	Mine Electrician	Engineering, manufacturing and construction
1015	Mine Welder	Engineering, manufacturing and construction
1016	Mining Shot Firer or Blaster	Engineering, manufacturing and construction
1017	Ore Processing Operator	Engineering, manufacturing and construction
1018	Rig Mounted Drill Operator	Engineering, manufacturing and construction
1019	Safety Operator	Engineering, manufacturing and construction
1020	Side Discharge Loader (SDL) & Load Haul Dump (LHD) Operator	Engineering, manufacturing and construction
1021	Wire Saw Operator	Engineering, manufacturing and construction
1022	Timberman	Engineering, manufacturing and construction
1023	Assistant Mine Surveyor	Engineering, manufacturing and construction
1024	Banksman	Engineering, manufacturing and construction

S. No.	Occupational Training Standards	ISCED-F 2013
1025	Compressor Operator	Engineering, manufacturing and construction
1026	Dewatering Pump Operator	Engineering, manufacturing and construction
1027	Fireman	Engineering, manufacturing and construction
1028	Gas Detector	Engineering, manufacturing and construction
1029	Grader Operator	Engineering, manufacturing and construction
1030	Haulage Operator	Engineering, manufacturing and construction
1031	Jumbo Drill Operator/ Jumbo Operator	Engineering, manufacturing and construction
1032	Long Wall Operator	Engineering, manufacturing and construction
1033	Mechatronics In-charge	Engineering, manufacturing and construction
1034	Mine Driller (Exploration)	Engineering, manufacturing and construction
1035	Mine Machinist	Engineering, manufacturing and construction
1036	Roof Bolter	Engineering, manufacturing and construction
1037	Strata Monitoring Operator	Engineering, manufacturing and construction
1038	Surface Miner Operator	Engineering, manufacturing and construction
1039	Track Layer Operator	Engineering, manufacturing and construction
1040	Fan Operator	Engineering, manufacturing and construction
1041	Winding Engine Operator	Engineering, manufacturing and construction
1042	Mining Mate	Engineering, manufacturing and construction
1043	Reclamation Supervisor	Engineering, manufacturing and construction
1044	Retail Outlet Attendant (Oil & Gas)	Engineering, manufacturing and construction
1045	Electrical & Instrumentation Technician – Wind Power Plant	Engineering, manufacturing and construction
1046	Solar Pump Technician	Engineering, manufacturing and construction
1047	Power System Transmission Technician	Engineering, manufacturing and construction
1048	Technical Helper Distribution	Engineering, manufacturing and construction
1049	Technical Helper Mechanical - Thermal Power Generation	Engineering, manufacturing and construction
1050	Assistant GIS Mapping Power - Distribution	Engineering, manufacturing and construction
1051	Assistant - Tower Erection Power Transmission	Engineering, manufacturing and construction
1052	Attendant Sub-Station Power Distribution	Engineering, manufacturing and construction
1053	Consumer Energy Meter Technician	Engineering, manufacturing and construction
1054	Pipe Fitters	Engineering, manufacturing and construction
1055	Ash Handling Operator - Thermal Power Plant	Engineering, manufacturing and construction
1056	Cable Jointer Electrical Power System	Engineering, manufacturing and construction

S. No.	Occupational Training Standards	ISCED-F 2013
1057	Coal Handling Operator - Thermal Power Plant	Engineering, manufacturing and construction
1058	Distribution Lineman	Engineering, manufacturing and construction
1059	Industrial Electrician	Engineering, manufacturing and construction
1060	Lineman Distribution (Multi-Skilled)	Engineering, manufacturing and construction
1061	Millwright Fitter (Power Plant)	Engineering, manufacturing and construction
1062	Operator Ash Handling - Thermal Power Generation	Engineering, manufacturing and construction
1063	Operator Coal Handling - Thermal Power Generation	Engineering, manufacturing and construction
1064	Operator Water Treatment - Thermal Power Generation	Engineering, manufacturing and construction
1065	Power Plant High Pressure Welder	Engineering, manufacturing and construction
1066	Power System Technician (Transmission)	Engineering, manufacturing and construction
1067	Surveyor - Transmission Line	Engineering, manufacturing and construction
1068	Technician - Power Sub-station Erection and Commissioning	Engineering, manufacturing and construction
1069	Technician - Power System Transmission	Engineering, manufacturing and construction
1070	Technician - Tower Construction	Engineering, manufacturing and construction
1071	Technician - Distribution Transformer Repair	Engineering, manufacturing and construction
1072	Technician Grid Sub-station Operation & Maintenance	Engineering, manufacturing and construction
1073	Technician Railway Track Electrification	Engineering, manufacturing and construction
1074	Tower Foundation Power Transmission Technician	Engineering, manufacturing and construction
1075	Power Distribution Technician	Engineering, manufacturing and construction
1076	Street Light Installation and Maintenance Technician	Engineering, manufacturing and construction
1077	Mechanical Technician - Wind Power Plant	Engineering, manufacturing and construction
1078	Solar Domestic Water Heater Technician	Engineering, manufacturing and construction
1079	Solar Lighting Technician	Engineering, manufacturing and construction
1080	Solar PV Installer (Civil and Electrical)	Engineering, manufacturing and construction
1081	Solar PV Maintenance Technician - Civil (Ground Mount)	Engineering, manufacturing and construction
1082	Solar PV Manufacturing Technician	Engineering, manufacturing and construction
1083	Solar Thermal Plant Installation & Maintenance Technician	Engineering, manufacturing and construction
1084	Condition Monitoring Systems (CMS) Technician - Wind Power Plant	Engineering, manufacturing and construction
1085	Rooftop Solar Grid Technician	Engineering, manufacturing and construction
1086	Solar Off Grid Entrepreneur	Engineering, manufacturing and construction

S. No.	Occupational Training Standards	ISCED-F 2013
1087	Solar PV Technician	Engineering, manufacturing and construction
1088	Solar PV Operations and Maintenance Technician	Engineering, manufacturing and construction
1089	Solar PV Structural Design Technician	Engineering, manufacturing and construction
1090	Solar Thermal Technician- Industrial Process Heat	Engineering, manufacturing and construction
1091	Assistant Planning Technician - Wind Power Plant	Engineering, manufacturing and construction
1092	Construction Technician (Civil)- Wind Power Plant	Engineering, manufacturing and construction
1093	Construction Technician (Electrical)- Wind Power Plant	Engineering, manufacturing and construction
1094	Construction Technician (Mechanical)- Wind Power Plant	Engineering, manufacturing and construction
1095	Asset Maintenance (Wastewater) Technician	Engineering, manufacturing and construction
1096	Asset Maintenance (Water) Technician	Engineering, manufacturing and construction
1097	Hydrological Monitoring and Data Processing Operator	Engineering, manufacturing and construction
1098	Biogas Plant Operator	Engineering, manufacturing and construction
1099	Compost Plant Operator	Engineering, manufacturing and construction
1100	Rainwater Harvesting Technician	Engineering, manufacturing and construction
1101	Hazardous Waste Technician	Engineering, manufacturing and construction
1102	Quality Monitoring (Water and Wastewater) Technician	Engineering, manufacturing and construction
1103	Wastewater Collection System Operations Technician	Engineering, manufacturing and construction
1104	Wastewater Process Plant Operations Technician	Engineering, manufacturing and construction
1105	Water Distribution System Operations Technician	Engineering, manufacturing and construction
1106	Water Process Plant Operations Technician	Engineering, manufacturing and construction
1107	Pipelaying (Water and Wastewater) Technician	Engineering, manufacturing and construction
1108	Biomass Depot Operator	Engineering, manufacturing and construction
1109	Desludging Operator	Engineering, manufacturing and construction
1110	Faecal Sludge Treatment Plant Operations and Maintenance Technician	Engineering, manufacturing and construction
1111	Recyclable Waste Collector & Segregator	Engineering, manufacturing and construction
1112	Septic Tank Technician	Engineering, manufacturing and construction
1113	Wastewater Treatment Plant Technician	Engineering, manufacturing and construction
1114	Water Technologist	Engineering, manufacturing and construction
1115	Aircraft Repairer Craftman	Engineering, manufacturing and construction
1116	Aircraft Line Maintenance	Engineering, manufacturing and construction

S. No.	Occupational Training Standards	ISCED-F 2013
1117	Aircraft Surface Finisher	Engineering, manufacturing and construction
1118	Aeroskills (Mechatronics) Technician	Engineering, manufacturing and construction
1119	Aeroskills (Avionics) Technician	Engineering, manufacturing and construction
1120	Aeroskills (Mechanical) Technician	Engineering, manufacturing and construction
1121	Aeronautical Engineering Technician	Engineering, manufacturing and construction
1122	Aerospace Conventional Machinist	Engineering, manufacturing and construction
1123	Aircraft Painter	Engineering, manufacturing and construction
1124	Aerospace Structural Fitter	Engineering, manufacturing and construction
1125	Aerospace Welder	Engineering, manufacturing and construction
1126	Airline Baggage Handler	Engineering, manufacturing and construction
1127	Airline Cargo Assistant	Engineering, manufacturing and construction
1128	Airline High Lift Truck Operator	Engineering, manufacturing and construction
1129	Airline Security Executive	Engineering, manufacturing and construction
1130	Airport Cargo Operations Assistant	Engineering, manufacturing and construction
1131	Airport Terminal Electrician	Engineering, manufacturing and construction
1132	Airport Unit Load Device (ULD) Staff	Engineering, manufacturing and construction
1133	Aerospace CNC Machinist	Engineering, manufacturing and construction
1134	Aerospace CNC Programmer	Engineering, manufacturing and construction
1135	Aerospace Composite Technician	Engineering, manufacturing and construction
1136	Aerospace ECS (Environmental Control System) Technician	Engineering, manufacturing and construction
1137	Aerospace Flight Control Technician	Engineering, manufacturing and construction
1138	Aerospace Fuel and Hydraulic Technician	Engineering, manufacturing and construction
1139	Aerospace Jigs and Fixture Technician	Engineering, manufacturing and construction
1140	Aircraft Instrument Technician	Engineering, manufacturing and construction
1141	Aircraft Powerplant Technician	Engineering, manufacturing and construction
1142	Airfield Ground Lighting (AGL) Technician	Engineering, manufacturing and construction
1143	Airline Cabin Crew	Engineering, manufacturing and construction
1144	Airline Customer Service Executive	Engineering, manufacturing and construction
1145	Airline Forklift Operator	Engineering, manufacturing and construction
1146	Airline Ground Support Equipment Operator	Engineering, manufacturing and construction
1147	Airline Network Planner	Engineering, manufacturing and construction
1148	Airline Pushback Operator	Engineering, manufacturing and construction
1149	Airline Ramp Executive	Engineering, manufacturing and construction
1150	Airline Reservation Agent	Engineering, manufacturing and construction

S. No.	Occupational Training Standards	ISCED-F 2013
1151	Airline Revenue Management Analyst	Engineering, manufacturing and construction
1152	Airline Senior Unit Load Device (ULD) staff	Engineering, manufacturing and construction
1153	Airline Technical Publication Executive	Engineering, manufacturing and construction
1154	Airlines Ground Support Equipment Mechanic	Engineering, manufacturing and construction
1155	Airport Crash Fire Tenders and Rescue Officer	Engineering, manufacturing and construction
1156	Airport Fire Prevention Officer	Engineering, manufacturing and construction
1157	Airport Warehouse Coordinator	Engineering, manufacturing and construction
1158	Airport Wildlife Management Officer	Engineering, manufacturing and construction
1159	Airport X Ray Staff	Engineering, manufacturing and construction
1160	Composite Repair Technician	Engineering, manufacturing and construction
1161	Flight Dispatcher	Engineering, manufacturing and construction
1162	FOL Storage and Control Technician	Engineering, manufacturing and construction
1163	Helicopter Transmission Technician	Engineering, manufacturing and construction
1164	Propeller Technician	Engineering, manufacturing and construction
1165	Seat and Safety Equipment Technician	Engineering, manufacturing and construction
1166	Airline Flight Load Controller	Engineering, manufacturing and construction
1167	Airport Safety Officer	Engineering, manufacturing and construction
1168	Runway Operator	Engineering, manufacturing and construction
1169	Technical Services Mechanics	Engineering, manufacturing and construction
1170	Aviation - Aerodrome Operator	Engineering, manufacturing and construction
1171	Aviation - Remote Pilot	Engineering, manufacturing and construction
1172	Aviation - Rescue Officer	Engineering, manufacturing and construction
1173	Aviation - Air Traffic Control Officer	Engineering, manufacturing and construction
1174	Aviation Manager	Engineering, manufacturing and construction
1175	Commercial Pilot- Aeroplane	Engineering, manufacturing and construction
1176	Commercial Pilot- Helicopter	Engineering, manufacturing and construction
1177	Aviation Flight Instructor	Engineering, manufacturing and construction
1178	Aviation Instrument Rating Officer	Engineering, manufacturing and construction
1179	Aircraft Maintenance Technician	Engineering, manufacturing and construction
1180	Maritime Operations Watchkeeper	Engineering, manufacturing and construction
1181	Structural Fabricator - Ship	Engineering, manufacturing and construction
1182	Utility Hand (Skilled Marine)	Engineering, manufacturing and construction
1183	Joiner - Ship	Engineering, manufacturing and construction
1184	Marine Fitter and Rigger	Engineering, manufacturing and construction

S. No.	Occupational Training Standards	ISCED-F 2013
1185	Pipe Fitter - Ship Building	Engineering, manufacturing and construction
1186	Pre-cleaning Technician – Shipbreaking	Engineering, manufacturing and construction
1187	Technician – Ship scrapper	Engineering, manufacturing and construction
1188	Ship Safety Inspector – Radiation and Hazardous Material	Engineering, manufacturing and construction
1189	Consignment Executive	Engineering, manufacturing and construction
1190	Courier Associate	Engineering, manufacturing and construction
1191	Data Feeder- Warehouse	Engineering, manufacturing and construction
1192	Inventory Associate	Engineering, manufacturing and construction
1193	Land Transportation - Associate	Engineering, manufacturing and construction
1194	Loading Supervisor	Engineering, manufacturing and construction
1195	Receiving Assistant	Engineering, manufacturing and construction
1196	Shipment Bagging Agent	Engineering, manufacturing and construction
1197	Signalman Port Operation	Engineering, manufacturing and construction
1198	Vessel Operator	Engineering, manufacturing and construction
1199	Warehouse Associate	Engineering, manufacturing and construction
1200	Warehouse Binner	Engineering, manufacturing and construction
1201	Warehouse Packer	Engineering, manufacturing and construction
1202	Warehouse Picker	Engineering, manufacturing and construction
1203	Warehouse Quality Checker	Engineering, manufacturing and construction
1204	Cargo Equipment Handler	Engineering, manufacturing and construction
1205	Cargo Surveyor	Engineering, manufacturing and construction
1206	Clearance Support Agent	Engineering, manufacturing and construction
1207	Documentation Executive (Custom Clearance Export)	Engineering, manufacturing and construction
1208	Documentation Executive (Custom Clearance Import)	Engineering, manufacturing and construction
1209	Documentation Executive (Freight Forwarding Export)	Engineering, manufacturing and construction
1210	Documentation Executive (Freight Forwarding Import)	Engineering, manufacturing and construction
1211	Field Operation Executive (Custom Clearance Export)	Engineering, manufacturing and construction
1212	Field Operation Executive (Custom Clearance Import)	Engineering, manufacturing and construction
1213	Goods Packaging Machine Operator	Engineering, manufacturing and construction
1214	Grab Ship Unloader (GSU) Crane operation	Engineering, manufacturing and construction
1215	Ground Operations Associate	Engineering, manufacturing and construction

S. No.	Occupational Training Standards	ISCED-F 2013
1216	Land Transportation Executive	Engineering, manufacturing and construction
1217	Liquid Transport Operator	Engineering, manufacturing and construction
1218	Material Handling Equipment (MHE) Operator and Technician	Engineering, manufacturing and construction
1219	Material Handling Equipment (MHE) Maintenance Technician	Engineering, manufacturing and construction
1220	Rail Mounted Quay Crane (RMQC) Operator	Engineering, manufacturing and construction
1221	Reach Truck Operator	Engineering, manufacturing and construction
1222	Reefer Vehicle Operator	Engineering, manufacturing and construction
1223	Shipment Classification Agent	Engineering, manufacturing and construction
1224	Shipment Query Handler	Engineering, manufacturing and construction
1225	Tank Farm Associate	Engineering, manufacturing and construction
1226	Transport Consolidator	Engineering, manufacturing and construction
1227	Transport Coordinator	Engineering, manufacturing and construction
1228	Warehouse Claims Coordinator	Engineering, manufacturing and construction
1229	Warehouse Executive	Engineering, manufacturing and construction
1230	Cold Chain Process Management Specialist	Engineering, manufacturing and construction
1231	Container Freight Station (CFS) and Inland Container Depot (ICD) Supervisor	Engineering, manufacturing and construction
1232	Courier Claims Processor	Engineering, manufacturing and construction
1233	E-commerce Team Lead	Engineering, manufacturing and construction
1234	Key Consignor Executive	Engineering, manufacturing and construction
1235	Land Transportation Supervisor	Engineering, manufacturing and construction
1236	Perishable Product Handling Specialist	Engineering, manufacturing and construction
1237	Refrigeration and Maintenance Equipment Specialist	Engineering, manufacturing and construction
1238	Ship and Yard Planning Supervisor	Engineering, manufacturing and construction
1239	Tank Farm Supervisor	Engineering, manufacturing and construction
1240	Warehouse Supervisor	Engineering, manufacturing and construction
1241	Transport and Logistics (Pathways)	Engineering, manufacturing and construction
1242	Rail Track Vehicle Driver	Engineering, manufacturing and construction
1243	Road Transport Terminal Operations	Engineering, manufacturing and construction
1244	Shunting	Engineering, manufacturing and construction
1245	Electric Passenger Train Guard	Engineering, manufacturing and construction
1246	International Freight Forwarding Operator	Engineering, manufacturing and construction
1247	Mechanical Rail Signalling Operator	Engineering, manufacturing and construction
1248	Rail Signalling Executive	Engineering, manufacturing and construction

S. No.	Occupational Training Standards	ISCED-F 2013
1249	Rail Structures Technician	Engineering, manufacturing and construction
1250	Rail Track Surfacing Technician	Engineering, manufacturing and construction
1251	Rail Infrastructure Officer	Engineering, manufacturing and construction
1252	Rail Network Control Officer	Engineering, manufacturing and construction
1253	Rail Safety Manager	Engineering, manufacturing and construction
1254	Traffic Control Room Operator	Engineering, manufacturing and construction
1255	Mental Health Peer Worker	Health and welfare
1256	Alcohol and Other Drugs Counsellor	Health and welfare
1257	Child, Youth and Family Intervention Counsellor	Health and welfare
1258	Youth Worker	Health and welfare
1259	Justice Services Officer	Health and welfare
1260	Medical Service First Responder	Health and welfare
1261	Ambulance Communications (Call-taking)	Health and welfare
1262	Dental Laboratory Assistant	Health and welfare
1263	Health Administrator	Health and welfare
1264	Health Services Assistant	Health and welfare
1265	Pathology Assistant	Health and welfare
1266	Pathology Collection Technician	Health and welfare
1267	Cardiac Technology Technician	Health and welfare
1268	Operating Theatre Technical Support	Health and welfare
1269	Anaesthetic Technology Technician	Health and welfare
1270	Audiometry Technician	Health and welfare
1271	Nurse	Health and welfare
1272	Paramedical Science Support	Health and welfare
1273	Front Line Health Worker	Health and welfare
1274	Medical Equipment Technician	Health and welfare
1275	Phlebotomy Technician	Health and welfare
1276	X- ray Technician	Health and welfare
1277	Anesthesia Technician	Health and welfare
1278	Assistant Physiotherapist	Health and welfare
1279	Blood Bank Technician	Health and welfare
1280	Cardiac Care Technician	Health and welfare
1281	Dental Assistant	Health and welfare
1282	Dialysis Technician	Health and welfare

S. No.	Occupational Training Standards	ISCED-F 2013
1283	Diet Assistant	Health and welfare
1284	Emergency Medical Technician	Health and welfare
1285	General Duty Assistant	Health and welfare
1286	General Duty Assistant Advanced	Health and welfare
1287	Geriatric Care Assistant	Health and welfare
1288	Hospital Front Desk Coordinator	Health and welfare
1289	Medical Laboratory Technician	Health and welfare
1290	Medical Records & Health Information Technician	Health and welfare
1291	Medical Records Assistant	Health and welfare
1292	Neurophysiology Technology Assistant	Health and welfare
1293	Operating Theatre Technician	Health and welfare
1294	Pharmacy Assistant	Health and welfare
1295	Radiology Technician	Health and welfare
1296	Speech Audio Therapy Assistant	Health and welfare
1297	Telehealth Services Coordinator	Health and welfare
1298	Transplant Coordinator	Health and welfare
1299	Vision Assistant	Health and welfare
1300	Emergency Medical Technician (EMT)	Health and welfare
1301	Histotechnician	Health and welfare
1302	Radiation Therapy Technologist	Health and welfare
1303	Community Development Officer	Health and welfare
1304	Counselling	Health and welfare
1305	Screen and Media Technician	Information and Communication Technologies (ICTs)
1306	Assistant Cameraman	Information and Communication Technologies (ICTs)
1307	Live Production and Technical Services Executive	Information and Communication Technologies (ICTs)
1308	Social Media Executive	Information and Communication Technologies (ICTs)
1309	Sound Editor	Information and Communication Technologies (ICTs)
1310	Sound Technician	Information and Communication Technologies (ICTs)
1311	Texturing Artist	Information and Communication Technologies (ICTs)
1312	3D Digital Game Art	Information and Communication Technologies (ICTs)
1313	Web Technologies	Information and Communication Technologies (ICTs)
1314	Collections Executive	Information and Communication Technologies (ICTs)
1315	Customer Relationship Manager (Non –Voice)	Information and Communication Technologies (ICTs)

S. No.	Occupational Training Standards	ISCED-F 2013
1316	Customer Relationship Manager (Voice)	Information and Communication Technologies (ICTs)
1317	IT Helpdesk Attendant	Information and Communication Technologies (ICTs)
1318	Software Developer	Information and Communication Technologies (ICTs)
1319	Infrastructure Technician	Information and Communication Technologies (ICTs)
1320	IoT - Command and Control Room Operator	Information and Communication Technologies (ICTs)
1321	Media Developer	Information and Communication Technologies (ICTs)
1322	Technical Support Technician	Information and Communication Technologies (ICTs)
1323	Technical Support Executive (Non Voice)	Information and Communication Technologies (ICTs)
1324	Technical Support Executive (Voice)	Information and Communication Technologies (ICTs)
1325	Technical Writer	Information and Communication Technologies (ICTs)
1326	Test Technician	Information and Communication Technologies (ICTs)
1327	E-Waste Collector	Information and Communication Technologies (ICTs)
1328	Optical Fiber Splicer	Information and Communication Technologies (ICTs)
1329	Telecom Board Bring-Up Technician	Information and Communication Technologies (ICTs)
1330	Broadband Technician	Information and Communication Technologies (ICTs)
1331	Fiber to the Home (FTTH/X) Installer	Information and Communication Technologies (ICTs)
1332	Field Sales Executive	Information and Communication Technologies (ICTs)
1333	Hand Soldering Technician Telecom Board	Information and Communication Technologies (ICTs)
1334	ICT Technician	Information and Communication Technologies (ICTs)
1335	In-store Promoter	Information and Communication Technologies (ICTs)
1336	Line Assembler - Telecom Products	Information and Communication Technologies (ICTs)
1337	Network Administrator	Information and Communication Technologies (ICTs)
1338	Optical Fiber Technician	Information and Communication Technologies (ICTs)
1339	Site Surveyor	Information and Communication Technologies (ICTs)
1340	Telecom Embedded Hardware Developer	Information and Communication Technologies (ICTs)
1341	Telecom Network Security Technician	Information and Communication Technologies (ICTs)
1342	Telecom Surface Mount Technology (SMT) Technician	Information and Communication Technologies (ICTs)
1343	Telecom Technician - IoT Device/System (Installation & M2M Communication Setup)	Information and Communication Technologies (ICTs)
1344	Telecom Terminal Equipment Application Developer (Android Application)	Information and Communication Technologies (ICTs)
1345	Telecom Terminal Equipment Application Developer (Native)	Information and Communication Technologies (ICTs)
1346	Telecom Tower / Bay Installation Supervisor	Information and Communication Technologies (ICTs)
1347	Tower Technician	Information and Communication Technologies (ICTs)

S. No.	Occupational Training Standards	ISCED-F 2013
1348	Wireless Technician	Information and Communication Technologies (ICTs)
1349	Cluster In-charge	Information and Communication Technologies (ICTs)
1350	Drive Test Technician	Information and Communication Technologies (ICTs)
1351	Field Maintenance Technician	Information and Communication Technologies (ICTs)
1352	Installation Technician	Information and Communication Technologies (ICTs)
1353	Installation Technician- (SDH and DWDM)	Information and Communication Technologies (ICTs)
1354	Network Management Technician	Information and Communication Technologies (ICTs)
1355	Plant Fiber Installation, Testing and Commissioning Supervisor	Information and Communication Technologies (ICTs)
1356	Product Specialist	Information and Communication Technologies (ICTs)
1357	Cloud Computing Technician	Information and Communication Technologies (ICTs)
1358	Cyber Security Technician	Information and Communication Technologies (ICTs)
1359	IT Network Systems Admin	Information and Communication Technologies (ICTs)
1360	IT Software Solutions Technician	Information and Communication Technologies (ICTs)
1361	Mobile Robotics Technician	Information and Communication Technologies (ICTs)
1362	Web Developer	Information and Communication Technologies (ICTs)
1363	Fraud Control Technician	Information and Communication Technologies (ICTs)
1364	Broadcast Technologist	Information and Communication Technologies (ICTs)
1365	Graphic Designer	Information and Communication Technologies (ICTs)
1366	Computer Designer	Information and Communication Technologies (ICTs)
1367	Piano Technologist	Information and Communication Technologies (ICTs)
1368	Storyboard Artist	Information and Communication Technologies (ICTs)
1369	Animator	Information and Communication Technologies (ICTs)
1370	Editor	Information and Communication Technologies (ICTs)
1371	Rigging Artist	Information and Communication Technologies (ICTs)
1372	Roto Artist	Information and Communication Technologies (ICTs)
1373	Search Engine Marketing Executive	Information and Communication Technologies (ICTs)
1374	Search Engine Optimization Executive	Information and Communication Technologies (ICTs)
1375	Camera Operator	Information and Communication Technologies (ICTs)
1376	Security System Installation Technologist	Information and Communication Technologies (ICTs)
1377	Fault Management Technologist	Information and Communication Technologies (ICTs)
1378	Digital Marketer	Information and Communication Technologies (ICTs)
1379	Digital Content Developer	Information and Communication Technologies (ICTs)
1380	Service Technician - Home Appliances	Information and Communication Technologies (ICTs)
1381	Lighting Artist	Information and Communication Technologies (ICTs)

S. No.	Occupational Training Standards	ISCED-F 2013
1382	Art Director (Animation and Gaming)	Information and Communication Technologies (ICTs)
1383	Music Programmer	Information and Communication Technologies (ICTs)
1384	Social Media Manager	Information and Communication Technologies (ICTs)
1385	Animation Director	Information and Communication Technologies (ICTs)
1386	Printing and Graphic Arts Manager	Information and Communication Technologies (ICTs)
1387	Field Technician - Computing and Peripherals	Information and Communication Technologies (ICTs)
1388	Field Technician - Other Home Appliances	Information and Communication Technologies (ICTs)
1389	Mobile Phone Repair Technician	Information and Communication Technologies (ICTs)
1390	Taxi Driver	Services
1391	Telecaller	Services
1392	Chauffeur	Services
1393	Driver Trainer	Services
1394	Finance, Insurance and Registration Coordinator	Services
1395	Sales Representative	Services
1396	Vendor Development Executive	Services
1397	Aromatherapist	Services
1398	Spa Therapist	Services
1399	Wellness Neurotherapist	Services
1400	Life Guard Pool & Beach	Services
1401	Janitorial Services	Services
1402	Dishwasher	Services
1403	Housekeeping Executive	Services
1404	Façade Cleaner	Services
1405	Food & Beverage Service Executive	Services
1406	Front Office Executive	Services
1407	Kitchen Steward	Services
1408	Chef	Services
1409	Travel Insurance Executive	Services
1410	Adventure Sports Organiser	Services
1411	Billing Executive	Services
1412	Commis Chef	Services
1413	Counter Sales Executive	Services
1414	Facility Store Keeper	Services
1415	Front Desk Officer – Quick Service Restaurant	Services
1416	Laundry Machine Operator	Services
1417	Multi-skilled Technician	Services

S. No.	Occupational Training Standards	ISCED-F 2013
1418	Order Taker-Home Delivery	Services
1419	Quality Control Executive	Services
1420	Ranger - Tourism	Services
1421	Reservation Desk Executive	Services
1422	Room Attendant	Services
1423	Tour Guide	Services
1424	Tour Vehicle Driver	Services
1425	Travel Consultant	Services
1426	Visa Assistance Consultant	Services
1427	Bartender	Services
1428	Boat Jetty In-charge	Services
1429	Cafeteria Supervisor	Services
1430	Facility Supervisor	Services
1431	Food & Beverage Services Manager	Services
1432	Food Safety Supervisor	Services
1433	Housekeeping Executive	Services
1434	Inventory In-charge	Services
1435	Laundry Manager	Services
1436	Meeting, Conference and Event Planner	Services
1437	Pastry Chef	Services
1438	QSR Coordinator	Services
1439	Scuba Diving Coach	Services
1440	Water Sport Vehicle Operator	Services
1441	Kitchen Operations	Services
1442	Bus and Coach Driver	Services
1443	Personal Trainer	Services
1444	Yoga Instructor	Services
1445	Personal Training Manager	Services
1446	Tattoo Artist	Services
1447	Outdoor Recreation Technician	Services
1448	Aquatics and Community Recreation Operator	Services
1449	Sport Development Instructor	Services
1450	Fitness Instructor	Services
1451	Sport and Recreation Manager	Services
1452	Sports Masseur	Services
1453	Community Sports Coach	Services
1454	Correctional Administration	Services
1455	Investigator	Services

S. No.	Occupational Training Standards	ISCED-F 2013
1456	Industrial Security Operator	Services
1457	Research Operations (Counter Drug Intelligence)	Services
1458	Crime Scene Investigations	Services
1459	Intelligence Analysis	Services
1460	Armed Security Guard	Services
1461	Fire-fighter	Services
1462	Personal Security Officer	Services
1463	Security Risk Analysis Executive	Services
1464	Unarmed Security Guard	Services
1465	Close Protection Operations	Services
1466	Fire Protection Inspection and Testing Technician	Services
1467	Security Operations Manager	Services
1468	Salon Assistant	Services
1469	Beauty Therapist	Services
1470	Hairdressing Technician	Services
1471	Small Business Manager	Services
1472	Child Caretaker (Non Clinical)	Services
1473	Elderly Caretaker (Non Clinical)	Services
1474	General Housekeeper	Services
1475	Baby Caregiver	Services
1476	Caregiver – Mother and Newborn	Services
1477	Caregiver - Person with Disability (Non Clinical)	Services
1478	Household Multipurpose Executive	Services
1479	Cemetery and Crematorium Operations Executive	Services
1480	Funeral Operations Manager	Services
1481	Embalming Technician	Services
1482	Cleaning Operator	Services
1483	Urban Pest Management	Services
1484	Translator	Services
1485	Nail Technology Technician	Services
1486	Field Survey Enumerator	Services
1487	Community Journalist	Social sciences, journalism and information
1488	Library Assistant	Social sciences, journalism and information
1489	Career Development Counsellor	Social sciences, journalism and information
1490	Library and Information Services Manager	Social sciences, journalism and information

ANNEXURE II: STANDARDS DEVELOPED BY TVETA

S. No.	Occupational Training Standards (Under review)
1.	Internal and External Verifiers
2.	Principal Trainer/Manager
3.	Programme Developer
4.	Technical Instructor
5.	Trainer/Assessor
6.	Community Health Level III
7.	Agriculture Crop Production Level III
8.	Mechatronics Installer Level III
9.	Mason Level III
10.	Entrepreneurship Level 5
11.	Entrepreneurship Level 6
S. No.	Regulatory Standards (Gazetted)
1.	TVETS_01_2019: CBETA - Requirements and guidelines
2.	TVETS_02_2019: PLAR - Requirements and guidelines
3.	TVETS_03-1_2019: CBET Trainers qualification framework (General)
4.	TVETS_04_2019: National Polytechnics Requirements and guideline
5.	TVETS_05_2019: ODeL - Requirements and guidelines
6.	TVETS_06_2019: Centre of excellence - Requirements
S. No.	Regulatory Standards (Under review)
1.	Draft Assessment Tools Training Standards
2.	Draft Guide to Developing Assessment Tools
3.	TVET Assessment Centre Standards and Guidelines
4.	Draft Governance And Management For VTCs And TVCs

ANNEXURE III: TVETA APPROVED TVET CDACC CURRICULA

S. No.	Course Title	Level
1.	Agricultural Extension	6
2.	Agriculture Extension	4
3.	Agripreneurship	3
4.	Agripreneurship	4
5.	Agripreneurship	5
6.	Agripreneurship	6
7.	Airport Operations Management	6
8.	Animation and Digital Media	6
9.	Apiary Attendant	4
10.	Apiculture	5
11.	Apiculture	6
12.	Applied Statistics	6
13.	Aquaculture	3
14.	Aquaculture	4
15.	Aquaculture	5
16.	Aquaculture	6
17.	Architectural Draftsmanship	5
18.	Architectural Technology	6
19.	Automotive Engineering	6
20.	Automotive Mechanic	3
21.	Automotive Technician	5
22.	Baking Technology - Pastry production	3
23.	Baking Technology - Production of yeast products	3
24.	Bartender	4
25.	Beauty Therapy	3
26.	Beauty Therapy	4
27.	Beauty Therapy	5
28.	Beauty Therapy	6
29.	Bee Hives and Bee Equipment Construction	4
30.	Bee Products and Processing	4
31.	Broadcast Journalism	6
32.	Building Artisan (Masonry)	4
33.	Building Technician	6
34.	Business Management OS & Curriculum Level – 5	5

S. No.	Course Title	Level
35.	Business Management OS & Curriculum Level – 6	6
36.	Carpentry and Joinery	5
37.	Carpentry and Joining	4
38.	Ceramics Artisan	3
39.	Ceramics Artisan	4
40.	Ceramics Technology	6
41.	Chemical Engineering	6
42.	Child Protection	6
43.	Christian Ministry	6
44.	Construction Management	6
45.	Construction Plant	6
46.	Cooperative Management	5
47.	Cooperative Management	6
48.	Corporate Governance	6
49.	Counselling Psychology	5
50.	Counselling Psychology	6
51.	Credit Management	6
52.	Criminal Justice Management	6
53.	Cyber Security	6
54.	Dairy Farm Management	3
55.	Dairy Farm Management	4
56.	Dairy Farm Management	5
57.	Dairy Farm Management	6
58.	Dairy Plant Management	4
59.	Dairy Plant Management	5
60.	Dairy Plant Management	6
61.	Dairy Processing	4
62.	Distribution Sales	3
63.	Distribution Sales	5
64.	Electrical Engineering (Power Option)	6
65.	Electrical Installation	3
66.	Electrical Installation	5
67.	Electrical Installation	6
68.	Electrical Installation	4
69.	Electrical Operation (Power Option)	5

S. No.	Course Title	Level
70.	Environmental Management	6
71.	Environmental Science	6
72.	Fashion Design (Dressmaking)	3
73.	Fashion Design (Tailoring)	3
74.	Fashion Design Technology	4
75.	Fashion Design Technology	5
76.	Financial Sales	5
77.	Fine Arts	6
78.	Flight Dispatcher	6
79.	Food and Beverage (Sales & Service)	5
80.	Food and Beverage Sales	3
81.	Food and Beverage Sales & Service	4
82.	Food and Beverage Sales Management	6
83.	Food and Beverage Sales & Service	5
84.	Food Production Culinary Arts	5
85.	Food Technology	5
86.	Food Technology OS & Curriculum Level – 6	6
87.	Footwear Making	3
88.	Footwear Making	4
89.	Forensic Investigation	5
90.	Forensic Investigation	6
91.	Forex and Securities	6
92.	Front Office Level – 3	3
93.	Highway Engineering	6
94.	Horticulture Nursery Management Level – 3	3
95.	Horticulture Nursery Management Level – 4	4
96.	Horticulture Nursery Management Level – 5	5
97.	Horticulture Nursery Management Level – 6	6
98.	Horticulture Processing	3
99.	Horticulture Processing	4
100.	Horticulture Processing	5
101.	Horticulture Processing	6
102.	Horticulture Production	3
103.	Horticulture Production	4
104.	Horticulture Production	5

S. No.	Course Title	Level
105.	Horticulture Production	6
106.	House Keeping	5
107.	House Keeping	4
108.	House Keeping	3
109.	Housekeeping Management Level - 6	6
110.	Human Resource Management	5
111.	Human Resource Management	6
112.	ICT	6
113.	ICT	4
114.	ICT	5
115.	Industrial Automation and Robotics	6
116.	Industrial Controls Installations	6
117.	Industrial Plant Operations	6
118.	Industrial Plants	4
119.	Instrumentation and Control	3
120.	Instrumentation and Control	5
121.	Instrumentation and Control	4
122.	Instrumentation and Control	6
123.	Integrated Pest Management	5
124.	Land Survey	6
125.	Laundry and Dry Cleaning	4
126.	Leather Technology	6
127.	Library and Information Science	6
128.	Library and Information Science	5
129.	Marketing	6
130.	Masonry	3
131.	Meat Abattoir Operator	4
132.	Meat Processing	5
133.	Meat Processing	4
134.	Mechanical Engineering Level – 6	6
135.	Mechanical Plant Engineering	6
136.	Mechanical Technology and Maintenance	6
137.	Mechatronics	6
138.	Mechatronics	5
139.	Motorcycle Mechanics	3

S. No.	Course Title	Level
140.	Motorcycle Mechanics	4
141.	Office Administration Level - 5	5
142.	Office Administration OS & Curriculum Level - 6	6
143.	Office Assistant	4
144.	Oil Pipeline Fire Officer	5
145.	Oil Pipeline Instrumentation and Control	5
146.	Oil Pipeline Laboratory Technology	5
147.	Oil Pipeline Mechanical Maintenance	5
148.	Oil Pipeline Operations	5
149.	Operation Theatre Technology	5
150.	Operation Theatre Technology	6
151.	Optical	6
152.	Pastry Cook	4
153.	Perioperative Theatre Technology	5
154.	Plant and Service Engineering	6
155.	Plumbing	3
156.	Plumbing	4
157.	Printing Technology	6
158.	Project Management	5
159.	Project Management Level - 6	6
160.	Records & Archives Management OS & Curriculum Level - 6	6
161.	Records and Archives	5
162.	Refrigeration and Air Conditioning	5
163.	Scaffolding	4
164.	Scaffolding	3
165.	Science Lab Technologist	6
166.	Security Guard Level - 3	3
167.	Security Management	6
168.	Slaughter House Attendant	3
169.	Social Work	6
170.	Social Work	5
171.	Soil Management	5
172.	Soil Management	3
173.	Soil Management	4
174.	Soil Management	6

S. No.	Course Title	Level
175.	Solar PV Installation	3
176.	Supply Chain Management	5
177.	Supply Chain Management	6
178.	Sustainable Agriculture for Rural Development	5
179.	Tour Guide	5
180.	Water Resources Management Technology	6
181.	Welding	4
182.	Welding and Fabrication	6
183.	Welding and Fabrications	5
184.	Aeronautical Engineering - Airframes and Power Plant	6
185.	Aeronautical Engineering - Avionics Option	6
186.	Agricultural Engineering	6
187.	Agriculture Machinery and Equipment	4
188.	Air Cargo Management	6
189.	Apiculture (Bee Technology)	6
190.	Apiculture (Bee Technology)	5
191.	Baking Technology	3
192.	Baking Technology	4
193.	Baking Technology	5
194.	Baking Technology	6
195.	Baking Technology - Cake Decoration	5
196.	Bank Cleric	6
197.	Biotechnician	6
198.	Bio-Technician	6
199.	Biotechnology	5
200.	Cartography	6
201.	Certified Pension Management	6
202.	Christian Minister	6
203.	Community Health	4
204.	Community Health	6
205.	Computer Applications	3
206.	Credit Manager	6
207.	Credit Officer	5
208.	Credit Officer	5
209.	Culinary Arts Level – 3	3

S. No.	Course Title	Level
210.	Culinary Arts Level – 6	6
211.	Fashion Design	6
212.	Film Production	6
213.	Final Interior Design	6
214.	Food and Beverage Level -4	4
215.	Food Production	5
216.	Food Production	4
217.	Footwear Production	5
218.	Freight Management	6
219.	Gemology	6
220.	Graphic Design	6
221.	Hair Dressing	3
222.	Hair Dressing	4
223.	Hair Dressing	5
224.	Hair Dressing and Beauty Therapy	3
225.	Hair Dressing Level OS & Curriculum Level – 6	6
226.	Health Records and Information Technology	6
227.	Heavy and Light Machinery Operations (Excavator)	4
228.	Heavy and Light Machinery Operations (Grader)	4
229.	Industrial Plant Operations	3
230.	Lathe Machines Operator	4
231.	Manual Arc Welding	4
232.	Marine Engineering	6
233.	Marriage and Family Counselling	6
234.	Marriage and Family Therapy	5
235.	Masonry	4
236.	Meat Butchery Attendant	3
237.	Meat Butchery Attendant	3
238.	Meat Butchery Operations	4
239.	Meat Slaughter House Attendant	3
240.	Meat Slaughter House Attendant	3
241.	Mechanical Heavy & Light Machinery Operations	4
242.	Mechanical Heavy & Light Machinery Operations	5
243.	Mechanical Technology and Maintenance	4
244.	Mechanical Technology and Maintenance	5

S. No.	Course Title	Level
245.	Medical Laboratory Technology	6
246.	Music Performance	6
247.	Music Technology	6
248.	Pharmaceutical Technology	6
249.	Post Press	5
250.	Poultry Breeding Operations	5
251.	Poultry Broiler Operator	3
252.	Poultry Broiler Production Attendant	4
253.	Poultry Broiler Production Operator	3
254.	Poultry Hatchery Operations	4
255.	Poultry Kienyeji Chicken Production Operator	3
256.	Poultry Kienyeji Operator	3
257.	Poultry Layer Operator	3
258.	Poultry Layer Production Attendant	3
259.	Poultry Layer Production Operations	4
260.	Poultry Management	6
261.	Poultry Processing Operator	5
262.	Poultry Products Processing Operations	4
263.	Pre-Press	5
264.	Press Printing Technician	5
265.	Quantity Survey	6
266.	Road Transport Management	6
267.	Scaffolding	5
268.	Scaffolding	6
269.	Simple Automation Inspection	4
270.	Soft Furnishing	5
271.	Technical Trainer	5
272.	Textile Technician	6
273.	Theatre Arts	6
274.	Tourism and Travel Management	5
275.	Tourism Management	6

ANNEXURE IV: NATIONAL OCCUPATIONAL STANDARDS DEVELOPED BY NITA

New Areas (QPs, NOS, Curricula and Assessment Guidelines)	
Computer Trades	Computer Operator – Level II, III, and IV Graphics Designer – Level II, III and IV
Apparel	Machine Knitter – Level II, III and IV
	Apparel Pattern Maker – Level IV
	Sewing Machine Operator – Level II and III
	Apparel Quality Checker – Level IV
	Tie and Dye - Level II
	Batik - Level II
	Screen Printing – Level III and IV
	Garment Production – Level V
Fashion Accessory Designer – Level II, III and IV	
Building	Scaffold fitter – Level II, III and IV
	Terrazzo/Granolithic Layer – Level II, III and IV
	Landscaper – Level II, III and IV
	Form Worker – Level II, III and IV
	Glazier – Level II, III and IV
	Steel Fixer – Level II, III and IV
Interior Decorator – Level III and IV	
Automotive	Lighting Vehicle Mechanic – Level II, III, IV and V
	Vehicle Body Builder – Level II, III and IV
	Power Generation Mechanic – Level III, IV and V
	Earth Moving Plant Operator – Level II, III and IV
	Lifting Plant Operator – Level II, III and IV
	Motorcycle Mechatronics – Level II, III and IV
	Motor Vehicle Assembler – Level V
Agriculture	Floriculture – Level II, III and IV
	Mechanical Tea Harvester –Level II
	Ranching – Level II, III and IV
	Dairy Processing Operator – Level III
	Cheddar Cheese Maker – Level IV
	Butter and Ghee Processor – Level IV
	Mushroom Farmer – Level II, III and IV
	Poultry Farmer – Level II, III and IV

Hospitality	Food and Beverage Service – Level II, III and IV
	Food and Beverage Production – Level II, III and IV
	Housekeeping – Level II, III and IV
	Baker – Level II, III and IV
	Leather Technology
	Footwear Cutter – Level II
	Footwear Stitcher – Level II
Music	Music Instrumentalist – Level II, III and IV
	Music Producer – Level II, III and IV
	Media and Communication
	Photographer – Level II, III and IV
	Videographer – level II, III and IV
Existing Trade Areas under Review (QPs, NOS, Curricula and Assessment Guidelines)	
Automotive	Plant Mechanic Level II, III, IV and V
	Panel Beater – Level II, III and IV
	Spray Painter – Level II, III and IV
	Motor Vehicle Electrician – Level II, III, IV and V
Security	Private Security Guard – Level II
	Private Security Supervisor – Level III
	Armourer – Level II, III and IV
Mechanical	Arc Welding - Level II, III, IV and V

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