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The Ethical Relevance of Technology and Its Impact and Development, Particularly in Tanzania

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Abstract:

The focus of this study is to address the ethical relevance of technology in Tanzania and analyzing its impact and its development in Tanzania and also to demonstrate how technology and its impact have affected the communal life in Tanzania. Meanwhile, the study adopted documentary review method to examine how the technology brought impact to the society. However, as we know science and technology have brought a tremendous change in the world as far as human development is concerned. It is indeed that an innovation in science and technology has introduced the world into a period of creative and radical cultural change in human existence. Hence, the review goes on to say that science and technology have been helping man to solve his daily problems and challenges in life. Hence, they have been facilitating and helping man to adapt and conduct his life in different environment.

Keywords: Technology, ethics, development

1. Introduction

The literal meaning of Technology might be a practical application of science. The word 'technology' has a Latin root *texere* which means to weaver or to construct (Rogers, 1986). In English 'technics,' 'technique,' and 'technology' are all rooted in the Greek *τέχνη*, commonly translated as 'art,' 'craft,' or 'skill.' The same goes for the German Technik/Technologie and the French technique/technologie. (As already noted, the Greek has behind it a common Indo-European stem.) The root phoneme projects into the Latin *texere*, which means to weave, and *tegere*, which means to cover (Meijers, 2009). Technology comes from human intuitive mind and creativity in bending nature for his own advantage. The definition of technology in the history of philosophy has been discussed in different ways. Some of the philosophers find it difficult to define what technology is. The difficulty arises from the fact that some Philosophers, while defining technology, departs from man's creativity of ideas in relation to actual things i.e. what I think is in relation to an actual thing. The idea represents the thing which does exist in reality. Here a creative mind is able to create something from the nature. Man is able to create and bring out a designed tool to help him in his work. He is able to simplify his work by inventing a tool or device to support his daily work. The Mother Nature produces a ground for man to enjoy his life. It creates the environment for man to use his creative mind to invent some tools and use them for his development. What is created comes from the imaginations and intuitions of the creator who fashions and designs what he wants to create. The intuitive mind of the human being may help him to create and produce something for his consumptions. Intuitive mind having the ability and capacity to know or understand things without proofs is always the instrument used by the scientists before actualizing and subjecting their intuitive concept to experiments.

Before the definition of technology is given, it is to be noted that philosophers have been struggling to get the meaning of the definition. What does definition mean? The Greek philosophers like Socrates, Plato and later Aristotle held on the notion of real definition which assumes that there is a real structure to the world that corresponds to our words and that a correct definition will match the real nature of thing. According to Dusek 2006, 'real definitions of the sort that Plato and Aristotle sought are supposed to cut nature at the joint that is, correspond to the natural kinds of things; this is to say the things, which exist in reality, also exist in the mind.'

Another type of definition is that of stipulative definitions which claims that 'definitions are arbitrary choices or stipulations. Definitions are about words and not things; here it is like to say words represent the thought, not the thing. The nominalists came up with their own way of understanding a definition by saying that one can define anything as he/she wishes (Dusek, 2006). Lewis Carroll (1832–1898), who was a logician as well as a writer of children's books, had Humpty Dumpty hold this view of definitions.

From this explanation it is obvious that the scientists and technologists have been struggling to define what technology is. They end up coming with different conceptions of the word 'technology'. Technology is defined from different perspectives.

According to traditional technology, it took place once people voluntarily organized into groups with specialized knowledge to produce more complex objects and structures (Aunger, 2010).

Technology can be defined as a physical component which comprises items such as products, tooling, equipment, blueprints, techniques and process and also the informational component which consists of know-how in management, marketing, production, quality control, reliability skilled labor and functional areas (Wahab *et al.*, 2012)).

Moreover, technology is the integration of the physical objects or artifacts, the process of making the objects and the meaning associated with the physical objects; hence, these elements are not distinctive and separable factors but form a seamless web that constitutes technology; however, in defining the term technology, all the three elements must be understood as being interconnected to each other and a change in one element will affect the other two elements (Wahab *et al.*, 2012).

According to Mwabukojo (2020), Tanzania is one of the countries in the sub-Saharan Africa, which is characterized by massive deficit in science and technology. The main issue behind technology deficit in the country is a limited innovation capacity. However, the innovation capacity is low due to number of factors including inadequacy of innovation drivers such as poor quality and quantity of human capital, inadequacy of technology institutions and infrastructure and poor political will.

Furthermore, since our paper wants to examine the ethical relevance of technology and its impact and development, we see that the vital role of science and technology in socio-economic development is acknowledged all over the world, by all nations, both developed and developing. However, it is also imperative for developing countries like Tanzania to embrace science and technology as vital tool for accelerating their social economic development (Ministry of science, technology and higher education policy, 1996). However, it is evident that the development in science and technology is not only an important determinant of country's level of development but also enhances its international competitiveness and its position in the world economy.

The importance of science and technology in increasing responsiveness to changing world environment cannot be overemphasized. Likewise a realistic science and technology policy should, therefore, reflect the key role that science and technology will play in bringing about rapid socio-economic development and subsequent realization of self-reliance. However, the important role played by science and technology in socio-economic development in Tanzania has been recognized. Hence, during the last two decades or so, Tanzania has established a number of science and technology service and research and development institutions with the major aim of spreading development and promotion of science and technology for socio-economic development (Ministry of science, technology and Higher education, 1996)

1.1. Theoretical Perspective

In this study, we will employ the modern ethical theory which is divided into two broad categories: teleological and deontological. Teleological ethical theories focus primarily on the consequences, results, ends, goals or purposes of agent acts. Meanwhile, they give priority to the good over the right, and they evaluate actions by the goal or consequences that they attain (McCarthy *et al.*, 2005). Whereas, deontological ethical theory centers on the act taken by the agent and the duties, rights, privileges or responsibilities pertain to that act. According to a deontological framework, actions are intrinsically right or wrong regardless of the consequences they produced.

2. Review Related Literature

2.1. Science and Technology Education and Manpower

Tanzania needs to educate and well-prepare a critical mass of human resources and mechanism for controlling brain drain if there has to be an effective and successful application of science and technology for socio-economic development. This calls for the projection of long-term manpower needs, spelling out what school enrolment is needed, what discipline should be encouraged and how talents should be developed and harnessed (Ministry of science, technology and Higher education, 1996). Meanwhile, promotion of the social usefulness of science and technology, manpower, and fostering for the integration of science and technology result into production and essential services such as health, housing, transportation and education.

2.2. Competitiveness of Knowledge and Technology Transfer in Tanzania

According to global innovation index (as presented by WIPO reports; 2013; 2014; 2015; 2016, 2017), the innovation capacity in Tanzania is among the most inferior in the world. The reason behind the poor innovation capacity in country is inadequate capacity of innovation inputs such as poor education, poor quality and quantity of R&D activities, inadequate number of researchers and scientists. Therefore, Tanzania is characterized by an inadequate innovation inputs (Mwabukojo, 2020). Meanwhile, due to that many scholars think of technology transfer approach as an appropriate strategy for developing countries; there is limited evidence of applicability of the strategy in Tanzania.

2.3. Ethics and Technology

There is always a relationship between ethics and technology because if technology is left alone to be used anyhow the results may be dangerous. Ethical principles should guide the scientists in their findings and discoveries. The question one may ask: 'What will happen when scientific endeavors and technologies will be left alone without any consideration to moral aspect?' In my opinion, it would be a disaster to human beings. In technology, the ethics which are preferable in my opinion should be applied ethics (practical application of moral consideration) and the normative ethics which attempts to give systematic answers to how we should generally decide what to do in the use of technologies. At a

general level, normative ethics is concerned to establish a justificatory framework or a theory that provides answers to questions about what kinds of actions are morally right or wrong in the use of technology and scientific discoveries. Normative ethics is concerned with criteria of what is morally right and wrong, including the formulation of moral rules that have direct implications for what human actions, institutions, and ways of life should be like (Tavan, 2013).

The ethical issues on medical technology or innovations are profound and their controversies are enormous. In the old days, ethics and medicine were not often in conflict. The physician intervened to save lives when he could, but his main limitation was technology. Nowadays, however, we have the technology to keep life going for an indeterminate period, blurring distinctions between life and death.

Looking at this explanation, it is obvious that technology and ethics today should not be in conflict, however, ethical issues in technology should be observed and solved before the use of the new technology. The old technologies should also be revisited to check and evaluate the ethical issues. In the use and discovery of new technologies, professional ethics is applied to monitor the findings of science and the effects of technology whether positive or negative. Professional ethics makes the technologists responsible for their actions. It sets moral codes and moral conduct for them to act accordingly. Africa has been using profession ethics as a tool to safeguard the interest of the whole society and not the interests of the few. Different ethical associations and even laws have been made to monitor and protect the users of the new technologies. Some of the laws punish even the users of technologies if they abuse it.

2.4. Ethical Relevance of Technology

Technology as an applied science aims at some good because every craft and every inquiry, similarly every action and project, seem to aim at some good; hence, the good has been well-defined as that at which everything aims. Technology is expected to produce positive and ethical results in its field, though it is ambivalent in the sense that it brings positive and negative results. Ethical issues are expected to be applied in technological endeavors in order to avoid the disaster in human life. Ethical principles as code of conduct in technology are used to govern technology, especially in risk management and individual rights. They promote and safeguard the values of truthfulness, autonomy and transparency. Any technology should adhere to the ethical principles. Ethics in technology is relevant in the sense that you cannot speak of a skill or a discovery of new technology which does not consider the well-being of human beings and nature in general, otherwise that technology will be a disaster and a threat to human existence (Browne, 1895).

3. Research Methodology

3.1. Research Design

Research design is a plan on how a study will be conducted or detailed outline of how an investigation will take place. A research design in way or another will typically include how data is to be collected, what instruments will be employed, how the instruments will be used and the intended means for analyzing data collected (Msabila & Nalaila, 2013).

3.2. Data Collection Tools and Procedures

In this study documentary review was done in collecting information and some of the sources of information were used while conducting literature review. These are: journal articles (good especially for up-date information about ethical issues and technology which is relevant to the study in Tanzania. They offer a relatively concise, up to date format for research); books also tend to be less up-date as it takes longer for a book to be published than for a journal article; conferences proceedings will also be useful for university library, theses and dissertation; Government or corporate reports are useful particularly for government departments and corporations commission (published findings). All these information were gathered from useful sources as well as internet (the fastest-growing sources of information).

4. Study Finding

4.1. Tanzania Traditions and Customs Are Ignored

The new communication technologies have brought to some extent disaster to African traditions and customs. The dress codes have changed (women especially go along the road, school, and churches and so on half-naked), life style has changed, and good African values are ignored because people are aware of what is happening in the world; therefore, they compare their culture and assimilate, for example- some western culture. Africa is not an Island with media; African people see the different life styles in the world and they sometimes copy them as they are. In addition to that, use of modern technologies for the young people is the desire not to deal with others directly and not to establish social relationships. This leads to strong alternative of social visits and exchange of experiences and feelings (Younes & Zoubi, 2015).

The question of new technologies of family planning brought to Africa is contrary to the natural methods we have previously. Why do we need a westerner to teach us how to plan our families? Why do we need some western medical personnel to engage him in family planning? He may assist but the final say for what is to be the fate of the Africans should come from the Africans themselves. Africa has been experiencing many problems due to the introduction of new technologies in Africa. It is obvious that it has also benefited a lot from them but still it doesn't rule out the fact that new technologies, especially from the West, have changed the African life style a lot (Sibani, 2018).

Culture as the sum total of human creations, intellectual, technical, artistic, physical and moral is complex. It is the complex form of life which directs human social life. The things each generation must learn and to which they eventually

may add taking the consideration of this definition is that the socio-political life of the Africans has changed in a way that the Africans are able to incorporate other social values from the West due to the development of science and technology. If the culture is the sum total of human creation which involves the intellectual and technical knowhow, then the Africans in some degrees are to be held responsible for the negative impacts of technology (Sibani, 2018).

The main agenda should be: which kind of technology is suitable for the Africans? Is Africa as a continent ready to accommodate the new technologies which are present in the world? Are the Africans ready to filter and choose the type of technology they want taking into consideration the culture and the African moral conduct. It is true that culture is not static but the changes should be somehow monitored. Culture in itself grows and changes depending on different factors including science and technology. Ethical evaluation of what is happening should be considered especially in harmonizing and balancing the use of science and technology without compromising the basics in the culture.

4.2. *The Challenge of Education*

The education system is also challenged due to technology. Technology has helped the African and Tanzania children to learn fast and get the required information in time. They use technology to equip themselves with knowledge about different issues. The questions are: which kind of knowledge they get through information technology? Is it sufficient? Is it appropriate? Is the information received beneficial for them? These are the few questions that Africans should ask themselves if they want their children to have a good future.

The knowledge acquired through the internet should be filtered and ethically evaluated, by the parents, teachers and even the governments to protect children from bad psychological effects like aggressive and violent behaviours, burying, fear, depressions and even nightmares. Children should be monitored and directed well on the use of information technologies. They are to be taught and guided on what to watch and what not to watch taking into account the African culture and values. It does not mean that technology is bad in education but if it is used well, students may be able to learn a lot and in a short time. Tanzania today is experiencing a vast use of technology in a learning process in different schools in Africa. However, teachers are in a unique position to show students how to use technology properly. According to the international society for technology in education, teachers should follow performance indicators for social, ethical, legal and human issues. Meanwhile, teachers should teach students the possible harm of not following the ethical rules while using the internet, and guide them through their use of internet at a level appropriate to their age (Akcaay, 2008).

4.3. *Copy Right and Property*

Tanzania experienced a lot of quarrel and dishonesty in regard of copy right. So many issues arise due to the copy right. We witnessed some just robed other people's works and modified them to make their own. Therefore, copyright is an important issue since today's music and movies companies fight for their copyrights. Meanwhile, the internet provides many websites to users to access these companies product illegally (Akcaay, 2008). Therefore, we see that there are many laws to protect property rights; this illegal access is ongoing. People complain that these products such as movie, DVDs, and music CD are costly. Hence, it shouldn't matter if we can look at the issue from an ethical perspective.

4.3.1. Cybercrimes and Cybercriminals

Cybercrimes have been increased due to abuse of information technologies. Cybercriminals have increased in Tanzania today. Tanzania is now experiencing cyber robbery whereby people are robbed of their money and are killed by criminals. Hackers are also busy hacking and getting the information which they use to threaten people and demand for ransom. Cybercrimes are common now in Tanzania. The governments are trying to monitor the use of information technology, but still there must be some deliberate actions and interference of the governments to control this situation without infringing the freedom of the users of these technologies. Therefore, Tanzania has established cybercrimes Act (2015) that was enacted by the National assembly of Tanzania in April 2015 and signed into law; therefore, the law makes provisions for criminalizing offences related to computer systems and information communication technologies provided for investigation, collection and use of electronic evidences in Tanzania Mainland and Zanzibar.

In this the law criminalizes and penalizes a number of cyber activities such as data espionage, publication of child pornography, publication of false, deceptive, misleading or inaccurate information, production and dissemination of racist and xenophobic material.

4.3.2. Negative Impact of Technology to Children in Tanzania

The children, who are born today in Tanzania, do experience the crisis of information technology. They are born in the digital eras where they can access good and even bad information. The Tanzanian children are exposed in the world of mass media and if there is no effort to direct them well, they may end up messing up their lives. Children do learn first from their parents or guardians and then from their teachers and from the society at large; therefore, if the society is does not know how they use technology and how they teach their children, then it is expected the generation will have problems in future. Therefore, some video games have an online community, and the culture of the internet can provide hints for dealing with bullies. However, in some cases, the internet community deals with bullies in a very productive way (Ceulemans, 2012).

The curiosity of children, if not monitored, may bring problems to them because of the lack of mature intellectual capacity to sort out the information they receive and the reality around them. How do they distinguish the information they receive whether it is false news or a true one if they are not guided well? The improvements and advancement in medical technology has also caused problems to African children; the contraceptives and drugs have also an impact on an African child. Children as the future leaders should be protected by the society. The children are curious in learning things; they need

someone to direct them on how to use the media and tell them the positive and negative effects of them. If they are not guided well, they may enter into crisis.

4.4. Positive Impact of Technology in Communal Life

4.4.1. Technology Has Facilitated Good Business in Tanzania

The development we experience today is the cause of technology. Business people have been using the media for promotion of their product; some business men have been using planes, ships, trains, and even big trucks to transport their goods to the respective areas. Business people are able to communicate easily and exchange information about the market, the availability of the goods, the price of the goods and even the possibility of having loss or profit from their business. However, technology, in one way or another, is accelerating its ability to help businesses do more with less and provide better results. Hence, businesses can use technology to create the product idea in less time, and create it and deliver it to customer using fewer workers (Wilburn & Ralph, 2018). For the communication technologies, industrial technology, medical technology, Agriculture and bio technology, Information Technology, Electronics Technology, Mechanical Technology, Materials Technology, Digital technology and many more, Websites, have been the source of fast development in African countries.

African people are using these technologies to facilitate their business issues and improve social services. In the low scale, simple technologies have done a good job in promoting agricultural sector in Africa. Irrigation systems with simple technology are being used all over Africa. The most parts of Africa depend on rains for agricultural activities because of the lack of technology in the available water from the lakes, and rivers but due to new technologies, Africa finds itself secure in terms of food. The only problem which is facing Africa is the market of what is produced.

4.4.2. Improvement of Social Services

Technology in Africa has improved the social services a lot. The medical technology has improved the health of many people even reducing the death rate. One of the biggest benefits of the digital revolution has been the ability to store and access data. Healthcare professionals can now retrieve patient data from anywhere. Likewise technological products may also stimulate certain social structures and institutional arrangements not by requiring them as background conditions, but by affording or stimulating new social and institutional arrangements by the new functionality offered by the technology (Brey, 2017). The improvements of the infrastructures, especially the roads, have helped the sick people to be rushed easily to the hospitals. Agricultural technology has made an assurance of food to many countries in Africa. The new techniques in irrigation and the tactics of reserving water, the use of insecticides, fertilizers have also been improved. The mechanical technology has brought agricultural machines which are helpful in Agriculture. The good roads have helped the transport of agricultural goods. It is easy to some countries to transport food because of the good infrastructures. Education sector has been improved due to the use of the information technology. Students in Africa today have been using the gadget to learn and secure some skills.

4.4.3. Increase of the Sense of Invention and Innovation

Innovation is a process whereby new cultural elements are created; often previously existing elements are introduced in the society. The coming of new technologies in Tanzania has motivated the young Tanzanian technicians and scientists to be creative and come up with simple technologies which can help to solve problems concerning health, agriculture, business, and environments. Hence, the most important long-term impact of new technologies, particularly electronics technologies, is likely to be on the manufacturing sector in developing countries and on their ability to compete in global, competitive markets; moreover, electronics technology, especially developments in microelectronics technology and informatics, is resulting in major innovational developments not only in products but in technological processes and in management techniques. Meanwhile, inadequate technological absorption is likely to result in significant competitive disadvantage (Marton *et al*; 1992)). Recently the Tanzanian young innovators have blazed the trail in fighting Covid-19. The new inventions are drones, robots, and contact tracing apps, sanitizers, sanitation chambers and even oxygen making machines. There is a saying that 'poverty is lack of creativity and not the lack of resources' and the Tanzanians have been using their creativity to produce and make herbal medicines to cure themselves from different disease. New innovations have been experienced in Africa today. In agriculture, many inventions and innovations have been made to facilitate agricultural activities and support the farmers to produce more products and get good market for their products. If technology is used to process the raw products, it is very easy to get the market in other countries, especially in Europe and America.

Tanzania may not have big technologies but the simple technologies available have been the source of inspiration to young professions in Tanzania. There is a move to motivate the young intellectuals to be creative in order to develop their countries rather than waiting for the loans and aid from the West. Africa should be the new frontier of development in the world because of the resources available and the presence of many young professions.

The governments should motivate the inventors of technology and support them in order to boost their research. The failure of many researches and innovations are coming from the economic perspectives. How many governments in Africa are ready to fund the young scientists to carry on their researches? How many Tanzanian and Africans scientists, who were trained in the West, are ready to come back to their countries to share the knowledge they have acquired? As the world is in crisis, on which technology should be used or rather which type of energy should be used whether the Nuclear energy or other energies? What about Tanzania and Africa? Is Tanzania and Africa free to use any type of energy they want in their technologies? Innovations in Tanzania and Africa experience many barriers; that is why, it is difficult for

the Africans to advance their technologies. However, there is another question: Is the world nuclear association ready to permit Africa to use nuclear energy to create nuclear powers? Probably, African countries are unable to use nuclear power because of the poverty. They are unable to buy the technology even though the raw materials used for nuclear power are available in Africa.

5. Conclusion and Recommendation

Technology as an art, craft or a skill to create and produce something, has been the instrument of solving many issues concerning human life in the world. The world can be benefitted more if technology is used properly. The scientists and the technologists should work hard to make research and invent new technologies which are helpful. The development of the modern world has been triggered by the advancement of science and technology. The developments that Africa is experiencing have also been triggered by technology. It is easy to do business in Africa today through information technology. It is easy to transport agricultural good because of the good infrastructures. The health issues in Tanzania, in one way or another, have been handled by technology. The treatments have been successful due to the use of technology.

The governments, on other hand, must be supporting the technological companies by creating good environment for investments. Tanzania governments have been moderating the technological operations to reduce the effects which may be caused by technology. Many laws, ethical codes and guidelines have been approved by the governments as check and balance instruments to secure the human life and regulate the economy, like the cyber law 2015 that is to monitor the media and information technology.

The Tanzania government through the ministry of science, technology and higher education must put emphasis on strengthening middle level cadre education by building training colleges for vocational education and training centers for the provision of technical education, and also encourage the creativity and innovation.

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