TECHNOLOGICAL ADVANCEMENT AND ENVIRONMENTAL CONSERVATION: PARADOXES AND SOME SOLUTIONS

BY

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DECLARATION

This project is my original work and has not been submitted for a degree in any other University.

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DEDICATION

This project is dedicated to my lovely mother, Milliam Wangari, for being so patient.

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ABSTRACT

For the past two centuries since the advent of industrial revolution, man has tremendously improved his scientific and technological knowledge with the aim of promoting his quality of life.

However, some of our technological innovations and developments have ended up being "double-edged" with environmental side effects which threaten the survival of other living beings including man himself.

This project undertakes to search for an ethical guideline as we advance technologically in agricultural sector in particular, bearing in mind some of the negative impacts of our modern agricultural techniques on the environment and the need for optimum quantity and high quality agricultural production.

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CHAPTER ONE: INTRODUCTION

1.0 BACKGROUND TO THE PROBLEM

It is inevitable that man must interact with his environment from where he accesses the necessities of livelihood by use of technology, which is a tool for his survival. In his effort to meet these necessities of life, nature has subsequently traded- off in terms of pollution, the depletion of natural resources, and the destruction of other species.

Due to this negative externalities associated with modern advanced technology, we have been left in a state of dilemma as to how to strike a balance between the social "cost-benefit" correlations of our technology. This probably is what led Jones in Bernett and Estall (eds.) (1991:37) to assert that though technology provides the means of defence against hazards, conversely it may increase our vulnerability to hazards.

Scholars who have written on man, technology and environment have given diverse and antagonistic views. There are some philosophers who express a very low opinion towards modern technology and even wish how man can revert back to pre-technological society. An example of one of these scholars is Davis in Commoner (1971:7) who even resorted to a beatitude when referring to a technologically backward society along Mississippi region: "Blessed be the blacks of Mississippi with their

privies, for they are ecologically sound, and they shall inherit a nation".

Other philosophers believe that man can only improve his welfare by developing new technologies. One such philosopher is Laszlo (1974) who feared that unless we develop new technologies to manage societies and our environment, our future might be worse than before. We can deduce that what Laszlo is implying is that environmental conditions keep on changing and hence man must also keep on changing his ways of adapting to nature by innovating and improving his technology in order to cope with the changing times.

Having acknowledged the ambivalent perspectives of mankind in relation to his technology and environment, we should search for a moral guideline that will enhance our well being by harmonious relationship of the technologies we are going to develop and the rest of nature.

1.1 PROBLEM STATEMENT

Technology, which is a result of human intelligence, will continue to advance as fast as man progresses qualitatively through the process of evolution. However, though technology has really improved the quality of our lives, it has in most cases been accompanied by various deleterious consequences on our environment. Thus, the double-effect of our

technological advancement gives us a major intellectual challenge as to which ethical code of behaviour we should adopt so as to lead the best and enjoyable life possible without causing any environmental dereliction.

1.2 OBJECTIVES

1. To critically examine and analyse various philosophical views on environmental degradation to determine whether technology in itself is the root cause of most of the prevalent environmental problems.
2. To seek and establish a humanistic way of handling any technological innovation that seems to have side effects on the environment for the benefit of present and future generations.
3. To try and come up with a moral value or code of behaviour that can be inculcated to all persons which will be accompanying every technological discovery and application so that any technology will be used for the enhancement of the well being of mankind.

1.3 JUSTIFICATION AND SIGNIFICANCE OF THIS STUDY

The mystery and uncertainty that has been baffling man as result of his scientific and technological development and perceived environmental deterioration necessitates a well co-ordinated and organised research that

will shed some new light on the destiny of humanity. In this research, I will synthesize the opposing views on technology by various philosophers with an aim of having a middle ethical ground whereby we can make the best use of our technology without jeopardising our life-support system. After accomplishment of the mission of this research, I expect it to have the following contributions:

1. We will expand our knowledge and understanding on the relationship between technology and our natural environment.
2. The findings will act as a guide to technologists and users of the new technology to know the limit or extent to which any technology should be applied within our environment without sabotaging the nature's balance.
3. The findings will also be useful to environmentalists in planning their conservation strategies, as it will give them a new approach.
4. The success of this project will be an added stock to reference work for all those interested in studying environmental ethics and other environmental issues.

1.4 LITERATURE REVIEW

Man's survival has been in the balance for the last few decades as he struggles to improve his well-being by continuously advancing his technology. We have been in a state of moral dilemma because instead of

enhancing our social welfare, some of the consequences of our modern technology completely outstrip our aspirations.

Hey and Davies (eds.) (1975:1) argue that "conflicts between economic growth and environmental deterioration are difficult to rationalize because they both have a profound effect on our standard and quality of life". They however emphasized on effective use of resources for prevention of harmful impact on the environment. Hey and Davies thus leaves for us to work out a rational and a harmonious way of coping with the need of economic growth which is governed by the modern technology taking into account any negative externality to the environment. On somehow a similar line of thought, Ahmad (1981:77), commented that "all around the world its being realized that pollution is a sign of wasteful inefficiency and represents a potentially valuable resource in the wrong place". What Ahmad is against is the mass production by the affluent technocratic society which according to him, if they reverse this trend, there will be no environmental degradation. But Ahmad's conception begs a question as it was asked by Meyer in Dallmeyer *et al.* (eds.) (1998:xvi): "How large a proportion of our earth's resources should a morally responsible human be consuming?"

Caldwell (1972:9-10), expresses a low opinion towards modern technology which he blames for "environmental degradation" and

consequent "decline on man's future." He asserts that, "armed by evolving technology, man has become progressively more dangerous to all forms of life, including his own". Caldwell goes on to state that,

> the observed discrepancies between human ideals and behaviors, between knowledge and action, have suggested to some a basic discontinuity in human personality – a fundamental imperfection in the human brain.

This conception seems interesting and to some extent convincing because if our ideal is to lead a happy and long life, how comes then that the intelligence that guides is directing us to what Slaate (1974:139) called a "chaotic hell". It is however our task to investigate the truth of this presupposition and why our intelligence should be diminishing instead of increasing. Caldwell's fear of imperfection of human brain also contradicts with views of some evolutionary philosophers, like Steere (1970:70), who holds that "man's intelligence has been increasing over the entire history of man, from the primitive to the modern". Also, Jerison (1973:preface) another evolutionary theorist, stresses the evolution of the brain which according to him determines the "general principles of behavior". According to Slaate (Ibid:138), man is no longer free but a slave of his own technology. He poses two questions: "what should be done to allow science to be our servant and not our master?"

and "how much change can society accept and how fast can it adjust?". Slaate also has quoted Arthur Koestler in the Christian Science monitor:

> there is no getting away from the fact that from now onward our species lives on borrowed time. It carries a time bomb around its neck. We shall have to listen on the sound of its ticking – until it either blows up or we succeed in defusing it.

Koestler was referring to threat of nuclear weapons. In attempting to answer his questions, Slaate wondered whether the best way through is to control scientific and technological research or not and he was for the idea that research work should be controlled so that the "pace of development" does not control us. To support his views, he mentions Taylor Gordon who emphasized on "a need for a biological ice-box" in which the new techniques may be retained until society is ready for them. I personally doubt whether its possible to invent or make a certain discovery and then keep it in "store" waiting for the right time for its use. If science and technology is assuming the role of master as Slaate contends, man's future is in real danger and an urgent moral ethic should be sought to merge humanity and technology. For Commoner (1971:11), there was a time man existed peacefully with the rest of nature but now that relationship is already broken. He asks: "why, after millions of years of harmonious co-existence, have the relationships between living things

and their earthly surroundings begun to collapse?" commoner goes further and warns us that we are at cross-roads in determining our fate:

> now that the bill for the environmental debt has been presented, our options have become reduced to two: either the rational social organization of the use and distribution of the earth's resources, or a new barbarism.

By new barbarism, Commoner means the new modern technology.

Shrader-Frechette and Westra (eds.) (1997:3) lament that, "people seem more competent at developing science and technology than at correcting the social and environmental problems associated with it". These scholars claims that human's intellectual progress often outstrips their moral and ethical development. Their suggestion to this problem is that this trend should be reversed. This position is also questionable as to how we can reverse a natural process. Winner in Coombs (eds.) (1993:61) attempts to give a new moral code of behaviour for the contemporary technology-related issues. His approach is marrying the technology and politics "where citizen deliberation and action ought to be encouraged". Winner has, however, not expounded on the mode of raising the views on technology by the citizens, whether it will be by representation or consensus.

Galbraith's (1967:20) position on technology is that it changes with time. He points out that though technology may course changes, it is in itself a response to change. He warned that, "our present method of underwriting advanced technology is exceedingly dangerous. It could cost us our existence". He further remarked that what is most important for us is the quality of life but not the quantity of our goods. Galbraith does not explain how we should harmonize the quantity of goods we have to produce and the quality of life we desire to live. We know with certainty that for a quality life, a minimum quantity of goods must be produced.

Other scholars like Passmore (1980:77) have been skeptical about how the future will be. Passmore admits that the present advanced technology may be disastrous to the environment but he sees no need why we should bother to control its development or to conserve the environment: "we can be confident that some day our society will run out of resources, but we do not know when it will do so or what resources it will continue to demand". Now the question we should ask ourselves is whether we are morally bound to take risk due to the uncertainties of the future. Dijksterhuis (1961:73) took both science and technology as being "stimulated by the practical demands of society". This is true for most scientific and technological advancement like in the medical field, but what about technologies like of very harmful weapons designed for

maiming other human beings? Alcon (1997:5) expresses no worry for any technological development. His argument is that society cannot adapt any technology with adverse effects on its environment:

> to help ensure that we do not allow our adaptations to outstrip their ability to control and select for positive adaptive value, humanity also has the survival trait of homeostasis, that is, a natural resistance to change

If we are to believe Alcon's homeostasis principle, he has to give an explanatory account for the pollution that we have as a result of modern technology and also the potential threat of the dangerous inventions like nuclear weapons.

Like Passmore, Gould in Amstrong, *et al.* (ed.) (1998:327) conception is that technology can be dangerous to the environment and hence to man but there is no need for us to bother by taking any precautions. Gould based his ideas on "the inevitability of extinction for all species- in the long run and on the broad scale of geological time" from Palaeontological perspective. Gould thus want us to live a "natural" way or to let nature take its course without our effort to determine how to relate to our environment with our technologies. As rational beings, I don't find Gould's analysis being comprehensive because our power of reason can play a major role in determining the length of our existence if used properly.

The above representative literature on man's destiny as a result of his technology seems to give an inadequate moral guide as to how we should interact with our natural environment for maximum enhancement of our well-being. We should therefore embark on searching for an ethic which man should adopt by getting more insight on how technology develops and how man can use this technology within his environment without jeopardizing his welfare.

.5 HYPOTHESES

1. That technological advancement is not inherently detrimental to environmental equilibrium.
2. That environmental equilibrium can be maintained despite the advent of modern technology.

.6 THEORETICAL FRAMEWORK

This research project will be guided by the "golden mean" of Aristotelian virtue ethics. According to Aristotle in this theory, a morally virtuous life is a state intermediated between two extremes in which we make wise decisions. Aristotle went further and differentiated two sorts of virtues; there is the virtue of thought, which arises and grows mostly from teaching and experience and the virtue of character, which comes about by habituation. Virtue, as this theory contends, is a mean, which is

defined by reference to reason. It's a mean between two vices, one of excess and one of deficiency.

.7 METHODOLOGY

The method that will be adopted in collecting data for this research is solely based on content analysis. Relevant documentary materials like textbooks, journals, magazines, daily newspapers, and conference reports will be perused from various libraries. World Wide Web will also be of much importance for the latest information with respect to this topic. The various views on technology and its impact on the environment by various scholars will be critically analysed and synthesized to enable us either to affirm or deny our hypotheses.

.8 SCOPE AND LIMITATION

Since there are many technological advancements that have double-effects, that is, positive and negative outcomes to our well-being and the environment and each of which can attract a study of its own, this research project will only confine itself to modern agricultural technologies associated with high yielding varieties (HYV).

CHAPTER TWO: TECHNOLOGY IN PHILOSOPHY

2.0 INTRODUCTION

The philosophical analysis of technology as a unique subject has relatively taken a longer time to be given attention as compared to other areas of philosophical concern like science, metaphysics, epistemology, etc. This is because traditionally technology was perceived as a chore of low class lot of the society involving no intelligence at all. This attitude was prevalent even during Plato's time where he broadly categorised some members of the society as workers, others as soldiers while the rest was to be involved in some intellectual activities.

2.1 SCIENCE AND TECHNOLOGY

A number of philosophers have attempted to make a distinction between science and technology. Almost all of these philosophers claim science as being concerned with search for knowledge for its own sake and technology as involving the practical realm of humanity. Feibleman in Mitcham, *et al* (eds.) (1972:33) not only distinguished science from technology, but also he made a sharp distinction between pure science and applied science. According to Feibleman, pure science which he also referred to as basic research is a "method of investigating nature by the experimental method in an attempt to satisfy the need to know." On the

other hand, applied science is "the use of pure science for some practical human purposes." The aim of applied science as Feibleman (Ibid.) puts it, is to employ the "findings of pure science to get practical tasks done." Technology as conceived by Feibleman is synonymous to skills which are used "to satisfy a practical need without the use of science."

Other philosophers have almost a similar view of differentiating science and technology as that of Feibleman. The only difference is that most of them do not distinguish between pure science and applied science as with Feibleman. For a scholar like Bunge in Mitcham *et al.* (eds.) (Ibid), technology is concerned with success in action while science's endeavour is exclusively a search for knowledge. However, Bunge has distinguished between traditional technologies and modern technologies. Accordingly, as Bunge contends, traditional technologies are characterized by pre-scientific rules and principles.

In short, philosophers who have made an effort to put a line of demarcation between science and technology, merely take science as being theoretical and technology as being embedded within the practical realm of humanity.

2.1.1 SCIENCE AND TECHNOLOGY AS SIAMESE TWINS

Since the advent of industrial revolution, science and technology has been closely used by man in production of goods necessary for his welfare. Unlike in the earlier days when science was considered just as a theoretical reflective discipline, the industrialists realized that the scientific knowledge could be put into practical use. White in Mitcham *et al* (Ibid.: 260) referred to this "sudden fusion of" science and technology as a "functional unity of brain and hand." Tiles (1995:1) also termed this integration of scientific principles and technical skills as the coming together of "homo faber", that is, man the technical animal and "homo sapiens" or rather, man the thinker.

Upto present, science and technology have thus been used in a mutually reinforcing manner by man in a bid to improve the welfare. Most of our current technological developments are based on in already established scientific rules and principles. Henceforth, throughout this project, the two concepts, that is, science and technology will be used to refer to an organised form of knowledge for practical purposes.

2.2 IS TECHNOLOGY VALUE-FREE?

For a greater part of the early period of the industrial revolution , all the technological developments were considered a great achievement for emancipating man from the "tyranny" of nature and also for aiding man where he is naturally limited. It was not until the middle of the twentieth century that some side effects of the new technologies were noticed and attracted the attention of various scholars as King in Schmeikal, *et al.* (eds.) (1983:XIV) claims: "Contemporary interests in the impact of technology on society started after the Second World War." Some few decades later towards the end of the twentieth century, the effects of some of our technological developments to the environment were so severe that man even started wavering whether to do away with these innovations or not as King (Ibid: V) notes:

> By the end of the 1960s, the era of euphoria for science, technology and economic growth had begun to evaporate with the appearance and public recognition of many symptoms of inadequacy

During the same period, man also realised that some non-renewable natural resources were at a risk of being depleted by the new production technologies and according to Broom *et al* (eds.) (1981: 557), this generated "a new concern" and "the fear that technology is causing irreversible changes in the environment, changes that threaten modern civilisation and the human species itself."

The impact of technology on the environment has generated a serious debate among philosophers as to whether technology is value-neutral or not. This discourse has consequently given rise to two broad opposing theories in technology from praxiological perspective:

2.2.1 OPTIMISM OR INSTRUMENTALISM

This theory as Feenberg (1991:5) asserts "offers the most widely accepted view of technology;" The basic tenet of instrumentalism according to Tiles, *et al.* (Ibid.: 60) is that "technologies are good or bad, depending on how they are used." As Barbour (1980: 49) likewise holds, technology is "neither inherently creative nor inherently destructive, but essentially neutral until its use in particular ways." In simple terms, the optimism theory holds that technologies are merely for serving the purpose predetermined by man at the time of their design. It is thus, the man who influences the way technologies are to be used, either for good or for evil and hence he is to blame for all the environmental problems associated to modern technologies as argued by the optimist scholars. A contra-perspective to optimism is held by pessimist school who argue in reverse direction.

2.2.2 PESSIMISM OR SUBSTANTIVE THEORY

Unlike optimists, pessimists hold that technology has a powerful influence on values to be cherished through creation of new opportunities, wants and demands. Tiles *et al* (Ibid.: 21) claim that pessimists of technology do not consider technology as comprising of only tools but rather they "talk about technological systems and practices (techniques) rather than devices." These technological systems or cultural systems as described by Jacques Ellul and Martin Heidegger in Feenberg (Ibid.: 7) restructures the entire social world as an object of control."

Ellul (1973:7) argues that "man no longer possess any means of bringing action to bear upon technique". For him, technology transcends intellectual and spiritual sphere and also it cannot be contemplated from sociological perspective. Ellul goes on to say that "there is, therefore, nothing of a sociological character available to restrain technique because everything in society is its servant." Thus, for pessimists, modern advanced technologies dictates the destiny of man today as nature governed the primitive man. Ellul (Ibid.) illustrates this well by a metaphor: "Modern man surrounded by techniques is in the same situation as prehistoric man in the midst of nature"

Mesthene in Shrader-Frechette, *et al*, (eds.) (1997: 78) laments that technology influences our ways of thinking and attitudes by availing to us what was not present before:

> Technology has a direct impact on values by virtue of its capacity for creating new opportunities. By making possible what was not possible before, it offers individual and society new options to choose from.

Tiles, *et al* (Ibid: 25) argue that most technologies are purposefully developed by man to perform some specific work but that the moment a technological devise is created, it "assumes a life of its own". They (Ibid.) continue to contend that "technologies present us with realities which place demands on us independently of what we either individually or even collectively might wish for or think desirable". Winner in Barbour (Ibid:45) also believes in the independency of technology and its capability of directing man to various ends. He even refers to technology "as an autonomous system that shapes all human activities to its own requirements." Winner (Ibid.) further claims that whatever we aspire to achieve or the end we pursue are adapted to available techniques.

George in Tiles, *et al*, (Ibid:56) also gives a pessimistic approach to technology, but in a modified form. He first attests that "contrary to a central tenet of instrumentalism, all technologies embody values."

However, the values in the technologies as George contends are manifestations of attitudes of the designers of these technologies as he continues: "A technology usually reflects the plans, purposes and ambitions of some individual, some institution, or some class."

These two above opposing theories on axiological position of technology puts us at a difficult position in determining the place of technology in morality. In trying to reconcile optimism and pessimism theories, Reddy in Sardar (1988: 291) took a middle ground with respect to whether technology is value-neutral or not. His position is that there is a mutual reinforcement between society and technology where "the pattern of technology is shaped, and in turn shapes the society in which this technology is generated and sustained." The mutual reinforcement occurs in what Reddy called "causal chain", or "causal spiral". At a closer examination and analysis of Reddy's views in trying to resolve the conflict between optimists and pessimists, I personally find it equally or even more confusing. The reason is that, the causal spiral Reddy's is talking about presents is my mind a kind of circle where you cannot logically locate the starting point or the end. Also, when I try to contemplate of a casual chain, I perceive a continuum of causality running from nowhere to infinitum. In short, Reddy's problem is like that

of determining what is older, a chicken or an egg, and hence we cannot deduce from him whether technology in itself is value-free or not.

Below we are going to look at some other conceptions on technology and at the end of this chapter we will be in a better position to determine our first objective of this research project, that is, whether technology in itself is the root cause of the prevalent environmental problems.

2.3 TECHNOLOGY AND GOVERNMENT

In this section, we are going to critically assess the relationship between man and technology in a political institution. Most of our technological developments are a function of a political organisation which shapes the direction of technological development and also sometimes the technological innovations has in turn an impact on the ideals to be pursued and adopted by the society.

Feenberg (Ibid:14) argues that "the dominant form of technological rationality stands at the intersection between ideology and technique where the two comes to control human beings and resources in the potential to serve the human race as a whole." He (Ibid: 36) continues to say that "different social contexts can determine different paths of industrial developments." What Feenberg is implying is that various

forms of political systems may have a due influence on the course of technological development. This kind of influence is much evident, for instance, in 1960s and 70s during the era of Cold War where most technological innovations or discoveries of the super powers were mainly of warfare in nature. This interference of technological course of evolution can also be facilitated by a body-politic through the tax systems, for example, by lowering or increasing of corporate tax or through trade licensing policies where most governments in the world have absolute power to licence or not to licence any research institution or manufacturing enterprise within their sovereignty.

The state would also be willing to promote any technological progress that seem to have a liberating effect like technologies that seem to have eradication effect on "famine, disease, and poverty or the tyranny of physical nature" as cited by Barbour (Ibid.: 36). We hence expect technologies like those within medical field, agricultural sectors, and all those concerned with the human welfare to be given due support by the state. For the purpose of this project, our main concern in examining man, technology and society relationship will be to understand the rationale behind the development and application of technology within the two major forms of political system, which are capitalism and socialism. Most scholars have argued that technological systems of

western World are naturally exploitative to our environment and that the oriental technologies are relatively environmentally benign.

2.3.1 TECHNOLOGY IN A CAPITALIST SOCIETY

Technology is basically value-free as conceived by some philosophers in a capitalist form of political system. Some of such philosophers like Feenberg (Ibid.: 31) even deny the existence of anything like technology "in itself" by arguing that "technologies exist as such only in the context of one or another sort of employment." According to Feenberg, the environmental degradation is not as a result of "technology per se" but its caused by poor political system which dictates the path of "technological development" and application. He (Ibid: 3) goes on to argue:

> A good society should enlarge the personal freedom of its members while enabling them to participate effectively in a widening range of public activities. The design of technology is an ontological decision fraught with political consequences The exclusion of the vast majority from participation in this decision is the underlying cause of many of our problems. Only a profound democratic transformation of industrial civilisation can resolve these problems.

Bhagavan's (1990: 2) view on technology in capitalist states is that its development was accelerated by competition within the owner of capital who wanted to outdo their competitors in terms of making "more profits or more capital accumulation." The capitalists' urge for production

maximisation led to concomitant technological advancements as Bhagavan (Ibid.) asserts:

> Thus, a symbiosis was created between industrial capitalism and technological innovations, which developed, grew and spread out in a mutually, inseparable manner

Technology as developed and applied under capitalism has generally been conceived by some philosophers as being geared towards full-scale production with little consciousness over its impact on environment as compared to socialism as Feenberg (Ibid: 124) points out:

> Some Western radicals concede that a socialist production system would be less "efficient" than capitalism. Socialism they argue would lower labour productivity in favour of increased returns of "soft" variables, such as job satisfaction, equality, and environmental protection

As Feenberg further claims, it is a certain group of people in capitalist society, who are the owners of the means of production and also the ruling class that perpetuate this indiscriminate technological innovations and applications as he (Ibid.: 32) says:

> Under capitalism, technology is applied destructively because the pursuit of maximum profit and the maintenance of capitalist power on the work place conflict with the protection of workers and the environment from the hazards of industrial production

Barbour (Ibid.: 13) also like Feenberg conceived technology in a capitalist society as being an asset for a small group or a section in society for consolidating material wealth and power to improve their welfare without concern for other members of the society and the environment as he claims:

> Private ownership of resources fostered the treatment of the natural world as a source of commercial profit Along with rising standards of living came increasing burdens on the environment.

Barbour (Ibid.: 49) continues and explicitly argues that the effects of technological developments in a capitalist state is creating a sort of dominance and subjugation relationship between humanity because the majority lot of the society do not benefit from these new modes of production but are just victims of their side effects:

> Technology tends to increase the power of those who already are powerful. It has increased the gap between rich and poor, both within nations and between nations. It has perpetuated patterns of domination and dependency between industrial and developing countries.

Thus, for scholars like Barbour, the remedy to the prevalent environmental decaying associated with most of our technological advancements lies on the re-organisation of the socio-political economic base of our society. Feenberg (Ibid: 13) referred to this change as redesigning the modern technology "to adapt it to the needs of a freer

society." Our environmental problems according to Feenberg (Ibid.) has their roots to egoistic tendencies of man and can only be solved by our concern and care to other people:

> The conquest of nature is not a metaphysical event, but begins in social domination The remedy is therefore not to be found in spiritual renewal but in a democratic advance

Going back to the issue of technology and value, how would Marxists like Feenberg consider technologies within socialist states like Peoples Republic of China, Japan, or former Soviet Union? Is technology there value-Laden and the ones in Western capitalist states value-neutral? We know with certainty that the present quandary that we are in due to the effects of some of our technological developments transcends all the political boundaries, whether in capitalist or socialist nations. It is thus my view that we cannot morally valuate technology from the systems of political organisations.

2.4 CONCLUSION OF THE CHAPTER

The foregoing chapter is a brief explication of the nature of philosophy of technology as we proceed to inter-marry it with environmental ethics in the subsequent chapters. Philosophy of technology is a relatively new sub-branch of philosophy which concerns itself with the critical

examination of the nature and significance of organised knowledge as applied for practical purposes.

One of the pertinent problems within the philosophy of technology is the question of the moral value of technology as we have seen above. It is not an easy decision to bend to either optimism or pessimism as we have noted. I personally feel the problem between optimism and pessimism lies in the scope of definition of the concept technology. Optimists consider technology as only entailing tools or devices, while pessimists goes further to include the environment within which innovations are made and operated as being part of technology.

It is my contention that we should synthesize the operational definitions of the concept technology as used by both the optimists and pessimists. In my view, technology as a concept should not be seen only as technical devices according to optimists, neither should it be too broad in coverage as applied by pessimists. Instead, technology should be considered as a form of knowledge whereby the evaluative content will be accorded to those in its application as free moral agents.

The technical devices may really influence the ideas, perceptions, and habits in a certain social set-up but only to the extent that the encultured

individuals freely and willingly adopts or they are unable to resist this new kind of cultural euphoria and this kind of influence should not at all make us trend into a technological somnambulism.

CHAPTER THREE: IS TECHNOLOGY FREEING OR ENSLAVING?

3.0 INTRODUCTION

In this chapter, we are going to critically examine various paradoxical scenarios in which man finds himself when interacting with his environment by use of his modern technologies.

3.1 THE COMMON DILEMMA IN TECHNOLOGICAL ADVANCEMENT

This dilemma is analogous to the popular economics law of "opportunity cost". The law of "opportunity cost" in economics states that in any choice that you make, there is always an immediate next best alternative. Likewise, as we decide to develop and to adopt a certain technology or not to, there is in most cases some counter consequences in either side.

Usually, the common dilemma in technological advancement is manifested in the achievements of modern technologies like increased agricultural production through modern farming methods and consequent environmental degradation as a result of application of inorganic fertilizers and chemicals. To maintain the health of the environment by not using these modern farming techniques, it will on the other side result to low production in terms of quantity and quality resulting to starvation and malnutrition.

Feenberg (1991: 14) is among the philosophers who have discussed at length on this dilemma. He defines technology as "an ambivalent process of development between different possibilities." We can infer from this definition of technology that what Feenberg is implying is that we are in a fix; to either carry on with some of our advanced technologies and bear their consequences or stop such technologies altogether. Feenberg goes on and claimed that the modern technologies are like substitutes to traditional means of survival. He (ibid: 9) attests that: " critics urgue us to reject certain technologies and then ask us to accept the price of preserving traditional or natural ways." The point worth noting which Feenberg is highlighting is that despite the advantages we do derive from most of our advanced technologies, there is always side effects, which are mostly environmental in nature. But if we on the hand stop developing these technologies, there is still a serious problem that we will encounter despite our safe environment. Take, for instance, if we stop using fossil products as sources of fuel and according to Barbour (Ibid: 213), " oil and the natural gas associated with it, provides 75% of our total energy supply". It therefore means a sudden stoppage of fossil fuel usage will ground almost all of the world's activities. Its use has environmental effects of greenhouse effect or global warming due to excessive Carbon dioxide emission into the atmosphere.

The modern technological advancements has also proven to be a "mixed blessing " as Broom, *et al*, (Ibid: 548) contend. They exalted science and technology as having lengthened life and bringing prosperity to industrial nations. Conversely, they (ibid) argue that " at the same time, technology has made life more dangerous and unstable and in some ways less pleasant." To explicate deeply what Broom and his associates are clamouring at, lets consider the case of the effect of medical revolution on human population. In his speech during the world Environment Day, 1994, former Vice President of the United States of America, Al Gore, in *"our planet"* 6 No. 2 (1994: 22), expressed a shock due to world population explosion in the past few decades as he remarked:

> From the beginning of the human species until the end of WWII It took more than 10,000 generations to reach a world Population of a little more than 2 billion But in just the past 45 Years, it has gone from a little over 2 billion to 5.5 billion.

Most of the environmentalists as we know have blamed increased population growth as the cause of some of the environmental problems that we experience like the depletion of the natural resources which are not in plenty to cater for the ever rising population. It is for this reason we guess, Al Gore, above, seemed to so much worry about the high rising population growth. Without the modern medical knowledge on the other

side, our population would have been wiped out long in childhood by diseases like measles, polio, and the like.

For Tiles (1995: 135), the dilemma in technological advancements is in form of what he referred to as " benefits" and "malefits". His position is that our technological solution to some of our problems ends up generating other problems. "It is unrealistic to think that technological solutions to practical problems come without side effects, which have the potential for creating new problems." Another philosopher and a contemporary of Tiles, Mesthene in Mitcham (Ibid: 112) conceived technology on a similar perspective. He saw technology as having "two faces: one that is full of promise, and one that can discourage and defeat us." Mesthene elaborated his idea well in Shrader-Frechette, *et al*, (eds.) (1997:74) where he argued that "technological change would appear to induce or 'Motor' social changes in two principal ways; one, by creation of new opportunities which has positive effects and two, by generation of new problems or the negative effects of technology."

This is thus the kind of intricate and desperate web that we find ourselves engulfed in by the technological dilemma. We are torn between technological success on one side and unprecedented damage to environment according to Silvertown (1990: 193). This situation gives

rise to a dilectic in society as Rotenstreich in Mitcham (Ibid; 112) puts it, who saw technology as a "life – giving drug, if not, deadly poison." The technological dilemma is thus a reality and we should not just conceive technology from one dimension only, that is, in either its positive or negative side as summarized by Simon in Mitcham (ibid: 182):

> The final picture is neither one of inevitable progress nor one of inevitable decadence. It is rather, that of a double movement carrying mankind, through the fire of sharp conflict, toward greater good and toward greater evil.

3.2 TECHNOLOGY AS A LIBERATOR

There is a group of philosophers who primarily perceive technology as having emancipation effect for mankind from what they call the tyranny of nature. They argue that nature in its original state is inadequate to sustain man and thus technological inventions and improvements are necessary to facilitate our sustenance and welfare.

A Spanish philosopher, Gasset in Mitcham, *et al*, (eds,) (Ibid; 229) attributed the need for technological development to limitations of nature in enabling the actualization of man and his self-realization as he says:

> Since man, in order to exist has to be in the world and the world does not forthwith admit of the full realization of his being, he begins to search around for the hidden instrument that may serve his ends.

Thus, technological advancements according to Gasset are a means of helping us to understand ourselves better as human beings through expressing our inner selves. This view is also echoed by Mesthene (Ibid: 113) who contends that we cannot stop advancing technologically "because we would not stop being men". Without technology, we are almost not human beings as Mesthene (Ibid: 112) implies:

> We have the power to create new possibilities and the will to do so By creating new possibilities, we give ourselves more choices With more choices, we have more opportunities. With more opportunities, we can have more freedom, and with more freedom, we can be more human.

Mesthene (Ibid: 113) is aware of the deleterious Consequences of most of our technological advancements but he remains firm that the advantages we reap from these technologies outweigh their side effect as he states:

> It's not clear that the monster the laboratory may create, in searching the secret of life, will be more monstrous than those that nature will produce unaided if its secrets remain forever hidden.

Modern technology is also seen by Derr in Barbour (Ibid: 35) "as a liberator from famine, disease, and poverty." This is quite evident in high quantity and quality agricultural production through modern farming methods, control of various diseases by modern medical practices, and high standard of living in industrialized nations. Hence, modern

technologies have played an important role in improving our quality of life. For Passmore (1980: 178), technology arises as a result of struggle between man and nature:

> Through their struggle with nature, men have discovered their potentialities and developed those forms of enterprise which constitute their civilization

Due to this hostility of nature towards man as Passmore implies, he has to find ways of meeting his needs by developing technologies to meet his necessities. Nature cannot provide anything ready for man unless we manipulate it by our technologies as Passmore (Ibid: 185 Claims: "It is indeed, absurd to suggest that man can find in nature, at hand for his taking all that he needs to live a good life." This view is also shared by Mesthene (Ibid: 110) who emphasized for our effort to try and make technological inventions in order for us to survive:

> We no longer wait upon invention to occur accidentally, we foster and force it, because we see it as a way out of the heretofore inviolable constraints that physical nature has imposed upon us in the past. We are today coming to the realization that the physical world need not be as it is. We can change it and share it to suit our purposes.

Caldwell (1972:27) branded pro-technologies as "anti-ecologists." The anti-ecologists as termed by Caldwell condemn conservationists as "misguided romantics who would in effect, return mankind to the caves and expose the human species to the natural ravages of famine, disease,

floods and drought." Further, Caldwell (Ibid) argues that pro-technologies view the human history "as the story of man's struggle against the brutal indifferences of the natural world." This conviction is also held by Dessauer in Mitcham, *et al.* (eds.) (Ibid: 320) who conceived technology as signifying " overcoming of the limitations of the laws of nature, liberation from the bonds of natural law."

What all these philosophers who perceive technology as a liberator claim is that nature cannot guarantee our livelihood unless its altered by man through technology. They are in direct opposition to Nyasani (1996:103) who maintains that " nature natures" (*natura naturans*).

3.3 TECHNOLOGY AS ENSLAVING.

The views and justifications brought forth by scholars that technological advancements are a " human yoke" are more or less the converse of the conceptions of those who regard technology as a human liberator.

The common stance of these scholars is that nature is complete to sustain all its inhabitants including man and hence any intervention by man in nature by use of artificially made technologies always has a far-reaching detrimental effects through upsetting the nature's balance.

One of these scholars is commoner (1971:12) who praised the ecological balances in the absence of modern human technologies. He used the term ecosphere synonymously to ecosystem, which he also referred to as the circle of life. Commoner blamed the modern technologies for the environmental hassles that we are experiencing:

> Here is the first great fault in the life of man in the ecosphere. We have broken out of the circle of life. The ecosphere is being driven towards collapse.

By breaking out the circle of life, commoner means starting artificial means of survival, that is, new technologies to interfere with ecosystem or our natural environment. Barbour (Ibid:5) argues against technology still from ecological perspective. According to Barbour, this artificial means of survival interferes with ecological balance as he explains: "we have reduced greatly ecological diversity that contributes to stability and balance of natural system."

Caldwell (Ibid:7) dismissed the modern advanced technologies as "technological barbarism" due to its effects on the environment. He even argued that man should do away with most of his technologies if he is to survive:

> Man is facing the greatest crisis in his history, and the cause of this crisis is man himself. The crisis is the growing threat posed by the activities of man to the planetary life-support systems of air, water, soil, and living organisms

Caldwell (Ibid:9) continued: " civilized human society has reached a point at which it must change its habits if it is to survive." This fear of modern technology is also expressed by Anders in Mitcham (Ibid:135) when he says that " from now on, mankind will always and for eternity live under the dark shadow of the monsters." By monster, Anders means the new or modern technologies. Another scholar, Tiles (Ibid: 12) even blamed our improved medical care services for environmental degradation caused by overpopulation as he remarks: " Even programmes of immunization against childhood diseases such as measles and chicken pox have contributed to overpopulation and hunger in developing nations."

To conclude this section, we may consider the anti-technologies as remystifiers of nature who do not only advocate liberation of nature from the obnoxious technologies for its own sake but far from that, for the human's welfare.

3.4 MAN AND NATURE

To understand clearly the relationship of man and his natural environment, it is important first for us to determine whether man is part of nature or separate from it. This has been an age-old philosophical

discourse and no unanimous agreement has yet been realized. We may classify the philosophers who have discussed on the relationship between man and nature into three major camps: First, we have the group of those scholars who conceive man as being part of nature The second group comprises of those philosophers who hold that man is separate from nature. The last cohort is that group of philosophers who bifurcate man into traditional and modern societies whereby man in traditional society or pre-scientific society is considered to be part of nature and the modern man in scientific or technological society is seen as being apart from nature.

Alcorn (Ibid:14) is one of the representatives of the first group who see man as being part of nature. For Alcorn, the technologies that man make are also part of nature and hence they cannot be harmful to the environment as he writes: "Technology is part of what it is to be human and, consequently, part of what it is to be part of nature." As we have seen in our literature review, Alcorn (Ibid) has argued that nature " has the survival trait of homeostasis" that prevents development of technologies that may interfere with its balance. Commoner (Ibid: 229-300) also contemplates man as ideally part of nature or "circle of life", to use his terms. However, for commoner, man ought to stick within the

natural world only for bare survival, but contrary to that, man has parted with nature and started his new artificial life:

> Human beings have broken out of the circle of life, driven not by biological need, but by the social organization which they have devised to " Conquer" nature: means of gaining wealth that are governed by requirements conflicting with those which govern nature The end result is the environmental crisis, a crisis of survival. Once more, to survive, we must close the circle.

To close the circle, commoner means to accept being part of nature, and hence not to develop technologies that might upset the nature's balance.

One of the philosophers who consider man as being separate from nature is Mesthene in Derr (Ibid: 54) who argues that " true harmony with nature, a sound balance between man's needs and environmental preservation, requires the subjugation of nature by all the technical wisdom we can summon." Mesthene goes ahead to say that man had to create his artificial environment by use "of the most advanced science and technology available" because the "physical nature was brute, recalcitrant, limited, indifferent or hostile." Mesthene hence leaves us to determine how our artificial environment can be harmonized with the natural environment considering that nature contains some of our most essentials for life like air, water and land. On the same line of argument, Clarke in Mitcham, *et al* (eds.) (Ibid: 258) considers the modern

technology as enabling man to assume his natural position as master of nature and hence distinct from nature through the ordinate and subordinate relationship as he contends:

> The phenomenon of modern technology, of man's sudden coming into his natural inheritance as master of material nature poses a staggering challenge to our whole race as we scan the horizons ahead The stakes are higher than they have ever been in human history before. And the risks are proportionately great

Despite our being separate from nature and being its master, Clarke thus warns us to be careful and more responsible when handling our technological achievements.

Lastly, lets now look at some conceptions of those philosophers who determine the relationship of man and nature with respect to either man is in traditional or modern societies. Gasset (Ibid:249) distinguished "Primitive" man from modern man by contending that primitive or traditional man lives only an "organic life, mere being in nature" by adapting himself to the environment. The modern man on the other hand lives "by adapting the environment" to his will. For this reason as implied by Gasset, primitive man is part of nature and modern man is apart from it. Gasset further writes that in life of nature, that is, life without technology, man is almost an animal:

> Primitive man is very little man and almost an animal His technical acts are scattered over and merged into the totality of his natural acts and appear to him as part of his natural life.

The modern man, separate from nature as Gasset (Ibid:308) asserts consciously and deliberately searches for technological inventions to improve his supernature but the primitive man who is also a part of nature waits for any technological discovery to occur to him spontaneously:

> In the course of his constant and fortuitous manipulation of objects, he may suddenly and by any chance come upon a new useful device. While for fun or out of sheer restlessness he rubs two sticks together a spark springs up, and a vision of new connections between things will dawn upon him. The stick, which formerly served as weapon or support, acquires the new aspect of a thing producing fire Our savage will be awed, feeling that nature has inadvertently loosed one of its secrets before him.

Broom, *et al.* (Ibid: 558) had a similar view as Gasset. The only difference is that, instead of using the term primitive society like Gasset, they used the terms Preliterate and folk societies. They claimed that these pre-scientific societies "are deemed part of nature; they are not set apart from it or placed above it". We can infer from the above quotation that broom, *et al*, perceive the modern technological society as being separate from nature. The most important point to note as far as technology and environment is concerned is that broom, *et al*,. (Ibid) considers this

relationship of man and nature in traditional society as being respectful as they highlight: "this view of humanity-in-nature leads to a principle of self-restraint." By implication, modern man is hence through his scientific and technological progress disrespectful to his natural environment. Barbour (Ibid:20) also distinguished traditional and modern societies with regard to relationship of man with nature. He gave an example of traditional American societies to show that pre-scientific societies are part of nature : "The native American culture provides also an example of unity with nature." It hence means that the contemporary scientific and technological American culture is not part of nature according to Barbour. Among the native Americans, Barbour (Ibid.) continue, " there is a strong sense of the inter-relationship of all living things with a cosmic pattern." What Barbour is getting to is that there is a harmonious relationship between man and nature among the natives as compared to aggressive interaction of man to nature by modern man.

White in Mitcham, *et al* (eds) (Ibid:262) comments that "formerly man had been part of nature," but now " man and nature are two things and man is master." For white, during the time man was part of nature, the relationship was cordial and with some hope for man's survival but today, the separation of man from nature by his technology puts his life in the balance. What created this separation of man from nature as white puts it

is mostly the Christian religion ethic of dominance of man over nature as we will see later.

3.5 TECHNOLOGY AS PERCIEVED FROM EVOLUTIONARY PERSPECTIVE

Technological advancements have been conceived by evolutionary philosophers as being an aspect of human cultural process and hence technical inventions and improvement will continue to take place as our cultures progresses through the process of evolution.

As all these philosophers maintain, the evolution of culture is as a result of increase in human brain size and Jerison (1973:Preface) equated brain to mind, which according to him " determines behavior." The human mind enables him thus to express himself symbolically unlike non-human beings. Alcorn (Ibid:14) held that the ability of man to invent and use technologies distinguishes him from other brutes: "It is only in the external manner of our evolution and in the far greater efficiency of adaptation that we are separated from other animal life." The most important thing to note is that evolutionary philosophers presume the human evolution to be independent and apart from the other natural evolution as made clear by white (Ibid:264): "Despite Darwin, we are not, in our hearts, part of the natural process."

If then man evolves in his own course, separate from the evolution of non-human world, there is hence likely to be incoherence in technologies that we are going to develop and the natural environment in which they are going to be used. At the world conference of philosophy held in Nairobi, Kenya, in July 1991, Agazzi in Oruka (ed.) (1994:6) disputed any possibility of conserving our environment by stopping development of our modern technologies. He claimed that such a move "is not only practically untenable, it is philosophically unsound" because "the very idea of cultural evolution would be annihilated." Agazzi's idea of the solution of the effect of our environment by some of our technologies is to seek for a way of "wedding" the cultural evolution and the natural evolution as he says:

> The real problem is a different one: We must see how we can make human environment compatible with the natural environment, or to put it differently, make cultural evolution compatible with natural evolution.

Man has no intention of subjugating nature by his advanced technologies because they just develop with no ill intention but just as a result of excessive intellectual energy due to increase of brain size in evolution as Mumford in Mitcham, *et al.* (eds.) (Ibid:79) acknowledges:

> Through man's overdeveloped incessantly active brain, he had more mental energy to tap than he needed for survival at a purely animal level, and he was, accordingly under the necessity of canalizing that energy, not just into food

> getting and reproduction, but into modes of living that would convert this energy more directly and constructively into appropriate cultural-that is, symbolic form. Man's technological expansions and transformations were less for the purpose of directly increasing the food supply or controlling nature than for utilizing his own immense internal resources, and expressing his latent superorganic potentialities.

Rotenstreich (Ibid: 170) also shares a similar view with Mumford. He asserts that "the technological phenomena is a revelation of man's capacity, and not a manifestation of man's drive for domination." Caldwell (Ibid: 15) warns that there is in most cases, a conflict in cultural evolution and natural evolution especially due to side effects of our modern technologies like pollution as he attests:

> Human evolution has permitted man to develop cultures, altering the nature of his relationship to the natural world and permitting him at least in the short run to separate himself psychologically and economically from it.

The modern industrial culture is "artificial" as Caldwell (Ibid: 21) states and thus "deficient in self-sustaining or self-renewing abilities."

The difficult situation that we are embedded in is thus how to integrate our cultural evolution with the wider natural evolution. Man is a cultural animal and hence "homo faber" as explained metaphorically by Tiles

(Ibid:41) :"Just as water is the natural medium of fish, so the natural medium of human is culture.

3.6 TECHNOLOGY AND ENVIRONMENT FROM RELIGIOUS POINT OF VIEW

The way man relates to his natural environment by use of his technology has been conceived by some philosophers as having some religious connotations. Most philosophers who reason on that line have blamed religions inclined to Abrahamic tradition for the exploitative tendency of man by use of his modern technologies. This presumably is due to the teaching of the Hebrew Bible as written in Genesis 2:26:

> And God said, let Us make man in Our image, after Our likeness: and let them have dominion over the fowl of the air, and over the cattle, and over all the earth, and over every creeping thing that creeps upon the earth.

The critics of this Abrahamic faith like Judaism, Christianity, and Islam use the above Biblical verse to interpret it as creating a schism between man and nature where man is the master of the rest of nature and hence unfair aggression of man to his natural environment by use of any technology at his disposal. On the other side, the other religions mostly of oriental world are taken by these philosophers as contemplating the oneness of man and nature and hence a harmonious relationship based on respect of environment by man.

Lynn white, Jr, blames Christianity as being the root cause of all our environmental problems associated with modern technologies as quoted by Rosenfield, *et al*, in shrader – Frechette (ed.) (1991: 6): "The root of the ecological crisis lies in our Judeo – Christian heritage". Because man was created in the image of God according to the Bible as we have seen in the Genesis, above, this consequently creates a distinction between man and nature which makes man to have an attitude as white in Derr (1973:16) claims, that " everything in nature, living or inorganic, exist to serve" him. In Barbour (Ibid: 18), White gives credit to some religions of the Near East that "sought the harmonious integration of human life within the life of nature." White says that these cultures in the Near East expressed their respect to nature as:

> their rituals and festivals celebrated the annual cycle of the seasons and the fertility of nature rather than celebrating historical events, as the biblical religions always have done

White (Ibid: 76) has also exalted other Eastern religious traditions like Zen Buddhism and Hindu mystics whose theme is "harmony with nature, which has been ignored in much of the history of Christianity." He (Ibid: 264) also cautions that our survival is at a threat unless we shun away the Christian doctrine of man's dominance over nature:

> Hence we shall continue to have a worsening ecologic crisis until we reject the Christian axiom that nature has no reason for existence save to serve man

Some other philosophers, also like white, blame Christianity as perpetrating technologies with adverse effect to our environment. Broom, *et al.* (Ibid:558) claims that " these Western religious ideas contrast sharply with those of much of the non – Western world." They (Ibid) argue that the non – Western world religions like Hinduism and Buddhism has "the doctrines of reincarnation and cosmic consciousness" that " work against the idea of human uniqueness." They as an illustration states: "Hinduism, for example, asserts that humanity finds 'nirvana,' or perfect blessedness, by uniting with a cosmic spirit that contains all of nature."

For Caldwell (Ibid: 20), "the gap between science and religion has been a major 'conditioning' factor in the destruction impact of modern man on his environment." Caldwell stressed that this gap has been created by Christianity religion, which holds that " the world was made for man's convenience." He (Ibid) exalted "the ancient religious systems of Greece and China" which "emphasized harmony between man and nature."

There are other scholars, though talking of Christianity as a contributor to exploitative tendency of man to the rest of nature, they mainly blame Protestantism as the prime facilitator of violable and aggressive attitude

of man to his natural environment. They associate Protestantism with the growth of capitalism which basic tenets are individualism and profit-making. Silvertown (Ibid : 190) states that:

> Some scholars have argued that Protestantism was more consistent with the growth of capitalism and industry than was Catholicism or Islam, and hence that northern Europe was advantaged over south.

Silvertown was talking of the emergence and development of industrial revolution, which took part earlier and faster in northern Europe, which was perversed by Protestants than southern Europe, which was dominantly Catholic. Derr (Ibid: 1973) also like Silvertown attributes the environmental problems that we have to Protestantism in particular as he writes: "The exploitation of nature in Science and technology is actually the fault of the protestant Christian tradition."

This section shows us the dilemma we are in because the world all over seems to be adopting Western technologies developed with very little regards if any to oneness of man with nature. White (Ibid: 18) also notes this pervasiveness and influence of Western technological culture:

> It seems that in previous Centuries, eastern Countries have on balance treated nature with somewhat greater respect than Western one, and that changes in attitudes during the twentieth century have been mainly the result of western influence.

3.7 CONCLUSION OF THE CHAPTER

In this chapter we have tried to give a multi-faceted approach to the relationship of man and his environment by use of his technology as a way of explicitly showing the paradoxical situation man finds himself entangled in as he struggles to improve his welfare. We are now then in a better position to discuss more critically the effect of modern agricultural technologies and our environment in the next chapter which is our key area of concern in this project.

CHAPTER FOUR: TECHNOLOGICAL ADVANCEMENT IN AGRICULTURAL SECTOR

4.0 INTRODUCTION

This chapter, which is intended to be our focus of concentration in this project underscores the modern technological agricultural production methods from philosophical perspective. The benefits of these new farming methods will be weighed against the environmental impact and this will consequently expose us to a moral dilemma of what man ought to do because as we are going to see, the application of the newly advanced farming techniques result to high production output and concomitant environmental deterioration which is an apocalyptic danger for man himself and other non-human beings.

4.1 A BRIEF OVERVIEW OF PRE-SCIENTIFIC AGRICULTURAL SYSTEMS

The traditional farming methods which were epitomized by 'simple' technology had very little negative impact to the natural environment if any. By 'simple' technology in agriculture on the equipment side, we mean as Bhagavan (1990: 56) clearly explained ; "implements and tools which are operated by human physical energy and animal energy such as hoes, bushknives, axes,ploughs, etc." Other skills used in simple technology according to Bhagavan (Ibid.) "includes organic fertilizing, natural-biological control of weeds, pests, and so on."

Mendis in Sardar (ed.) (Ibid: 343) expressed his tribute to the pre-technological agricultural system for its low and natural energy consumption as compared to modern farming methods which use artificial alternatives of energy like fuel that have adverse effects of air pollution:

> For traditional agriculture, the energy efficiency is much higher than that of modern agricultural practices because they use freely available solar energy In many cases, they are 50 to 250 times more efficient than the new technologies.

When discussing of the patterns of food production in the horn of Africa, silvertown (Ibid: 10) also seems to be much in favour of the traditional agricultural systems based on simple technology and he even said that its due to modern "technical failure that contributed possibly to change of Tunisia from wheatlands in Roman times to present-day desert." Upawansa in Sardar (ed.) (Ibid: 309) based his leaning towards traditional agricultural systems from his study in Sri Lanka. He is quoted saying that the civilization of Sri Lanka "flourished around an indigenous farming system" and that it "has suffered greatly from western domination." By western domination, upawansa means the introduction of the modern farming methods like fertilization and mechanization. The indigenous Sri Lankans used their "knowledge gleaned out of long experience of

climatic rhythm to obtain the maximum benefit of seasonal rains, and minimize crop damage and failure" as upawansa (ibid.) tells us. The Sri Lankans also according to upawansa (Ibid.) have "a proverb enshrining this wisdom," *"kal yal bala govithan karanna"*, which means, "stick to the time and season for planting." This farming method reduced "severe outbreaks of diseases" and "consciously maintained a stable ecological system" (Ibid: 310).

This section which has dealt on agricultural production based on low – level technologies will assist us later in determining critically what we ought to do in the face of the onslaught of modern hazardous farming methods.

4.2 THE NATURAL ECOLOGICAL FOOD GETTING SYSTEM

Of much importance to note is that the traditional or pre-scientific dietary patterns were naturally determined by the rules of ecology. From the immediate previous chapter, the traditional food acquisition system presupposes man as part of nature governed by all its laws and principles.

The natural environment under which pre-technological man obtained his livelihood was a balanced complex organization of interdependent organisms, both living and non-living, man included. In this kind of

survival, man was just a cog under the mercy of whims of nature. There was no any form of environmental degradation by man because our natural environment or our ecosystem to use an ecological jargon, naturally regulated all its activities. As ecologists argue, such an ecosystem was far much stable because of its wider diversity and hence capable of withstanding adverse effects such as pests' invasion and dramatic climatic changes.

However, the modern agricultural methods has caused irreparable damage to the natural ecological foraging. As Broom *et al.* (Ibid: 561) notes, the modern farming "technology tends to simplify ecosystems." They (Ibid.) argue that as ecosystems become simpler, the more vulnerable they "are to unexpected changes in the weather, to invasions of pests or diseases."

As we are going to see in the foregoing chapter as we proceed, despite the adverse consequences of the modern farming techniques, we cannot inevitably do without them for reasons that will be brought forthwith.

1.3 THE GREEN REVOLUTION

The new agricultural techniques which are basically as a result of the high yielding varieties programme (HYVP) characterized by cross-fertilization

and grafting has been perceived by some philosophers as being a reaction to nature by man. Unlike the traditional man, who has been viewed by various scholars as being part of nature and hence getting his food and other necessities of life from the natural ecological system, the modern man, "homo faber", has been seen as living a life full of constant struggle with nature because he conceive nature as either being hostile or inadequate to provide him with livelihood as we have seen earlier. Ferre in Oruka (Ibid: 235) points out that the modern agricultural techniques dates as far back as when man started developing his first tools:

> The first significant attempts by "Homo sapiens" to change and master nature dated to the late Stone Age, or Neolithic, about 10,000 years ago. It was at that crucial point that the intelligence of "Homo sapiens" became an important causal element in the natural environment surrounding us.

Man's increased intelligence through the geological time scale enabled him to improve his welfare by counteracting some natural human threats like various diseases which led to increase of population which the natural ecological system cannot sustain. This prompted man to develop alternative artificial agricultural techniques like high yielding seeds with a fast maturing rate and improved quality and quantity to meet the needs of the rising population. These new varieties cannot endure the natural weeds and pests and hence chemicals must be applied.

The production based on the new agricultural technology was so significant as compared to that of traditional method and it really showed a drastic change as Bajaj in Sadar (ed.) (Ibid: 138) says:

> The new technology involving "miracle seed" and the associated practices was indeed successful in generating high yields, and in some areas the increase in yield could justifiably be characterized as revolutionary.

By "miracle seeds," Bajaj implies the astoushing high productivity of the new developed varieties. As we have just mentioned above, these new varieties require a great deal of organic fertilizers and pesticides which have some side effects to the natural environment as we are going to see. According to a survey conducted by pimentel, *et al.* in Shrader-Frechett, *et al.* (eds.) (Ibid: 375), "worldwide, about 2.5 million tons of pesticides are applied each year. In the United States, approximately 500,000 tons of 600 different types of pesticides are used annually." Despite this huge use of pesticides in the United states, pimentel *et al.* (Ibid) goes on and points out that:

> Pests destroy 37% of all potential food and fibre crops. Estimates are that losses to pests would increase by 10% if no pesticides were used at all.

Going by the finding of the above research carried out by pimentel and his colleagues, it hence implies that if the government of the United states decides to ban the use of pesticides on environmental grounds or rather to

conserve the environment from the effects of these pesticides, the agricultural production will fall drastically.

Bhagavan (Ibid :55) gave a comparison of agricultural production in industrialized nations and less industrialized countries to show the positive effect of the modern agricultural methods. The agricultural population in Africa is 45-80% as compared to that of developed capitalist countries which is only 7% according to Bhagavan. In terms of production, Bhagavan writes that the developed capitalist Countries produce "35 percent of the world's total output of cereals" on "its arable land area" which "is only 26 percent of the world's total." He (Ibid.) further gave an outline of grain productivity per hectare of various different parts of the world as he states:

> The average grain yield per hectare in the developed capitalist world was about 3,700 kgs as compared to 1,100 kgs in Africa, 1,400 kgs in South Asia, 2,900 kgs in east Asia, and 1,900 kgs in Latin America.

What is of paramount to take into Cognance from these figures is that agricultural production is higher in countries that have more advanced agricultural production techniques like use of inorganic fertilizers and pesticides than those nations which have not yet in full adopted these new farming techniques.

4.4 ENVIRONMENTAL IMPACT OF THE GREEN REVOLUTION

As we have just argued briefly at the outset of this chapter, the newly laboratory developed agricultural varieties cannot thrive under natural conditions. Hence, an artificial environment must be created for them to produce as expected. In this respect, Tiles (Ibid: 147) states:

> In other word, a condition of their successful use is the transformation of land and of farming to make them uniform with the conditions presupposed by the seed developers.

One of the conditions for optimum yield of these new varieties is application of inorganic fertilizers which also accelerates their maturity rate. Despite the high response of these varieties to these fertilizers, some critics maintain that they remain vulnerable to pests and pathogens as compared to natural varieties. Bajaj in Sardar (ed.) (Ibid: 138) has this to say:

> "Miracle seeds", genetically selected to absorb huge doses of chemical fertilizers, but since they had not evolved under natural conditions, they were susceptible to a number of pests and diseases.

Other scholars have argued that though these inorganic fertilizers have a positive effect to various crops, in most cases, the crops are weak which calls for application of pesticides or other chemicals to prevent these crop from pests and diseases attacks as upawansa in Sardar (ed.) (Ibid: 312) points out:

> Because of the abnormal conditions and artificial fertilizers, the crops are not strong and healthy and are easily damaged by pests and diseases. This necessitates the spraying of pesticides and fungicides.

The large scale application of these chemicals remains a great danger to our environment as nature is unable to integrate them within its grand leitmotiv of operations. Broom, *et al.* (Ibid: 562) referred to "widespread use of such materials" as "an assault on the environment because they are not biodegradable." This result also to destruction of vital and beneficial organisms like fungi and bacteria which according to pimentel, *et al.* in Shader-Frechett, *et al.* (Ibid: 397) are "equally important in their ability to 'fix' nitrogen, making it available to plants." From our simple biology, we know very well that plants release oxygen during photosynthesis which in turn is used by man during metabolism. These small organisms that are destroyed by modern agricultural chemicals and fertilizers have also other vital roles that they play in nature's balance as explained by pimentel, *et al.* (Ibid):

> The holes (upto 10,000 holes per square meter) in the soil made by earthworms and insects also facilitate the percolation of water into the soil, thereby slowing rapid water runoff from the land and preventing soil erosion.

For the modern agricultural genetically altered varieties to thrive, an elaborate land preparation must be done which weakens the soil and

hence easy to be washed away even in a light downpour. Upawansa in Sardar (Ibid) writes:

> With intensive preparatory tillage, soil proper become a mass of minerals. As the water – holding capacity of minerals is less, irrigation is required, even during a short spell of drought. Run off during heavy rains is inevitable, and this causes erosion.

Since the soil eroded has chemicals and mainly finds its way into water bodies; lakes, rivers, and oceans are polluted with consequent destruction of the aquatic ecosystems and also endangering man's health.

Pesticides alone, either through direct or indirect contamination has been established to be one of the world's leading death causes. As pimentel, *et al.* in Shrader-Fechette, *et al.* (Ibid:376) narrates "a recent world Health organization and United Nations Environmental Programme (WHO/UNEP), 1989 report, estimated an annual 20,000 deaths due to pesticides poisoning."Pimentel and his team also at the same time mentioned Schotthenfeld of University of Michigan, 1991, who estimated in United States alone that 1% of the cancer cases as being caused by exposure to pesticides.

4.5 POLITICIZATION OF THE GREEN REVOLUTION

The modern agricultural techniques based on artificially developed crop varieties and mechanization have been perceived by various philosophers

as being socio-economically ill-tailored for exploitation by man to his fellow men. This exploitation is conceived as having taken either of the two forms; exploitation of the rural sector by the urban sector, or exploitation of less industrialized countries by the industrialized nations.

For those scholars who argue that the new agricultural techniques were designed to favour the urban sector at the expense of the rural dwellers, the agricultural system before the introduction of the new methods was efficient and adequate enough to cater for the needs of the farmers but today that system has collapsed leading to impoverishment and misery in the rural sector while on the other side, the urban sector continues to develop. This scenario led Bajaj Sardar (ed.) (Ibid: 148) to argue that if the new agricultural technique were developed to boost the socio-economic welfare of the rural sector, then it has completely failed:

> If however, our expectation from a revolution in agriculture is that first of all it enables the millions of subsistence workers living below the poverty line to produce their essential requirements, then of course there would have been no question of even considering the Green Revolution technology.

Bajaj (Ibid) continues to say that if on the other hand these new techniques were designed to strengthen the urban economic base, then they have really succeeded:

> If the idea of introducing the revolutionary new technology was to provide new avenue of investments for the industrial sector, and not bother about the cost of food production, the Green Revolution technology has clearly done the job well.

Bajaj (Ibid: 137) further claims that the new agricultural developments were only aimed at providing resources and capital required for the industrialization in the urban sector:

> In other worlds, the developments sought for in the agricultural sector were not primarily to meet the needs of the rural population, but to provide the resources and capital needed for the industrialization taking place in the urban centres.

Other scholars like Mendis in Sardar (ed.) (Ibid: 332) have a similar conception of the green Revolution. Mendis's view is that "the impact of" this new "technology is pronounced in shifting resources from rural areas to urban areas thereby reinforcing the disastrous process of the impoverishment of rural people." Bhagavan (Ibid: 69) states that the legitimization of the green Revolution "has been established through the production of surpluses for the urban markets." All these criticisms are almost similar to those leveled towards exploitation of the less industrialized countries by the industrialized nations as we are going to see below.

The new agricultural technology was brought into effect to break up the indigenous farming system of the less industrialized countries and hence make them dependent on developed nation for industrial agricultural input like fertilizers and other chemicals as some scholars argue. Bajaj in Sardar (ed.) (Ibid: 141) expressly states:

> The new technology of agriculture is capital intensive. Since this technology depends critically upon industrial input like fertilizers and pesticides, it commits the nation to large investments in these sectors

Another form of dependence of less developed countries to industrial nations in the new agricultural technology according to Bajaj (Ibid: 143) includes intangibles like "the external dependence for knowledge of agricultural processes." This usually occurs when a less industrialized country hires expatriates from industrialized nations for consultancy services. The new farming methods have also been relatively hazardous to the environment as compared to indigenous techniques and the victim are mostly the majority farming peasants in less industrialized nations as pointed out by upawansa in Sardar (ed.) (Ibid: 309):

> Modern agricultural techniques have played havoc with Third World societies Ecologically beneficial systems of agriculture, have been disrupted; that methods of maximizing production in the short-run are showing up long- term adverse effects; and that values and attitudes of farmers are changing.

By changing the values and attitudes, upawansa means the loss of environmental consciousness and nurturing of exploitative tendency when interacting with nature which has been a characteristic of industrialized capitalist nations. The importation of these chemicals associated with the modern agricultural system according to Surendra in Sardar (ed.) (Ibid :158) has been estimated as causing "375,000 peasants in the Third world to become ill every year," out of which a total of 10,000 die. Mendis in Sardar (ed.) (Ibid:332) argues that the modern technological agricultural system cannot effectively be of much use in the third world countries and that it cannot even meet the food requirements of these less industrialized countries as the indigenous system had done before:

> The new practice that are being introduced are inherently incapable of effectively utilizing the resources available in the Third world Countries and sustaining the Third World populations.

Mendis (Ibid.) cautioned that if the less industrialized Countries have to be self-sufficient in agricultural products, they must do away with the modern introduced systems of farming and revive the indigenous systems:

> Agriculture and connected practices being the major way of life of the Third World societies, there is an urgent need to defend the indigenous knowledge, practices and resources in these areas from the western onslaught

Having looked at various conceptions of the modern technological agricultural production system, that is, the green Revolution, its now better to critically expound on its real implication in the dilemma of environmental conservation.

4.6 THE REALITY OF THE GREEN REVOLUTION AND ITS ENVIRONMENTAL IMPACT

By and large, stripped off their caricatures, all the views expressed above concerning the Green Revolution have some truth in them. From the available scientific data, and some of which we have already quoted in this chapter, the new modern agricultural techniques have really improved the food production. At the same time, the input like fertilizers and pesticides used to facilitate this high yield productivity have been proven to be an environmental disaster and hence endangering the life of man and other species.

The pre-scientific or indigenous farming techniques were environmentally benign as compared to modern agricultural methods but considering the increased world population as a result of improved better medical services, the new agricultural techniques have to be used to meet the food demand which the traditional or indigenous system based on natural ecological functioning cannot sustain. The reason for

this is simple. The modern medical facilities or health care services have interfered with the natural population growth rate which nature regulated and hence capable of taking care of. Population growth rate has therefore taken a shape of a geometrical progression and can only be sustained by an elaborate agricultural system which can make the optimum use of the available land surface. What is therefore required is a system of agricultural production that will care for both environmental and social welfare values.

4.7 CONCLUSION OF THE CHAPTER

This chapter exposes man in a paradoxical situation as he tries to meet his dietary requirements. The problem arises because the new agricultural techniques capable to produce sufficient food has serious environmental effects that put the future of man and other species at a great risk. The subsequent chapter will try to seek for rational ways of trying to reduce these risks for the enhancement of human welfare.

CHAPTER FIVE: STRIKING A BALANCE IN MODERN AGRICULTURAL PRODUCTION METHODS AND ENVIRONMENTAL CONSERVATION

5.0 INTRODUCTION

In this chapter, we are going to critically analyze some views on technological advancement with respect to agricultural production and related environmental consequences. We will also examine various suggested solutions to the dilemma surrounding our need for a more improved agricultural production techniques and usually environmental trade-offs associated therein.

5.1 DOES TECHNOLOGY TRANSCENDS MAN'S FREE - WILL?

Man has two important faculties, which distinguishes him from other animals. The two faculties are intellect and will. Intellect is the "rational power" as O'Donnell (1995: 60) puts it. He (ibid) defines the object of intellect as the truth. The object of the will according to O'Donnell (Ibid) is goodness. These two faculties enable us to make what O'Donnell (Ibid: 61) called "intelligent decisions."

Free-will in simple terms means rational choice. It is the ability of man to make an informed decision with full knowledge of its consequences. As we have seen in chapter three, the modern agricultural technology just like other human techniques are as a result of evolution of man's

intelligence. Some philosophers have attempted to make a distinction between natural evolution and cultural evolution as we noted earlier. In this project, we are going to take it that man's cultural evolution takes place within the wider natural evolution. We are therefore not going to deal with an issue of intermarrying cultural evolution with natural evolution to solve the dilemma of technological advancement in agricultural sector and environmental conservation as some philosophers like Agazzi in Oruka (ed.) (Ibid:6) would presume but rather how man evolving within the wider system of evolution ought to direct his technological inventions for his optimum welfare guided by his intellect and will.

5.1.1 TECHNOLOGY AS LAISSEZ-INNOVER

It has been argued by some philosophers like Mcdermott in Shrader-Frechette, *et al.* (Ibid) that though technological innovations may have some adverse effects in the short run, their effects in the long-run are usually for the general welfare. This has led to indiscriminate and aggressive technological discoveries among industrialized nations as cited by Mcdermott (Ibid: 101) concerning the United States:

> It is now the premier ideology of the technological impulse in America society, which is to say, of the institutions which monopolize and profit from advanced technology and of the social classes which find in the free exploitation of their

> technology the most likely guarantee of their power, status, and wealth.

Ellul (Ibid: 301) also does not conceive the effects of modern technological improvements like soil degradation from chemical fertilizers and pesticides as being long-lasting. Instead, they are temporal re-adjustment processes just like a new pair of shoe takes some time before it adjusts to our feet. Ellul describes this situation well:

> It is never initially clear that the new factor will be acceptable to the cultural complex. This is due to the simple fact that every new factor must be integrated into the cultural framework, and this process requires a certain period of time because it entails modifications of the two interacting elements.

If we go by Ellul's view, what we perceive as being detrimental from modern technological discoveries may after sometime turn out to be a great "blessing." Kahn in Barbour (Ibid: 119) also foresees a "garden of Aden" from our advancing technologies especially in agriculture. His argument is that even some of the side effects accompanying our innovations can also be eradicated by further advanced technologies as he says:

> The resources of the earth will be more than sufficient – with a wide margin of safety to sustain for an indefinite period of time and at high living standards, the levels of population and economic growth we project. Every environmental hazard can be corrected by technology with sufficient time and a reasonable amount of money.

The holistic philosophical outlook of technology as Laissez-innover throws a reasonable doubt for having any logical or moral grounds to give room for any technological advancement with visible deleterious effects. My view is that since man freely choose which technology is best for him at any particular situation, any kind of technology with the slightest side effect to the environment should be withdrawn right-a-way and alternative technology sought. We are however bound to give an allowance of technical errors in various innovations due to lack of total perfections of human mind, but the repercussions from such errors like environmental degradation should be handled with a lot of care knowing that they can cost our lives and extinction.

5.1.2 CAN WE DEVELOP COST-FREE AGRICULTURAL TECHNOLOGIES?

As we have just mentioned above, that is, that the human mind is never 100 percent perfect, we cannot with absolute certainty expect technological improvements in our agricultural sector that are completely harmless to man directly or indirectly through our environmental degradation. This is the problem that usually lead to what I was earlier referring to as the common dilemma of technology that we also correlated with the economics law of opportunity cost. This is what leads various scholars to argue that usually most technological discoveries are associated with some side effects. Alcorn (Ibid:84) warns us that we

should be careful not to allow the side effects to go beyond the expected threshold:

> For every technological innovation and for every advance in the economic utilization to which a society puts its natural resources, there is an inherent cost that the society must pay. Because of the natural law of reciprocity, a culture cannot avoid paying this price. If the effects are not handled logically and with forethought by the society, the payment may be higher than necessary and may actually reduce the level of quality of life through destruction of the environment, overuse of limited resources, or other unforeseen results of technological activity.

Feenberg's (Ibid:6) position is that for us to have a healthy environment, we should be ready to use simple technologies which have less environmental impact if any though their efficiency is a bit lower as compared to modern advanced technologies:

> There is a price for the achievement of environmental, ethical or religious goals, and that price must be paid in reduced efficiency.

Our role as philosophers is hence to work-out or devise a logical framework for man's technological innovations and applications that will minimize the cost in terms of environmental degradation and maximize the benefits with respect to optimum quantity and high quality agricultural production. Having this in mind, the question of whether technology has a liberating or enslaving effect will also be solved. Any

technological development designed by a free agent and with good intention is always liberating from our desires, either material desires or anxiety. It will continue indefinitely as Szelt – Gyorgi in Slaate (Ibid:173) notes out: "Scientific progress cannot be stopped. Human curiosity cannot be quenched". Thus, the few side effects of our agricultural technologies should not lead us to nurture any idea of abandoning these technologies and to go back to traditional farming methods. Instead, as rational beings, we should try and specifically tailor our agricultural innovations for humane purposes. Heidegger was quoted by Dreyfus in Shrader-Frechette, *et al.* (eds.) (Ibid:46) commenting on this issue:

> It would be foolish to attack technology blindly. It would be short-sighted to condemn it as the work of the devil. We depend on technical devices; they even challenge us to ever greater advances. We can affirm the unavoidable use of technical devices, and also deny the right to dominate us, and so to warp, confuse, and lay waste our nature.

5.2 TECHNOLOGY AND ENVIRONMENTAL RACISM/NATIONALISM

Much of the criticisms levelled against technological advancement in agricultural sector and environmental problems based on racism and nationalism are almost similar to what we termed as politicization of the Green Revolution in our last chapter. The fundamental argument on environmental racism or environmental nationalism is that development

and application of various technological innovations is predetermined for the benefit of some sections of the society based on race or nationality while the other sections bear the burden.

In September, 1969, the Noble Peace Foundation held a conference in Stockholm to discuss "the place of value in a world of facts". Various speakers blamed nationalism and racism as the major cause of tensions within nations and between different countries, which leads to some segments of the society perishing from starvation and hunger. The conference in Slaate (Ibid:166) agreed that:

> Nationalism maintains unnecessary inequality and conflict in the world. It is sustained by the excessive indoctrinability group loyalty, and ethnocentric outlook of man.

This kind of group loyalty causes disregard to other sections of humanity and hence lack of sense of reverence to other human beings. The Stockholm conference (Ibid:166) resolved that:

> For the sake of all our children, whether in rich or poor nations, the mutuality and interdependence of human life and creativity everywhere in the world should be ever present in our consciousness.

However, most of these kind of resolutions have been just empty rhetorics or mere paper works because the majority of the participants and even convenors of such conferences are the ones perpetrating the

environmental racism and nationalism that we are discussing about. An example of such nations is the United States and United Kingdom as cited by Tiles, *et al.*(Ibid:131) with reference to use of fuel energy in agricultural production. They argue that the above two countries continues to export the environmentally hazardous "leading gasoline to developing nations while curtailing sales in their own countries". This is really lack of moral concern to their fellow human beings because these developed countries will later come for the agricultural products in the developing countries and usually at their own dictated terms leaving the poor users of this dangerous form of energy suffering. Shrader-Frechette in Shrader-Frechette, *et al.* (eds.) (Ibid:4) claims that "in the United States, nearly one-third of the pesticides produced are banned for local use". This is very inhuman and an illustration of what Reddy in Sardar (ed.) (Ibid:297) calls the "immorality of the Western Pattern of technology". Why should a country produce knowingly hazardous agricultural chemicals that it can't use in its own country, only to sell it to other poor countries?

Most of these dangerous agricultural chemicals cannot even be allowed to be produced by the developed countries at home in order to safeguard their environment. They have thus sought for locations of their industries producing these chemicals in developing countries that warmly welcome

them out of ignorance or desperation to gain from employment opportunities and corporation taxes. Some of the victims of this kind of environmental nationalism are poor countries of Southeast Asia countries as explained by Mendis in Sardar (ed.) (Ibid:336):

> Western multinationals have also exported that model, along with its chemical processes so hazardous that they would not satisfy Western safeguards for health and safety. At their surface, Southeast Asia governments have eagerly competed to offer these multinationals the most attractive terms for exploiting their countries.

Environmental racism has also been evident within countries where some toxious industrial production facilities are located in certain segments of a nation on racial grounds. Collins-Chobanian in May, *et al.* (eds.) (1998:160) argues that:

> In America, where environmental harm has been established, the federal government doesn't provide the same protection to minority communities as it does to predominantly white communities.

Dallmeyer, *et al.* (Ibid:xiii) like Collins-Chobanian blame the government of the United States "for undesirable land uses" and " industrial location model". He gave an example of locus of most effluent industries "in poor Goergia Counties with proportionately higher non-white populations".

As Schmeikal, *et al.* (eds.) (1983:xv) puts it, the solution to environmental racism and nationalism can be sought by looking at "how technological development might be better directed to the improvement of the conditions of life of people as a whole rather than to the benefit of a few". We are therefore as human beings morally obliged not to injure or cause harm to other human beings because of our self-egoistic desires.

5.3 THE CONCEPT OF "APPROPRIATE TECHNOLOGY" AND ENVIRONMENTAL CONSERVATION

In this section, we are going to look at a possibility of devising an appropriate agricultural technological system that will cater for our agricultural production needs and at the same time take care of our environment. The concept of appropriate technology is somehow ambiguous because its definition usually varies from the interest of individuals. Other various nomenclatures have been used synonymously to appropriate technology like "bare-foot technology, soft technology, low-cost technology, village technology, intermediate technology, e.t.c", as mentioned by Floor in Bhalla (ed.) (1979:143).

Generally speaking, the concept of appropriate technology has been approached from two broad perspectives. Jequier in Bhalla (ed.) (Ibid:4) referred to this classification as "two big families" in appropriate technology. On one side, according to this broad classification, there is

appropriate technology for the developed and industrialized countries and on the other side, a parallel appropriate technology is advocated for developing or less industrialized nations. Most scholars have thus argued that countries, i.e., industrialized or industrializing should adopt and promote their own forms of technologies depending on their own specific needs. Usually, technologies that will not have a degradation effect on the environment is seen as a concern of industrialized countries while in developing countries, the technologies proposed are the ones that will eradicate poverty, create employment opportunities and assist in meeting the basic needs.

The kind of appropriate technology that has for a long time been proposed as we have seen above may not be adequate or comprehensive enough to globally solve the environmental problems associated with our modern agricultural production technologies. It is my view that any agricultural technology from the site of design should not be developed with an idea that it will be used for any particular section of humanity, but instead, any innovation should be set-up with a consciousness that it will be used for the benefit of humanity in toto. Also, as we have acknowledged, our age along the trajectory of history, can only accommodate a top-down agricultural system or rather, application of technical knowledge in agricultural production based on scientific

research. The industrialized countries are miles ahead in scientific knowledge as compared to developing countries and hence a transfer of this knowledge is inevitable if the poor nations are to meet the agricultural needs of their citizens. The allegations by Upawansa in Sardar (ed.) (Ibid:313) that "the crop-livestock-energy integrated farming system would fulfill the present and future needs of the developing world" are hence philosophically untenable. Such a farming system as advocated by Upawansa is environmentally sound but it cannot meet the food requirements for the present generation, leave alone for posterity.

5.4 IN SEARCH OF A GLOBAL ETHIC FOR TECHNOLOGICAL ADVANCEMENT IN AGRICULTURE AND ENVIRONMENTAL CONSERVATION

Most of the environmental problems arising from our modern agricultural systems have been argued by most philosophers as being the result of separation of technological knowledge from morality. Morally guided technologies in agriculture could "make hunger and poverty everywhere absolute" as declared by the Noble Peace Foundation Conference held in Stockholm, September, 1969 is Slaate (Ibid:165). Like the majority of contemporary scholars, the participants of the Stockholm conference (Ibid.) "more or less concurred that the basic problems of today are moral or spiritual in nature."

Winner in Coombs, *et al.* (eds.) (Ibid:46) argues that the absence of currently needed universal moral guidelines for technological innovation and applications is due to lack of shared global ideals:

> The vacuum is created, in large part, by an absence of widely shared understandings, reasons, and perspectives that might guide societies as they confront the powers offered by new machines, techniques, and large scale technological systems.

Somehow in response to Winner, Slaate (Ibid:169) claims that though there might be diverse world conception from different sections of the world, there are some shared values that all rational beings cherish which can be a foundation for a global ethic in scientific and technological progress:

> Though many values may vary due to relative circumstances, there are many things that all men of intelligence and good will value-alike, e.g., health, knowledge, integrity, friendship, love, beauty and gratitude.

Slaate (Ibid.) further cautions that "in the future we must not divorce scientific enterprise from human values". Slaate however, did not expound how practically or realistically we should integrate these human values as he mentioned them with various technological improvements like in agricultural sector.

We have a number of philosophers who have tried to devise some workable mechanisms for establishment and promotion of a global ethic that can be used to abate the environmental hazards associated with our new and modern agricultural production methods. Among these philosophers is Bhalla (ed.) (Ibid:212) who proposed for 'A New International Mechanism For Appropriate Technology – IMAT'. As Bhalla would wish, this international mechanism "should be a non-governmental institution" This institution as Bhalla further says should be operating independently from "the United Nations system", but it has to "be closely associated with it through a sponsorship arrangement". He (Ibid:216) recommends that its "secretariat should be small in size since its principal role is to support, catalyze and activate national appropriate technology efforts in the developing countries". The international mechanism that Bhalla proposes as a nucleus for global ethic may not achieve this noble goal for two reasons: First, if it has to rely on United Nations for sponsorship, we know very well that a large substantial of UN financial resource, is from the most industrialized nations and it is claimed that 70 per cent of all the UN funding comes from the United States alone. Since these industrialized countries are the culprits of most of the environmental hazards associated with agricultural technological developments as we have seen, there is high likelihood that they will water-down the efforts of Bhalla's IMAT. Secondly, Bhalla has argued

that the prime role of the IMAT will be enhancing appropriate technology efforts in developing countries. As we have already agreed, no form of appropriate technology based on polarization of nations as either developed or developing can be used as a base for a global ethic. What we are now aspiring for is an all-encompassing form of appropriate technology that will take care of the global village as a whole and hence a solid foundation for an ethic to guide all human beings on equal basis.

Almost with a similar view to Bhalla is Wilson in Ikeda, *et al.* (Ibid:334) who proposes for an establishment of an 'ethical council' which as he (Ibid.) says "would in itself institutionalize the regulation and control of science and technology". Wilson (Ibid:333) expect this ethical council to sprang from "international agencies like the United Nations" or else from "organizations like the one administering the Noble Peace Prize". He (Ibid.) further states that the council should be headed by "well-tested, public-spirited individuals" preferably "religious leaders". As a scientific and technological monitoring council, Wilson (Ibid.) claims that "its point of control is likely to be less over the individual scientist and more over scientific institutes, research foundations, governments, and perhaps most important of all, industry". Wilson's model for a course towards technological global ethic has some flaws, some of which we have already mentioned above concerning the United Nations by Bhalla.

Another problem with Wilson's paradigm is advocating religious leaders as the most morally upright men in our society to head this ethical council. This may not be practically amicable because of diversity of worldwide religious beliefs as we mentioned earlier. The last weakness that I noted in Wilson's model toward a global ethic on technology is the manner of operation of the ethical council where Wilson wishes its control to be "less over the individual scientists and more over" large groups concerned with technological research and applications. I personally feel that a global ethic that will be working as a guide in our modern agricultural systems should be firmly grounded at the grassroots, that is, from each individual, right from childhood so that any group like an agricultural research institution will be comprised of morally in-built personalities that will be directed solely to innovation and discoveries purely for enhancement or promotion of human welfare worldwide.

5.4.1 THE 'GOLDEN MEAN' OF ARISTOTELIAN VIRTUE ETHICS

As we have noticed from all the scholars that have dealt on the relationship of man, technology and environment, they usually compare the efficiency of the pre-scientific technological systems with modern technologies.

The traditional or pre-scientific agricultural systems were relatively harmless to man and his environment in general as compared to modern agrarian techniques. The 'pendulum' of life during the pre-scientific age was at the centre, an indication of the stability and efficiency of the farming system of the time. But today, our modern farming techniques are a great threat to our survival.

We also argued that due to some factors like increase in population as a result of advancement of other technologies in other areas like in the medical field, the traditional pre-scientific agricultural production techniques cannot sustain the present society. It is for this reason that we find ourselves entangled in between the mercy of the two production systems and none of which is completely favourable. The effects of pesticides like cancer, the degradation of soil by chemical fertilizers, the pollution of ground water through percolation and run-off, etc, has pushed the pendulum of life away from the centre which denotes inefficiency in our current agricultural production methods. The problem then is how to push back the pendulum to the centre or rather have a farming system without detrimental effects to our environment and hence no endangering the human race.

Despite the increase in population it is evident from the available data that some of the modern agricultural inputs that has damaging effect on the environment are applied excessively for maximum production to maintain an affluent life-style of most industrialized nations. This results to wastages of resources, depletion of non-renewable resources and environmental degradation. For instance, Barbour (Ibid:213) notes that "on average, a United States Citizen uses twice the energy of a European, 20 times that of a Third World Citizen, and 50 times that of a person in one of the poorer developing countries". The bitter truth of this excessive use of these hazardous agricultural chemicals is that the benefits are privatized to the advantage of just a few people while the environmental costs are internationalized and even the less developed nations are the most vulnerable due to their unawareness of the side effects of these chemicals.

For the sake of survival of the entire human race, the industrialized affluent nations have a moral obligation to change their mass consumption patterns. This will also result to reduction of chemicals applied in the agricultural production and hence lower the level of environmental degradation. For this to happen, the affluent society need to internalize an ethic, preferably the "golden mean" of Aristotelian virtue ethics which will assist this society understand that excess of everything

can also be harmful in other various respects. After understanding this, the affluent society will shift their consumption rate from maximum point to an optimum level which is the Aristotelian golden mean and the resources being wasted will be equably distributed to the poor and misery lot of humanity, eradicating hunger and poverty.

CHAPTER SIX: CONCLUSION

6.0 A CRITICAL EXAMINATION OF SOME PROPOSED PANACEA TO TECHNOLOGICAL ADVANCEMENT AND ENVIRONMENTAL DELERICTION IN AGRICULTURAL SECTOR

Various scholars have tried to provide some guiding principles on how man may minimize some detrimental impacts on the environment by various technological applications in a bid to boost agricultural productions. Daly, *et al.* in Barbour (Ibid:285) suggested that heavy taxes and depletion quotas on non-renewable resources may reduce the environmental degradation and depletion of various natural resources as he says: "such quotas or taxes would limit both resources depletion and pollution, they would encourage resource-saving and recycling technologies, and a shift to renewable resources". They (Ibid.) further states that "by means of taxes, the prices of products would internalize the full social costs of depletion, pollution and disposal. This view by Daly and his colleagues may assist us to curb the negative effects of some of our technologies in the environment but to a very less degree. The reason is that most of the beneficiaries of the new agricultural production methods are middle-class people in terms of socio-economic stratification and even when the prices of these agricultural products escalates, they will still be able to purchase them. Due to weak purchasing power of the poor people especially in developing countries, their consumption rate is very low to be affected by the taxation system. If we, for example, look

at the Kenyan coffee growers, very few of them can manage to buy coffee beverages but they are the victims of the chemicals used in coffee production. The other uncertain solution suggested by Daly, *et al.* is the imposition of quotas. The problem here is determining who will be mandated to set these quotas. As we are aware, the countries that are responsible for the current environmental problems, are also the beneficiaries of the technological improvements that generate these problems. Since therefore, the status quo agricultural production system is the one facilitating their material supremacy in the world, it will be rather difficult for them to give way for any formal or non-formal institution or agency to dictate to them how much of the world's resources they should extract and consume.

Other philosophers have argued that religion can be a better approach to solving the environmental problems associated with some of our technological advancements. As we pointed out in chapter three, the critics of religion as the cause of these environmental problems, usually blame the Abrahamic tradition. By implication, what these critics infer is that alternative religious doctrines may prevent the exacerbating environmental condition. One of these scholars nurturing this idea is white in Mitcham, *et al.* (eds) (Ibid:264) who believed that "since the roots of our trouble are so largely religious, the remedy must also be

essentially religious". He (Ibid.) further warns us that we should not expect any solution to our environmental problem to emanate from our technological discoveries but that we should only think of adapting a desirable religion: "more science and more technology are not going to get us out of the present ecologic crisis until we find a new religion, or rethink our old one". The religious approach to solving our environmental problems has received a lukewarm encounter from various philosophers. Barbours (Ibid:78) argument is that "we live in a pluralistic culture in which public policies cannot be built on the assumptions of any one religious tradition". For Botzler, *et al.* (1998:199), it is difficult to build an ethic governing technological innovations and applications on religion because "its appeal may be limited to the community of believers". In short, religious approach to solving our environmental problems brought about by our technologies has a problem because of different religious faith that we have worldwide and also the presence of different sects with their own beliefs within a single religion. A comprehensive ethic build on religion can thus be possible only if we have a universal global religion with prerequisite similar beliefs which at present we don't have.

The issue of man-nature relationship has also been used by some philosophers as a base for seeking a way forward for a harmonious

relationship of man and the environment. As we pointed out in an earlier chapter, there are scholars who argue that man is part of nature and another group who holds that man is separate from nature. Both of these attitudes toward nature may really influence our tendencies in relating to our natural environment as noted by White in Mitcham, *et al.* (eds.), (Ibid:264): "what we do about ecology depends on our ideas of the man-nature relationship". Some scholars like Feenberg (Ibid:559) believe that its only through our awareness as part of nature that the current environmental problems brought about by our technological developments can be contained:

> In the long-run, humanity's impact may be destructive regardless of how people view the world, but a concept of humanity as part of nature may help conserve limited resources. Without such a concept, there is less chance that humanity exploitation of nature can be kept under control.

Also, Ikeda in Ikeda, *et al.* (1987:336) like Feenberg see the only hope of survival within our technological age as being the recognition of ourselves as one with nature as he asserts: "Each individual human being must awaken his inner self to an awareness of oneness with nature. This necessitates the cultivation of sufficient psychological strength to crush the greed inherent in all life".

At the extreme side of the philosophers who have discussed on the environmental problems associated to our technological developments from man-nature relationship, we have those who take man to be apart from nature, and hence a conducive, interaction is necessary for man and nature for our survival. Such interaction is presumed to be based on man's dominance over nature. Derr (Ibid:57), one of such philosophers who believes in bifurcation of man and nature comments that "we cannot really escape the burden of this controlling relationship. The question, in fact, is not whether we shall exercise dominion over the earth, but how". Another proponent of the schism between man and nature is Agazzi in Oruka (ed.) (Ibid:5) who claims that "Contrary to what is typical of other living beings, man has been able to progress not by adapting to the natural environment, but by adapting this environment to people's needs".

In this project, the issue of whether man is part of nature or not will be of no importance. I will hold that what man ought to take into cognance is the functioning of the natural environment and his dependence on it for his survival. I will also argue that man as a rational being endowed with intellect and will, is morally bound to modify the natural environment to improve his welfare so long as the effects of such alterations will be beneficial to humanity more than if no such alterations are made.

6.1 SUMMARY AND RECOMMENDATIONS

This entire research project has really been a success in exploration of the critical issues on the destiny of man as homo faber and his interaction with the natural environment. We have argued that technology cannot be perceived as just mere tools as optimists hold, neither does it possess subjugating qualities to sway man this way or that way according to its whims as pessimists claim. Far from that, technology manifests a form of knowledge which has been freely organized to meet some practical human wants. From this perspective, it is the relegation of man's responsibility to direct and apply his practical knowledge as expected that we experience the current environmental degradation from our modern agricultural technologies.

The prime cause of the present environmental decay as we advance technologically is the self-egoistic greed by some members of the society especially in the affluent industrialized countries. It is on this ground that we will also accept our first hypothesis, that is, that technological advancement is not inherently detrimental to environmental equilibrium because it is this few uncaring section of the society that direct the technology for evil purposes, for instance, excessive application of harmful agricultural inputs in order to maximize production for them to

live a lavish lifestyles while the rest of humanity is starving and dying of hunger.

From the 'golden mean', we have also learnt that the present environmental problems can be brought to a manageable level if the affluent societies stop the attitude of production maximization and opt for an optimum level. This will be facilitated by inexcessive application of agricultural inputs and fair distribution of production among all humanity. For that to happen, man must develop an attitude of respect and love for all other human beings regardless of nationality, race, religion or any other form of creed. If we can achieve this which is possible, our second hypothesis, which is, that environmental equilibrium can be maintained despite the advent of modern technology can also be accepted. In addition to cultivating a global respect and love for humanity, I also want to suggest that any agricultural technology that may have side effects should be scientifically analyzed for a threshold of its application to be established to prevent any direct contamination of the user and a possibility of long-term environmental effect.

Finally, man should understand that technological knowledge is a special endowment and a characteristic of humanity for enhancement of his welfare and facilitation of his survival. This understanding should be

nurtured by all human beings right from birth. An umbilically-linked attitude to this understanding is universal love and reverence of all mankind. With this understanding and attitude in mind of all of us, technology cannot be taken as a "necessary evil" as Oruka in Oruka (ed.) (Ibid:169) contends "in humanity's endeavours to improve the quality of his life.". On contrary, for instance, in agricultural sector, the modern technologies will be used to ensure food for all through optimum production and human sharing with little negative environmental impact if any.

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