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Ethical Considerations in the Diffusion of Katumani Hybrid Maize Seed Innovation in Machakos County, Kenya

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Abstract: **In this paper, I will discuss the importance of ethics in the field of agriculture in the process of diffusion of innovations. My argument is that the consequences of agricultural biotechnologies on humans and their effects on the environment are often disregarded or underplayed in the diffusion process. There is an inordinate reliance on biotechnologies whose diffusion is undertaken in contexts of contrived urgency in an effort to bridge the mismatch between food supply and demand in Africa. This is an issue of ethical concern. Research should not only answer questions and solve problems, but should do so in line with the ethical values and needs of society. In explaining my point, I will rely on my observations, experiences and findings while carrying out research on diffusion of hybrid maize seeds in Machakos County.**

Keywords: **Ethics in agricultural innovation diffusion, Moral issues in agricultural innovation diffusion, Diffusion of agricultural innovations, biotechnology, food security and technology, Innovations in agriculture.**

1. INTRODUCTION

Diffusion of agricultural innovations in Africa got a great impetus from the Malthusian theory which made increasing food production an urgent matter. The consequence was that African countries came to rely inordinately on agricultural biotechnology in an effort to bridge the mismatch between food supply and demand giving room for the disregard of the consequences of these technologies on humans and the environment. This raises issues of ethical concern and creates a moral dilemma for those involved in promoting the diffusion and adoption of these innovations. Agricultural innovations have socio-cultural and economic implications as well as effects on health and the environment.

Thomas Robert Malthus (1798) was influenced by the conditions in Europe to develop his theory of imperfect world in which food production would grow arithmetically while population would grow geometrically. According to his theory, at one point in time, the world would have no capacity to produce enough food for all the human beings unless measures were taken to curb the growth of human population.

The introduction of birth control technology in Kenya is a good example of the application of the dread of Malthusian predictions to suspend ethics and to manipulate Kenyans into accepting an innovation they didn't consider they needed and which they considered disruptive of Kenyan culture. Chiweni Chimbweteàà, Eliya Zulu, Susan Cotts Watkins (2014) in their paper, "The Evolution of Population Policies in Kenya and Malawi" narrate how Frank Sutton then working for the Ford Foundation, pressed the Western world to take advantage of the state of flux in the newly independent African states in the 1960s:

"We would miss superb opportunities for service, and ***enlightenment*** if we did not respond to the openness and the urgent needs of the ***fledgling governments*** we are helping in this part of the world." (*Emphasis mine*)

A new "scramble for Africa" began as Western governments and international organizations offered African Governments "advice" and money in areas such as agriculture and population control. Barrett and Tsui (1999) explain how the activities were carried out covertly, through a system of bribes and coercion of the Kenyan government officials.

The international population movement developed a standard choreography to encourage the adoption of a population policy and its implementation. This included surveys that would show a popular interest in or demand for family planning and multi sectorial seminars for political elites that would then support beyond the Ministry of Health and technical assistance for family planning programs. Elites opposed to technology were characterized as ignorant while wide spread resistance was blamed on backward cultures.

In fact the dominant model of diffusion of innovations commonly referred to as "diffussionist model" had its origins in the modernization paradigm which arose soon after World War II coinciding with the neo-Malthusian movement. Development was seen as a challenge to bring the "underdeveloped countries" out of their conditions of poverty by "modernizing" them – making them look like the West. The argument was that underdevelopment in the developing countries was due to internal causes present within the nation and the individual as well as within the social structure.

Daniel Lerner and Wilbur Schramm (1964) two important communication theorists stressed that the individual was to be blamed to the extent that he was resistant to change and modernization. He was therefore the starting point to bring about social change. Changing the individual's traditional values became the priority task.

At the social system level, modernization advocated for a change in the mindset of individuals in poor countries who had to abandon traditional beliefs, considered an impediment toward modernization, and embrace attitudes and behaviors favorable to innovation and modernity (Lerner 1958).

In this paradigm the communication flow was one way which was top- down vertical communication from the authorities to the people. Mass media channels were used to mobilize the people and the audience was assigned a passive role for acceptance of social change.

A reactionary "participatory model" which developed in developing countries purports to involve the users in a two-way process but has hardly overshadowed the diffusionist model. The participatory model attempts to create a feeling of ownership of the innovation among end users in order to win their approval. It is an approach that is expected to facilitate people's involvement in problem identification, research, decision-making, implementation and evaluation concerning issues impacting their lives in order to address specific needs and priorities relevant to people and at the same time assisting in their empowerment. It is supposed to be consistent with a democratic vision of international development, necessary for increasing projects sustainability.

In essence however, the two communication models are the same -- top-bottom models where information originates and flows from innovator to the end user.

In this paper I will discuss what I consider to be the major ethical issues that diffusion of agricultural innovations in Africa raises. All the while I underline my conviction that research should not only answer questions and solve problems, but should do so in line with the ethical values and needs of society. In explaining my point, I will rely on my observations, experiences and findings while carrying out research on diffusion of hybrid maize seeds in Machakos County and on zero grazing in Kericho County. I will start by discussing diffusion process and the role it plays in getting an innovation to be adopted

2. THE DIFFUSION PROCESS AND ITS ROLE IN GETTING INNOVATIONS ADOPTED

2. 1 Introduction:

The classic definition of diffusion of innovation is attributed to Everett Rogers who describes it as "the process by which an innovation is communicated through certain channels over time among the members of a social system" (Rogers, 1995). An innovation is an idea, practice, or object that is perceived as new by an individual or other unit of adoption (Rogers (1995). Rogers (2003) explained how new ideas permeate a social system through communication channels. He articulates a number of factors that assist in the diffusion process. These include the characteristics of the innovation such as relative advantage, compatibility with norms and current practices, complexity, observability, and trialability or ease of experimentation. Li and Lindner (2007) adds communication channels, cultural factors, contextual innovativeness, perceived needs, social systems, and socioeconomic factor.

2.2 Communication process:

Communication process involves a sender, message, channel, and receiver. The process begins with a sender who has a message to send and encodes it in a form to suit the channel he thinks is best suited for the message to be received without distortion by the receiver. All the four elements – sender, message, channel and receiver - have characteristics which can influence the diffusion process. The innovator deliberately sets out to understand the characteristics of each element and tries to use them to achieve the acceptance of the innovation.

For example the source must have credibility for the message to be believed. An innovator looks for acceptable people or channels to pass the message. Messages are coined by the innovator taking into account the norms and characteristics of the potential adopters. The source has the power to decide how much information and what type to include in the message. He may choose to exaggerate or apply fear appeals that predict starvation and death to enhance possibilities of adoption. Messages may also deliberately label non acceptance as a sign of being backward or primitive. Channels such as change agents and agricultural stores depend on information provided by the innovator which may be limited. Depending on his motive, the innovator may coerce or manipulate. The innovator also takes into account the receiver variables that include the social economic status and social system in which they belong to facilitate diffusion. The innovator seeks to understand the social system norms and values and tries to craft his messages in words that seem compatible and acceptable. From the social system opinion leaders are identified.

2.3The Innovation Adoption Decision-making Process

The innovation adoption decision making is an information-seeking process. The would-be adopter is actively seeking information to enable them to make a decision to adopt or reject the innovation. According to Roger's (2003), innovation adoption decision making model has five stages.

i) Knowledge

This is the point at which the would-be adopter is first exposed to the innovation itself. They do not have enough information to make a decision to adopt or reject the innovation but they are sufficiently inspired to find out more on why and how the innovation works. Individual characteristics distinguishing potential adopters include their attitudes to change and their perceived needs while the social system should be tolerant to change and deviancy. These are the people who are quick to accept innovations and are used to spread the innovations. So messages created at this stage are designed with this group in mind.

ii) Persuasion

Persuasion is the point at which the prospective adopter has formed favorable opinion towards the innovation. They are actively seeking information which will inform their eventual decision. They are looking for information to confirm that the innovation has characteristics and benefits above what they are currently using. For this they rely on trusted friends and opinion leaders who relay information they received from the innovator. This is an effort to reduce uncertainty. However the information available on the characteristics of the innovation emanate from the innovator who decides what to share and what not to.

ii) Decision

Eventually the would-be adopter must make a decision. They will weigh up the pros and cons of the innovation and either accepts the innovation or reject it. At this point he relies more on expert advice of extension workers and farm demonstrations who use information that originates from the innovator,

iv) Implementation

This stage is when the adopter makes a decision as to whether or not the innovation is actually useful to them. They may also seek out further information to either support the adoption of the innovation or to better understand it in context by consulting early adopters.

v) Confirmation

This is the point at which the potential adopter evaluates their decision and decides whether they will keep using the innovation or abandon it. This phase will normally involve a personal examination of the product and also opinions of colleagues, family and friends.

In all these stages the information relied upon to make decisions is from the innovator. The innovator can filter or twist the information as he pleases. He also chooses persons with characteristics that make them to be believed by potential adopters or are in positions to use coercion, as in the case of governments, to force them to accept the innovation

I have defined diffusion of innovations and described how the process works. Basically an innovation is "injected" into a social system and information about it is expected to travel through the system, turning everyone in the system to an adopter. This is what McCann (2012) refers to as a "pro-innovation bias" – an inherent belief in diffusion research that all members of a social system have a need for, and should therefore adopt a particular innovation. In this chain of innovation, diffusion and adoption, the diffusion researcher and communication strategist stand in the important position of developing the ideas that guide the entire diffusion programme.

Most innovations originate from outside the community and do not take into account the felt needs and knowledge of the community. Their long term consequences on the social system are often overlooked. They may also have far reaching effects on health and environment.

It is the understanding of the issues involved in developing an innovation, packaging it and spreading it through the social systems that raises the ethical issues.

3. ETHICAL ISSUES IN DIFFUSION OF AGRICULTURAL INNOVATIONS

Ethical issues are moral issues. Every individual is affected differently by ethics. Richard Paul and Linda Elder define ethics as "a set of concepts and principles that guide us in determining what behavior helps or harms sentient creatures" (Paul and Elder, 2006). Ethical standards help us to distinguish between acts that enhance the well-being of others and those that harm or diminish the wellbeing of others. Innovations that are perceived as diminishing or harming the wellbeing of potential adopters, will not only have a hard time being diffused but will also diminish the credibility of those involved in their diffusion.

In my analysis, I will select four widely accepted ethical principles as articulated by Beauchamp and Childress (2001) which are: The principle of respect for autonomy, the principle of beneficence, the principle of nonmaleficence, the principle of justice in order to illustrate my argument with reference to the diffusion of Katumani hybrid maize seed innovations in Machakos County. It is therefore in order for me to give a brief introduction to the development of Katumani hybrid maize.

The Katumani hybrid maize programme was introduced by the colonial government in 1953. The purpose was to develop drought resistant maize. According to many reports, Katumani maize does what it promised to do, but its adoption by farmers in the area has remained low over the years (Mbithi, 1972, De Groote,2005, Kavoi, 2014). At the expected 80 per cent adoption level, annual food shortage rate would consequently decrease from 33 per cent to 12 per cent. (Mbithi, 1972, Kamotho, 2012). Despite these obvious advantages however, the adoption levels by the farmers have remained low at below 30 per cent over the years due to lack of diffusion (Kavoi 2014). In a paper entitled "Participatory Selection of Farm Enterprises: A case study from Makueni District in semi-arid Eastern Kenya" Gatheru (2001) says, "Although recommendations of these technologies (Katumani maize seeds) have been documented and disseminated, their adoption is low." That is where I come in – to try to establish the causes for the lack of diffusion.

The circumstances that preceded the introduction of the hybrid maize seed are interesting The Kambas who live in the area traditionally practiced mixed farming with areas strictly allocated for crop farming which included a tall, maize variety producing large cobs referred to as "Kikamba maize." The adjacent plains were grazing fields. These are the areas that European settlers took away, driving the Akamba cattle to the crop farming areas. Crowding soon led to soil erosion and then the infamous destocking in which many Kamba cattle were confiscated or slaughtered. That led to more problems … and famine (English, Tiffen and Mortimore, 1994). It was in these circumstances that hybrid Katumani maize seed was developed. It was short – about 3 feet above ground. It could naturally therefore only support a small maize cob – the size of a fist.

In promoting the maize, the colonial government spared no tactic – coercion, blackmail, exaggerations and even labeling those who didn't adopt as backward and tradition-bound (Mbithi, 1972).

The innovation was rejected the innovation and in their turn, the local community branded it with many negative labels – it was called maize for dogs (it was so short dogs could eat it). Eventually Katumani became a word for anything short and useless. The negative labels spread faster than the innovation. In many parts Kenya and beyond, Katumani today means short and useless.

How then, does this relate to the ethical issues I outlined?

i). The Principle of respect for autonomy

This principle refers to our obligation, as human beings, to respect the decisions made by other people concerning their own lives. This is also called the principle of human dignity. The practice of diffusion of innovations whichever model we use – diffusionist or participatory or anything in between - soon becomes a top-bottom communication if ethical issues are not taken into account. The assumption is that the innovator has the knowledge and the community is ignorant. Let's take the case of Katumani maize again.

During the introduction of the maize seed, the people were not involved in the innovation process nor were their opinions sought on what traditional foods could do well taking into account their climatic condition and environmental concerns. Instead they were pressured to adopt an innovation that was not a felt need. There was coercion and exaggerations about drought in Ukambani. The region is vast, with variations of climatic conditions with arable areas. But with the colonial destruction of the traditional economy coupled with exaggerations, Ukambani became synonymous with famine and starvation. It is an exaggeration that injures the dignity of the community.

Ethical questions that people involved in diffusing these innovations should ask themselves:

a) Was the innovation introduced as a result of a felt need by the people?

b) Were there alternative traditional foods suited to the ecosystem which could do well without modifying seeds and changing of lifestyles?

c) Did the introduction of the innovation take into account their traditional farming knowledge or was it just assumed that they were ignorant?

d) Was the introduction of the innovation upsetting social structures, norms and values?

e) Was there understanding of the cultural and intrinsic values (such the intrinsic value of height and size of maize cob among the Kamba) taken into account?

ii). Principle of beneficence

This is an obligation to prevent harm to the environment, safety and health. We should not promote technologies that are harmful. In Kericho, where I am carrying out research on adoption of zero grazing, people use *Roundup* herbicide without protective gear, exposing themselves to health risks. These are harmful effects which raise the question: How much information are farmers given on how to protect themselves? Innovators at the persuasion stage emphasize the visible characteristics of an innovation (such as the ability of Roundup to destroy weeds) leaving out any mention of its negative aspects or side effects (such as birth defects and autism in the case of Roundup). The end should not justify the means.

Ethical questions that people involved in diffusing these innovations should ask themselves:

a) Was there concern for the environment, health and safety?

b) Were any precautions taken to prevent possible harm such as informing the people on the use of protective gear?

c) Was the local community consulted for alternative methods?

d) Was there information on consequences on culture and patterns of behavior?

e) Was there sufficient information on the long term consequences of exposure and use of herbicides on health and environment?

iii) The principle of non-Malfeasance

Non-Malfeasance is ethical principle that is commonly referred to as "first, do no harm." It translates to: Do not do anything that does harm to the members of the social system or the social system itself. By knowingly aiding diffusion of innovations which can harm health and the environment, we are breaching this principle. In addition, it is unethical to waste resources that could have been put to better use by introduction of innovations that are unsustainable. Introduction of innovations such as Katumani hybrid maize seed is costly and should therefore only be done when sustainable.

You may also harm other people, too, when you introduce agricultural innovations which affect those who didn't accept it. For example, GMOs are tested in fields where cross pollination can affect the stability and quality of yields of neighbors targeting organic farming. According to McCann (2012), herbicides such as glyphosate roundup may have harmful effects on health and environment.

Ethical questions that people involved in diffusing these innovations should ask themselves:

a) Is the innovation harmful to health and environment?

b) Does the innovation affect others who are not part of the diffusion process?

c) Are public resources unnecessarily being misused?

iv) Principle of justice

We are obligated to work for the benefit of those who are unfairly treated and the environment. It means as we said in the beginning that research should answer questions and solve problems, and do so in line with the ethical values and needs of society. I go again to Katumani hybrid maize seed. Taking account of what the community knows leads to identification of the felt needs of the community and therefore to the development of innovations that are useful to the community. This ensures sustainability. It is unethical to introduce innovations whose adoption may not reach the critical mass necessary for its continuity and in the process waste the time of the few adopters. In the Katumani case traditional knowledge of the community identified areas which are suitable for crop farming and type of crops that were needed.

Ethical questions that people involved in diffusing these innovations should ask themselves:

a) Is there any value in continuing research for a crop identified as unsuitable and unsustainable?

b) Are we wasting other people's time with our experiments which we often abandon when they are not sufficiently adopted to attain the critical mass for our commercial interests?

c) Do we as researchers feel it is morally okay to continue for decades, research into an innovation that the target group doesn't feel the need for?

4. CONCLUSION

In conclusion, my effort in this paper has been to show the ethical issues that arise in the diffusion process in agriculture and to explain how they affect the target group of the innovation and those who are involved in the diffusion of the innovations. I have also suggested ethical questions that I believe can guide ethical diffusion.

I have emphasized that innovation diffusion involves transfer of information on the assumption of trust between persons. It is therefore axiomatic that the rights, culture, dignity, interests, knowledge and sensitivities of communities targeted for innovation diffusion must be safeguarded. This also includes the responsibility to protect the physical environment, health and safety of the members of the communities in which the innovations are diffused.

Indeed, Rogers includes ethical issues in his diffusion of innovations model. He says for an innovation to be adopted it must be compatible with the existing values and practices. He defines compatibility as the degree to which an innovation is perceived as consistent with existing values, past experiences, and needs of potential adapters. An idea that is incompatible with the values and norms of their practices will not be adapted as fast as compatible innovation will be rejected (Rogers, 1995, 2003).

I have also argued that when there is a conflict of interest, community interest must come first.

Ethics may affect us differently. There is however, I would like to believe, a common denominator that makes us human.

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