
Ethical Considerations in Technology Transfer

THOMAS J. FROEHLICH

ABSTRACT

ISSUES IN TECHNOLOGY TRANSFER are examined from the perspectives of Kantianism and utilitarianism and in terms of the factors that must be considered in moral deliberation—i.e., social responsibility; social utility; and individual, professional, and institutional survival. In current practice, utilitarianism operates under the guise of technology needs assessment. This article advances the argument that ethical deliberation in technology transfer is biased toward the utilitarian view, that utilitarianism has inherent difficulties in projecting the consequences of technology transfer, that utilitarian principles are often sabotaged by political or self-serving goals and ideologies, and that the perspectives offered by Kant and feminism are important aspects in establishing what should be a dialectical process for determining which technologies are appropriate and how they should be transferred.

INTRODUCTION

Wales seems an unusual place for an American to reflect on ethical considerations in technology transfer, particularly the transfer of information technology, and the role of information professionals in the process. Yet it is the experience of teaching several summers at the International Graduate Summer School in Aberystwyth that evoked these reflections. Students, faculty, and professionals from as many as forty different countries gathered for this cross-cultural educational experience, now under the auspices of the Department

Thomas J. Froehlich, School of Library and Information Science, Kent State University, Kent, OH 44242

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of Library and Information Studies of the University College of Wales. (Before its merger with the University College of Wales, the school was known as the College of Librarianship Wales. The summer program has been renamed the International Graduate Information Summer School.) The summer school was designed, in part, precisely for the purpose of facilitating transfer of information technologies from developed countries to less developed countries (LDCs). Information technologies are an integral part of successful technology transfer and contribute to an LDC's ability to develop and sustain scientific and technological activities. During these summer programs, information professionals from various countries discovered many shared needs and concerns, but the diversity of needs, the plurality of problems, and cultural differences also became apparent. This heterogeneity made the issues of technology transfer and ethical considerations all the more difficult.

Transfer of technology touches on such issues as global economics, balance of trade deficits, political and social beliefs, balances of power, allocation of world resources, and environmental issues. Its rise to prominence as a geopolitical issue stems from imbalances between advanced or developed countries and underdeveloped or lesser developed countries. Graham (1982) reports that northern or developed countries account for 95 percent of all the world's research and development while southern countries, representing 70 percent of the world's population, generate only 4 percent (p. 45). Technology transfer is important for economic development, but much of the available technology is invested with proprietary rights so that it cannot be freely transferred.

APPROACHES TO TECHNOLOGY

There are many ways in which technology can be understood. For this article we will distinguish among three levels of technology: (1) technology in general; (2) technological practices, and (3) technological packages. In general, a technology can be characterized as a group of techniques, either intellectual or embodied, orchestrated as a totality for solving a particular problem or set of interrelated problems. The technologies with which information professionals are familiar can be divided into two kinds: (1) "intellectual technologies" (Taylor, 1986) such as classification, cataloging, indexing and abstracting, technologies that perform "value-added processes in information systems," and (2) technologies as embodied systems of tools or procedures, such as computer systems and their use in online public access catalogs. In practice, this distinction is difficult to maintain because intellectual technologies, manifest in the mental activities of theoreticians or experienced

professionals, lead to forms of embodiment—e.g., theories of classification lead to systems such as Dewey Decimal, thesauri, authority lists, etc. These embodiments, taken up by professionals, may in turn influence perceptions and intellectual organization.

The intellectual technologies are like Kant's schemas, structures by which experience is organized and which make experience possible. For example, information professionals acquire classification schemes through courses, lectures, exercises, and reading; but once the schemes are acquired, they become devices through which classifiers and catalogers structure their experience of intellectual works, which thereby transform their experience of those works. This may not always be appropriate. Berman (1981) noted that the 1979 *Dewey Decimal Classification* had inadequate coverage of popular music and gay issues and had ambiguous treatment of North American Indians. Classification schemes and subject headings tend to reflect the biases of the general population. Since the dominant classification and subject heading schemes were developed in America, the bias they reflect is an American one. These biases may inhibit the easy applications of such classifications to local issues in a developing country.

In addition to characterizing the technology associated with information work, one should also distinguish, as Pacey (1983) does, between technology and technology practices. Technology practices are individual or generic applications of technologies in a specific context of people and organizations: "technology-practice is thus the *application of scientific and other knowledge to practical tasks by ordered systems that involve people and organizations, living things and machines*" (Pacey's emphasis, p. 6). Technology practice is geared to specific contexts, which entail cultural and organizational constraints. For example, a Dewey Decimal Classification used in a special library may be adapted to meet local needs and objectives. Recommendations for appropriate classification embodied in the Dewey rules may be overridden to suit organizational requirements.

Thus intellectual technologies lead to forms of embodiment (classification schemes) which in turn, through the activities of trained or experienced professionals, lead to specific practices (e.g., classification of a particular text for a particular information-seeking environment). But it should be a dialectical process: problems in particular classifications should lead to reflection on the forms of embodiment and the grounding intellectual technologies. Unfortunately, there are three reasons why this may not occur: (1) practices may pose insoluble problems—e.g., in hierarchical classification schemes, it is often difficult to expand the vocabulary, modify the meaning of a term, or describe complex

concepts (Meadow, 1967, p. 26); (2) practitioners may not communicate difficulties to classification rule makers; and (3) classification schemes have historical inertia and tend to be inflexible.

A technological package, a third approach to technology, can be seen as an uprooted technological practice. A given technology is developed for a particular cultural and historical environment. Upon its success, the developers often attempt to generalize the technology by disengaging it from its original application. Examples include many library automation systems, such as NOTIS, which have been "home grown"—that is, built for a particular university setting; they then become a technological package marketed to other universities and applications. This deracination process lies at the core of the notion of a technological package, which has been adapted from Crowther's (1986) characterization of information technologies:

closely inter-related sets of hardware, software, . . . human resource (and skill) requirements and guidelines, . . . which "work" or "function" together in a strictly technical sense (e.g., reducible to a highly controlled laboratory situation), apart from contextual considerations, in order to produce or transform a good, service or standard. The technology becomes a *technological package* when it is labelled by a policy symbol and subjected to a series of technological utility and economic efficiency decisions. (p. 1)

For Crowther, a technological package is the mechanism by which technology is transferred and therefore is the unit around which assessment occurs. It is an important notion because it describes actual phenomena, and understanding its character helps one to understand the complexity, as well as occasional failures, of some transfers. The technological package is "a classic case of a technological solution looking for a problem to solve" (Rogers & Larsen, 1984, p. 269) without regard to the appropriateness of the problem or the context.

ETHICAL FRAMEWORKS

With these distinctions in mind, two familiar philosophical positions can be introduced as frameworks for studying ethical considerations—i.e., Kantianism and utilitarianism. These positions do not of course exhaust the pluralism that exists in current ethical inquiry. Part of the difficulty in discussing applied ethics lies in developing some shared standards, difficult enough in the diversity of American culture and even more problematic in an intercultural context. Yet the positions of Kant and utilitarianism were chosen because, according to Kohlberg (1976), they are dominant and commonly held across cultures. (Kohlberg has claimed that these two positions are stages in a process of moral development that is shared across cultures. He argued that there were six definable stages in the moral development of persons. The stages were divided into three

levels: pre-conventional, conventional, and post-conventional morality. In the latter two levels, the ones characteristic of mature morality, each stage reflects the utilitarian and Kantian position respectively, but the latter level has a deeper appropriation based on a personal commitment to a sense of justice rather than social determination [conventional morality is based on shared norms and values that sustain groups and societies]. People who progress through these levels or positions do not necessarily know their philosophical names, originators, or advocates. Nevertheless, if Kohlberg is correct, they come to live according to these positions as their ethical development matures. Although there are some difficulties and challenges to Kohlberg's position, for the sake of establishing a springboard, the focus will be on the utilitarian and Kantian aspects of conventional morality [level 2], since they seem to be the guiding ethical views of many cases of technology transfer.) Even if people, transferrers and transferees alike, do not know their names, they practice behavior that can be described in Kantian or utilitarian terms.

THE KANTIAN APPROACH

The Kantian position of the "categorical imperative" appears to be a rationalization for the golden rule: do unto others as you would have them do unto you. One of Kant's (1959) formulations of the categorical imperative is: "Act so that you treat humanity, whether in your own person or in that of another, always as an end and never merely as a means" (p. 47). Kant admonishes us to treat ourselves and other people as ends worthy of respect and never merely as means.

Kant's position was formulated as a personal ethic: in fact ethics for Kant was anthropocentric, dealing with man's relation to himself or other men. The stakeholders in technology transfer, however, can be persons, groups, or institutions of various sorts—i.e., governments, corporations, foundations, nonprofit agencies, scientific committees, or countries. In this article, *institution* will be used as a generic term to cover these various collectivities. To extend the value of the categorical imperative, one must include these institutions as actors, because they are entities with some degree of autonomy, with their own status and rights. Given the view in the United States that corporations have legal status as individual entities, one could simultaneously argue, as we for the moment will assume, that any institution can be accorded the status of moral agent. Philosophically, it is not easy to justify this assumption (especially for Kant where moral worth is traceable to a rational will), for collectivities, like governments and other institutions, exist only in and through individuals, and yet it is clear that governments and institutions make

choices. Their actions and directions represent a will for the institution as a whole. In this sense, institutions have an autonomous life. Assuming the moral agency of institutions, Kant's categorical imperative can be restated: treat all institutions not merely as means, but at the same time as ends in themselves. Just as an information professional, from this Kantian perspective, has no right to regard his employing institution as a mere means to his livelihood, organizations in both developed and developing countries must avoid being mere users of each other.

With these views in mind, one could argue that Kant's categorical imperative gives rise to three factors for ethical considerations in technology transfer: promotion of organization survival, preservation of individuality, and presence of goodwill. These can be compared to the four factors isolated by Rubin (1991) in a paper on "Ethical Issues in Library Personnel Management"—organizational survival, individuality, social utility, and social responsibility. (The notion of principles implies settled rules of action. But these considerations are less rules than constituent elements that contribute to the moral deliberation that leads to a choice and/or action, upon an appeal to some ethical principles, like fairness or justice. Ethical principles imply sets of values or rules that are invoked in the process of weighing these diverse factors.) The factor of organizational survival, derived from Thompson's *Organizations in Action* (1967), originates in the view that a fundamental function of an organization is to perpetuate itself so that the organization survives and prospers. While Thompson derives this consideration by analogy to the moral self-interest of individuals found in the work of Locke and Hobbes, it appears to be associated with the Kantian notion of the autonomy of the will from the version of the categorical imperative quoted earlier: "Act so that you treat humanity, *whether in your own person* or in that of another, always as an end and never merely as a means" (emphasis added, p. 47). If institutions have moral agency, they also are ends, never to be treated merely as means. This implies, as Rubin suggests, that those who run or serve institutions have an obligation to make the organization as efficient as possible for serving organizational ends (otherwise they would be treating organizations as mere means in themselves).

But in the world of information professionals, there is a related consideration—survival of the profession. Each profession is also never merely a means but an end and must be granted rights of survival. One of the origins of ethical conflict is precisely the clash between organizational and professional survival: on occasion, obligations to the profession may override organizational survival or vice versa. For example, if an information professional is asked

to pad the account of a client with inappropriate online searches, this activity may promote institutional survival but at the expense of professional survival. Since this factor applies to organizations and professions, it might be better called the principle of institutional survival.

There is another dimension of survival that must be included in contemporary ethical discussions, that of planetary survival. The advent of technologies with large-scale impacts have changed the character of the ethical arena. These changes have led Jonas (1984) to create new formulations of Kant's categorical imperative: "Do not compromise the conditions for an indefinite continuation of humanity on earth," or "Act so that the effects of your action are compatible with the permanence of genuine human life" (p. 11). Paradoxically, these versions of the imperative move away from Kant's focus on intentional states and move toward the utilitarian mode of thinking, as they necessarily focus on the consequences of an action, and so these versions will be taken up during the discussion of utilitarianism.

Like the factor of institutional survival, the factors related to individuality are founded on the original versions of the categorical imperative. People are individuals in an organization and ends in themselves. Their individuality must be respected, and Rubin argues that they should have as much freedom in the marketplace as practicable. Rubin adds: "Restrictions on employee conduct and expression require a valid rationale. In other words, the Principle of Individuality implies that all rules, regulations and punishments should have a clear rationale, i.e., 'just cause'" (p. 8). This principle can be applied to organizations as well. Organizations should have as much freedom as possible, and restrictions on organizational behavior in the marketplace should have "just cause." For this reason, the principle might be better called the principle of autonomy, since it affirms the autonomy of individuals and organizations in pursuing their goals subject only to constraints based on just cause (e.g., the prevention of environmental pollution).

Some further clarifications of Kant's position can be productive here. At the center of Kant's moral philosophy is the notion of a good will. A good will is an unqualified good, unlike other kinds of goods—for example, wealth, power, or information technologies—which can be abused. A good will is a will that acts for the sake of duty. When an action is performed because of the belief that it is right, it accrues moral worth for the person acting. In Kant's view, it is not because good consequences are achieved that an action is good; rather, an action is good when it was attempted because it was the right thing to do (e.g., the action of providing agricultural

information to a developing country with problems of starvation is good despite the fact that a drought destroyed the crops). Somewhat problematically, Kant disassociates a good will from inclination. Kant believes that an action is hardly moral if we are inclined to do it anyway—e.g., a corporation that gives away computers to universities or developing countries because of tax write-offs or obsolescence of models is performing actions that have no moral worth even if the consequences are good. The reason, according to Kant, is that, although its actions were in accord with moral duty, they were not done for the sake of that duty.

Kant seems to imply that there must be a certain level of consciousness in moral action—i.e., one must be aware that what one is doing is in accord with one's duty. This notion seems to run contrary to the Aristotelian view that moral worth is related to properly acquired moral habits. For example, if a person or institution is in the habit of donating obsolescent models of computers to charitable causes, such actions are morally praiseworthy because they are in accord with good character formation and not because the institutions are conscious of their duty. They are the kind of actions a good person of good character would perform. One would think that Kant would agree, but he seems to insist on a certain level of awareness of duty.

Given that this motivation is the element that supplies moral worth, Kant must determine some objective content for the moral law. He reasons that you should "act only according to that maxim by which you can at the same time will that it should become a universal law" (p. 39). In this version of the categorical imperative, Kant is suggesting that an action is morally acceptable if the doer of that action could wish that the principle that guides it become a universal law. For example, one could not wish that lying become a universal law; if it did, communication of fact would become impossible since not everyone would make the same assumptions on the basis of what they were told.

Kant does not imply that concrete laws of conduct can be deduced directly from the categorical imperative; rather it operates as a criterion for judging the morality of subjective principles of conduct which Kant calls maxims. Suppose that I choose to supply agricultural information for use in a poor rural area where there are no proprietary rights on the information or its use. The maxim of this action is: I will provide technological and scientific information to needy countries or people, where the supply of that information will not infringe on copyright, misuse of employer's resources (e.g., duplicating costs), etc. I ask myself whether I could will that this maxim become a universal law, namely that anybody in a position

such as mine would do the same, and decide that I can so will it. Hence the maxim is morally justified. Interestingly, in terms of this example, there may be some who would feel justified in the misuse of employer's resources and/or in the infringement of copyright, for example, if they deemed that a higher good would be served, namely, the alleviation of famine, disease, or poverty. Kant would have difficulty in endorsing such actions as acceptable moral law, precisely because he sees justice and universality tied together. For him, it is still a matter of stealing, albeit from the rich to the poor, and to wish that it become a universal law would be to advocate actions inconsistent with fundamental notions of morality, namely, justice, fairness, and contracts.

Through the criterion of universalizability, one can determine the admissibility of certain maxims into a proper ethical code. So the maxim, "steal information from vendors or employers, everyone else does," is inconsistent when universalized—i.e., vendors and employers would cease to exist if everyone stole from them. Kant's position is often called a formalism since it only determines the form of the moral law (universalizability) and not its content.

In the context of technology transfer, whether considering a technology, a technology practice, or a technological package, the Kantian approach is embodied by those for whom good will is a valuable and moral asset, supplying a proper motivation for the distribution of scientific and technological information and experience for the promotion of economic development. Although tangible results are hoped for in the transfer process, their failure to occur does not detract from the basic morality of the situation—i.e., that individuals and institutions of whatever variety should operate with good will and treat each other as ends and not merely as means. On the other hand, Kant's view also accords with one's intuitive feeling that if a technological package is foisted on a developing country sheerly on the basis of a profit motive for the developer, that action is morally questionable despite beneficial results.

THE UTILITARIAN PERSPECTIVE

John Stuart Mill (1957) explains the utilitarian principle:

The creed which accepts as the foundation of morals, Utility, or the Greatest Happiness Principle, holds that actions are right in proportion as they promote happiness, wrong as they promote the reverse of happiness. By happiness is intended pleasure, and the absence of pain; by unhappiness, pain and the privation of pleasure. (p. 10)

The utilitarian position focuses on results or consequences, striving, as it does, for the maximum amount of happiness for the most number of people. Mill's position is a modified hedonism; he believes that

most people seek happiness or pleasure as an end, but he attempts to apply this to the entire social setting. The slogan of the utilitarians, "the greatest happiness of the greatest number," is directed toward both a wide and a just distribution of pleasure and its maximization.

It is because the distribution was supposed to be both broad and just that Mill's views have had wide impact. One interpretation of Mill argues that it implies that people should enjoy rights to the basic necessities of life—i.e., adequate food, housing, a job, and favorable working conditions. In fact, politicians, social activists, judges, and decision makers of all varieties have adopted his beliefs in the creation of social programs, legislation, and plans for economic development. The attempt to bring about the general happiness represents their method of implementing utilitarian principles. Smart sees behind utilitarianism the "motive of generalized benevolence" (in DeMarco, 1986, p. 26), and one can see this motive behind the use of technology transfer for economic development and for supporting the "modernization cycle," a process in which developing countries undertake technologies to improve the general conditions of their societies.

One may understand the dynamics, benefits, and difficulties of utilitarianism by employing an example. Take the case where the personnel of an agricultural library in a developing country are deciding whether to automate its library system. Such a system would supply many benefits—e.g., improved agricultural production through the availability of knowledge of crops, techniques for enhancing crop culture, and avoiding or inhibiting crop diseases and pests; increased income for farmers; and increased prosperity and health because of adequate or increased harvests. But not only would it supply benefits, but also the benefits would be superior—i.e., the easy availability of agricultural information, increased speed of access to such information, the elimination of much irrelevant information, and elimination of the work required to duplicate research results of the information. From these benefits, certain deficits must be subtracted—i.e., reliance on externally created technologies, depletion of financial resources and increased indebtedness to developed countries, difficulty in getting skilled human resources to run and maintain the operation, increased educational requirements for creating such human resources with reliance on developed countries or companies for training, increased educational requirements for users needed to overcome language and technophobic barriers, higher unemployment due to technological replacement of the large numbers of personnel typically employed in a manual system, difficulties in fostering the need for information on the part of the end-users, difficulties in enhancing the literacy standards so that end-users can

use the information, the consequences of misused or misapplied technologies (e.g., use of inappropriate pesticides or incorrect dosages), the consequences of inappropriate technologies (e.g., use of dangerous pesticides), increased "brain drain" by loss of bright students who emigrate to developed countries. These benefits and deficits must be added up within individuals and across individuals to arrive at a general sum. This sum is to include those consequences that are associated not only with the present, but also those associated with the immediate and remote future. A long-range ecological disaster would ultimately devalue a high level of current general happiness. Furthermore, the availability of the information and its use for increased agricultural production should not unduly favor one segment of the population (e.g., rich landowners) at the expense of another (e.g., poor local farmers). For utilitarians and other consequentialists, an action is moral if it promotes the long-range general happiness for the most people and/or if it inhibits the general amount of displeasure.

This example illustrates a number of critical features of utilitarianism. These include: (1) a distinction among pleasures in terms of quality; (2) the additive nature of benefits and deficits; (3) that there is a temporal factor that must be considered in calculating the general happiness; (4) that the general happiness is a good to every individual; and (5) that there should be a just distribution of the benefits. Let us move on to a delineation of the problems associated with such a view.

Not all forms of utilitarianism (e.g., the theories of Bentham) have argued for qualitative distinctions among pleasures, but it was a view that Mill (1957) supported and demonstrated in his famous assertion that it "is better to be a human being dissatisfied than a pig satisfied" (p. 14). In certain areas it seems to be justified: increased agricultural production due to increased knowledge and experience is superior to local agricultural production bound to sheer "grunt work" because of inappropriate technologies (e.g., failure to rotate crops). In other contexts, it can be hazardous to associate labels of inferiority or superiority with physical or mental pleasures (e.g., is sex inferior to book reading?), because these pleasures are variously good at diverse times and are not a matter of inferiority or superiority. Inferiority as a label is often employed only to indicate abuse or fixation on certain kinds of pleasure, typically physical.

Not all "grunt work" farming may be bad. Given some good information about appropriate techniques, such production may be environmentally safer and instill large amounts of self-esteem for the farmers. Part of the problem for Mill is that he wants to make qualitative distinctions based on pleasure. If one makes qualitative

distinctions among pleasures, it is not on the basis of some difference in pleasure that these are made but according to other values. The superiority of informed agricultural production versus grunt work production is not simply a matter of pleasure (it is true that less physical effort may be involved and there may be increased production, but these are quantitative measures) but of other values—i.e., freedom from ignorance, increased knowledge, better control of and relationship to nature, more leisure time.

Mill attempts to establish these differences in quality on the basis of a competent judge. He argues that if one of two pleasures is preferred by people who are competently acquainted with both, “even though knowing it to be attended with a greater amount of discontent, and [who] would not resign it for any quantity of the other pleasure,” the preferred pleasure is superior in quality (p. 12). Mill’s description has to do with weighing quantitative and qualitative pleasures within the individual, but our example generalizes to social dimensions. Determining and weighing qualitative and quantitative pleasures in the aggregate has always been a difficult problem, especially in matters bearing upon the public sector. In matters of the public interest, who are to be regarded as the competent judges: politicians, scientists, or pollsters (reflecting a consensus of the general population)? In matters of technology transfer it is more difficult to decide since the experts presumably must be competent to assess a technology from the viewpoints of both the donor and receiving cultures. The problem is aggravated if the technology is newly applied, because there is little knowledge of the potential or actual consequences. Even the methods of technology assessments are geared to the donor culture, and they may be inappropriate for the receiving culture. If the experts are attached to the donor culture, they may have a serious lack of understanding of the receiving culture—i.e., its needs and traditions. If they are in the receiving culture, they may not be able to fully assess the effects of the technology in itself and more so in its application to their own culture.

As an alternative judge, one might resort to appealing to a consensus by major players or the public in a sort of “participatory technology”—e.g., if the public is given sufficient information, it will come to a consensus about what technology it will need or reject. Brooks (1973) indicates the problems with this view:

This seems an unrealistic hope. What is more likely to happen with greater participation, as traditionally visualized, is that any adversely affected group or interest can exercise a veto power over a technological enterprise, almost regardless of other affected interests or values. Unfortunately, all policy, including that relative to technology, requires a measure of both consistency and continuity among objectives, which is difficult to reconcile with participatory democracy in the decision process. (p. 255)

Nonetheless, this is precisely the strategy recommended by Noar (1982) with respect to the social responsibility of multinational corporations to operate in a "socially desirable manner." What is socially desirable is to be determined on the basis of whether activities will be seen to bring about welfare improvements in the countries in which the companies exist. "Periodic public opinion polls, or more informal methods in the less developed countries, are seen to provide the necessary inputs for the overall corporate guidelines for action, which in turn will influence strategic corporate decisions" (p. 219). To reiterate Brooks, this seems naive, since it is not clear that those polled could really understand or predict the consequences or nonconsequences of a corporate course of action.

Implied in the discussion so far is that pleasures (whether qualitative or quantitative) are additive in some way, and that these pleasures and pains can be computed into a sort of aggregate happiness. But this calculus of pleasures must be examined. In some instances, two pleasures can enhance the individual pleasures. Using the example of the agricultural library, there would be greater happiness if both the citations were available online and the source documents were immediately available than if there were source documents alone (with few or faulty access points in a manual system) or online references alone, with months needed to obtain the source documents, if they were at all available. In other instances, two pleasures may be in conflict, as, for example, trying to promote full employment while simultaneously trying to automate the agricultural library in a country with a large population and little local technological resources or expertise. On other occasions, a pleasure may even be enhanced with the addition of a pain, as when the successful implementation of an automated system is enhanced by the number and degree of difficulties overcome, such as low availability of capital, language barriers, unstable governments, low prestige of information professionals, lack of available trained personnel, and poor existing information infrastructures (Eres, 1981, p. 99). In simple comparisons, one often can make a judgment, but when one combines all these factors, it is difficult to estimate overall results. For example, in the plans to automate the agricultural library, one would have to take into account the unhappiness of all those who remained unemployed and their offspring—i.e., the unhappiness of the government in reduced tax revenues because of reduced employment; all the happiness of the patrons due to the quick easy efficient access to the materials of the library; their unhappiness when the equipment breaks down; and the unhappiness caused by reliance on external suppliers and the cost of acquiring, maintaining, and repairing the equipment.

There is also a temporal element in the computation, since the consequences to be considered are not simply the current ones but those in the future as well. At the extreme, one must take into account the effects of a technology transfer on the survival and quality of life on planet earth in the distant future. As noted earlier, Jonas (1984) believes that Kant's ethics are inadequate to deal with contemporary situations. Previously, man's actions had little effect on the self-sustaining character of nature or on the ability of the planet to sustain life. Now actions undertaken by whatever individual or institution, be it corporation, government, or social agency, can have grave consequences for life on the planet. In the new ethics, increased knowledge is vital to proper moral decision making especially where actions involve or promote these serious consequences. Hence, Jonas (1984) reformulates Kant's imperative: "Act so that the effects of your action are compatible with the permanence of genuine human life"; or "Act so that the effects of your action are not destructive of the future possibility of such life" (p. 11). Although these formulations remind us to avoid ecological disaster, they make two shifts from the original Kantian perspective. First, they heighten the role of knowledge. For Kant, the knowledge required for ethical decision making was not that of a scientist or expert, but "of a kind readily available to a man of good will" (p. 5), a man of common sense. The impact of one's actions did not have consequences except for the foreseeable future. Current moral action requires "predictive knowledge," but paradoxically, as Jonas points out, such knowledge is unavailable since man lacks experience in the long-range effects of certain actions upon the life of the planet. So a dilemma appears: on the one hand, the need for knowledge of consequences as a prerequisite for performing utilitarian calculation, and on the other, the inadequacy of predictive knowledge. This is especially perplexing for developing countries for two reasons: (1) they are more vulnerable to a lack of knowledge of consequences (both in terms of the technology and of its application to their environment); and (2) technologies, such as the use of certain pesticides that are no longer tolerated in developed countries, are often foisted on them by unscrupulous businessmen. Even though these technologies may be recognized as harmful, they are often tolerated because they are cheap and because they offset other large-scale problems such as severe shortages in food supply.

Thus the utilitarian computation of the consequences of technology transfer is complicated by many additive and temporal factors. When a decision maker opts for the importation of a technology such as computer hardware and software for automation, he must consider the current and future benefits of all affected

persons—e.g., the benefits to be derived from the avoidance of hunger, poverty, disease, and ignorance; economic growth and development; stimulation of research and productivity; and increased stature in the international community. From this aggregate he must subtract the cost of the technology and the resultant dependency it fosters; those adverse consequences resulting from misapplied technology as in the improper use of pesticides; environmental costs including the depletion of natural resources, pollution, and long-range (and often unknown) adverse consequences including those that may affect life on the planet; costs of science policy development and implementation; costs of the failure of anticipated results; and the erosion of cultural identity. If the moral quality of a choice for a transfer of technology depends on its consequences (as the teleological dimension of utilitarianism suggests), there will be a long wait to determine the verdict of such a choice.

Furthermore, there is an uneasy relationship between the individual's happiness and general happiness in utilitarianism. Mill suggests that since each person's happiness is a good to that person, the general happiness is a good to everybody. Taken at face value, this is the fallacy of division, arguing that a property associated with the whole must be associated with the parts. One could imagine that with our agricultural library, some individuals may very well be unhappy, despite an increase in the general well-being of the society. Farmers who were excluded from use of the library because of economic, educational, or other barriers, and thus excluded from implementing the information contained therein through appropriate technologies, would discover the falling value of their current production efforts, making them unable to earn a living and sustain a family. On a positive side, economic growth in a country as a general good does tend to facilitate economic growth throughout a society. But such growth may disproportionately favor some constituents at the expense of others.

This suggests another problem: utilitarianism aims for a just distribution of those goods. Given the greatest happiness principle, a corresponding principle of justice to which utilitarians should appeal is that the allocation of resources should be such that there will be the most happiness for the most number of people. In the case of a developing country, funding decisions for technology transfers would address the more fundamental problems of a society—i.e., poverty, starvation, disease. Funds might go to a medical facility first before they would go to the agricultural library. Or would they? Which are the more fundamental problems? Would a best-maximization principle imply a single obvious, well-defined course

of action or set of priorities, when there are conflicting goods or conflicting competing avenues for combating sundry evils?

For example, in the agricultural library, conflicts are bound to arise between organizational demands and social responsibilities. As noted earlier, Rubin (1990) has suggested difficulties in balancing the factors of social responsibility, social utility, and institutional survival (p. 6). In the context of library personnel management, factors related to social utility are concerned with promoting the greater good of society within the context of the organization's goals. Personnel managers must maximize resources to promote the public good. For the agricultural library, the budget would have to be allocated so that it would best fulfill its mission—i.e., to provide agricultural information to those sectors of the society most in need of it. In this manner, it would fulfill both the goals of social utility and institutional survival.

But social responsibility is concerned with advancing the larger goals of a developing country. In this respect, the library may be inclined to hire more staff than it needs (to enhance national full employment demands) and to hire less qualified but native citizens (to inhibit economic dependence on external countries); it may concern itself more closely with the problems of the impoverished and ignorant through such things as literacy and outreach programs (as opposed to serving the needs of the wealthy and privileged); may acquiesce in cutting budgets (so that critical problems in other areas of the economy may be addressed); may defer automation (to increase employment and to avoid dependence on external technologies). These choices would aim for a harmonious society in which all or most people would enjoy basic rights to food, shelter, clothing, education, etc.

Such a concern for social responsibility, however, would often stand in tension with institutional survival since losses entailed by actions promoting social responsibility would infringe on a library's economic well-being. Promotion of organizational survival fosters an organization that is efficient and economical. The agricultural library fulfills its goals by minimizing staff requirements, by hiring only the best-educated and most highly skilled workers, by purchasing only the most reliable technology, and so on. In this respect, the unhappiness of some individuals (e.g., those who fail to gain employment or other benefits from the system) would be overridden in favor of the greater social good. In addition, poor personnel practices would also deflate the profession's standing, a matter of special concern in developing countries where the value and prestige of trained professionals is not well established. Thus professional survival would also be threatened. And the promotion of the library's

social utility function—to provide agricultural information—may also be impaired by expending resources on programs or actions promoting social responsibility. The choice of a technology, including information technology, is bound to many competing demands and to many uncertain results. Yet the utilitarian calculus demands—whatever the choices—a projection of results.

REINTERPRETING MILL IN CONTEMPORARY TERMS

Such choices based on calculations of the general happiness have been undertaken. The apparatus of utilitarianism has taken on several guises in contemporary life. In the context of technology transfer, it is actualized under the rubric of technology needs assessment, a preliminary analysis of an LDC's needs and capabilities, so that appropriate technologies can be imported for economic development, and a trajectory for successful technology transfer may be established. Hetman (1973) reformulates the utilitarian principle in contemporary economic terms: "a mass society devoted to maximizing economic growth and the average expectancy of material well-being" (p. 258), accomplished by a technology that "has to be put at the service of the economy" (p. 257). Such technology incorporation is part of the "modernization cycle" for developing countries so that they can effectively deal with their local problems and can learn to compete in the world market or to participate in the "New International Economic Order." Hetman's assessment entails three parts: technological utility, social relevance, and political acceptability. With respect to the first part, a reason for introducing a technology is to gain some sizable advantage with respect to existing technologies. In order to determine this, the available technologies and their variants must be explored as a set of options. With respect to the second issue, each option must be subjected to a test of social relevance that includes assessment of direct economic costs and benefits and all other identifiable effects and impacts (on the environment, society, individuals, and values). Following an assessment of social relevance with each option, political acceptability must be determined—e.g., it might be the case that the preferred options, though socially relevant or technologically useful, may not be politically acceptable. This acceptability:

must be ascertained through a multi-constituency procedure where impacts on affected parties are examined and evaluated in terms commensurate with those expressing overall social relevance. Depending on the importance given to values of various social and political groups, several socio-political alternatives can be formulated. The final step is the choice of an acceptable alternative which appears most suitable in a given socio-political context. (Hetman, 1973, pp. 268-69)

In terms of information technologies, this process is further

complicated because traditional cost benefit analysis may not apply to the ultimate product of such technologies—i.e., information or knowledge. Even though one hears of the “economics of information,” the phrase is misleading since traditional economics, based on supply and demand, cannot be readily applied to information. As Eres (1981) notes: “Knowledge is cumulative and generally unquantifiable. The process of acquiring knowledge is complex. An article read today might trigger research in 20 years” (p. 98). One cannot predict the long-range effects of the acquisition of information. Although there is a commodity sense to information, it is derived from the containers of information—i.e., a specific physical unit such as a document, book, microfiche, online citation, or text. But information is not properly quantifiable, and one could argue that the commodity sense is incidental to the real meaning of the term. Information, as Fox (1982) points out, is not a count noun but is related to the “propositional content” of a text or texts, what the texts affirm or deny. If information is a unit in this sense, it is elusive since any unitization occurs ultimately through the meaning that the information creates in the information seeker’s mind, where different parts, sources, and elements of texts are bound. For example, an information seeker’s understanding of technology may have been acquired through a variety of texts, references, and sources, and the unit of comprehension must be traced back to all these sources. Even when we associate information with a particular text or journal, one cannot readily determine the effects of its absence from a collection (Kent, 1974, p. 303). How can we estimate how the absence of a text or the absence of online or on-disc searching prolonged or wasted the work of other researchers? Although we do know that such absences have important effects, calculating the consequences of their absence is close to impossible. Brooks (1973) claims the same is true of technology: “The problems of assessing the absence of a technology can be much more difficult than assessing any particular proposed technology” (p. 249).

Setting apart for the moment the difficulties of quantitatively assessing the consequences of information or information technologies, the iterative process suggested by Hetman earlier is only to determine whether to undertake a certain technology, but utilitarian principles demand some computation through the whole process, including actual consequences. Unfortunately, a technology chosen for transfer is not necessarily created, implemented, maintained, or used in harmony with the objectives for which it was originally assessed. And the secondary effects may have more impact than the original direct intended effects. Dede (1981) asserts:

Research in the field of technology assessment has shown that the

unintended, second order effects of a technological innovation on society are frequently more influential, long-term than its direct and deliberate effects. For example, in many crowded areas one can travel by car no faster than by horse—the greater speed of the automobile has been lost through congestion—but automotive pollution and petroleum availability remain as major societal concerns. (p. 204)

According to Crowther (1986), technology transfer is constructive when the following conditions are supported: the capacity to determine a country's major socioeconomic problems and to translate them into a coherent set of technological requirements; the marshaling of the population to innovate, implement, and deal with the effects of the innovation; simplified presentation and ample diffusion of information regarding the technological options; an analysis of hardware and software requirements and costing of these items; and an awareness of the ideological or social value content to technologies and technical decisions (p. 2). Unfortunately, Crowther's experience with information services in Latin American countries indicates that these conditions are countervailed, and the information technologies adopted by the services "enhances the personal value and not necessarily the national development value of the information" (p. 3).

Not only are intended consequences often sabotaged, the long-range general happiness in the form of basic developmental needs is sacrificed for immediate goods. For example, Akin M. Makinde (in Murphy et al., 1986), explains the imbalance of happiness caused by the oil found in Nigeria:

As long as the oil revenues lasted, Nigerians lavished their foreign exchange on innovations that were completely unrelated to their basic developmental needs. In fact, agriculture, the major source of foreign exchange, was abandoned as the population gravitated to big cities to enjoy the products of technology....The desire to enjoy foreign technological products has led to a wide gulf between the rich and the poor, with contractors of technological products and government officials becoming millionaires overnight. In fact, it is now estimated that a few individuals in Nigeria have more money than the national treasury! (pp. 182-83)

The considerations that we have looked at so far are concerned with technological practices and consequences and with technology transfers in the form of technological packages, inappropriately uprooted, and applied or implemented practices. But leaving the discussion at this point would seem to imply that the problem lies only in the practice or in the package or in its implementation but not in the technology itself or in the marketplace of the available technologies.

Consider that there is an information problem in an LDC looking for a technological solution. Given this kind of problem, there is a belief in a free marketplace of available information technologies,

similar to the notion of the free marketplace of ideas. There exists a marketplace of goods and services of all available information technologies. From this marketplace any developing country can freely choose any technology in terms of the problem under consideration. Given that the technologies adequately address the needs or problems of the developing country, these technologies are supposedly of equal value. But just as in the free marketplace of ideas, one cannot assume that competition has pruned the market to the best or the most appropriate: some technologies may dominate, occlude, or exclude more efficient ones. One merely has to think of the domination of IBM in setting standards for the computer market, especially in the personal computer market, even in the face of its confused strategies and some poorly conceived products. In information technologies, Library of Congress and Dewey classifications have commanded the classification market, and the commercial bibliographic retrieval systems have established Boolean, deductive systems as the standard. In cataloging, OCLC has dominated the market, and although it has not captured the market, it sets standards with which other catalogers must contend.

There are many reasons for this uneven marketplace—e.g., historical events, economics, and consequences of past choices. Given the need for economies of scale, the range of economically feasible designs for a technology is limited. With respect to the use of information technology in an educational setting, Dede (1981) remarks: "In brief the educational quality of the device (or instructional unit) and the profit margin of the manufacturer will be inversely related" (p. 206). Furthermore, he asserts: "Market forces, if the sole criterion..., will dictate that the educational hardware and software produced be designed for the needs of the largest and richest body of consumers: the middle and upper class majority culture" (p. 211). Given the availability of such software and hardware, it is not hard to understand the emergence of technological packages (e.g., computer hardware and software) that are then foisted into inappropriate settings or used for inappropriate problems.

And it is easy to foresee the motives of information technology salespersons in their assessing and addressing the needs of developing countries. If one were to adopt a more cynical attitude, one could argue that these motives are suspect. Mowshowitz (1984) calls computer literacy a "euphemism for consumer training. It should take only a moment's reflection to realize who stands to gain the most by promoting computer literacy. Is it the free choice of a neutral technology that is bringing computers into the schools?" In view of the developing countries' drive to enter the modernization cycle, can one really speak of the free choice of neutral, equally available

technologies? That is to say, not only are the available technologies unequal, the prevailing belief that technologies are neutral is mistaken (Mowshowitz, 1984; Froehlich, 1990). Every technology is undertaken with a technological practice in mind and is bound to a set of values for which it was undertaken. Technological packaging attempts to hide these value-laden roots, but proper needs assessment must uncover these values to ensure their appropriateness and utility for the problems to be solved.

Crowther (1988) remarks that technological development opposes the modernization cycle, since the cycle focuses on the technology rather than the context and purpose for its use:

The modernization cycle is inherently contradictory to technological development. It is the proper function of the technology itself rather than human or natural environmental stress, that is monitored and corrected; technology assessment in this cycle explicitly emphasizes technological utility and economic efficiency rather than social relevance or political consequences, and commercial criteria override the consideration of basic needs. (p. 8)

The choices from the marketplace are uneven and so put constraints on the fulfilling of objectives. And decision makers, in facing the available choices, are not necessarily guided by utilitarian principles and needs assessment.

In the context of technology transfer, there are necessary unhappy choices—e.g., when budgets and resources are limited, some members will be serviced before others. Mechanisms to develop and facilitate agricultural or medical information transfer may be given higher priority than educational information or vice versa. As noted earlier, the content of the greater good or the maximized happiness or minimized displeasure is not achieved through utilitarian principles or through an abstract notion of justice, but by setting priorities and solving problems in turn. Taylor (1985), in an essay on “The Diversity of Goods,” suggests that this is precisely an area where utilitarianism founders—that it assumes homogeneity of goods where actually only conflicting heterogeneity exists (p. 244). Each stakeholder comes to the deliberation process of determining the greater good with different traditions and different priorities. Such differences are often amplified by the differences between developed countries and LDCs and within LDCs by competing segments of the society with diverse cultural backgrounds. Thus there is a diversity of competing goods (not clear goods opposing clear evils) or, more often, a diversity of competing evils (which area of the economy to address first—poverty, ignorance, disease?) for which utilitarianism supplies no governing principles for choices. Although it can be agreed that there is a greater good or a greater happiness, what the

greater good is and how it should be actualized is fraught with difficult choices that are ultimately political. According to Brooks (1973):

Although the consequences of various technological choices may be clarified by analysis, there is no objective or scientific basis on which final choices can be made. The choices themselves are political, depending on a complex interplay or bargaining process among conflicting economic, political and ideological interests and values. The chips in this bargaining game involve not only immediate choices at issue, but also unrelated perceptions and interests. For example, many people who opposed supersonic transport in the United States did so because it was a convenient symbol for uncontrolled technology, rather than because of its specific environmental impact or economic viability. (p. 251)

Similarly, in addition to such good reasons for technology transfer as increasing the general welfare, there may be a series of reasons based on less desirable motives—e.g., prestige value of owning computer technology, centralization of power at the expense of democratic values, and vested interests. In the case of information technologies in particular, Katz (1988) sees politics as the driver of the diffusion of such technologies (pp. 47-78).

The ideals of utilitarianism—i.e., its “generalized benevolence”—tend to be vulnerable to corruption because of the number and variety of stakeholders in the decision-making and implementation process and their diverse interpretations of what the general happiness is and how to best realize it, interpretations often colored by simple self-serving interests. Again the problematic relation of individual and collective happiness and the importance of motivations based on good will is seen here. The ethical can be confounded or clarified by the political, but the former seems to be more often the case since stakeholders, whether experts or members of a participatory technology, have such diverse perceptions and motivations.

In sum, if we look at the application of utilitarian principles to issues of technology transfer in developing countries, we find that technology needs assessment is confounded on many fronts—e.g., in lack of predictive knowledge for determining a set of effects; in difficulties in ensuring that the intended effects are achieved; in establishing priorities on reasonable grounds (either by experts or participants); in balancing competing demands of various factors or from differing interpretations of the greatest good and how it may be achieved; in creating a fair distribution of goods; in uncovering the implicit values of technologies and technological packages; and in the constraints of available technologies.

DIALECTIC OF THE KANTIAN AND UTILITARIAN THEMES

The difficulties surrounding the actualization of utilitarian principles, and the confusion surrounding the determination of results, do not invalidate utilitarianism as a moral perspective or

obviate the need for some mechanism of needs assessment (however flawed). It only underscores the difficulty of making choices among conflicting or competing goods and evils, ensuring intended effects, and making overall assessments. Attempts to define moral choices pale in the face of poverty, starvation, disease, and ignorance: how can citizens of an LDC hope to enjoy an ethical life if their basic needs are severely compromised? The Mother Therasas and social activists of the world have long recognized the fundamental necessity of providing for basic needs.

Part of the problem of contemporary culture, as suggested by Jonas (1984), is that we are forced to endorse the utilitarian view, and the calculus of happiness takes the upper hand. Ellul (1980) asserts that technological morality has two characteristics: "(1) it is behavioral (in other words, only correct practice, not intentions nor motivations, counts); and (2) it rules out the problematics of traditional morality (the morality of ambiguity is unacceptable in a technological world)" (p. 244). For Ellul, all moral evaluation, including that required in technology transfer, is forced into the utilitarian framework. Utilitarianism is, of course, not wrong per se, but its domination as a sole moral perspective and its sacrifice of the ethical to the political is problematic. It offends the intuitive notion that morality should be related to good intentions and good will.

One could argue the other side of the case as well: proper motivation and good will are not the only basis for moral evaluation. Good motivations that fail to produce beneficial results will not serve the severe problems that confront LDCs. Although the calculus of utilitarianism or needs assessment is difficult to perform, so too are Kant's motives elusive: proper motivation and good will can be faked, they are not readily discernible, and our perceptions may be unreliable. This invisibility of real motives is probably the source, at least in part, of the ambiguity of "traditional morality," the ground of its unacceptability to "technological morality." Motives are neither verifiable nor quantifiable. Furthermore, technology transfer that promotes a genuine good cannot be morally dismissed because the motivation is not pure. The point is that each perspective offers a partial truth, and both perspectives can be engaged as two poles of a dialectical clarification process that can be used to evaluate the moral dimensions of technology transfer.

This article has examined only two ethical perspectives based, in part, on the work of Kohlberg (1976); there are other perspectives and other variations of Kant's and Mill's views that are not represented here. In addition, one must acknowledge that Kohlberg's work has been criticized, and if the dialectical reasoning that we are advocating

is based on problematic research, one should recognize these difficulties and the alternatives they raise. An alternative perspective is offered by Gilligan (1982). She suggests that the moral development of women is different from that of men. In her view, Kant and Mill advocate an "ethic of rights," Kant in terms of the rights and autonomy of moral agencies, and utilitarianism in terms of a complex dialectic balancing of the rights of all parties in a transfer process. Women, in Gilligan's view, are more concerned with preserving human relationships and hence are advocates of an "ethic of care" or an "ethic of responsibility." Those attached to an ethic of rights are concerned with the abstract rules of justice (whether Kantian or utilitarian), notions of social contract, and the rights of moral agents, whether individual or institutional (Held, 1988, p. 12). A feminist approach calls for a reasoning that is more narrative and contextual, noncontractual, and focused on others, so that caring relationships become the basis for ethical behavior. Gilligan's (1987, p. 25) work indicates that both such methods of moral reasoning occur among men and women, that reasoning in the manner of an ethic of care occurs more frequently in women (and less frequently in men), and that, among men and women who are socially similar, there are fewer differences. What accounts for these differences is unclear, but Gilligan and others have argued that it is tied to differing ego development in men and women. For men, masculine ego development is based on individuation and separation from the mother; for women, feminine ego development is based on attachment (Chodorow, 1978; Gilligan, 1982). Most feminists do not wish to propose that a different basis for morality be constructed on these observations. They are only concerned that the feminist view not be discredited, that any male gender bias not be perpetuated in moral theory, that concerns traditionally characteristic of women (e.g., concern for children) not be dismissed from moral reflection, and that the feminist view be integrated into a more comprehensive moral theory (Held, 1988, p. 13).

If one grants the legitimacy of this critique, does it significantly change the dialectical perspective proposed earlier for matters of technology transfer? It is not clear that the feminist perspective prescribes any different set of moral principles; what it may call for is a different approach to problems of technology transfer, a different weighing of factors and elements (derived from context), and a recognition of the legitimacy of certain topics that have been omitted from many discussions of ethical theory—e.g., care for each and every country and care for those as yet unable to frame their needs.

If one integrates the feminist viewpoint, one must balance an ethic of rights with an ethic of care. In the ethic of rights, one must

balance competing claims and rights of stakeholders in a complex dialectical process, weighing contrasting factors and the competing claims of individuals and institutions, recognizing the factors of social utility and social responsibility, and respecting the autonomy of individuals and institutions, including organizations and countries. On the other side, an ethic of care underscores a common history and a sense of an advancing smallness of the planet. Paradoxically, it may accentuate certain features of both Kant and Mill. It extends the Kantian motive of good will beyond the rights and autonomy of individuals to care for the human family and planet as such, and to the unconditional acceptance of the rights of all persons and institutions. It also extends the utilitarian emphasis on generalized benevolence to a sense that the whole planet and the human family is a system of interconnected parts so that any exploitation of individuals, groups, societies, or countries will have an impact on the whole and return to haunt both the exploiters and the exploited. It does not change the nature of the problems of technology transfer nor the nature of principles to which one might appeal (e.g., fairness to all parties); it only changes the perspective from one of separation (balancing rights and principles) to one of connection and contextualization. An ethic of care could not be blind to specific individuals and context, and therefore it would advocate a view of fairness in contrast to that suggested by Rawls's (1957) technique of a "veil of ignorance." In his method, stakeholders could decide on the fairest allocation of resources or rights if each of the stakeholders would assume, for the duration of the decision-making process, that none of them could know what their post-decision status was to be until after the decision was reached and a course of action was implemented. For example, in the case of the agricultural library and its decision to automate, the stakeholders would assume that they would make choices not knowing whether, after the choice was made and implemented, they were the minister of agriculture from the developed country, the head librarian, the vendor from the developed country, a wealthy farmer, an illiterate farmer, a user, a consumer, or a staff member. In this way, Rawls thinks that stakeholders would be more inclined to make rulings that were fairer to each party since each stakeholder, under the veil of ignorance, would not know where he or she would be at the end of the process. But the feminist position would argue that the veil of ignorance may be itself a problem because the context cannot be ignored, and a genuine fairness may acknowledge differences among the specific stakeholders. For example, fairness may mean that one ignore the demands of the wealthy farmers (perhaps even penalizing those who previously abused the available systems) or the administrators and

heed more fully the demands of those who suffered more past inequities (illiterate farmers, those members who have the most barriers to technology usage). In general, feminists do not demand that this perspective dominate, only that this voice be respected in the deliberation process.

Even if Kohlberg's theory is incomplete and feminism adds new principles (and not just perspectives), one can still regard moral deliberation in technology transfer as enhanced through a dialectical process in which the coexisting poles of Kantianism, and utilitarianism, "masculinism" (if that is how one may characterize the history of philosophy, as having been dominated by male thinkers), and feminism are used for framing ethical issues and coming to closure on them.

In conclusion, issues in technology transfer are not simple, and, although ethical considerations may amplify their complexity, such considerations are essential for evaluating the appropriateness and consequences of certain technologies and their transfer, since they can clarify issues and raise important challenges. There is an implicit ideology bound to the information age, an ideology that is self serving and full of dubious values and that may work against the quality of life in LDCs and on the planet. Part of this ideology is the belief that all problems can be solved through some form of technology, that technologies are morally neutral, and that technology is an unqualified good. One of the functions of ethics is to critique this prevailing ideology. Dahlgren (in Slack, 1987, p. 27) calls for a conscious ideology to counter this tacit yet dominant ideology. Ellul (1980) observes that one option is the practice of an ethic of nonpower as a resistance to the domination of technology in our culture. This option, infrequently recognized, but often necessary, states that appropriate technology may mean the absence or the minimization of technology, the refusal to implement technology or the simplification of technology, even those information technologies that at first blush may seem to solve a myriad of problems. Could it be suggested, as Dosa (1985) does, that many authors "overestimate the role of information technology and present it as a panacea to all project-related problems . . ." (p. 146) in providing technical assistance for development? Sometimes appropriate technology may mean engaging one's own resources and simplifying and refusing high-tech solutions to problems. Only by doing so might we inhibit the spread of ill effects of technology to LDCs and preserve a viable planet for all countries, both developed and developing.

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