Afropolitan Journals

This open-access article is distributed under Creative Commons license CC-BY-NC 4.0.

ISSN: 3027-1932 www.afropolitanjournals.com

Ethical Issues on Cloning and Genetically Modified Products: Implications for Science and Technology

Ijeoma Ene

Department of General Studies, School of Foundations and General Studies, Captain Elechi Amadi Polytechnic, Rumuola, Port Harcourt, Rivers State.

DOI: *https://doi.org/10.62154/5kgqew55*

Abstract

Science and Technology have greatly improved man's quality of life as new discoveries are designed to nurture a healthy and long life. Science and Technology can be described as two sides of a coin as science discovers the problem and technology provides the product to solve that particular problem that affects the wellbeing of mankind. Philosophy, like science is a discipline that is hinged on rational thinking and the pursuit of truth. The branch of philosophy that is concerned with how man ought to live in the society is Ethics. Ethics is the branch of philosophy that deals with rightness and wrongness of human actions. It also determines the rightness or wrongness of technological innovations and its effect on the health of man. There are numerous scientific discoveries in the area of genetic engineering but this paper is limited to cloning and genetic modification. In this work, ethical implications of these scientific discoveries were identified. This paper shall use the method of conceptual analysis. It intends to address the ethical implications of cloning and genetically modified product to mankind. The paper concludes that the benefits of these scientific developments should be embraced as it outweighs the cons and provides succor to beneficiaries which is the objective of Science and Technology. The welfare of mankind is the concern of ethics as well as science and technology.

Keywords: Ethics, Science, Technology, Cloning, Genetically Modified Products.

Introduction

The 21st century is also known as the digital or information age and encompasses every aspect of human life. It is an age where scientific discoveries and technology are advancing and changing the world rapidly. These inventions and innovations are enriching knowledge by generating amazing breakthroughs in science and technology that have solved problems especially in the area of health, changed lifestyles which has greatly improved the quality of living." These technological advances have significantly improved the lives of people and the society as observed by Ihuah (2012:117) who elaborately asserts:

Science and technology are two modes of human activity that are organized around interaction with nature. Such interaction is neither random nor causal, but conscious and goal oriented, which character derives from the need to understand nature in its diverse structures and patterns of working…there exists a symbiotic relationship; science provides information to technology, and technology in turn provides science with ingenious precision instruments, which extend the scope of human sources of knowledge and also provides avenues for practical utilization of scientific theories.

Science and Technology have a symbiotic relationship where science provides the information to technology and in turn, technology makes available precision instruments which extend the scope of human sources of knowledge. The significance of science and technology cannot be overelaborated. Ehusani (1999:7) puts it thus: "Without the possibilities offered by modern science and technology, life would be impossible for many. The weak could become extremely vulnerable since they would be unequipped to deal with an otherwise hostile and unyielding nature

Science and technology can be experienced in different aspects of life which include healthcare, security, education, nourishment, transportation, communication etc. It is pertinent to state that science and technology has also caused a lot of damage to mankind. With these modern advancements come the ethical discussion on the moral justification of cloning and genetically modified products. It can be said to have its down sides too and has to be prudently managed. This means that it has the propensity to control societies for good and evil. These scientific discoveries are designed to improve and extend the lives of people using technological procedures which include cloning and genetic modification through Genetic Engineering. Technology is therefore a tool to make better human life. In other words, technology is for the benefit of man, to give man an improved lifestyle. As Ihua (2011:43) puts it, "...consider technology as an instrument in the realization of basic human needs rather than as an end – merely a way of demonstrating human power or ingenuity." Cloning and Genetic modification are different branches of Genetic engineering which are involved in experimentations that use the human subject. According to Thiroux (2102: 307), "Human experimentation means the use of human beings for experimental purposes ... for the good of humanity." Now the question to ask is if it is ethical or not to use human beings as specimens. Technology in itself is not bad but the inappropriate or overuse of it is the problem. Another question we should ask is, what is the purpose of technology? As it is often said, when purpose is unknown, abuse is inevitable. Agunda (2017: 10-18) puts it thus: The scientific and technological attainment of the contemporary age is pregnant with possibilities. It is capable of building and also destroying, capable of healing and also killing, capable of increasing humanity's happiness and also capable of reducing it and increasing their grief and sadness. This reflects man's true nature as an enigmatic and unpredictable being that is capable of many things.

Cloning and Genetic modifications are burning contemporary issues that affect mankind, this is the reason why they are being debated on and discussed. We are faced with questions of if it is ethically correct to have humans and animals cloned. Is it also ethical to produce genetically modified foods? This paper is centered on the ethical concerns of human cloning and genetic modification.

Conceptual Clarifications

To give appropriate focus to this paper, it is necessary to first of all clarify the key concepts used. These concepts are Ethics, Science, Technology, Cloning, Genetically Modified Products.

Ethics

Philosophy as a discipline border on rational thinking and pursuit of the truth about everything that relates to man. Onyeocha (2009:1), observes that Philosophy is the science that investigates the highest causes of all things in as far as they are knowable by reason. It is a parental discipline with five major branches which includes Ethics. 'Ethics' is derived from the Greek word "ethos" which means custom or a way of life. It raises questions on how man ought to live and behave in the society. According to Omoregbe (2006: ix), Ethics studies the reasons why certain kinds of actions are morally wrong and why other kinds of actions are morally right and commendable. In other words, Ethics or moral philosophy as it is sometimes called, is defined by Itelimo & Chukwu (2019:345), as "... the branch of philosophy that provides rational justification for the rightness or wrongness of an action or act." It is pertinent to note that the central point of any action is man. Our concern therefore should be on how any action should be beneficial to mankind. Oke & Esikot (2005:106) define Applied Ethics as the practical application of ethical principles for the purpose of resolving ethical problems in the different fields of human endeavour. The branch of applied ethics that deals with biology, medicine, and technology is known as Bioethics. It examines moral values, principles and provides guidelines in the practice of medicine. Bioethics determines the rightness and wrongness of these scientific discoveries as it affects humanity. It is concerned with the value of humans in relation to advancing scientific discoveries like genetically modification like cloning and GM products. Bioethics brings to bear the advantages and disadvantages of issues involving mankind as we know that some methods used by science can be termed dehumanizing. Weeks (2014 : 145) puts it thus:

> Advances in the sciences have increased our knowledge of the world, bringing many benefits. Now, more than ever before, we are able to control the natural world to our advantage. Many of these advantages come at a cost, However, and we should consider the moral implications of this scientific progress.

Science

Science is derived from the Latin word 'scientia' which means knowledge. It is the study of the physical and natural world through observations and experiments. Science uses a method called "scientific methodology" which is a process of conducting research based on theory construction, the generation of testable hypothesis, their empirical testing and revision of theory, if the hypothesis is rejected.

Technology

Etymologically, the word "Technology" is derived from a Greek word *techne* which means art or craft. Ogbujah (2020: 50) defines it as "the application of scientific knowledge for practical use, whether in industry or in our everyday lives". Uduigwomen (2007: 343) says "Technology is a term describing the use of both primitive and highly advanced methods of work." Technology has always been with mankind from the stone Ages till today. Man-

fabricated tools from nature to meet his needs be it clothing, food, shelter, protection etc. In other words, the history of technology can be linked to the history of humanity. The purpose of technology can be divided into Agriculture, Bio-technology, energy and power technology, communication technology, medical technology etc All in the bid to give man a comfortable life. Technology for mankind.

Cloning

The term 'cloning' is derived from a Greek word *klon* for 'sprout' or 'twig' (Bansal:180) and it was originally used by Webber, an American horticulturist to refer to the cutting or grafting of plants. Here parts of a plant is transplanted on to another to breed new plants. He used this technique to improve his yield of oranges, pineapples, apples, pears, wheat, corn and cotton. (Webber, 1900:128) These cloning techniques were used in making duplicates or copies of biological material.

Genetically Modified Products

Genetically modified products or organism refer to crop plants created for human or animal consumption using latest molecular biology techniques. Genetic modified organism(GMO) are organisms whose genome have been altered to enable the action of desirable physiological trait or the manufacture of desired biological products. The application of GMOs in the area of agriculture and medicine is significant. They aid with the development of new medicines and increased crop yields.

Genetic Engineering

Genetic Engineering is any manipulation by man of the embryo / sperm or ovum and hence it extends to artificial insemination, in-vitro fertilization (test tube babies), surrogate motherhood, womb leasing, sex selection, cloning, artificial womb or placenta. It is an area of medicine that involves gene manipulation by man. Genetic Engineering is therefore the deliberate modification of the characteristics of an organism by manipulating its genetic material while Genetic modification refers to the artificial alteration of the genetic material of an organism to produce a desired characteristics or to eliminate undesirable ones. Genetic engineering is used by scientists to enhance or modify the characteristics of an individual organism. Genetic Engineering is also used in fighting health issues such as diabetes, cystic fibrosis etc. There are several arguments against Gene Engineering of which one is that of "playing God":

a) The technology seems to manipulate the divine creation of God to suit ones selfish purpose.

b) Gene engineering can cause change in the ecosystem. New organisms created by genetic engineering could present an ecological problem as one cannot predict the changes that a genetically engineered specie would make on the environment. It could cause an imbalance in the ecology of a region just like exotic species would do.

c) Human genetic engineering could cause risks to human health like antibiotic resistance. Gene engineering often uses genes for antibiotics resistance as "selectable markers". The Gene Engineered plant foods carry fully functioning antibiotic –resistant genes and eating these foods could reduce the effectiveness of antibiotics to fight diseases when taken with meals.

d) Terrorist groups or armies could develop more powerful biological weaponry which could be resistant to medicines or even earmark people who carry certain genes.

The Idea of Human Cloning

Genetic Engineering is the area in medicine that involves gene manipulation as in cloning and genetically modified products. Smiley (2005:5) refers to any manipulation by man of the embryo or sperm or ovum and hence it extends to artificial insemination, in-vitro fertilization (test tube babies), surrogate motherhood, womb leasing, sex selection, artificial womb or placenta, hybridization, cloning, etc. In this sense, it is called artificial reproduction." Man is naturally an inquisitive being who desires to improve his life and society, hence all these inventions and innovations which involve human experimentation. The issue of human experimentation has generated a lot of concern as it involves the use of technology to manipulate or modify genes. According to Thiroux (2012: 309), "The main problem caused by genetics arises from determining how to use the technology we have to help us acquire genetic information and manipulate genes. In other words, science and technology itself is not a problem but the methods of usage is the challenge faced in the society."

Cloning is a scientific discovery used to produce exact copies of humans, animals and plants. It involves the production of another human, animal or plant that is identical with the original one. A clone bears the same genetic makeup with the donor. The DNA (deoxyribonucleic acid) of person to be created is injected into the receiving party. Ani (2011:119) puts it thus "Cloning is a technological breakthrough in genetic engineering which enables the production of exact copies of an organism from a replication of one of the organism's cells without any recourse to the genealogical protocol of male and female reproduction." There are three forms of cloning namely: Reproductive cloning, Therapeutic cloning and Gene cloning.

a) Reproductive cloning- This form of cloning is also known as organism/ embryo cloning and it is a procedure whereby a person is created with exact genetic material as another person. This type of cloning occurs naturally with identical twins as the embryo divides into two identical cells. Reproductive cloning is also used to reproduce plants.

b) Gene cloning - This form of cloning is also known as DNA/Molecular cloning or Somatic Cell Nuclear Transfer (SCNT). In this form of cloning, a specific gene is identified and cloned or copied of all the other genes and multiple copies of DNA (deoxyribonucleic acid) are created out of the DNA drawn out from an organism which was replaced with that of a donor adult cell for recreation. As in the case of cloned sheep called Dolly. Dolly was the first mammal cloned from an adult somatic cell.

c) Therapeutic cloning- In this form of cloning, embryonic stem cells are created for curative or medicinal purposes. Here embryonic stem cells are derived without the process of pregnancy and these cells are also used to grow healthy tissues to replace diseased tissues in the human body. These embryos are destroyed in the process.

Ethical Implications of Human Cloning

There are three forms of cloning namely Reproductive cloning, Gene cloning and Therapeutic cloning. One of the objectives of cloning is for medical or curative purposes. The goal of medicine is to cure diseases, prevent diseases, reduce pain and suffering of patients to mention a few and this is the purpose of cloning. There are arguments for and against the practice of cloning and the ethical theory that supports cloning is Utilitarianism , the ethical theory based on the principle of utility, the principle of the greatest happiness. Oke & Esikot(2005 :70) see Utilitarianism as the ethical theory that an action is morally good if it brings about or will bring about the greatest good for the greatest number of people. Arguments for cloning include:

a) With cloning, childless couples can have children who are biologically their own as in the case of human reproductive cloning. In other words, reproduction is made possible.

b) It is used in treatment of diseases and healing. Therapeutic cloning uses stem cells from cloned embryos for the purposes of treating diseases and testing of drugs to ascertain its level of toxicity on humans.

c) Cloning helps in the manufacture of organs that are genetically identical and ideal for major transplantation of organs like the kidneys, liver and heart. There are also arguments against cloning which include:

a) Cloning as a form of experimentation with the use of human life which is also known as human experimentation. Experimenting with human life is highly immoral as it objectifies life. This experimentation could lead to deaths.

b) The mental state of the cloned person cannot be ascertained or better put disregarded. These clones are not regarded as human and thus not treated as people but objects without a say in how they should be treated. They are seen as "laboratory Beings" not human Beings.

c) Cloning takes away the unique personality of an individual. Every person is created differently and is a special individual.

d) The cloning of cells could also assist scientists in gene editing and removal of bad genes. In other words, cloning could lead to engineered humans for specific traits which can enhance and advance human development. Thereby renewing damaged cells.

e) The embryos used in the process of therapeutic cloning are destroyed. These embryos had life in them but are treated and cast out like any other inanimate object. This is clearly unethical.

f) Scientists are seen as "playing god" with human life by producing people with the same genes and have no individual differentiation. They are therefore manipulating natural occurrences for desired outcomes and results.

g) The generation of human organs leads to commercialization of human parts.

We agree that science is for the benefit of man but when man is now put on the back burner it becomes a problem. When human life is not seen as human life then we say there is a problem. When humans become the experiment, there is a problem. Eboh (2005:138) argued that an embryo can be seen as human as far as it has the potentials of becoming an adult human. He is hereby emphasizing that the value of human life cannot be down played. Ekennia (2003:145) lent credence by putting it thus:

Scientists researching into regenerative medicine should look beyond huge financial gains and businesses promised by this extreme research programme and focus more on the value and dignity of the human person at all stages of its formation. These ethical questions should act as litmus test for all genetic engineering procedures.

The Idea of Genetically Modified Products (GM)

Genetic modification refers to the manipulation of an organism's genes using techniques of genetic engineering. These organisms have their genetic material (DNA) adjusted for particular traits or features to be put into another plant or animal. Scientists do this by inserting these genes into the cells of desired plant or animals and this process is done in a laboratory. Genetically modified foods (GM) are also known as genetically engineered foods (GE). This is as opposed to organic foods that are grown naturally devoid of chemicals, using organic farming practices involving crop rotations, the use of manure, rotational grazing to mention but a few. At this juncture, it is pertinent to state the difference between cloning and genetic modification. Cloning and Genetic modification are two types of methods used in biotechnology to influence genetic material. Cloning is the process of creating identical copies of cells or organism. In other words, the new organism is genetically related to the parent organism. In genetic modification genes with a preferred characteristics is transplanted into a different organism and the new organism is not genetically identical to the parent organism. Here, a brand new organism is formed. Genetically modified organisms are organisms that have their genetic material artificially modified. They are plants or animals that were created by placing another gene in them by extracting a desired trait. The questions still arises if it is ethical to alter the natural life of plants and animals? Is it harmful to consume these genetically modified products?

Ethical Implications of Using Genetically Modified Products

The aim of science is to improve the lives of mankind. Everyday scientists work hard to achieve this goal. Cloning and genetically modified products are scientific discoveries of great concern to people because human life is involved in these processes. Genetically modified foods or products are foods produced from organisms that have had changes introduced into their DNA (gene) using the technique of genetic engineering. They can be said to be artificial foods and not natural foods. There are many arguments for and against the production of genetically modified crops. The arguments in support of genetically modified foods include the following:

a) Food security – Genetically modified food aid food production. This is so because the plants and animals grow faster than the natural ones. Genetically modified foods are more nutritious and tasty. These crops are also produced at a cheaper rate to meet the ever expanding world population.

b) Medical purposes – Genetically Modified plants are used for medicinal reasons. In the area of drug production like vaccines. Genetically modified insects are also useful in researches to prevent parasitic diseases.

c) Reduced use of pesticides – Genetically Modified foods use less pesticides as they are engineered to resist insects. Hence the crops are more resistant to the diseases spread by insects or viruses that usually affect natural plants.

d) Herbicide tolerant – Crop plants are genetically–engineered to be resistant to very powerful and dangerous herbicides.

e) Pharmaceutical medicines and vaccines – Vaccinations are essential for eradication of infectious diseases in humans and animals. Genetically engineered plants are made to serve as vehicles for the manufacture and delivery of vaccines. Example of genetically engineered vaccine is hepatitis B vaccine. The arguments against genetically modified foods include the following:

a) Allergic reaction – people who consume a lot of genetically modified foods tend to experience allergic reactions. These allergic food reactions appear as rashes on the skin.

b) High level of toxicity - Genetically modified foods contain toxins that tend to damage vital human organs in some people as a result of over consumption of such foods. The high level of toxicity is due to the altered chemical composition of food products. This could lead to the development of cancer and other terminal diseases.

c) Other health risks include infertility, stomach aches, enhanced aging etc. The long term use of genetically modified foods has led to the development of diseases that are immuned to the use of antibiotics. This is as a result of the altered genes entering humans or animals when they eat them.

The rightness and wrongness of genetically modified foods are clearly noted but as in every matter, the question to ask is if its benefits outweigh the negatives. In this case, we can say genetically modified foods have a place in solving problems that arise from food shortage plaguing the world which is due to overpopulation. Others see it as "playing God" where natural occurrences are manipulated for desired outcomes or results. Weeks (2014:142) reveal "Sometimes, when scientists and engineers find uses for discoveries that give us more control over our world- for instance, growing genetically modified crops to combat food shortages- these are seen as "unnatural " and our manipulation of natural phenomena as " playing God".

Conclusion

Ethics is concerned with values and values are specifically measured in terms of right and wrong, good or bad. A sub-field of ethics that investigates and seeks to resolve ethical questions relating to technological innovations is known as ethics of technology or

sometimes called Technoethics. Ethics of technology seeks to find out whether it is right or wrong to invent a technological innovation. This is so because the moral value of a piece of technological equipment is dependent on its use rather than the technology itself or even the developers. Ethics of technology guides new technology so that their development and applicants do not cause harm to the society. It also monitors the actions of engineers and the processes of technological development.

There is no doubt that cloning and genetic modification play crucial roles in the life of man. Cloning in its part provides a remedy to infertile couples as it gives them a chance to bear children of their own. It also gives an opportunity for damaged body cells to be renewed or replaced. Genetic modification assists with food production to meet the ever increasing population. This way, it aids food security. Cloning and genetically modified foods were created to bring succour to mankind. They have their good sides as well as the harmful sides but it is not advisable ' to throw the baby out with the bath water'. There is need to consider the greater good and happiness for people in need. There should also be set strict rules and regulations to enforce compliance to laid down rules against scientists that abuse the use of humans for experiments. This will curtail the excesses of the scientists and still give the necessary medical assistance to those in need. Ogbujah (2020: 80-81) asserts "Science and technology are valuable resources that propel integral development of man and society when properly deployed. They cannot of themselves determine the meaning of existence and human progress. They exist to serve human purpose and to draw meaning from ethical values of their originators – human beings."

References

Agundu (2017), O.T. Moral Obligations and Technological imperative: issues of human dignity in *International Journal of Research in Arts and Social Sciences.* Vol. 10, no.1&2,

Ani, E. I. (2011). Philosophical Issues in Genealogy and Genetics *in The Nigerian Journal of Philosophy*, Vol.24, No. 1& 2. Lagos: Department of Philosophy, University of Lagos.

Bansal, R.K. (2005). Reproduction Cloning – An Act of Human Rights Violation*, Journal of Indian Academy of Forensic Medicine*, Vol. 27 Issue 3.

Eboh, B. O. (2005). *Living Issues in Ethics.* Nsukka: Afro-Orbis Publishing Co. Ltd.

Ehusani, G. (1999) An Afro- Christian Vision; *"Ozovehe" Towards a more Humanized World.* New York: University Press of America.

Ekennia, J. N. (2003). *Bio-Medical Ethics: Issues, Trends and Problems*. Owerri: Barloz Publishers Inc.

Ihua. A. S. (2011) Rethinking Human Development: Between Technology Transfer and Appropriate Technology in *The Nigerian JOURNAL OF PHILOSOPHY.* Lagos: Department of Philosophy, University of Lagos.

Ihua, A. (2012). Science, Technology and The Afrdican Predicament: From Knowledge to Wisdom in *Truth, Knowledge and Society.* eds. M.F. Asiegbu and C. J. Chukwuokolo.eds . Abakiliki : Pacts Press.

Itelimo, M and Ogugua, J. C. (2019). The role of Moral Philosophy in combating corruption and promoting Development in *Philosophy, Security and the challenge of development in Africa Issues, Problems and Prospects.* Eds A. S. Ihuah, A. Idachaba, M. I. Shenge. Abuja: Eagle Prints Nigeria.

Ogbujah, C.N. (2020). Philosophy of Science and Technology in *History and Philosophy of Science and Technology, A Reader.* Ed. Columbus N. Ogbujah. Port Harcourt: Pearl Publishers International Ltd.

Onyeocha, I. M. (2006). *Introfil A First Encounter with Philosophy,* 2nd Edition. Washington: The Council for Research in Values and Philosophy.

Omoregbe,J .(2006).*Ethics A Systematic and Historical Study*. Maryland: Joja Educational Research Publishers Limited.

Oke, M & Esikot I. F. (2005). *Elementary Ethics*. Lagos: MacGrace Academic Resource Publishers.

Smiley, S. (2005). *Genetic Modification: Study Guide (Exploring the Issues)*. Montana: Independence Educational Publishers.

Thiroux, J. P. (2012). *Ethics: Theory & Practices.* Boston: Pearson.

Uduigwomen, A.F. (2007). *A Textbook of History and Philosophy of Science.* 4th Edition. Aba: AAU Vitalis Books.

Webber, H. J. (1900) *Work of the United States Department of Agriculture on plant hybridization,* J.r. hort. Soc.

Weeks, M. (2014) *Heads Up Philosophy.* London: Dorling Kindersley Limited.