DIPLOMA IN EDUCATION LEADERSHIP AND MANAGEMENT
MODULE 7:LEADERSHIP IN SCIENCE, TECHOLOGY AND INNOVATION

UNIT 2:
POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK FOR SCIENCE, TECHNOLOGY, AND INNOVATION

Introduction

- In this unit, we examine the policy, legal and Institutional framework of ST&I in Kenya. The unit will explore the policy and legal instruments guiding ST&I, curriculum reforms in relation to ST&I, and institutions that manage the ST&I sector. Finally, the unit will introduce you to the Institutional ST&I policy so that you can understand how to develop one for your institution.
- The National Commission for Science, Technology, and Innovation (NACOSTI) is one of the arms of the ST&I sector and it exists to regulate and assure quality in the S T & I sector as well as act as an adviser to the government in matters thereto. The Kenya National Innovation Agency (KENIA) exists to develop and manage the national innovation system while the National Research Fund (NRF) exists to facilitate research for the advancement of science. These were some of the key highlights of Kenya's ST&I policy environment of NACOSTI.
- The National Commission of Science and Technology is charged with the responsibility of overseeing the processes of ST&I policy formulation and implementation. The development of the new ST&I policy entrenched in Vision 2030 sought to connect the variety of entities and their activities towards a more coordinated approach with more defined mechanisms for mobilizing human, financial and Institutional resources.



Upon completion of this unit, you will be able to:

a) Explore policy and legal frameworks of ST&I
b) Analyze curriculum reforms in relation to ST&I
c) Appreciate the importance of the Institutional framework of ST&I
d) Develop an Institutional ST&I policy

Policy and legal framework of ST&I

New technologies are constantly being developed, driving progress and change. Because technology has the capacity to drastically change our lives and not always for the better it would be invaluable to know how sustainable a new technology is before it is introduced. This, therefore, necessitates the introduction of policies, frameworks, and guidelines that govern ST&I.



1. **Constitution (2010)**

   - The Kenyan constitution recognizes the role of science, and indigenous technologies in development and there is a commitment of 2% of GDP to scientific research in raising the quality of Science, Technology, and Mathematics (STEM). Vision 2030 where ST&I is embedded quite explains why the ST&I policy has taken quite some treads in Kenya and thus the advancement of the ST&I sub-sector towards the realization of a knowledge-based economy.
   - Article 11(2) (b) and (c) of the Constitution recognizes the role of science and indigenous technologies in the development of the nation, the promotion of intellectual property rights of the people of Kenya, and the promotion of all form of national and cultural expression through literature, the arts, traditional values, and celebrations.
   - This also impacts our education and training curriculum.

Science, Technology, and Innovation (ST&I) policy (2008):

- Through this policy and strategy, the Government will harness Kenya‘s collective talents and creativity to promote capacity building in ST&I human, financial and infrastructure development and effective networks and linkages for knowledge generation and sharing. Strengthened science, mathematics, and language skills will be critical in supporting Kenya‘s scientific, engineering and technology base.
- Equally important will be creating the enabling environment to apply these skills into productive and innovative competencies and opportunities for technological learning, particularly within industry and business enterprises.
- The thrust in the realization of these objectives is outlined in the document in various prioritized programmes and projects within which Kenyans are expected to promote scientific and technological deepening and application in industry, enterprise, community, research and development institutions.

Science, Technology and Innovation Act (2013)

- It was enacted to facilitate the promotion, coordination and regulation of the progress of science, technology and innovation in the country; to assign priority to the development of science, technology and innovation as well as to entrench science, technology and innovation into the national production system.
- Schedule III Article 9 of the ST& I Act 2013 provides for the establishment of the National Research and Surveillance Committee (NRSC), for the regulation of ethics and values in ST&I. The functions of NRSC include:

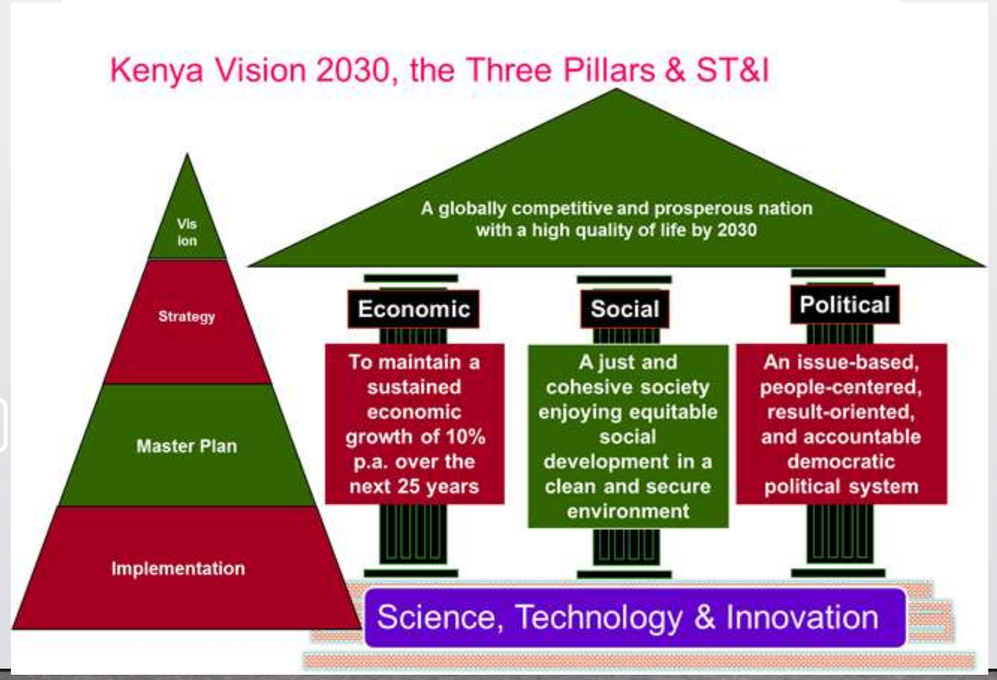
i. To develop a national information and documentation observatory to track, analyse and promote the development of ethical issues in science at the national, regional, and international levels.

ii. Establish open dialogue with stakeholders including industry, the scientific community, religions, cultural groups, schools, and other interested groups

Vision 2030

- For Kenya to become a globally competitive and prosperous nation with a high quality of life by the year 2030, ST&I is the foundation that will enable the KV2030 pillars of economic, social and political to be realized.

A globally competitive and prosperous nation with a high quality of life by 2030



The relationship between ST&I and Kenya Vision 2030

a. Education, Training and Research

- The pool of skills emanating from education and training institution influences the ability to develop quality human resources within employment.
- To ensure that adequate and relevant skills are available, important ST&I-related disciplines are integrated at all levels of education and training.

In addition, research is essential for the purposes of generating new knowledge and for putting into perspective the already developed knowledge in pursuit of the Kenyan goals. In this regard, the Government is set to:

- Promote creativity and learning by discovery through a participatory approach.
- Promote attitudes receptive to ST&I among all education stakeholders.
- Promote appropriate science, engineering and technology (SET) skills at various levels of education and training.
- Re-enforce its commitment to targeted transformational research aimed at generating new ideas and putting into perspective those already developed to address Kenya‘s strategic priorities.

(b) *Human Resource Development (HRD) and ST& I*

- The objective of HRD is to attract, develop and retain a critical mass of world-class human resource capacities and capabilities that can develop and apply ST& I in the production of products and services.
- The human resource function is central to any organization‘s development such as a education.
- It is the human resource that:
  i. Formulates, reviews and operationalizes policies that propel the organization.
  ii. Applies/utilizes the other factors of production such as time and finance to promote the activities such as ICT.
  iii. Initiates and adopts change to align the organization to emerging trends such
  iv. as the application of ST&I knowledge and skills.
  v. Monitors, evaluates and reports on the effectiveness and efficiency of the organization‘s activities.
- Concerted efforts should be made continuously to organize professional development in various competencies through in-service courses for staff of various cadres.
- Through effective participation of the education management in professional development in-service courses, the education managers will be empowered in the ollowing ways:
- Acquire leadership skills that will enable them to move from being a novice to an expert in the area of specialization.
- Be able to formulate, implement, monitor, evaluate and report effectively on education for different levels and their peculiarities.
- Promote analytical, creative, innovative and practical abilities for both the teachers and the learners.
- Develop functional teams that can work collaboratively and harmoniously.
- Manage emotions of stakeholders in education through appropriate guidance and counseling approaches to forestall burnout.
- Develop strategies to motivate key players in education to be interested in ST&I and its applications to ensure the provision of quality services including curriculum delivery.
- Manage conflicts in education due to its many facets through appropriate approaches such as mediation.
- Carry out the placement of officers to positions in education based on the expertise of the staff including knowledge of ST&I.

(c) ST&I Infrastructure

- Infrastructure is a prerequisite for the effective utilization of science, technology and innovation.
- Lessons from global experiences suggest that infrastructure development provides an important lever through which a nation can enhance its level of technological development.
- This is through its contribution to the effective utilization of ST&I. It will also spur a potentially positive impact on enhancing the technological learning process.
- Therefore, the inadequate state of infrastructure and the services thereof in Kenya presents an important opportunity through which the country can leap-frog in its application of science, technology and innovation if addressed appropriately and effectively.
- Whereas ST&I is infrastructure intensive, the network of existing infrastructure is
- inadequate to facilitate the achievement of the national objectives in the field. To address this concern, the Government gears to:

i. Create an environment for the strengthening of supportive physical infrastructure for science, technology and innovation.
ii. Support establishment of efficient ICT infrastructure to ensure speedy, secure and cost-effective access to information.

- Priorities in this sector will involve the infrastructure development process to enhance the country‘s technological foundation, and improve technological innovation as well as the technological learning processes.
- Measures in this sector will include reforming the legal, institutional and regulatory frameworks to enhance proper infrastructure design, and integrity in contract procurement, enhance safety, proper and timely maintenance and allow for the private sector and community participation.
- It will also involve the integration of an information technology network to improve performance and create seamless, efficient and cost-effective telecommunication services for business and social interaction.

Agenda 2063- The Africa We Want

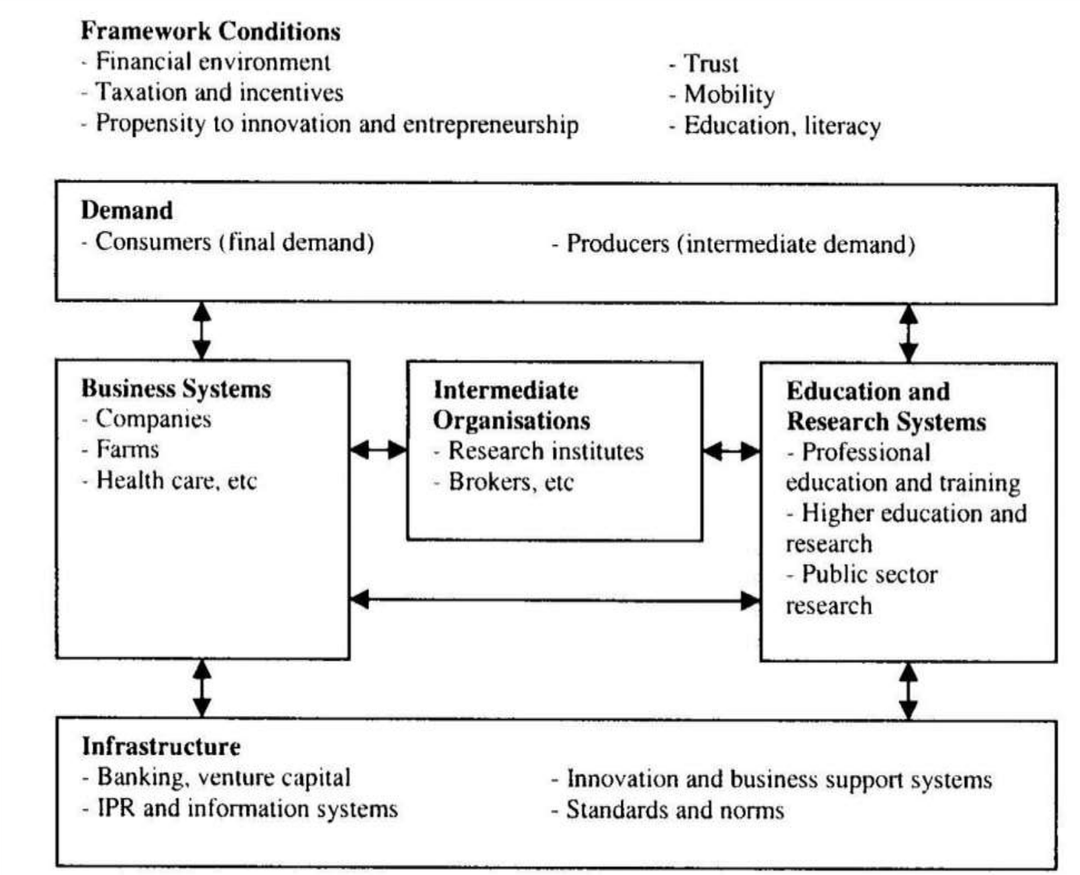
- Agenda 2063 encapsulates not only Africa's aspirations for the future but also identifies key flagship programmes which can boost Africa's economic growth and development and lead to the rapid transformation of the continent.
- Agenda 2063 not only considers Africa's continental growth aspirations but acknowledges that for the whole continent to develop the premise of Agenda 2063 must be adopted at regional and country level. Kenya does subscribes to this.
- At the inception of Agenda 2063, the National Development Plans of Member States were as well as the strategic plans of the Regional Economic Communities were reviewed and the focus areas of their development priorities have been included in the First Ten Year Implementation Plan to ensure that their priorities in the near term converge with the priority areas contained in the 50 year framework document.

The national and regional priority areas include:

- Sustainable and inclusive economic growth
- Human Capital Development
- Agriculture/value addition and agro-businesses development
- Employment generation, especially the youth and females
- Social Protection
- Gender / Women development and youth empowerment
- Good governance including capable institutions
- Infrastructural development
- Science, Technology, Innovation
- Manufacturing-based industrialization
- Peace and Security
- Culture, Arts and Sports
- Among the many areas mentioned ST&I comes out strongly to support the operationalization of ST&I in Kenya.

Kenya National Innovation System (KNIS)

- An innovation system essentially refers to the interactions among diverse groups of actors involved in the production, diffusion and use of new, and economically useful knowledge as illustrated in Figure 1 below.
- Major Components of a National Innovation System.
- An effective innovation system is required for a country to harness the potential offered by modern science and technology to its social and economic advantage.



Source : Arnold and Bell, 2001

Cont.

- An effective innovation system is required for a country to harness the potential offered by modern science and technology to its social and economic advantage.
- Kenya‘s current innovation system lacks coordination among the actors, is linear and fragmented, and has limited linkages between academia, industry and government. The academic curricula and graduate skill sets are not well -aligned to industry needs, and there is inadequate funding and support for innovations.
- Science and Technological innovations play a fundamental role in wealth creation, improvement of the quality of life and real economic growth and transformation in any society.
- The Government‘s effort will, therefore, be directed at:
  i. Ensuring that Kenya has a set of institutions, organizations, and policies which give effect to the various functions of a national innovation system,
  ii. Ensuring that there are interactions among and within all sectors and actors in the economy and
  iii. Harmonizing agreed sets of goals and objectives with Kenya vision 2030.

Curriculum Reforms in Relation to ST&I

Curriculum Reforms in Relation to ST&I

- Developing the interface between humans and technology involves the strategic question of how to connect innovation in teaching with the creation of value.
- Originating from an international conference on technology education, innovation and management. For example, parallels between teaching innovation and the work situation in smaller firms point to a general trend toward linking value creation and education.
- Though the Gachathi Report1976, Mackay Report of 1981 reformed/changed the education system of 7-4-2-3 to 8-4-4 education in 1985 with the need to tackle the problem of educated unemployment by the introduction of vocational and technical subjects in primary education to make education terminal after primary school cycle.
- The Ministry of Education had this to observe on the new proposed 8-4-4 education system; “the main aim in changing Kenya’s educational system from 7-4-2-3 to 8-4-4 is to improve the quality of education at all levels.

- The 8-4-4 education is in line with Vision 2030 since it emphasized on mathematics, sciences, vocational/technical subjects for technical skills needed to revamp the innovation and growth in industrial and economic sectors.
- The 8.4.4 education system was intended to make education more relevant to the world of work thus produce skilled manpower and high level workforce to meet the demands of the economy.
- However, 8.4.4 has failed to produce desired results hence the need to reform /change the education system.
- For education reforms to achieve innovation in education, the main stakeholder (Ministry of Education) had to change the policy of education reforms.
- Education reform is a very important process, therefore there is need to take time or plan for gradual change is important than taking a short time to think and implement change in education.

- As part of transforming the ST&I system, Kenya has taken strides in shaping effective policy framework for ST&I through a number of progressive changes. Initially, Kenya's system was anchored on the Science and Technology cap 250 of 1977 to ST&I Act, 2013.
- Earlier on, the policy did not account for aspects of innovation which had to be introduced in the ST&I Act of 2013. Integration of innovation would ensure commercialisation of technology hence economic development.
- Despite Kenya making some strides, the ST&I is marked by different challenges. There is a lot of fragmentation of research due to research/knowledge institution working in silos.
- The linkages between researchers, innovations and industry are also weak.
- To ensure promotion, coordination and regulation of the ST&I process, quality, funding and advisory linkage mandate, three arms whose roles are very discrete to one another were created in the ST&I Act, 2013.

- This is largely due to lack of partnerships between private and public sector thus emphasising the critical role public-private partnerships play. Additionally, knowledge sharing and dissemination is weak as most research institution and individuals are heightened with the fear of intellectual property loss.
- A number of initiatives are attempting to address the challenges mentioned. Based on lessons shared from different initiatives such as Linking Industry with Academia (LIWA) and the Science Granting Council Initiative (SGCI), linking academia, industry and government is a major challenge and the various facts on how to create an effective ST&I are S T & Ill lacking.]
- More specifically, there is lack of adequate information on what is being done and associated capabilities of the various sectors.
- For instance, questions such as the adequacies and inadequacies of the private sector and how their capabilities can be linked to academia, have never been adequately addressed.
- There's disparity on what the industry requires and what the academia - part of the knowledge system- produces. The idea towards linking industry with academia is to facilitate institution to think about how ST&I can spread and create value in the economy.

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- Other systemic issues involved the inter-generational isolation especially for the youth who need space in the knowledge systems.
- Moving forward, there is need for a knowledge system for Kenya that leverages and takes advantage of the available young and creative population.
- The current curriculum reforms in Kenya that led to the implementation of the Competency Based Curriculum (CBC) were inclined to managing most of the concerns raised around S T & I.
- The reforms call for learners demonstrating acquisition of various competencies such as creativity, imagination/innovation, critical thinking, problem solving, digital literacy among others which are geared towards promoting skills that are needed in the digital and technical world.
- This would in turn solve the issues of skills mismatch and unemployment.
- CBC encourages the acquisition of the 21st century which encourage Imagination, creativity and innovation. Technology is the main catalyst in achieving the purpose of CBC.

Institutional framework of ST&I

a) National Commission for Science, Technology and Innovation (NACOSTI)

This body replaced the National Council for Science & Technology (NCST). The National Commission for ST&I (NACOSTI) primarily set the national and county ST&I priorities and co-ordinate activities across all sectors, ministries and County Governments. Its mandate is to:

- Regulate and assure quality in the ST&I sector.
- Advise government on matters of ST&I policy.
- In consultation with stakeholders, determine priorities for ST&I activities.
- Accredit research institutes.
- Register research institutes.
- Approve all research programmes in Kenya.
- Ensure coordination between agencies involved in ST&I.
- Advise on science education for the public.
- Review and advise on programmes and budgets for the promotion of research and related scientific activities proposed by the ministers and ensure that they are in harmony with ST&I Policy.
- Maintain relationships with corresponding science organizations in other countries.
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b) The Kenya National Innovation Agency (KENIA)

The Kenya National Innovation Agency (KENIA) was established to largely develop and manage the National Innovation System. Its role is to:

- Facilitate the creation of innovation centres of excellence in priority areas
- Institutionalize linkages between universities, research institutes, industry, government and other actors in the national innovation system.
- Develop and continuously track and benchmark the National Innovation Metrics based on international best practices.
- Scout and nurture innovative ideas from individuals, training institutions, the private sector and other ST&I institutions.
- Recommend provision of financial and any assistance to a person to enable the person to develop any technological innovation.
- Acquire rights or interests in or to any technological innovation supported by the Agency from any person or assign any person rights in or to such technological innovation.
- Create synergy among different technological innovations, incubations and diffusion initiatives in Kenya.
- Develop the national capacity and infrastructure to protect and exploit intellectual property-derived research financed by the Agency.
- Facilitate the application for the grant of revolution of patents and institution of legal action for any infringement of IPR.
- Establish and regularly update the database on innovation.
- Regularly monitor technology and forecasting in all areas relevant to national development.
- Increase IPR awareness among innovators.
- Disseminate scientific knowledge & Technology.
- Promote ST&I advocacy.
- Establish and maintain a presidential award system for the commercialization of
- novel innovations.
- Establish and implement a mechanism for rewarding novel innovators.
- Implement the research and commercialization policy.

c) The National Research Fund (NRF)

The National Research Fund (NRF) was established to mobilize resources for the National Innovation System. It was established in 2015 as a result of the ST&1 Act (2013) and is managed by a board of trustees. Its mandate is to:

- Mobilize resources for the Kenya National Innovation system from the government, private sector, development partners and other sources.
- Effectively manage and invest mobilized funds.
- Support the development of human resources through grants, scholarships, or bursaries to persons, research institutions or universities pursuing post-graduate programs in ST&I national priority areas.
- Provide financial support for the development of ST&I infrastructure in universities, research institutions, centres of excellence and any other identified by NACOSTI.
- Support the development of research capacities in the national priority areas of ST&I.
- Allocate funds for research and promote multi-disciplinary collaboration among universities, research institutions and centres of excellence.
- Monitor, evaluate and report on the results of research funded by NRF.
- Provide support for participation in international scientific activities.
- Provide funds for collaboration, cooperation and sharing of research information and knowledge of conferences, workshops, seminars, meetings and symposia.
- Provide financial support to the Kenya Education Network (KENET) which is the national research and education network for the development of a broad infrastructure to facilitate cooperation and sharing of research information and knowledge.
- Initiate liaison with structures involved in the protection of IPR.
- Compile and maintain a national database of research and innovation funded by the NRF.

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d) Kenya Industrial Property Institute (KIPI)

- Kenya Industrial Property Institute (KIPI) is a government parastatal under the Ministry of Industrialization and Enterprise Development. The Institute was established on 2nd May 2002 upon the coming into force of the Industrial Property
- Act, 2001. Previously the institute existed as the Kenya Industrial Property Office (KIPO), which was established in February 1990 after the enactment of the Industrial Property Act, CAP 509 of the Laws of Kenya. The role of the Kenya Industrial Property Institute is to:

- Oversee that Intellectual Property Rights (IPR) are adhered to.
  - Ensure that inventors and innovators are motivated.
  - Ensure commercialization of products and services in the country leads to economic competitiveness.
- The core functions of KIPI include:
  i. Administer industrial property rights.
  ii. Provide technological information to the public.
  iii. Promote inventiveness and innovativeness in Kenya and
  iv. Provide training on Industrial property.

The Industrial Property Act protects four elements of intellectual property rights

i. namely:
ii. Patents
iii. Utility Models
iv. Industrial Designs and
v. Technovations.

e) The Technical and Vocational Education and Training Authority (TVETA)

The authority is a corporate body established by the Technical and Vocational Training Act, 2013. The functions of the authority are to:

- **(**Regulate and coordinate training under this Act.
- Accredit and inspect programmes and courses.
- 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.
- Prescribe the minimum criteria for admission to training institutions and programmes to promote access, equity and gender parity.
- Recognize and equate qualifications awarded by local or foreign technical and vocational education institutions ‘ in accordance with the standards and guidelines set out by the authority from time to time.
- Develop plans, and guidelines for the effective implementation of the provisions of this Act.
- Establish a training system which meets the needs of both the formal and informal sectors as provided under this Act.
- Collect, examine and publish information related to training.
- Inspect, license, register and accredit training institutions.
- 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 related to training.
- Undertake, or cause to be undertaken, regular monitoring, evaluation and inspection of training and institution to ensure compliance with set standards and guidelines.
- Mobilize resources for the 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 institutions.
- Perform any other functions necessary for the better implementation of this

Development of the Institutional ST&I policy

The educational institution should develop ST&I policies to guide them in operationalizing ST&I projects in the schools. The components of an ST&I policy include:

a) **Title of Policy**

b) **Summary:** Include summary text here. The summary should be a brief description of the main purpose of the policy; usually 1-3 sentences.

c) **Policy Statement:** State the policy statement

d) **Background:** Include background to the policy

e) **Applicability:** Include the persons who will be bound by the policy.

f) **Definitions:** Define significant terms of the policy

g) **Responsibility:** State the position, title or name of the office to be in charge of implementing the policy.

h) **Procedures:** Optional: Number the procedures you wish to include in this policy.

i) **Contact Information:** This includes the name, address, and phone number of the responsible office, plus email and website addresses where available.

Conclusion

- In this Unit we have looked at what the law says about ST&I.
- We have looked at the constitution and other laws and seen how they aim at promoting ST&I.
- In addition, we have looked at institutions that have been established to promote ST&1 including the process of developing an institutional ST&I policy.
- Its our hope that you can now develop an ST&I policy for ypur institution