2017

Implementation of moral education in Kenyan schools: a study of selected catholic schools from Kitui Central Deanery

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Ethical Analysis of Science, Technology and Innovation Policies in Four East African Countries

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Submitted in partial fulfillment of the requirements for the Degree of

Master of Applied Philosophy and Ethics (MAPE) at Strathmore University

School of Humanities and Social Sciences

Strathmore University

Nairobi, Kenya

May, 2017

DECLARATION

I declare that this work has not been previously submitted and approved for the award of a degree by this or any other University. To the best of my knowledge and belief, the dissertation contains no material previously published or written by another person except where due reference is made in the dissertation itself.

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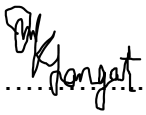
Signature ……  ……

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ABSTRACT

Science, Technology and Innovation (ST&I) policy is an essential part of the larger public policy programming in order to improve livelihoods and quality of life. Extant literatures indicate that policy-making is driven largely by economic considerations. Policy studies came into being largely as a response to a need to guide development of nations and competition among them. However, there has been a resurging interest in ethics of policies in the last few years as a response to the empiricist approach that followed the Second World War. Partly, this is due to concerns about policy makers' failure to address the moral ambiguity in technology development and adoption, and possible dire consequences that could arise from this failure. The main objective of the study was to analyze the ethical frameworks underlying the ST&I policies of Kenya and three selected eastern African countries namely Uganda, Tanzania and Rwanda using content analysis. The study found that the policies are predominantly utilitarian in Kenya, Rwanda and Uganda. In Tanzania it was found to be duty based. On whether it is necessary analyze ethics in ST&I policy, it was found that there are compelling reasons to undertake this task as this would give technology a more useful measure for determining whether it is responding to man's need for authentic development.

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ACKNOWLEDGEMENTS

I would like to thank some people who have assisted me in the work leading to this dissertation and those who made it possible to complete the study. These include: Dr. Maria Rosario Catacutan, my supervisor, who gave invaluable comments that made writing fun. I wish to thank, Dr Josephat Oyigo and Dr. Catherine Dean, for making valuable comments on the proposal. I also thank Dr. Magdalene Dimba and Mr. Raymond Mbindyo, for organization and facilitation. I thank the School of Social Science and Humanities, Strathmore University for offering the opportunity to me, the University Library staff for their support in getting material and software that was essential for writing.

DEDICATION

To all those who want to contribute to Kenya's development through enabling the people to care more for the country and her institutions

CHAPTER ONE

INTRODUCTION

This chapter presents a background, giving a description of public administration and ethics in public policy. Objectives are presented, showing the focus of the study leading to the research question, scope of the work, assumptions and significance of the study. It includes a section describing science and technology policies in Kenya, Tanzania, Rwanda and Uganda.

1.1 Background

Public policy refers to the statements of intent that are made to guide action with regard to activities of public interest in a country. The foremost public policy document in Kenya is the Constitution of Kenya (2010). The Constitution prescribes how Kenyans should live and the processes of arriving at important public policy decisions. The document clarifies that policies ought to be clear and available. Article 232 (1) of the Constitution describes the involvement of people in policy-making as a principle of public service. Elsewhere, in Article 35, it requires that information held by public offices should be availed to any person who may require it for the protection of rights. Etta notes that in the 1980s, there was a general crisis of policy which resulted in several attempts to rectify and develop acceptable policies in Kenya but was met with resentment and lack of ownership (Etta, Elder, & International Development Research Centre, 2005).

For Socrates, ethics teaches man how he ought to live. It is the moral bearing upon which public affairs are conducted. Lately, it has come to mean the normative mode of behavior that people are expected to abide by in public. Policies have the purpose of guiding our actions towards a desired effect; they are not neutral to the moral persuasion and intentions of those who develop it. A

science, technology and innovation (ST&I) policy is a developmental policy designed to enable a country tap into its intellectual resources for the purpose of economic progress. Science and technology is a sector that is engaged in production and conversion of knowledge for economic use. Its popularity as a tool for development is derived from the power it has continued to exert in human development.

In an economy development requires that the public have trust in government action. There is a need to always have the welfare and concerns of other members of the society while carrying out common or public duties. Such activities include the raising of productivity to desired new levels, fairness and equity. Such relationships demand that we direct our thoughts to the understanding of the ethical content of the policies. As a consequence of the above, it becomes clear that there are moral implications and that our behavior change appropriately to suit the demand, the focus on good or useful ends, greater contentment in the society and fair distribution of benefits. Regulatory action is therefore geared towards behavior change. Prioritization focuses on the most promising social returns while at the same time should not ignore the outcome of such actions.

1.2 Science Technology and Innovation Policies in East Africa

There are not many studies on science and technology policy in the East Africa region, one study by Bennett (2000) indicates that historical research in and about East Africa has rarely focused on matters of science and technology policy; the only exceptions noted are the works of Mwamadzingo and Ndungu in 1977 and that of Eisomon and Davis in 1995. Bennett (2000) also identified science and technology as one of the priorities for regional cooperation and development in the East African community. This makes science and technology an important policy arena in all the countries of the study, besides implying that the policies have some degree of similarity. Further, the study notes that current science and technology policies in Kenya, Uganda and Tanzania still have the

vestiges acquired while the three countries jointly managed the policies of science and technology under the East African Research Organization which became defunct in 1977.

The sector, and the collective activities known as science and technology, has morphed to become science, technology and innovation (ST&I). This nomenclature shift was meant to reinforce the focus of attention towards innovation. Science is simply a systematic method of organizing knowledge in forms that can be tested. It can give explanations and predictions of various phenomena. Consequently, technology is the methods or processes used to accomplish certain objectives like the production of goods using knowledge gained from science. Innovation is the application of better solutions to new requirements, unarticulated needs or existing market needs. Many countries, especially newly industrializing and developing ones, have adopted the new naming to draw attention to the fact that the main interest in engaging resources for the search for new knowledge is solely for the purpose of economic development. Examples of such countries besides the ones in eastern Africa include Brazil, South Africa, South Korea, Malaysia and others.

The importance of the change is to highlight the need to connect the words in a continuum that would create a paradigm best suited for economic and social development. While it is a logical flow, technology predates scientific knowledge (Marburger, 2011). There is an urgent need in developing and newly industrializing countries to generate more knowledge for their economies and hence the attention.

In Kenya, science policy-making has been in existence for long. Sessional Paper no. 10 of 1965 was the first post-independence document to outline science policy. In 1982, Parliament deliberated on the Sessional Paper no. 5 on Science and Technology policy. The shift to a science, technology and innovation policy in Kenya has been in the making since 2013. To develop the policy, the Ministry of Education, Science and Technology that was the lead agency organized numerous stakeholder consultative meetings. The main

stakeholders for the policy were: researchers, innovators, funding agencies, educationists, university administrators, students and various government departments that are responsible for different sectors of the economy. Three main sessions were held, the first one to elicit a buy-in from stakeholders that a policy is required and that their participation would be essential. The second meeting was to share and get comments for the first draft that had been developed by the lead agency with input from some stakeholders. The third sitting was to validate the draft. This sitting includes a special group of stakeholders; members of parliament and other elected public officials. The Cabinet and then Parliament would follow in discussing the resultant document. Upon passage by Parliament, the document becomes public policy.

The Science, Technology and Innovation Act No. 28 received Parliamentary assent in 2013. It constitutes the regulatory aspect of policy and is applied in the management of affairs in the sector. The Sessional Paper is yet to be tabled in Parliament to address the developmental aspects for implementation. The policy paper is more detailed and explains the specific areas of focus and actions by named institutions. The policy, under the theme: “Revitalizing and Harnessing Science, Technology and Innovation in Kenya”. It is meant to:

> [R]e-align ST&I programmes to national goals and market needs; improve technical competencies and institutional capacity for ST&I and R&D institutions; build a robust national innovation system (NIS) that entrenches product oriented multi-disciplinary approach to R&D; strengthen governance and management of the ST&I sector and institutions to make them more efficient and effective; develop and implement a mechanism for sustainable financing of ST&I; and protect knowledge production by strengthening intellectual property and regulatory regimes at all levels.”(Government of Kenya 2012)

The Global Innovation Index (2015) noted that the innovation policy in Kenya, was driven by the need to steer innovation towards finding solutions to the soaring unemployment and pressure from a growing population. Policy review started in 2012 and prioritizes funding of ST&I over other functions (Iizuka, Mawoko, & Gault, 2015)

The Tanzanian science and technology policy states as follows:

> It is imperative for developing countries like Tanzania to embrace S&T as a tool for accelerating their socio-economic development…developments in S&T are not only important determinants of the country's level of development but also enhances its international competitiveness and its position in the world economy… However, just as S&T are not an end in themselves but a means to an end, so is the S&T policy."(Republic of Tanzania 2013)

In Tanzania, the S&T policy dates back to the 1980s with the latest review being in 2013. It places its emphasis on enhancing productivity as indicated by Iizuka, Mawoko and Gault (2015).

Rwanda, with a policy dating back to 2006, places her emphasis on infrastructural development to support research and development at universities. It states in the preamble by the president that:

> "The principal objective of the policy is to integrate science, technology, scientific research and innovation in the context of the issues facing Rwanda" (Republic of Rwanda 2006)

In Uganda, science and technology policy dates back to 2009. It was the first policy and is yet to be reviewed (Iizuka et al., 2015). The policy at its core states the following:

> "…ST&I Policy provides a mechanism for increased capacity in ST&I that will result in significant improvements in national productivity leading to competitiveness and better standards of living for the people of Uganda." (Republic of Uganda 2009)

1.3 Gaps in the Science Technology and Innovation Policy Studies

As noted, science and technology policy in East Africa has received less attention from scholars. None has focused on the ethical issues of these policies. I intend to contribute to knowledge by addressing the ethical dimension with reference to the science and technology policy. Pertinent questions that need to be asked regarding the S&T policy have not all been dealt with. How should a science and technology policy impact on people in a society? Who should benefit from the policy? Are there issues of justice that the policy raises or should address? Is a science and technology policy supposed to be responsive to other needs and are the changes that could be brought about by the policy desirable? The response to these questions would depend invariably on the basic ethical frameworks of the thinking that prevails.

1.4 Problem Definition

Immediately after the Second World War, policy science envisioned a multi-disciplinary enterprise that would be informed by various processes like public consultation, research and analysis to guide political action. Today, the policy field has taken on an empirical orientation dominated mainly by economics and the scientific methodologies (Fischer, Miller, & Sidney, 2007a). Cloete, de Conning and Wissink (2006), for instance, observe that:

> "In the development of policy analysis, the discipline of economics

> outpaced others like sociology, political science, public administration and management to become the most important source of ideas and methodologies for public policy."

It could be argued that the undue emphasis on the use of quantitative approaches in policy development may have been at the expense of qualitative methodologies that would have brought out other important factors to consider resulting in better outcomes in implementation. It is also possible that the field of ethics may have been ignored, thus denying these policies some useful dimensions that could have shaped the policies for greater success in the development arena.

Philosophy has a legitimate claim to comment on public policy. It introduces a standpoint of value to the propositions that will have some bearing on human conduct. It clarifies the understanding of the issues by defining more clearly the ideological from the factual and relates the issues to the kind of society that is desirable(Hook, 1970). As a general hypothesis to guide the study, a useful approach will be to start from the premise that public policy has ethical characteristics primarily because policies are decisions meant to optimize human behavior in an environment of conflicting needs and an overarching urge to create contentment for the majority while at the same time not trampling on the minority.

The problem to be addressed by this study is introducing ethics and philosophy into the policy process specifically with regard to the science and technology policy. Ethical frameworks all have shortcomings that result in distinct outcomes. Most of the frameworks agree on specific vital matters that make it possible to live with them.

Science policy contributes to various areas of an economy. The many players in the making of a policy are comparable to a music band where each member is playing a different note and all contribute to the output sound. The various economic sectors are like the audience that listens to the

music and appreciate it. This study is an attempt to listen to one instrument in the music and determine its input towards the general output. The ethical dimension of a science and technology policy is just one aspect of a policy. This study was an attempt to characterize ethical issues and establish its impact on a policy as a less studied but significant factor among others in public policy.

1.5 Research Objectives

1) To identify the ethical dimensions of the Kenyan ST&I policy;
2) To analyze and compare the ethical dimensions of the ST&I policies in Kenya with the other three selected countries, (Uganda, Tanzania and Rwanda) in ethical terms; and
3) To explain the ethical inclination of the policies with reference to the known ethical frameworks.

1.6 Research Question

The research questions for this study were the following:

1) What are the ethical dimensions of the Kenyan science and technology policy?
2) What similarities or differences in comparison, would we find in ST&I policies in three other East African countries (Uganda, Tanzania and Rwanda)?
3) How is ethical analysis useful for improving ST&I policy?

1.7 Scope of the Study

The study narrowed down to only the ethical characteristics that can be discerned from reading the documents and did not include interviewing any persons or groups or persons. The preferred methodology was analysis of the documents. Policy documents of the four countries will be analyzed and each statement assessed for ethical connotation. It is therefore not possible with this

study, to make any quantitative deductions. Specific issues best dealt with in empirical studies in other disciplines regarding policy matters were left out.

East Africa has five countries but the four are appropriate because they all use the same languages for official business. Kenya, Tanzania, Uganda and Rwanda use the English language in their policy documents and Kiswahili is widely spoken in the region. The founder members of the Community were all members of a community that eventually broke down in 1977. Besides the above, the three countries were colonies of Great Britain during the first half of the 20th century. This study will highlight what the policies look like in ethical terms. It will focus on the character of the policy and not the details of the policy-making process. It is outside the scope of the dissertation to neither engage in making a deduction of stakeholder influence on the policy-making process nor pinpoint any relationship between the stakeholders at play.

1.8 Basic Assumptions

In order to enable the study to proceed, some assumptions had to be made. First; that a science and technology policy can lend itself to ethical analysis; Second, that the science and technology policies of the four countries are specific and sufficiently similar as to enable comparison.

1.9 Significance of the Study

Policy studies are important in that they record~~s~~ past experiences and enables us to learn from our past. Observed phenomena add to our knowledge and improve the environment within which we seek to improve policy-making in the future. Most of the works encountered for this investigation have been from other regions, other economies of the world with little similarity with the ones forming the subject of this study. This study was however, directed towards making it possible to achieve a better understanding of ethics in ST&I policy. Going forward, it will aid the development of new approaches to policy-making that could create real benefit for people. The study has highlighted the

methodology that may enable policy-making to be more balanced in terms of input from non-quantitative disciplines. Curriculum development for policy studies and policy analysis has also benefited from this study in terms of objectivity and balancing of the influences of the various stakeholders who comment on such policies.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This chapter examines other studies on science, technology and innovation policy. It starts with a general overview of public policy so as to locate the study firmly in its purview. The chapter therefore initially looks at ethics in relation to public administration, policy-making/analysis, and the science and technology policy. The second part of the literature review highlights the ethical frameworks that form the basis of determining the ethical focus of the ST&I policy documents.

2.1 Review of the ST&I Policy environment

Kenya's ST&I policy was developed between 2010 and 2012. During that period, the world's major economies were emerging from a recession occasioned by a weak currency in the Euro region (KNBS, 2012). The recession had a significant impact on the Kenyan economy. During the year 2011, the world economy grew by 3.8 percent in terms of Real Gross Domestic Product (GDP). This was lower than the 5.0 % of the year 2010. It had been strained further by an earthquake in Japan that sent disruptions across world economies. In Kenya, Real GDP growth was 4.4 percent down from 5.8 recorded in 2010. East Africa as a region had done better, recording 5.9% up from 5.8 the year before. Other factors that influenced the policy-making included the demands of the economic blue print known as the Kenya Vision 2030 which had been adopted in 2007. The first medium term plan under the Vision was coming to an end in 2012. The country had made a commitment to address the constraints that held back the economy and depressed the standard of living in the country. In the Vision, Kenya was to develop three strong pillars to hold it namely; the economic, the political and the social. Some adjustments had to be made in all spheres of life including political leadership, culture and the economy (Kenya Republic of 2012a). In the political

sphere, a new Constitution had to be enacted to streamline governance and redefine societal values while in economic and social spheres, the country had to restructure the mode of doing business and embrace innovation.

At the same time, there was a move worldwide to promote scientific activities for national development. A United Nations Resolution recognized the critical role of science, technology and innovation in building and maintaining national competitiveness in the global economy, addressing global challenges and in realizing sustainable development and the seminal role that information and communications technologies play in promoting and empowering science, technology and innovation for development. This move generally marks the shift to change of naming the sector from research and development (R&D) encompassing science and technology and to science & technology and lately, to science, technology and innovation (ST&I) as noted by (Wycliffe & Ayuya, 2013).

Thus, the new policy was meant to re-align the ST&I policy with national goals and market needs while improving technical competency and institutional capacity for ST&I and R&D. It was also geared to building a robust national innovation system to entrench product oriented multi-disciplinary R&D and sustainable financing of activities therein (Kenya, Republic of, (2012c).

2.2 Nature of Public Policy

Aristotle describes three forms of governance; monarchy, aristocracy and polity.(Kenny, 2006). Public policy-making takes the character of the form of governance adopted in a country. Policy-making involves stakeholders, research organizations and the public(Cloete, Wissink, & De Coning, 2006). Organization is required to bind society and ensure security, interdependence and progress. Society has to engage in activities that have rules. Thus public administration is accomplished through policies that are made to address various areas of governance for a country. Areas in public administration that are addressed by policy include public protection, regulation, development and welfare(Cloete et

al., 2006). This is a list of public functions for which ethics is central. The impact of decisions in the matters of public importance has ethical implications. The influence of stakeholders on policy is similar to that of the institutions that are responsible for the policy. Interests of the different stakeholders are however not similar and must therefore be managed in order to achieve results and fairness in public sector programs (O'Toole, 1997).

Policy can be understood as whatever governments choose to do or not to do and does not have to be a written document. (Fischer, Miller & Sidney, 2007). It could also be defined based on its specific characteristics for example what Lowi and Gisburg (1967) proposed; as an officially expressed intention backed by a sanction. Laws, rules, statutes, regulations and orders are therefore policy statements. This definition suggests that policies belong to either of two classes that is regulatory or developmental (Mbai 1999, Ngethe 1999). Public policy has been defined in many ways at different times. In all instances, it is expected to guide public action and distribution of resources and burdens among members of society. Public policy is a statement of intent or an action plan to transform a perceived problem into a future solution (Cloete et al., 2006). As a statement of intent, policy embodies and interprets the values of society much as it is a roadmap to determine future action.

Policy-making entails identification, classification and determination of the best public action to be undertaken to deal with an issue of public interest. The earliest record of policy documentation is attributed to Hammurabi in the 21st century BC. Hammurabi interpreted the socioeconomic issues of his subjects and produced a legal code to be followed (Cloete et al., 2006). Over the years, a similar approach of identifying issues and addressing has been used with variations depending on the style of political leadership. In authoritarian societies, the process is not as consultative as it would be in democratic societies. Execution and the effect of policies may therefore vary widely. Professional conduct has been regulated through policies that have been developed specifically. Some professions for example, developed creeds that

explain in few words what should and what shouldn't be done. Cloete et al cite the Hippocratic Oath as an example of such.

2.3 Historical overview of the policy making process

Studies in public administration focus on the changing approaches that have taken place since the Second World Warin 1945. The most noticeable being: the shift to globalization affecting comparative public administration; the spread of economic rationalism in public policy analysis; the new wave of managerialism affecting the study of public service; the transformation of administrative technique by informatisation and the use of legal formalization, redrawing the traditional boundary between law and administration(Hood,1995). It was predicted nearly seventy years ago that three interrelated problems, that is, values, behavior and cultures, will feature in public policy analysis in varying extents (Wright, 2015). The shift to public management is really the emergence of a paradigm of governmental administration that competes with but does not supplant public administration both as a practice and a field of study(Gray & Jenkins, 1995). These changes lead us to clearer understanding of what public policy is today and why it is important to study it with a view to highlighting ethical issues. Raadscheldershas (2008) classified public administration scholarship into four main intellectual traditions; practical wisdom, practical experience, scientific knowledge and relativist perspectives providing further proof that there is need to address the gaps in ethical studies of public policies (Raadschelders, 2008). These changes in the structure of public administration are the underlying reason for the post-modern complex, adaptive, open policy systems perspective where conflict is part of the normal occurrence as noted by Cloete and de Conning (2006). The science and technology policy would have undergone similar changes during the period.

The management movement of Fredrick Taylor and the scientific industrialization that followed it gave rise to logical positivism where effort is exerted to eliminate strife and confusion in society using objective knowledge. It was soon followed by a phase of utopian hopes brought about by contributions

from literature suggesting that politics dominated knowledge. These are for example; Aldous Huxley's "Brave New World" (1932), George Orwell's Nineteen Eighty Four (1949) and Douglas Hartle (1970). During this period it was held that policy analysis was technocratic and blind to political reality. (Cloete et al.2006). The fifth phase has been characterized as heuristic. It depends on information technology and uses recorded information from experience (empirical studies). It is described as evidence-based problem solving. Herbert Simon, cited by Perkins (1981) says; deciding rationally means maximizing expected utility. Available literature along these lines shows that policy invariably has value propositions. This however does not necessarily mean that the propositions are always necessarily logical.

Public policy studies have traced its development as it moved from a paradigm of inputs to policy, to outcomes of policy and to its impacts (Cloete et al., 2006). This movement took policy-making from opinion-influenced to evidence-based; from mass, short-term, economic benefit to long term, sustainable, impact-focused post-consumer society oriented policies. In the related field of political morality of policies, there are two ways of looking at it- cost benefit analysis and justice. The analysis of ethics in public policy concerns two main areas; ethical quality and cost benefit analysis. Assessment of matters of justice and other traditional philosophy skills in public policy are used to test the ethical quality of policies. Jonathan Wolff cautions however that good policy is not equivalent to good philosophical arguments (Lever 2014). The stakes in a policy are the sum total of the political weight of the stakeholders.

2.4 Ethics in public policy

Policy studies focus on policy including its making and its impact. It dates back to World War II and is attributed to Harrold Lasswel (Fischer et al., 2007a). Owing to its multidisciplinary nature, studies have been done from viewpoints like; economics, political science, sociology and to a lesser extent philosophy and ethics. Each discipline defines problems differently. Characteristics of a policy like utility, efficiency, fairness and coherence are equally important for

policy studies and may contribute towards determining the general outlook. Policies are studied in terms of content, political inquiry, value proposition and systemic controls. A study of the ethics of policies would therefore highlight value judgments that may influence relationships in a society. Ethics is relevant in all stages of public policy-making from defining the problem to identifying and assessing the available options to decision making, implementation and evaluation (Boston, Bradstock, & Eng, 2010). Policies should contain guides that ensure certain characteristics like; integrity, responsibility, competence, and respect become the norm. This again indicates the ethical nature of policies.

Since policies are made with specific aims, it is expected that they will meet a specific need of a country or institution. It is value laden by the fact that it strives to control human behavior for some determined good. This means that it can be considered along with other human actions based on intentionality. Intention is the foreseen consequence of an action (Anscombe, Geach, & Gormally, 2005). A good outcome has to come from good actions; good actions should come from good intentions. However, intentions of various stakeholders may not be similar. Since policy-making particularly in public affairs is a consultative process, the outcomes may exhibit a character that is more or less associated with one group or another.

It is however important to highlight natural moral law as a vital background for policy-making. By natural moral law, one understands the ordering of acts or organization as demanded by reason (Wanjiru Gichure, 2008). In ancient Greece, reference was made to natural law (Heraclitus, Sophocles) that all human law receives its nourishment and, by extension, relevance from divine law. Furthermore, human law is only valid if it is not at variance with the unwritten immutable laws of the gods (Wanjiru Gichure, 1997). This position was clarified further by Augustine and Aquinas who added that the universe is governed by divine reason, which he called eternal law (ibid.). Saint Augustine in the Confessions as cited by Sommers and Sommers (2004) writes that “divine law punishes theft as does the law written in the hearts of men which not even

iniquity can erase". Likewise, Thomas Aquinas in the *Summa Theologica* as cited by Rachels (1999) holds that:

> *"… [T]he moral life is the life lived according to reason… To disparage the dictate of reason is equivalent to condemning the command of God."*

2.5 Ethics in ST&I policy

Science and technology policies are guides for promoting innovation and fostering creativity. Thus, creativity is a prerequisite for innovation and at the same time innovation enables creativity (Mann, 2011). This relationship implies that countries must create environments that favour the development of both. The processes of arriving at acceptable policies in any field are as important as the product. In a country that is democratic, policy-making is by public consultation. Voters expect their representatives to pursue good policies based on the best available knowledge, but representatives defer this to persons with no authority save for presumed objective status of their disciplinary bases (Heazle & Kane, 2016). These are appointed officials and professional consultants. It is possible that such non-elected public officials could determine a moral basis for a policy differing from what the majority would have passed.

Some studies have attempted to label the groups that have introduced a bias to policy ethics. For example; It has been noted (Wolff, 2011), that there is an inevitable bias towards maintaining the status quo during any debate to make policy changes and the burden of argument towards the change is higher than that for continuation. Persuasiveness or correctness of a position is not a prime consideration, rather, it is how widely shared the position is that will influence the outcome. Policy rests on consensus even if it is based on conflicting moral assumptions Jonathan Wolff further notes. Sectors that have embraced ethics in the policy-making processes include public health as Moreno (1995), observes that bioethics has become an influential part of health policy-making in what he calls bioethical naturalism while trying to bring moral consensus to policy-making

(Moreno, 1995). These writers have demonstrated the visible shift towards ethics in recent decades owing to the outcomes of earlier policies.

The message of Pope John Paul for the World Peace Day in 1990 addressed environmental degradation stating that the world is threatened by lack of due respect for nature. Two decades later, in an encyclical dated 24th May 2015, Pope Francis quotes St. Francis of Assisi on the need to care for the environment while engaging technology for human progress(Catholic Church & McDonagh, 2016). St. Francis linked the devastation of the earth to the plight of the poor. Human activities have irreversible impact on the environment. Pope Paul VI (1968), while addressing issues of the Development of Peoples said that priority belongs to development that will guarantee man's authentic development. Going back to 2000 BC, we find recorded that priests routinely evaluated the social merits of technical projects before they were executed (Shrader-Frechette, 1984). These ancient examples indicate the level of human concern for the proper use of technology and environment across the ages.

Ethics in the use and development of technology is at the centre of concern for humanity. This means that ethical considerations are needed at the enactment of every policy. Some countries have attempted to include a clearer focus on ethics, for example the South Korean ST&I policy focuses on "societal changes that care about humanity and harmonization" (STEPI 2014). The Organization for Economic Cooperation and Development(OECD, 2009), however describes the relationship between the South Korean ST&I policy and Confucianism, the dominant philosophical stand in the country about which the report says, may hinder progress and adoption of unconventional ideas because it stresses patriotism and loyalty to traditional values. In the United States of America, antitrust laws play a role similar to the Korean Confucianist tradition in regard to the influence it has on the innovation policy. While the US has a vast innovation system, rights issues introduced by the antitrust laws act to hold back creativity in the ST&I sector (Nelson, 1993). Antitrust law is a collection of statutes that were enacted to ensure fair competition in commercial activities including

innovation. In Brazil, a study established that the country's ST&I policy is hinged on the framework of the modern capitalist state whereby the interests of the dominant actors in the policy-making process are reflected throughout the policy agenda (Dias & Serafim, 2011).

In Japan, the focus is to create value for people in the future and create a super society designed to make people progressive while connected to the rest of the world (Gov. of Japan, 2016). India developed a policy to use ST&I to generate wealth and inclusivity in economic development (Gov. of India, 2013).South Africa designed a policy along the lines of OECD countries basing the policy on market failure. The main theme of the policy is to support economic growth (OECD, 2011).

From the above sample of available literature, we see the experiences other countries have had indicating that ethics plays a significant role whether or not deliberately considered during the life of a policy. It appears that there is need to take a critical look at the ethical meaning of each statement in the policy. The next section will look at the relationship between policy statements and ethical frameworks as found in the literature.

According to Toulmin (1964) and others of his time like Polanyi (1962) and Weinberg (1963), the central problem in science policy is the problem of choice. It is both inescapable and difficult for policy makers to decide which investments in competing scientific disciplines should be funded in a situation of finite resources. More recently, a new approach has been suggested that involves tracking public values and evaluating their influence on science policy which entails examining the rights, benefits and prerogatives to which citizens should be either entitled or not. It would also include the principles on which governments and policies are or should be based. (Bozeman & Sarewitz, 2011)

2.6 Ethical Frameworks

Literature reviewed for this section shows the different ethical frameworks in relation to the ethical appearance of the policy documents of this study. Ethics theories to a large extent provide us with methods of determining how to make

decisions. The method may be difficult to discern but its influence is visible in the outcomes of our decisions. The most important frameworks for analysis of the selected policies will be examined. These are: utilitarian ethics, deontological or rule based ethics and virtue or character based ethics. Three ethical theories are commonly cited in extant literature, namely, utilitarianism, deontology, and virtue ethics. Utilitarian (or consequentialist) ethics relies on the outcome of one's actions to determine how one ought to act. Thus one should do only that which will result in happiness for the greatest number of people. Deontological ethics, in contrast, determines that one has a duty to behave in certain ways and that means one should only do one's duty in order to be ethical. Finally, virtue ethics determines that one's behavior should be based on one's character. One should be of good character and strive to maintain virtues in order to determine how to behave. One may argue that, depending on the source of the foremost influence, a policy may take a character that leans towards one of the aforementioned ethical theories or another.

2.6.1 Utilitarian ethics

Utilitarianism is a resilient and most influential ethical theory due to the ease of its application. Utilitarianism was first proposed by Hume while he was assessing the social contract and the virtue of utility (Copleston, 1977). Later, Jeremy Bentham and John Stuart Mill formulated the framework more definitively. In its current postulation, it stresses the need to pursue happiness. Borrowed from the hedonism of Epicurus, it offers a simple way of determining what is desirable and what is not. Good is identified with pleasure. Pain is not desirable and therefore evil. Thus what produces the greatest happiness for the greatest number of persons is the right action (Wanjiru Gichure, 2008). Utilitarianism developed at a time of social reform in Europe.

In utilitarianism, actions are judged solely on the impact of their consequences. The happiness or unhappiness that is of concern is the happiness of everyone, not just the moral agent (Rachels, 1999). This may be what makes the utilitarian ethical framework attractive for public policy-making.

The drawbacks in utilitarianism relate to the fact that it can be abused in multicultural societies and are not conducive to social justice(Wanjiru Gichure, 2008). Furthermore, it does not recognize the rights that may not be trampled on so as to just achieve happiness for the many. MacIntyre, as cited by Gichure found that the principle requires enlightened minds in its application to the extent that application in law making would be difficult (Wanjiru Gichure, 1997). Utilitarianism has many versions all geared towards social satisfaction and reduction of pain and suffering among the many. Positivism, intuitionism and emotivism are some of the versions that derived from utilitarianism after Bentham and Mill. Current forms of utilitarianism are; act-utilitarianism and rule-utilitarianism. Act-utilitarianism is concerned with what constitutes right or correct action while rule-utilitarianism focuses on rules that should govern actions and the duty underlying the actions (Wanjiru Gichure, 1997).

It is difficult to establish what exactly is good and is not good in everyday life. It is even more difficult to determine what is just and what is not, and yet in utilitarianism the rule to follow is to calculate the best possible source of happiness and pursue it. Many situations do not yield to such an easy interpretation. Rule-utilitarianism tries to deal with this problem by resorting to justification of rules that we use to decide on what action to take Smart, (1961), cited by (Rachels, 1999), argued that moral agents should delink their feelings from ethical decision making. This was his method of defending utilitarianism against the claim that in its classical form, utilitarianism is at odds with the notions of justice and individual rights. As noted by Gichure, (1997), utilitarianism abandons itself to what technology, sociology and economics would say is good in the light of this vague and confused idea about happiness. With respect to ST&I policy, utilitarian ethics may be attractive to a state that is more interested in developing markets and businesses or where competitiveness and productivity is prioritized higher than people’s other subtle needs.

2.6.2 Deontological Ethics

Fulfillment of duty is all one needs for the purpose of doing right. This form of ethical framework maintains that actions are right if they conform to a universal absolute rule. Deontology was developed by Immanuel Kant (1724-1804) by first examining the way we can know about existence; the idea of experience and phenomena (Wanjiru Gichure, 1997). Kant based his ideas of morality on metaphysics. Things we know are only the phenomena we can sense but not their essential structure. Even then, we get to know them based on intuition or *apriori* conditions. Humans are rational beings and have dignity and must be valued as such (rational and dignified). Humans should not be used as a means to an end as they are an end in themselves.

The implications of Kant's metaphysics is that rational beings must act only following a rule that whatever he does should be what he wills and would hold as universal law. Good will is all one needs to determine actions that would be considered moral. Any law received from others disrupts Kant's understanding of autonomy. Reason alone, independent of outside influence is sufficient for Kantian ethics(Sommers & Sommers, 2004)and (Wanjiru Gichure, 1997).Preoccupied with replying to Hume's empiricist approach, Kant rejected empiricism and attempted to base his ethics on autonomous reasoning. Rightness or wrongness of any action would be considered first in relation to the fulfillment of a duty, reparation, justice, gratitude, beneficence and self-improvement. Deontology does not consider experience or empirical knowledge relevant but it strongly holds that rationalism or autonomy is the key to making ethical decisions. Contemporary adherents of Kant's ethics focus on value clarification, cultural and psychological development (ibid).

The modern ethics of rights are rooted in Kant's deontology. Rights and liberalism rest on the proposition by Kant that, humans should not be treated as a means by others but rather with respect based on the fact that they have capacity for moral action to develop and implement their own decisions (Roberts & Reich, 2002), (Wanjiru Gichure, 1997). Thus consequentialist and deontological ethics agree on the centrality of reasoning by the moral agent only

differing on the important considerations to rationalize about. The impact of a rights approach to ST&I policy would lead to emphasis on specific activities that are needed for maintenance of rights and support for the weak.

Limitations of duty ethics are found in its rigidity in addressing consequences of our actions. We cannot know whether good results will follow our actions or not. Second, when two rules will apply there is no logical way of resolving the conflict and allowing a decision on what should be done. It is possible to seek an external solution as Geach, cited by Rachels (1999) does.

2.6.3 Virtue Ethics

The oldest formulated framework of ethics is anchored on the character of the person. Aristotle developed virtue ethics in his writings particularly the Nicomachean Ethics following Plato and Socrates who before him had considered it by asking the question: *what traits of character make one a good person?*(Rachels, 1999) Virtue ethics considers behavior as the most important for guiding ethical action. Morality in this approach is thus not just a cognitive activity, rather an attribute of character. Good ethical reasoning on its own does not constitute correct moral positions. The lived experience of the person is important for correct ethical reasoning. One needs to develop habits which lead to the acquisition of virtues. The focus of a 'virtues approach' to ST&I policy may be a greater concern for the processes and the actions of persons rather than the economic impact of the policy. This may mean more funding for basic research or a liberal environment for innovators to create knowledge and applications.

Human beings have an end to which they are directed by nature (MacIntyre, 2007). Aristotle, Aquinas, Wojtyla and several recent philosophers have suggested varying methods of placing dignity and value of persons in moral decision making. Ontology and the natural move towards God by all creatures is taken as a standard by which moral actions are gauged in all the various versions of personalist ethics.

2.7 Theoretical Framework

This study borrowed from the theoretical frame described by Bozeman (2007) that there are two main issues to consider in deciding what to pursue in science. The first thing to consider being that science is needed for economic development. Second, is that science is a wide field of study comprising of many disciplines that if pursued may provide solutions for different societal problems. Policy making is a political process that determines what is to be prioritized among the many possible options. Justification of any choice is based on the capacity of the option to achieve public values. Policy makers strive to make the best choices considering the moral ambiguity, the haziness of the vast amounts of scientific data from earlier work and the insurmountable difficulty of gauging the effect of public commitment in terms of financing scientific activities.

2.8 Summary

This review of literature provides a justification for the unique but desirable approach for this study. It has highlighted the character of similar policies in other countries with longer experience. While not exhaustive, the literature shows the relationships between ethics and ST&I policy in several. It has been shown here that while people have been interested in the moral output of their policies in developmental activities throughout history, there is a strong current move in various policy areas to implement an ethical approach to policy-making and analysis. Some have described the usefulness of ethics in public policy, the methods used and analysis. This study was an attempt to contribute towards the knowledge of ethics in science policy using a study design that enables us to see the relationships readily.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

Chapter three describes the methodology selected to address the objectives laid out in chapter one. The methods described here below were employed to address the research questions, i.e. to answer: (1) what the ethical dimensions of the Kenyan science and technology policy are; (2) what similarities or differences in comparison, would be found in the ST&I policies of three other selected East African countries (Uganda, Tanzania and Rwanda); and (3) describe how ethical analysis would be useful for improving ST&I policy using the results of this particular study.

3.2 Research Design

In this study, qualitative content analysis was employed to identify and analyze the ethical dimensions of ST&I policy documents. As defined by Hsieh and Shannon (2005), qualitative content analysis is a research method for the subjective interpretation of the text data through the systematic process of coding and identifying themes and patterns. Specifically, this design was used to derive properties and meanings of words and sentences; assess~~ment of~~ the relationship between different sections and their relations; structuring and articulation of the process of text construction; ordering of topics within the document; and establish the connection and causes between the statements and the ethical frameworks described earlier. Based on these procedures, the analysis arrived at an appreciation of the language of the text as an indicator of ethical content of a policy statement.

The philosophical method was also employed to complement the use of content analysis. Analytical and logical examination were conducted to ensure demonstrable logic and observations that are relevant for determining what discernable or intrinsic ethical content may be in the study documents. As a way

of assessing the ethical content of the policies, this study will focus on public values understood after Bozeman (2007) as such values that; provide normative consensus about the rights, benefits and prerogatives; obligations of citizens to others (society, state and each other); and principles upon which governance of the ST&I sector is based. The study will analyze the above in terms of what should citizens be or not be entitled to.

> The mission of the ST&I policy is: "*To mainstream the application of science, technology and innovation in all sectors and processes of the economy to ensure that Kenyans benefit from acquisition and utilisation of available capacities and capabilities to achieve the objectives of Vision 2030".*

This and other statements will be interrogated and inferences made regarding ethical content. In an effort to ensure objectivity and reliability, the study will pursue demonstrability, observation and logic.

3.3 Research Documents

The ST&I policy documents of the four east African countries were used for this study, namely: the Kenyan Science, Technology and Innovation Policy; the National Science and Technology Policy of the United Republic of Tanzania; the Uganda National Science, Technology and Innovation Policy; and the Republic of Rwanda policy for Science, Technology and Innovation. The Kenyan ST&I policy document was accessed at the National Commission for Science, Technology and Innovation while the ST&I policies of the other three countries were obtained the respective websites of their equivalent Commissions or public bodies responsible for such policies.

3.4 Data Collection

Policy statements in the documents were analyzed step by step. First to be sought was the goal of the statement. The goal would then be analyzed to find out the significant notion or idea that would lead us closer to the ethical framework to which it leans most. From the notion the ethical connotation would be derived leading to the underlying implication which would further be broken

down into sub-categories and finally the ethical framework. This procedure led to development of a table that clearly shows how we can move from the policy statement to the ethical framework to which it can be classified. A sample of the data collection format is shown in table 3.1below

Table 3.1 an outline of the form used to collect data and analyze from the ST&I policy documents

	Policy Statement	Goal	Significant Notion	Ethical Connotation	Underlying Ethical Implication	Underlying Ethical Implication – Sub-categories	Ethical Framework
1							
2							

In analyzing the statements for inherent ethical meaning, it was useful to use the above table to show the relationships that shape it as a statement with potential ethical dimensions. The process was carried out as follows:

i) *The goal,* was derived from what the statement is meant to achieve or the final cause that can be deduced therein

ii) *The significant notion,* was the idea that appears obvious from the deduced goal arrived at by analyzing the statement

iii) *The ethical connotation,* was arrived at upon analysis of the possible ethical meaning in the act prescribed by the policy statement

iv) *The underlying ethical implication* was that which can be seen as the direct meaning or what is implied taking into account the connotation that has just ben deduced

v) *The underlying ethical implication – Sub-categories,* beyond the implication, a test of subcategories was done to further clarify where it would belong in terms of the ethical frameworks as described in the literature.

vi) *Ethical framework,* grouping the statements in relation to the known ethical theories as arrived at from the analysis.

3.5 Expected Outcome

Anticipated outcome of the study was a clear understanding of the ethical content of the documents, a comparison of the ethical content of the documents and an indication of whether or not it is possible to use the analysis for understanding a policy.

3.6 Ethical Considerations

No persons were interviewed for the study and no confidential information was used as all the documents to be analyzed are in the public domain. The study did not elicit any ethical issues that would require clearance by an ethics review committee. Benefits of the study include understanding clearly the need for clarity in the wording of a policy document to improve its outcomes and objectivity and capacity to predict what outcomes of policies would be.

CHAPTER FOUR

PRESENTATION OF STUDY RESULTS, FINDINGS

4.1 Introduction

Chapter four presents the findings and results of the study. In accordance with the objectives, the study sought to identify the ethical dimensions of the Kenyan ST&I policy and compare it to the others in three selected countries. It also sought to explain the ethical inclination of the policies with reference to the known ethical frameworks and compare the ST&I policies of the four countries in the study and develop a methodology for carrying out critical and ethical evaluation of ST&I policies. This chapter presents the results of an analysis of the ST&I policy documents from the four countries. The analysis focuses on the research questions of the study that were determined as:

1) What are the ethical dimensions of the Kenyan science and technology policy?
2) What similarities or differences in comparison, would we find in ST&I policies in three other East African countries (Uganda, Tanzania and Rwanda)?
3) How is ethical analysis useful for improving ST&I policy?

Answering the above questions, it was anticipated, would lay the foundation for a critical, evaluation of ethics in ST&I policies. The chapter also presents in tabular form the actual findings of the analysis and what it has in its ethical element. The first part of the chapter describes the situation of the country's economy during the time of developing the policy. It serves to introduce the findings by giving a background that locates the actual findings in the environment within which the policies thrive. We therefore move to the background here below that we find in relevant government publications that keep records of activities in the economic environment.

Statements that form the core of the policy were analyzed using a step by step approach. The process involved determining the goal of the statement, the significant idea, its ethical connotation, ethical implication and the underlying ethical framework or theory. This categorization and analysis resulted in a table that classifies the policy statements into the three ethical frameworks described in chapter two. The main table of the findings is attached as appendix 1 while here below are tables showing the statements grouped into different ethics frameworks for the purposes of analysis and comparison.

4.2 Results

The science, technology and innovation policy document has six parts. These include: the introduction; the vision, mission, philosophy, goal, and objectives; the national innovation system; policy and strategy; institutional framework; and an implementation matrix.

The policy document seeks to re-align the ST&I sector programmes with national goals, aspirations and market needs. Whereas the goal is national development, market needs constitute the central driver in its implementation. This re-alignment seeks to build a strong national innovation system that will entrench a product oriented, multidisciplinary approach to research and development. Challenges identified include; a weak policy framework to facilitate effective integration of ST&I into the economy, a disjointed sector where researchers, policy makers, industry and other stakeholders operate independently, weak advocacy and low level awareness at the political level and the public about activities in the sector.

The ST&I policy has seven main statements that express the policy's character and determine its ethical overture. It starts with general descriptions of the global and the local environment, the current status of innovation in the country and the required adjustments that are expected to produce positive anticipated results. Perhaps the most important is that the country wishes to be competitive and be ranked among developed countries with a high standard of living. The anchoring statement in the policy reads thus: "*research for social and economic*

transformation and development". The goal of the policy is to attain transformation of the national economy into a knowledge-based economy. The guiding principles are listed as: cost effectiveness, realism, multi-disciplinarity and synergy, partnership, environmental protection and conservation, empowerment and participation, equity and nondiscrimination, ethical leadership, reward and recognition, good governance.

The fourth chapter of the Kenyan ST&I policy lists the policy statements and the strategies needed to implement the policy. The main thrust of the policy is to address the integration of the activities through a properly coordinated implementation, to enhance collaboration among the stakeholders and eliminate what it calls the silo mentality. These are derived from the weaknesses that had been identified by stakeholders during the consultative process that was an important part of developing the policy. This means that for every statement in the policy document, we would expect a specific result that can be justified as a public value. The procedure of the study encompasses an analysis of the statements to highlight their ethical content.

4.2.1 Ethical Dimensions of the Kenyan ST&I Policy

Findings under this section address the first research question that is to identify the ethical dimensions of the Kenyan ST&I policy.

The analysis of the main statements in the ST&I policies of the four countries classified into different ethical frameworks is provided in Tables 1-4 (found at Appendices 1-4).

Table, 1 (Appendix1), indicates that the Kenya Government highlights seven key statements in the ST&I policy covering mainly regulation, investment and promotion. Regulation includes strengthening procedures in governance, protection of intellectual property rights and resource use. Investments focus on increasing public and private funds that will be channeled to ST&I and the priority areas that should benefit from such funds. Promotional activities are to improve the general performance of the sector through ensuring that the sector receives favorable public rating and support. The youth are to be encouraged to

become innovative and participate in generation of useful knowledge for economic productivity. Public support is necessary to assure the flow of public funds to ST&I. This section presents a general description of the policy documents.

The overall goal of the Kenyan document is economic development. The policy addresses the requirements of the long range development plan for the country; the Vision 2030 and its periodic medium term plans. The drafters desired to raise the funding levels for knowledge generation and innovative activities anticipating that it would in turn raise the level of contentment within the society. It is expected to promote fairness in both the conduct and outcomes resulting from the activities implemented. Strengthening of capacity is expected to contribute to efficiency and generate desirable social transformation. These goals have significant ideas that can be identified and analyzed.

Economic transformation requires public confidence in government action. Both are identifiable in the policy and are notions that stand out indicating the prevalent force directing the action therein. Others include the raising of productivity to desired new levels, fairness and equity. Such weighed words direct us to the understanding of the ethical content of the policies. As a consequence of the above, it becomes clear that there are underlying ethical implications that point for example to behavior change, the focus on good or useful ends, greater contentment in the society and fair distribution of benefits. We find that regulatory action is geared towards behavior change. Prioritization focuses on the most promising social returns.

Ethical implications of the policy form a special category for analysis. One finds that there is an intention to promote the good and transform life experiences towards contentment. Spending more in ST&I is seen as leading to more happiness. Equitable distribution of benefits and burdens of producing the desired good is subtly articulated in the policy statements. Human skills development and infrastructure development indicate a considered spending on what may be desirable and useful to the majority. Underlying the above is such

actions as enforcement of rules, focus on utility, productivity, rights, fairness and equity.

Five out of the seven main policy statements are clearly utilitarian in character when analyzed using the above approach. The policy therefore has ethical dimensions that are largely utilitarian.

4.2.2 A Comparison of the Three Countries

The second question was to analyze and compare the ethical dimensions of the ST&I policies from the other three selected countries, (Tanzania, Rwanda and Uganda). The subsections here below present the results. The analysis followed the same process as used above for the Kenyan policy document.

4.2.2.1 Tanzanian ST&I Policy

As shown in Table 2, (Appendix 2), there are eight significant statements in the Tanzanian ST&I policy document. It has some similarities with the Kenyan policy, its main thrust being; promotion of ST&I for economic development, self-reliance of the country, capacity development to attract and retain scientists, reaffirm a science culture in Tanzania, manage intellectual property and safety including environmental, promote equity in society and encourage commercialization of local innovations.

Tanzanian policy aims to achieve the wide goal of engaging in ST&I projects that improve economic self-reliance, transformation of the social system introducing innovation and making it part of Tanzanian culture. The policy strives to regulate intellectual property use, environmental protection and fairness in access to social goods including knowledge.

Transformation of Tanzanian society is to be seen in the increase of knowledge and improvement of welfare. It should encourage citizens to apply knowledge to improve their lot and for commercial gain. Ethically, this implies assisting people to create satisfaction and promoting fairness. Equal opportunity for all sections is secured to promote creativity, professionalism and harmony in the system.

No part of the document expressly considers the improvement of moral competency for any group of persons. It is not possible to know if it is contained in the strategies for implementing the policy. A “science culture” may however include practices of making sound decisions to which ethics is important besides entrenching the scientific method in the local culture.

A distinctive feature of the Tanzanian policy is the rights language used in the document. It influences the moral direction to be taken by those active in the area and among those they come into contact with. It however, still appears grounded on the need to invest resources for the purpose of achieving a social good that can be measured in material terms. The positive social engagement would tilt its flavor towards utilitarian but unlike the Kenyan document it has a mode of execution that is largely legalistic suggests that it approaches the actions as duty. Five out of the eight statements are duty based making it predominantly a duty-ethics framework kind of policy.

4.2.2.2 Rwandan ST&I Policy

As shown in Table 3, (Appendix 3), Rwanda has five policy statements articulating support for economic growth, raising expenditure in ST&I, advancing the quality of life, improving skills/knowledge, regulating intellectual property and safeguarding the national commitment to innovation activities. This modest but terse document draws attention more to its implementation rather than the actual guiding statements it makes.

The country hopes to address issues of economic development using knowledge systematically generated. The main goal of the policy is therefore to improve skills and harness them for economic growth. It seeks to contribute to economic growth by systematically using the knowledge that can be available. Thus the goal of the policy is to make ST&I part of a broad based economy. The Government commits to allocate funding to research and development with the aim of contributing to the development goals of the Rwandan economy.

It stands out that the idea of a policy may have been to steer the ST&I sector towards the improvement of the quality of life, provision of needed resources

and protection of individual effort in the generation of knowledge besides enabling more people to participate in economic activities. It gives significant weight to the notion of individual rights in spite of the language.

Value addition is noted as a major intrinsic driver of the policy. New knowledge used appropriately adds to human livelihood. Acquired skills are useful to the economy which in turn leads to a desirable state of satisfaction in the society. It becomes apparent that the country desires to create a level field where each one has equal opportunities for participating in ST&I knowledge generation and use of innovative ideas in economic productivity. These efforts are focused therefore on increasing welfare in society.

The implication is that it is advantageous to make investments that bring about desirable results, advance the good life of citizens, improve the economy promote welfare, inclusivity and participation. This focus on contentment is what makes the policy appear to be based on the consequences it would bring about. With four out of the five statements leaning towards utilitarian, the Rwandan policy is largely utilitarian.

4.2.2.3. Ugandan ST&I Policy

Table 4, (Appendix 4), indicates that Uganda's ST&I policy document has fifteen policy statements. At first glance, it looks like a prescription of duties for government departments to execute. It opens with instructive accounts of government's wish to assess, forecast, advise and implement the policy of ST&I. The Uganda Government commits to sustaining an environment that supports industrial development, facilitating innovation and use of intellectual property rights and traditional/conventional and emerging technologies, participation of women and special groups and financial support for infrastructure development. It continues to state the government's support for education and training in scientific and practical disciplines, support for small and medium enterprises, regulation to ensure safety, environmental protection, moral and societal norms. It strives to promote standardization to enhance business internally and

internationally, promote public awareness and communication as part of improving innovation related activities.

Although the document has more than double the number of statements others have, its goals are similar to the other countries. It focuses on regulation, infrastructure development, skills development including practical moral behavior and public participation. Its main goal is to maintain an environment in which ST&I activities can flourish. The highlight of traditional technology suggests that what is needed is what can immediately be brought to the market. This means that innovation is understood in its wider context of introduction of ideas whether or not it has had some use elsewhere or at any other time.

The notion of reintroducing ideas to the economy indicates that all engagement is investment through which more is expected. Constant readjustment of policy similar to responding to market fluctuations is a strong indicator of relentless pursuit of material ends. The document however has several statements focusing on regulation and equitable access. These statements connote fairness in the system, inclusivity, participation and seek to enhance public confidence in the efforts of Government relating to ST&I activities.

Duties of the Uganda Government are visible and are expected to drive the policy, determining its outcomes and effect. It is also the only policy document in the study that expressly mentions development of morals and ethical norms as a target. Most of it is still, however utilitarian and duty based.

The tables below show the policy statements grouped according to the ethical frameworks they fall into using the classification described in chapter three. Following each table is a description of the ethical connotation as identified in the respective documents.

4.3 Findings

This subsection presents what we find specifically in the analysis regarding the relationship of the statements and ethical frameworks as determined earlier. The result shows us the essential final cause of the policy statements and this

constitutes its ethical essence. This essence gives the statements a specific character enabling us decide which ethical framework the statements belong. The findings presented here are derived from the table above as a logical follow up of analysis and inference from the documents as described in the methodology of the study.

4.3.1 Utilitarian Ethics

Table 4.1 below shows utilitarian policy statements in the four countries. Utilitarian ethics emerges as the ethical framework underpinning five out of the seven statements in the Kenyan policy, two out of the eight in the Tanzanian policy, three out of the five in the Rwandan policy and seven out of the fifteen statements in the Ugandan policy. Common among these statements is the focus on economic transformation for the purposes of promoting contentment, capacity development for enhanced commercial activity and raised expenditure in ST&I to enhance output and improve equipment and facilitation.

Statements falling into the category of utilitarian ethics in the documents examined for this study have goals that address economic transformation, enhanced financial flow to innovation activities, improving effectiveness, and raising the quality of life. Specifically, the ethical connotations of the statements indicate a deliberate move to improve the wellbeing of persons, motivate stakeholders to act towards greater contentment and careful selection of priorities that would result in popular public support and approval.

Ethical connotations of the statements have marked contrasts for example; there are those which focus on investment related actions like raising expenditure, infrastructure development and those aiming to develop skills and behavior of different players and stakeholders.

In ethical terms, the implications we find in the statements are those that suggest some form of “goodness” that is seen as desirable. Benefits are to be distributed as widely as possible to expand contentment and popular approval. Thus selection of activities within the policy statement is done carefully, based on the perceived outcomes. Public conviction about the good of each prescribed

action is necessary for its implementation which means a desirable consequence is fundamental for a policy action to be included in the document.

Implications of the above lead us further towards a unity of purpose in the statements. Economic performance is good for a country; spending national resources on ST&I leads to greater contentment; the intrinsic value of human skills development is potentially useful for knowledge development and subsequent use in economic development. Furthermore, promoting wellbeing through ST&I policies also leads to contentment. The policy statements linked to utilitarian ethics in the table above are all different but suggest a similar ethical basis.

Utilitarian policy statements come in various forms, those focusing on economic transformation and development – e.g. K2, R1; those that focus on purely raising public expenditure in ST&I like K3, and R2; those addressing equity in distribution like K4; those which focus on capacity development e.g. K6, R3, U7, and U15; those dealing with infrastructure like K7, U6 and U8; those focusing on commercialization like T8 and U10; and others formulated to enhance public support and promotion, these are T1 and U14. As can be seen the contrasts are more pronounced between the countries.

Table 4.1 Utility Based Policy statements of the ST&I Policies

	Policy Statement	Goal	Significant Notion	Ethical Connotation	Underlying Ethical Implication	Underlying Ethical Implication – Sub-categories
K2	The government through relevant institutions will leverage ST&I to transform the economy through identified national priority areas.	The goal is to transform the economy using knowledge and innovation.	The transformation the economy using ST&I which is a desirable end. To be achieved through a process of prioritization and careful selection to the desired transformation.	ST&I is an investment that embodies goodness. What is to be done is therefore what promises the best returns in economic terms. The economic gain will in turn bring contentment to many.	Transformation leading to change in the lives of citizens to towards a good or desirable state and should be pursued. High economic performance is presumably best for the majority of the people.	Results, contentment-utility
K3	The Government will allocate resources, mobilize and motivate stakeholders to participate in the R&D sub-sector funding to at least 2% of GDP	Raise expenditure in R&D to motivate stakeholders	Raising expenditure is required and will motivate stakeholders resulting in mobilization greater availability and capacity of production.	What Government expenditure brings about as the desired effect towards greater contentment in the society is the main reason for the policy statement.	Spending more on R&D leads to greater happiness	Productivity, contentment

	annually.					
K5	The Government will promote ST&I knowledge sharing and awareness creation.	Equitable participation, justice, sharing and general public participation.	Distribution of knowledge for equity in participation and utilization. This enhances access to knowledge industry for the public.	Distribution of benefits in the society is determined as a public good and therefore government functions as a promoter and investor.	Promote public participation and benefit to increase public utility of ST&I	Participatory Utilization of knowledge.
K6	The government will develop human resource capital in ST&I to meet the demands of the economy.	Improve human capacity for economic development by providing needed technical skills	Application of technical skills with a view to increase productivity in the future.	Human resource capital development is seen as an investment for the economy.	Development of skills for its intrinsic value is a necessary requirement for knowledge economy.	Human resource development, economic productivity, skills development are inputs to the economy that result in greater contentment.
K7	The government will develop ST&I infrastructure to support ST&I Programmes in identified priority areas.	Support programmes in ST&I for greater effectiveness by providing facilities and equipping	Improving (developing) infrastructure to support and promote specific identified ST&I programmes	Support to infrastructure as a means for promoting programmes in ST&I	ST&I infrastructure is a public good as is priority setting and leadership.	Infrastructure support promotes economic output and thus greater contentment
T1	Promote science and technology as	Promoting S&T for use in	Using S&T to transform the	Development as transformation and its	Using the knowledge of	Maximize on the net good

	a tool for economic development, improvement of human, physical & social well-being and protection of national sovereignty	economic development.	environment and improve human social well-being and security	relationship with the kind of changes that accompany such a transformation. Looking at the consequence of promoting knowledge development	S&T for well-being and security is a desired social good	
T8	Promote commercialization of research results and collaboration with the private sector in generation of knowledge for commercial use	Commercialization of knowledge	Knowledge has economic value that can be exploited for commercial gain	The benefit of commercialization of knowledge resources. Prudent use of generated technology.	Material value of knowledge should be exploited for economic growth and general well-being	Commercial value is desirable
R1	To support the growth of the economy of Rwanda, specifically to support the Vision 2020 targets of a steady growth in GDP – 8% per year from 2010 to 2020	Economic development	ST& I is a potential contributor to economic growth and should be promoted.	Value addition from ST&I to economic development is deemed necessary.	S&T use is an investment that can produce desirable results	Economic outcomes carry the most weight
R2	Advance the quality of life for all the citizens of Rwanda, specifically to support the Vision 2020 target of a GDP per inhabitant	Economic development	Application of S&T for the advancing of the quality of life	Applicable ST&I knowledge adds to the quality of the human livelihood experience.	Advancing the good life of citizens	Increasing contentment for the people

	of 900$ by 2020;					
R3	Improve skills and knowledge among the population, specifically to create a “knowledge-based” economy	Improving skills, in order to develop a knowledge-based economy.	Enhancement of knowledge for application in economic activity	Impact of skills improvement in the development of a knowledge economy is positive.	Utilization of knowledge to improve the economy	Any inputs that are investments in the economy result in greater contentment.
R4	The Government shall allocate annually 0.5% of the total budget to the NRF to be managed by the NCSTI for research and development activities oriented towards the development goals of Rwanda.	Raise expenditure to achieve development goals.	Resource mobilization is necessary to speed up development and growth in the economy.	Raised expenditure results in desired results.	Strategic investment in ST&I to meet demands of the economy.	Productivity, contentment

	Policy Statement	**Goal**	**Significant Notion**	**Ethical Connotation**	**Underlying Ethical Implication**	**Underlying Ethical Implication – Sub-categories**
U6	Provide financial support for ST&I activities to build capacity and put in place the necessary infrastructure	Financial investment in infrastructure	Improving (developing) infrastructure to support and promote specific identified ST&I programmes	Support to infrastructure as a means for promoting programmes in ST&I	ST&I infrastructure is a public good as is priority setting and leadership.	Results, contentment-utility
U7	Build an educational and training system that produces human resources with capacity to generate and effectively apply ST&I based on contemporary and future needs of society	Linking education to the ST&I sector	Education enables the sector generate and use knowledge	Education is development of people and brings good to the sector.	Skills improvement produces good results for ST&I	Maximize on the net good of skills
U8	Provide adequate and state-of-the art ST&I infrastructure to facilitate cutting-edge research	Equipping the sector	Investing in the sector	investment in ST&I infrastructure for better results.	Quality of investments in the sector desirable	Infrastructure support for greater contentment

	and scientific innovations.					
U9	Support basic, applied and development research for enriching the STI knowledge base and product development for enhancing indigenous knowledge and adaptation of imported technology.	Strong support for knowledge production and indigenous knowledge adaptation	The search for new knowledge to be given priority	Role of new knowledge from indigenous knowledge pool and new studies play in enhancing development is participatory	New knowledge has high value and needs to be tapped for its intrinsic and populist value.	Maximizing productivity to increase the good
U10	Support development and growth of small and medium enterprises through provision of essential services and infrastructure.	Focus developmental activities in R&D towards SMEs motivate their growth	Motivating SMEs leads to greater involvement of sections of the population in economic productivity	The desired effect is greater contentment in the society and inclusivity	Support leads to greater happiness to a wider section of the population.	Participation, contentment
U14	Promote ST&I awareness and ensure public commitment and support for ST&I activities and programs.	Solicit public support for ST&I investments	Seeks awareness of the public and a willingness to support public	Public conviction about how ST&I could improve life could result in increased	Public support is important and good growth of the sector	Seeking Pubic support as content

			spending on ST&I activities	funding		addition
U15	Develop an ST&I information management system to facilitate the production, storage and dissemination of accurate, timely and up-to date information on ST&I activities.	Strengthen the capacity of the ST&I sector to meets its obligations by equipping.	Improving ST&I communication	Seeking to raise productivity for its value	Quality improvement in communication	Focus on results of the action

4.3.2 Duty Ethics

Statements classified as deontological are mostly those that were seen to address issues of governance focusing on regulation, protection of intellectual property rights, access to knowledge and environmental protection and conservation. They also address promotion in development, self-reliance, behavioral transformation as a responsibility of the state and fairness in access to technology. These governmental functions are founded on the moral ground that a government should perform certain duties that are deemed to be good in themselves or those that provide a desirable, achievable environment for other activities to flourish.

Duty ethics in policy statements are illustrated by the ethical implication; to do what is right as a duty. For example: a state policy that promotes an activity that is desirable for being both good and virtuous. The statements categorized as duty ethics have the characteristics described in chapter two.

Kenya has two out of the eight statements in this category. Tanzania has five out of eight. Rwanda has one out of five while Uganda has seven statements relating to duty ethics out of the fifteen statements found in the policy document. As table 4.2 below confirms, there is in every country a statement dealing with governance and another with intellectual property rights. All the countries have statements on regulation to ensure fairness, standards and environmental protection. These statements depict a situation where governments commit do fulfill their duty of stewardship and ensuring justice. It is necessary for government institutions to ensure fairness and hence it has the duty to act in a particular manner.

The statements have some contrasts in substance for example: K1, T6, U4 and U13 specifically address various areas of regulation. Statements: K4, T5, R5 and U3, address the protection of intellectual property rights. Tanzanian statement T6 is a specific statement on environmental protection which is not found in any other country. Uganda is the only country with a statement of policy

monitoring and continuous adjustment. Statements T2, T3 and U11 focus on the welfare and safety of persons in ST&I related employment.

Table 4. 2. Duty based Policy statements in the ST&I Policies

	Policy Statement	**Goal**	**Significant Notion**	**Ethical Connotation**	**Underlying Ethical Implication – Categories**	**Underlying Ethical Implication – Sub-categories**
K1	The Government will establish an institutional and regulatory framework to promote, coordinate, mobilize resources and manage ST&I.	Regulation (streamlining) of technology by government	Regulation to ensure confidence in technology development and public support and standardization of activities	Regulatory action will accomplish a specific role of changing behavior in relation to the expectations placed on the policy	Promote the good action of people and institutions in ST&I through establishment of a norms	Regulation, enforcement of rules
K4	The Government will facilitate acquisition of Intellectual Property Rights (IPRs) by scientists, researchers and innovators.	Advancing the protection of rights to intellectual property to enhance innovation among the people	Fairness in exploiting the results of individual effort. Ensuring that innovations are protected in order to attract people to be creative	Rights protection meaning promoting a just system of innovation in society	Safeguarding equitable distribution of rights to all according to free market exchanges	Rights, fairness, just systems
T2	Promote scientific and technological self-reliance in support of economic activities	Develop ST&I for self-reliance and economic development	Investing in scientific enterprise to improve welfare.	Investing in self-reliance implies making people participate in implementing policy	Investing in people leads to innovative development of a country	Concern for welfare as a common good

	Policy Statement	Goal	Significant Notion	Ethical Connotation	Underlying Ethical Implication – Categories	Underlying Ethical Implication – Sub-categories
T3	Stimulate generation of knowledge for socio-economic application including attracting and retaining scientists	S&T promotion for knowledge production and improvement of the sector	Investment in the sector to improve welfare and productivity in the innovation system	Contented participants in the sector are expected to be more productive	Investment in people to raise their productivity	Welfare is seen as a necessary investment
T4	Inculcate a science culture in Tanzanian society	Transform people's behavior to favor innovativeness	A "science culture" would promote knowledge seeking	Culture is connected to productivity and transformation	Learning is needed for change	Attitude change for positive social engagement
T5	Establish an appropriate legal framework for IPR management, technology transfer, monitoring and evaluation and safety	Regulation of knowledge use and protection of IP rights	Protecting individual effort to enhance fairness in knowledge generation and use in order to promote innovativeness	What is the value of protecting rights for the purpose of promoting innovativeness and fairness (justice) in the innovation system	Safeguarding the rights of innovators for fair play and equitable distribution	Fairness, rights, just system
T6	Promote rational utilization of natural resources & environmental conservation	Environmental protection and conservation	The environment is necessary for human well-being and	Focus on What is the value of the environment for humans	Respect for the environment is part of the human value system	Obligation to protect the environment

	Policy Statement	Goal	Significant Notion	Ethical Connotation	Underlying Ethical Implication – Categories	Underlying Ethical Implication – Sub-categories
R5	An effective intellectual property management framework shall be established in Science and Technology Research and Development institutions and firms so as to create the capacity to support local researchers in protecting their Intellectual Property Rights (IPR)	Regulation and protection of IP rights	Protecting individual effort to enhance fairness in knowledge generation and use so as to promote innovativeness.	The need to protect rights for the purpose of promoting innovativeness and fairness in the innovation system.	Safeguarding the rights of innovators for fair play	Fairness, rights, just system
U1	Assess, forecast and advise on issues regarding ST&I, taking into account current and future trends in development, transfer and diffusion of both local and foreign ST&I outputs.	Evaluate ST&I and its relation to growth of the economy	Constant readjustment of policy direction is essential	Normative action to hold on to as changes occur	Staying on course to uphold the rights of stakeholders to remain on course towards a desired goal	Pursuit of rights over good

	Policy Statement	Goal	Significant Notion	Ethical Connotation	Underlying Ethical Implication – Categories	Underlying Ethical Implication – Sub-categories
U2	Provide a conducive environment for industrial development in Uganda	A level playing field for industry to flourish	Improving (developing) infrastructure to support and promote uptake of ST&I results	Support to infrastructure as a means for promoting programmes in ST&I.	ST&I is useful in raising the potential for development	Promoting inclusivity
U3	Facilitate and encourage S&T innovation through protection and use of Intellectual Property Rights	Regulation and use of IP rights	Protecting individual effort to enhance fairness in knowledge generation and use so as to promote innovativeness	Protecting rights for the purpose of promoting innovativeness and fair distribution of benefits.	Safeguarding the rights of innovators for fair play and equitable distribution.	Rights, fairness, just systems
U4	Guide the judicious use and application of traditional, conventional and emerging technologies for sustainable development	Regulation of traditional and conventional technologies	Enhance regulation to promote confidence public support and standards	Regulation achieves the desirable change in behaviour	Precautionary measures necessary in ST&I	Regulation, enforcement of rules

	Policy Statement	Goal	Significant Notion	Ethical Connotation	Underlying Ethical Implication – Categories	Underlying Ethical Implication – Sub-categories
U5	Mainstream and actively involve the special needs groups, men, women, and children in all ST&I activities in order to ensure that the resultant impacts are evenly spread across all sections of society.	Fairness and equal opportunity for all	Equal treatment for either gender and concern for vulnerable groups	Conformity with the norm of equality fairness and enhanced participation	Rights to fair treatment to be upheld, respect persons of different sections of society, promote inclusivity and participation.	Equal rights, respect for persons in the social structure
U11	Apply appropriate safety and health measures in the generation, development and application of ST&I in all its aspects	Safety regulations	Safety and health are greater requirements for carrying out the policy.	Regulation to reinforce desirable safe behavior	Regulation is necessary for guaranteed safety	Regulation, enforcement of rules
U13	Promote the standardization of Ugandan products and services in line with required international standards.	Regulation of standards	Enhance standardization to support growth and foreign trade	Regulation achieves a desirable outcome of acceptance.	Standards are necessary for fair exchange of goods and services across borders	Regulation, enforcement of rules

4.3.3 Virtue Ethics

Statements that could be attributed to a virtue based ethical framework were largely absent. Table 3 above shows there was only one statement in Uganda (U12) that could be placed under this framework. It focuses on developing moral values among persons in research and innovation work. The goal of the statement is to equip those involved with ethical resources. This means that moral obligations and norms would form part of the practice but coming from the transformed character of those who have been appropriately equipped. The underlying ethical implication is to stress that ethical behavior would be reinforced as a means of addressing ethical decision making that inevitably arises for those involved in ST&I. There is an apparent recognition that the ethical behavior of persons is needed to ensure ethical outcomes in their decisions.

The single policy statement in virtue ethics proposes the establishment of a mechanism to ensure development and application of STI in accordance with acceptable morals and national societal norms. Virtue ethics stresses the need for good character of the moral agent if ethical behavior is to be guaranteed. In a policy of ST&I, it implies that the drafters and stakeholders understand that technology has the power to transform societies and that it is important to use it with caution so as to control other unintended effects it would have on people.

4.3.4 Utility/ Duty ethics statements

One statement (T4) in the Tanzanian policy specifically addresses gender equity as shown in table 4.4 below. The wording of the statement: *"Promote gender equity in technology generation and use in everyday life"* determines its goal as that of promoting fairness and equality. This connotes acceptance of the fact that there are inbuilt unfair practices even in well thought out policies owing to long standing cultural practices. It further implies that it is necessary to uphold fairness and thus it is both a duty and a virtuous act. The statement is classified as both utilitarian and duty.

4.4 The Usefulness of Ethical Analysis for Policy Improvement

The third research question sought to establish how ethical analysis is useful for improving ST&I policy. The usefulness of ethical analysis of policy statements lies in the application of such knowledge to aid in taking precaution for any unintended effects a policy may have on the social environment.

Science and technology has empowered societies to solve existential problems. In so doing, ordinary human life has been transformed and made easier. The full list of consequences of technological progress however, has in some cases been long and impossible to predict. Over time, it has become necessary for countries to develop standalone policy for ST&I in order to address various issues related to the development and use of technology in modern states. This necessity is driven by ethical considerations regarding the need to have a policy regulating ST&I or the impact technology and innovations have on society. As shown above, policy statements have intrinsic ethical meaning. We would expect policy statements to express the strengths and weaknesses associated with the ethical framework. A practical experience of this is for example, the difficulty of dealing with personal rights in the parameters of a utilitarian policy statement or the more often encountered case of whether it is prudent to spend meager public resources on lofty research projects when some parts of the country are facing starvation. Utilitarianism and other ethical frameworks may not sufficiently cater for all ethical issues that arise. It is through ethical analysis that we can know such things about policy statements and use the knowledge appropriately in seeking realistic solutions.

A realistic question in public policy making and implementation is; how do we relate priorities to the actual needs and values of a state. The main interest of public administration regarding ST&I then is to ensure that priorities follow from social aspirations and practical needs. It is important to analyze policy in order to realign it to the needs and values of a state. The policy making

process that involves several levels of debate among stakeholders led by government is meant to ensure that this realignment exists. But just as policy analysis takes place in other disciplines like sociology, political science and public administration, it is important that ethical analysis is also done alongside.

Table 4. 3. Virtue Based Policy statements of the ST&I Policies

	Policy Statement	Goal	Significant Notion	Ethical Connotation	Underlying Ethical Implication	Underlying Ethical Implication – Sub-categories
U12	Establish mechanisms to ensure development and application of STI in accordance with acceptable morals and national societal norms.	Equip those involved with ethics resources	Guide the choices of those involved	Highlight moral obligations and norms	Ethics in necessary in ST&I	Reinforce ethical behavior

Table 4. 4. Duty/Virtue Based Policy statements of the ST&I Policies

	Policy Statement	Goal	Significant Notion	Ethical Connotation	Underlying Ethical Implication	Underlying Ethical Implication – Sub-categories
T7	Promote gender equity in technology generation and use in everyday life	Fairness and equality	Equal opportunity for either gender to contribute to knowledge generation	Fairness ought to be upheld, respect for women	The upholding equality and fairness	Equal rights, respect for persons in the social structure

4.5 Summary

This section of the study offers a summary of the chapter clarifying the findings with respect to the research questions. Table 4.5 below presents a summary of results from the earlier sections for ease of reference and comparison. It uses figures to show which frameworks are more intensely represented in the policy documents clarifies the overall picture of the ethics of ST&I policies in the four countries.

Here below, in Table 4.5 is a summary of results showing the number of policy statements in the various ethical framework categories

Table 4.5 Distribution of policy statements into categories of ethical frameworks

Country	Utilitarian		Duty		Virtue		Utility/Duty		Total	
	No	%	No	%	No	%	No	%	No	%
Kenya	5	71	2	29					7	100
Tanzania	2	25	5	62			1	13	8	100
Rwanda	4	80	1	20					5	100
Uganda	7	47	7	47	1	6			15	100

Chapter four has shown the results of the study in an attempt to answer the questions set out in chapter one. The first question asked: What is the ethical focus of the Kenyan science and technology policy? This question gets a response in this chapter showing that the Kenyan ST&I policy is principally utilitarian. Tanzania in contrast has a predominantly duty ethics layout. Almost two thirds (62%) of its statements are deontological while only one quarter is founded on a utilitarian ethics framework. One statement seemed to fit into both frameworks which however does not change its main outlook. Rwanda's policy is four fifths utilitarian and one fifth duty. On the other hand, Uganda with the largest number of statements is almost equally utilitarian and duty (47% each).

Unlike other countries, it has the only statement that fitted the virtue ethics framework.

The second question asks; what similarities or differences in comparison, would we find in ST&I policies in three other East African countries (Uganda, Tanzania and Rwanda)? Most similarities were found in the duty statements while the utilitarian statements had more contrasts. Statements in virtue would not be compared as they were found only in one country. For example: We have seen similarities in the statements related to the ethical connotations and the underlying implications. Utilitarian statements in the various countries contrast in the emphasis they place on specific matters that are crucial for policy. Where for instance the Kenyan policy statement talks about leveraging ST&I to transform the economy, Tanzania seeks to promote ST&I for national sovereignty and security. Rwanda and Uganda too stress promotion of ST&I for improving development programmes. In the regulatory statements that fall into duty ethics, there is more agreement as they all focus on fairness and protection of rights and the common good.

Is ethical analysis useful for improving ST&I policy? Using a logical inference, we get a compelling conclusion that it is important to analyze policy in ethical terms. Our inference would proceed in this manner; we have established in the last section that (1) policy statements have ethical implications. We have also established (2) that ethical implications can be determined by analysis. Therefore, (3) it is possible to analyze policy for its ethical implications. Actions that are not ethical, may lead to undesirable ends, furthermore, we know that first, policy, is a guide for public action and secondly, that public action should be ethical. Thus policy itself should be ethical in essence. The usefulness of ethical analysis of public policy lies in enabling us to foresee the possible difficulties and design appropriate solutions and assist in keeping the policy within the prioritized trajectory.

CHAPTER FIVE

DISCUSSION

5.1 Overview

The purpose of the study was: to identify the ethical dimensions of the Kenyan STI policy. Second, was to analyze and compare it to the others from three selected countries, (Uganda, Tanzania and Rwanda) in ethical terms. The third was to explain the ethical inclination of the policies with reference to the known ethical frameworks and, discuss the possibility of developing a method for making critical ethical evaluation in the science technology and innovation policy. This chapter discusses the findings with respect to available literature on the topic so as to be able to account for the third and the fourth objectives i.e. to explain the ethical inclinations noted in the analysis of the statements and discuss the possibility of developing a method for making a critical and ethical evaluation in a science technology and innovation policy.

5.2 Ethics in ST&I Policy

Earlier on, we established from the literature that a public policy is a statement of intent that determines what actions public institutions should or should not undertake (Fischer, Miller, & Sidney, 2007b). In the preceding chapter we have seen policy statements have ethical dimensions. The policies were classified into utilitarian, duty and virtue ethics based on their ethical connotations and apparent ethical implications of the actions prescribed therein. Countries have different policy statements that also differ in their ethical connotations yet they still have similarities. Whereas, it was not the purpose of this study to determine how policy statements are arrived at and what specifically informs them nor was it to establish the relationship between the ethical inclination and the perceived need for the statement, it is important to note the main reason given by the countries for drafting the policies. The countries all have a desire to develop and expand their

economies so as to improve the quality of life. Policy making is a consultative process that involves stakeholders.

The use of philosophical methods in policy analysis enables investigators to assess policy beyond the quantitative and introduces a value based appraisal. It seeks to separate the ideological from the factual as stated by Hook (1970). The contribution of this study has been the introduction of a way of understanding the impact of each policy statement in the STI policy of Kenya and neighboring states. The study has also established the importance of ethics for policy making especially in STI policy. Probing the issue further, this study was able to demonstrate that ethical inclinations of STI policy statements in the countries reviewed fall mainly into the utilitarian framework while some fall into the deontological framework. This analysis is useful because it would make it possible to know what outcomes would be expected from actions based on the known ethical frameworks.

Developed countries that have had more experience in dealing with policies of science have encountered similar questions of how to deal with science policy. There are three main issues in science classified by Dahrendorf, R. (1975) as; moral ambiguity, abundance of scientific information and the difficulty of assessing the effect of support for research. The making of a policy for STI is designed to address the above three. It is a deliberate attempt of a government to finance, encourage and deploy the scientific resources of a country to the best interests of national welfare (Dahrendorf 1975). This understanding of STI policy stresses that priorities of STI policies should follow from the political and social priorities. The policies studied for this paper relate to national development blue prints like the Kenya Vision 2030. Such policies would naturally address the needs and values of the country but are subject to a process of discussion which involves different stakeholders who would stress their own values and needs. Some stakeholders would for instance have obsessive or blinkered emphasis on certain aspects of ethics for example rights. Others still, may consider duty to

be more important than rights. It is quite possible that implementation of policy actions by different actors will result in different interpretations of the same clause. Performance of a duty induced by consciousness of needs will be different from one led by consciousness of rights. Analyzing the ethical inclination of policy statements would assist in realigning the statements with national aspirations and values.

Ethical implications of actions are related to their impact on; respect for human dignity, respect for vulnerable persons, privacy, confidentiality, justice, inclusivity and balance of harms and benefits. There is always a risk that one of the above may be disrupted by an action determined by a public policy. More specifically, actions related to STI have risks. This is inherent in the nature of most such activities as they are by and large experimental. Risks can be mild, eliciting only minimal deviation from existing practice to significant, i.e. having the potential to cause harm to humans and the environment. These impacts have been known for a long time as seen in the literature (Shrader-Frechette, 1984),(Pope Paul VI, 1968), and (Catholic Church &McDonagh, 2016). Implementation of policy is done by persons. Individual interpretations of these persons will count more in the final analysis of ethical dimensions of policies. The capacity of the actors for compassion, concern, cooperation or otherwise will have a significant influence on the ethical outcome of policy actions. Countries hold these values in high regard and have a desire to make them visible in all public activities. Some commentaries however hold that science policy energetically focused on assessing scientific and economic impacts at the expense of social impacts thus creating a problem of choice (Bozeman, B., & Sarewitz, D. (2011). This is similar to the findings of this study that most policy statements in the STI policies of the four East African countries are utilitarian.

One possible explanation to the apparent lean towards utilitarian ethics is the difficulty of choosing among the many options that science offers and the

many approaches that exist. Policy- making has to choose what scientific disciplines to support and what public programs such effort would enhance. The outcomes of the actions rely on complex and unknown relationships between science advancement and societal response. The problem of choice as Dahrendorf, R. (1975) describes, is about the difficulty in assessing any effect that is attributable to the input towards research. A utilitarian leaning policy focuses on what we might gain in terms of economic output and the satisfaction it elicits within the beneficiary population. Other ethical frameworks propose different approaches. Deontology would propose an identification of duties that do not use persons as means to any other ends. Virtue ethics would guide the executor (moral agent) to examine their character and be guided by it. It is reasonable to first address the need for contentment then that of duty in dealing with a public matter. This could explain the observation that STI policies show a strong leaning towards utilitarian and duty ethics. Could it then be assumed that the policy-making process corrects itself and manages to relate priorities, actual needs and values of a society?

The other question to ask is if it is possible to develop a method for ethical analysis. Other related areas like public health have applicable methods for carrying out ethical analysis and resolving issues that are pertinent. Public health ethics for example, take common morality or the norms that any reasonable person would apply as the basis for a methodology for assessing ethics in all public policy (Beauchamp & Childress, 2013). Should such a principle bind all persons, it would be possible to address the question of fairness and inclusivity. The Kenyan Constitution holds human rights as being such a binding common morality for all citizens and residents. It provides Kenyans with a bill of rights to guarantee freedoms and equal opportunity. But, discourse on human rights still leaves many gaps. Arguably a desirable framework is one which upholds human dignity and the Aristotelian principle of treating equals equally and the unequal likewise, unequally. We found in chapter four that one country had a policy statement

for a deliberate move to equip persons with moral tools. This would provide a stronger guarantee for maintenance of ethical standards would be.

Scientific activities are justified by their capacity to achieve public values (Bozeman & Sarewitz, 2011). Science, technology and Innovation policies which guide the activities should also be held to address the same public values. As such, ethical analysis of the policies would ask the same questions asked of other human actions. Our concern in ethical analysis is whether actions are right or wrong, fair or unfair. Rightness and fairness makes it look like there is no attribute of the persons managing these affairs that is required. This may explain why virtue ethics is rare in the policy statements examined.

Virtue ethics approaches morality from the character of the agent. This does not mean that it would have no role in matters of public policy. One foreseeable role is to assist the moral agent to grapple with issues which have a potential for raising ethical issues like political conflict that can interfere with the implementation of policy. As encountered in the Ugandan policy, moral development of implementers and stakeholders is important. But since this is needed for the whole society it should be left to the educational system to inculcate.

CHAPTER SIX

CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

This study started with the objective of characterizing and comparing the ethical issues of STI policies in four selected countries in east Africa. Chapter one described the structure of the dissertation giving a background, introducing the research objectives, locating the field of study and organizing the thoughts leading to the development of a methodological approach. Chapter two goes into previous work on policy and ethics, the two being notions that were the subject of the investigation. It explained the theoretical basis of the main tenets upon which the analytic organization was built. In chapter three, the methodology was developed and described in detail, justifying why the study needed a content analysis approach and a philosophical analysis. Chapter four presents the results of the study and answers the research questions.

The conclusion reached for the first question is a confirmation that there are indeed ethical dimensions in the STI policy statements. It is a connection between the public values that drove the process leading to the policy and the practical encounters associated with the actions prescribed in the statements. Policy statements have inherent ethical dimensions that can be studied or analyzed. For the second research question a comparison is provided for the four countries showing that it is possible to compare and describe similarities and differences. We have seen that most statements are however utilitarian a reason for which is currently speculative but could be systematically studied. This leads us to the response to the third question. The third question had asked about how analysis of the ethics of policy statements could be useful. We find that it enables policy makers, analysts and other interested groups to make appropriate adjustments and ensure

actions prescribed by policies are within desirable limits. This study has established the argument that it is possible to analyze policy statements for ethical content and use it to inform policy adjustments that may be found necessary during implementation.

Chapter five presents a discussion of the findings in the light of existing literature and the work of other investigators of the same topic. It outlines the implications and limitations of the study further pointing towards a direction along which future studies should follow in order to facilitate the gathering of knowledge about the important topic of ethics in STI and indeed the wider public policy arena.

6.2 Recommendations

This study has established that there are indeed ethical dimensions in the ST&I policy. One implication of this finding is that there is need to expand the study to other areas that it did not investigate. There are many unanswered questions that would need to be investigated.

Second, more studies in ethics of policy documents would make the comparisons between the countries more applicable. One such study could look at the possibility of relating the ethical dimensions to those stakeholders who participated in its drafting in order to determine any links that may improve our understanding. Research focusing on stakeholders is needed to further assist policy analysts and students of policy making to understand and predict the likely outcomes of a policy. It would give ideas to others who wish to pursue studies of ethics of policy or who wish to replicate with policy documents in other sectors.

The third recommendation would be to further document the usefulness of ethics in policy documents. This would take us closer to being able to predict the actual outcome of a policy based on an understanding of its ethics. It would be possible to compare policy ethics from various sectors of the economy and establish some relationships that are important for policy making but yet not understood. The foundation of ethics of policy studies has

been laid and new branches would develop and take us to new knowledge useful for scholarship and practice. In the end policy making would benefit from ethics and philosophical approaches applied generously.

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APPENDIX 1

Table1. Policy statements and analysis of the Kenyan ST&I Policy

	Policy Statement	**Goal**	**Significant Notion**	**Ethical Connotation**	**Underlying Ethical Implication – Categories**	**Underlying Ethical Implication – Sub-categories**	**Ethical Framework**
K1	The Government will establish an institutional and regulatory framework to promote, coordinate, mobilize resources and manage ST&I.	Regulation (streamlining) of technology by government	Regulation to ensure confidence in technology development and public support and standardization of activities	Regulatory action will accomplish a specific role of changing behavior in relation to the expectations placed on the policy	Promote the good action of people and institutions in ST&I through establishment of a norms	Regulation, enforcement of rules	Duty ethics,

K2	The government through relevant institutions will leverage ST&I to transform the economy through identified national priority areas.	The goal is to transform the economy using knowledge and innovation.	The transformation the economy using ST&I which is a desirable end. To be achieved through a process of prioritization and careful selection to the desired transformation.	ST&I is an investment that embodies goodness. What is to be done is therefore what promises the best returns in economic terms. The economic gain will in turn bring contentment to many.	Transformation leading to change in the lives of citizens to towards a good or desirable state and should be pursued. High economic performance is presumably best for the majority of the people.	Results, contentment-utility	Utilitarian ethics
K3	The Government will allocate resources, mobilize and motivate stakeholders to participate in the R&D sub-sector funding to at	Raise expenditure in R&D to motivate stakeholders	Raising expenditure is required and will motivate stakeholders resulting in mobilization greater availability and	What Government expenditure brings about as the desired effect towards greater contentment in the society is the main reason for	Spending more on R&D leads to greater happiness	Productivity, contentment	Utilitarian, ethics

	least 2% of GDP annually.		capacity of production.	the policy statement.			
K4	The Government will facilitate acquisition of Intellectual Property Rights (IPRs) by scientists, researchers and innovators.	Advancing the protection of rights to intellectual property to enhance innovation among the people	Fairness in exploiting the results of individual effort. Ensuring that innovations are protected in order to attract people to be creative	Rights protection meaning promoting a just system of innovation in society	Safeguarding equitable distribution of rights to all according to free market exchanges	Rights, fairness, just systems	Duty ethics
K5	The Government will promote ST&I knowledge sharing and awareness creation.	Equitable participation, justice, sharing and general public participation.	Distribution of knowledge for equity in participation and utilization. This enhances access to knowledge industry for the public.	Distribution of benefits in the society is determined as a public good and therefore government functions as a promoter and investor.	Promote public participation and benefit to increase public utility of ST&I	Participatory Utilization of knowledge.	Utilitarian Duty ethics
K6	The government will develop human resource capital in ST&I to meet the demands of the economy.	Improve human capacity for economic development by providing needed technical	Application of technical skills with a view to increase productivity in the future.	Human resource capital development is seen as an investment for the economy.	Development of skills for its intrinsic value is a necessary requirement for knowledge economy.	Human resource development, economic productivity, skills development are inputs to	Utilitarian

		skills				the economy that result in greater contentment.	
K7	The government will develop ST&I infrastructure to support ST&I Programmes in identified priority areas.	Support programmes in ST&I for greater effectiveness by providing facilities and equipping	Improving (developing) infrastructure to support and promote specific identified ST&I programmes	Support to infrastructure as a means for promoting programmes in ST&I	ST&I infrastructure is a public good as is priority setting and leadership.	Infrastructure support promotes economic output and thus greater contentment	Utilitarian

APPENDIX 2

Table 2 Policy statements and analysis of the Tanzanian ST&I Policy

	Policy Statement	**Goal**	**Significant Notion**	**Ethical Connotation**	**Underlying Ethical Implication**	**Underlying Ethical Implication – Sub-categories**	**Ethical Framework**
T1	Promote science and technology as a tool for economic development, improvement of human, physical & social well-being and protection of national sovereignty	Promoting S&T for use in economic development.	Using S&T to transform the environment and improve human social well-being and security	Development as transformation and its relationship with the kind of changes that accompany such a transformation. Looking at the consequence of promoting knowledge development	Using the knowledge of S&T for well-being and security is a desired social good	Maximize on the net good	utilitarian
T2	Promote scientific and technological	Develop ST&I for self-reliance and economic	Investing in scientific enterprise to	Investment in self-reliance implies focusing on	Investing in people leads to innovative	Concern for welfare as a common	Duty ethics

	self-reliance in support of economic activities	development	improve welfare.	people to make them participants in implementing the policy	development of a country	good	
T3	Stimulate generation of knowledge for socio-economic application including attracting and retaining scientists	S&T promotion for knowledge production and improvement of the sector	Investment in the sector to improve welfare and productivity in the innovation system	Contented participants in the sector are expected to be more productive	Investment in people to raise their productivity	Welfare is seen as a necessary investment	Duty ethics
T4	Inculcate a science culture in Tanzanian society	Transform people's behavior to favor innovativeness	A "science culture" would promote knowledge seeking	Culture is connected to productivity and transformation	Learning is needed for change	Attitude change for positive social engagement	Duty ethics
T5	Establish an appropriate legal framework for IPR management, technology transfer, monitoring and	Regulation of knowledge use and protection of IP rights	Protecting individual effort to enhance fairness in knowledge generation and use in order to promote	What is the value of protecting rights for the purpose of promoting innovativeness and fairness (justice) in the innovation	Safeguarding the rights of innovators for fair play and equitable distribution	Fairness, rights, just system	Duty ethics

	evaluation and safety		innovativeness	system			
	Policy Statement	**Goal**	**Significant Notion**	**Ethical Connotation**	**Underlying Ethical Implication**	**Underlying Ethical Implication – Sub-categories**	**Ethical Framework**
T6	Promote rational utilization of natural resources & environmental conservation	Environmental protection and conservation	The environment is necessary for human well-being and	Focus on What is the value of the environment for humans	Respect for the environment is part of the human value system	Obligation to protect the environment	Duty ethics
T7	Promote gender equity in technology generation and use in everyday life	Fairness and equality	Equal opportunity for either gender to contribute to knowledge generation	Fairness ought to be upheld, respect for women	The upholding equality and fairness	Equal rights, respect for persons in the social structure	Duty /virtue ethics
T8	Promote commercialization of research results and collaboration with the private sector in generation of knowledge for commercial use	Commercialization of knowledge	Knowledge has economic value that can be exploited for commercial gain	The benefit of commercialization of knowledge resources. Prudent use of generated technology.	Material value of knowledge should be exploited for economic growth and general well-being	Commercial value is desirable	utilitarian

APPENDIX 3

Table 3. Policy statements and analysis of the Rwanda ST&I Policy

	Policy Statement	**Goal**	**Significant Notion**	**Ethical Connotation**	**Underlying Ethical Implication**	**Underlying Ethical Implication – Sub-categories**	**Ethical Framework**
R1	To support the growth of the economy of Rwanda, specifically to support the Vision 2020 targets of a steady growth in GDP – 8% per year from 2010 to 2020;	Economic development	ST& I is a potential contributor to economic growth and should be promoted.	Value addition from ST&I to economic development is deemed necessary.	S&T use is an investment that can produce desirable results	Economic outcomes carry the most weight	Utilitarian
R2	Advance the quality of life for all the citizens of Rwanda, specifically to support the Vision 2020 target of a GDP per inhabitant of 900$ by 2020;	Economic development	Application of S&T for the advancing of the quality of life	Applicable ST&I knowledge adds to the quality of the human livelihood experience.	Advancing the good life of citizens	Increasing contentment for the people	Utilitarian

	Policy Statement	**Goal**	**Significant Notion**	**Ethical Connotation**	**Underlying Ethical Implication**	**Underlying Ethical Implication – Sub-categories**	**Ethical Framework**
R3	Improve skills and knowledge among the population, specifically to create a "knowledge-based" economy	Improving skills, in order to develop a knowledge-based economy.	Enhancement of knowledge for application in economic activity	Impact of skills improvement in the development of a knowledge economy is positive.	Utilization of knowledge to improve the economy	Any inputs that are investments in the economy result in greater contentment.	utilitarian
R4	The Government shall allocate annually 0.5% of the total budget to the NRF to be managed by the NCSTI for research and development activities oriented towards the development goals of Rwanda.	Raise expenditure to achieve development goals.	Resource mobilization is necessary to speed up development and growth in the economy.	Raised expenditure results in desired results.	Strategic investment in ST&I to meet demands of the economy.	Productivity, contentment	Utilitarian/ duty

	Policy Statement	**Goal**	**Significant Notion**	**Ethical Connotation**	**Underlying Ethical Implication**	**Underlying Ethical Implication – Sub-categories**	**Ethical Framework**
R5	An effective intellectual property management framework shall be established in Science and Technology Research and Development institutions and firms so as to create the capacity to support local researchers in protecting their Intellectual Property Rights (IPR	Regulation and protection of IP rights	Protecting individual effort to enhance fairness in knowledge generation and use so as to promote innovativeness.	The need to protect rights for the purpose of promoting innovativeness and fairness in the innovation system.	Safeguarding the rights of innovators for fair play	Fairness, rights, just system	Duty ethics

APPENDIX 4

Table 4. Policy statements and analysis of the Uganda ST&I Policy

	Policy Statement	**Goal**	**Significant Notion**	**Ethical Connotation**	**Underlying Ethical Implication**	**Underlying Ethical Implication – Sub-categories**	**Ethical Framework**
U1	Assess, forecast and advise on issues regarding ST&I, taking into account current and future trends in development, transfer and diffusion of both local and foreign ST&I outputs.	Evaluate ST&I and its relation to growth of the economy	Constant readjustment of policy direction is essential	Normative action to hold on to as changes occur	Staying on course to uphold the rights of stakeholders to remain on course towards a desired goal	Pursuit of rights over good	Duty ethics
U2	Provide a conducive environment for industrial	A level playing field for industry to flourish	Improving (developing) infrastructure to support and	Support to infrastructure as a means for promoting	ST&I is useful in raising the potential for development	Promoting inclusivity	Duty ethics

	development in Uganda		promote uptake of ST&I results	programmes in ST&I.			
	Policy Statement	**Goal**	**Significant Notion**	**Ethical Connotation**	**Underlying Ethical Implication**	**Underlying Ethical Implication – Sub-categories**	**Ethical Framework**
U3	Facilitate and encourage S&T innovation through protection and use of Intellectual Property Rights	Regulation and use of IP rights	Protecting individual effort to enhance fairness in knowledge generation and use so as to promote innovativeness	Protecting rights for the purpose of promoting innovativeness and fair distribution of benefits.	Safeguarding the rights of innovators for fair play and equitable distribution.	Rights, fairness, just systems	Duty ethics
U4	Guide the judicious use and application of traditional, conventional and emerging technologies for sustainable development	Regulation of traditional and conventional technologies	Enhance regulation to promote confidence public support and standards	Regulation achieves the desirable change in behavior	Precautionary measures necessary in ST&I	Regulation, enforcement of rules	Duty ethics

	Policy Statement	**Goal**	**Significant Notion**	**Ethical Connotation**	**Underlying Ethical Implication**	**Underlying Ethical Implication – Sub-categories**	**Ethical Framework**
U5	Mainstream and actively involve the special needs groups, men, women, and children in all ST&I activities in order to ensure that the resultant impacts are evenly spread across all sections of society.	Fairness and equal opportunity for all	Equal treatment for either gender and concern for vulnerable groups	Conformity with the norm of equality fairness and enhanced participation	Rights to fair treatment to be upheld, respect persons of different sections of society, promote inclusivity and participation.	Equal rights, respect for persons in the social structure	Duty ethics
U6	Provide financial support for ST&I activities to build capacity and put in place the necessary infrastructure	Financial investment in infrastructure	Improving (developing) infrastructure to support and promote specific identified ST&I programmes	Support to infrastructure as a means for promoting programmes in ST&I	ST&I infrastructure is a public good as is priority setting and leadership.	Results, contentment-utility	Utilitarian

	Policy Statement	**Goal**	**Significant Notion**	**Ethical Connotation**	**Underlying Ethical Implication**	**Underlying Ethical Implication – Sub-categories**	**Ethical Framework**
U7	Build an educational and training system that produces human resources with capacity to generate and effectively apply ST&I based on contemporary and future needs of society	Linking education to the ST&I sector	Education enables the sector generate and use knowledge	Education is development of people and brings good to the sector.	Skills improvement produces good results for ST&I	Maximize on the net good of skills	Utilitarian
U8	Provide adequate and state-of-the art ST&I infrastructure to facilitate cutting-edge research and scientific innovations.	Equipping the sector	Investing in the sector	Investment in ST&I infrastructure for better results.	Quality of investments in the sector desirable	Infrastructure support for greater contentment	utilitarian

	Policy Statement	**Goal**	**Significant Notion**	**Ethical Connotation**	**Underlying Ethical Implication**	**Underlying Ethical Implication – Sub-categories**	**Ethical Framework**
U9	Support basic, applied and development research for enriching the STI knowledge base and product development for enhancing indigenous knowledge and adaptation of imported technology	Strong support for knowledge production and indigenous knowledge adaptation	The search for new knowledge to be given priority	Role of new knowledge from indigenous knowledge pool and new studies play in enhancing development is participatory	New knowledge has high value and needs to be tapped for its intrinsic and populist value.	Maximizing productivity to increase the good	utilitarian
U10	Support development and growth of small and medium enterprises through provision of essential services and infrastructure.	Focus developmental activities in R&D towards SMEs motivate their growth	Motivating SMEs leads to greater involvement of sections of the population in economic productivity	The desired effect is greater contentment in the society and inclusivity	Support leads to greater happiness to a wider section of the population.	Participation, contentment	Utilitarian, ethics

	Policy Statement	**Goal**	**Significant Notion**	**Ethical Connotation**	**Underlying Ethical Implication**	**Underlying Ethical Implication – Sub-categories**	**Ethical Framework**
U11	Apply appropriate safety and health measures in the generation, development and application of ST&I in all its aspects	Safety regulations	Safety and health are greater requirements for carrying out the policy.	Regulation to reinforce desirable safe behavior	Regulation is necessary for guaranteed safety	Regulation, enforcement of rules	Duty
U12	Establish mechanisms to ensure development and application of STI in accordance with acceptable morals and national societal norms.	Equip those involved with ethics resources	Guide the choices of those involved	Highlight moral obligations and norms	Ethics in necessary in ST&I	Reinforce ethical behavior	virtue

	Policy Statement	Goal	Significant Notion	Ethical Connotation	Underlying Ethical Implication	Underlying Ethical Implication – Sub-categories	Ethical Framework
U13	Promote the standardization of Ugandan products and services in line with required international standards	Regulation of standards	Enhance standardization to support growth and foreign trade	Regulation achieves a desirable outcome of acceptance.	Standards are necessary for fair exchange of goods and services across borders	Regulation, enforcement of rules	Duty
U14	Promote ST&I awareness and ensure public commitment and support for ST&I activities and programs.	Solicit public support for ST&I investments	Seeks awareness of the public and a willingness to support public spending on ST&I activities	Public conviction about how ST&I could improve life could result in increased funding	Public support is important and good growth of the sector	Seeking Pubic support as content addition	Utilitarian

	Policy Statement	**Goal**	**Significant Notion**	**Ethical Connotation**	**Underlying Ethical Implication**	**Underlying Ethical Implication – Sub-categories**	**Ethical Framework**
U15	Develop an ST&I information management system to facilitate the production, storage and dissemination of accurate, timely and up-to date information on ST&I activities.	Strengthen the capacity of the ST&I sector to meets its obligations by equipping.	Improving ST&I communication	Seeking to raise productivity for its value	Quality improvement in communication	Focus on results of the action	utilitarian