Socio-Economic Contributions To Technological Assessment: The TICS Approach

Thus, a shadow hangs over social science contributions to technology assessments. How can the practicing anthropologist, or any other social scientist, contribute to technology assessments? By now, most of our nonscientific colleagues are aware of the importance of "noneconomic factors" in technological change. Excellent books and articles, such as Easter's Human Problems in Technological Change (1967), have identified social anthropologists as potential contributors to technology and society discussion. Unfortunately, a simple awareness of the importance of social and economic factors in a technological process is insufficient to permit contributions to specific TA problems. Problems are examined by peer-group social scientists misunderstanding the potential contributions of sociologists, anthropologists and even ecologists. And despite their efforts for our work, their patience wears thin when we do not repay their confidence with specific contributions.

A recent indicator of the failure of the socio-economic approach to become fully integrated to a technology assessment occurs when a decision is made to package the socio-economic questions into a distinct chapter in the TA, perhaps creatively titled "social-economic implications," "social-economic consequences," or "other factors." This is the most serious decision, for it damages, gutting our work into a corner along with oil spills, plant genetics, and groundwater hydrology. Most importantly, it reduces our effectiveness in the assessment process. We can escape such a trap by emphasizing, early in the TA discussions, that every technology will have immediate, intermediate and long-range effects on the economic and social structure. We might even add that the TA, itself, involves a package of questions that can be stated at any technological stage. In brief, we establish our social science identity by the questions we ask.

To illustrate this approach, I describe an example of an application in a recent technical assessment workshop organized by the Office of Technology Assessment. The workshop's objective was to examine new agricultural technologies, which are being developed to alleviate soil erosion and irrigation farming in the Western United States. I was to provide "socio-economic" input. Although agricultural technologies are probably of little interest to the visiting anthropologist, my remarks might be of some general interest which, coincidental to remarks when social scientists have the opportunity to contribute to technological assessments.

THE TICS APPROACH

The TICS approach assumes that every technology may be evaluated in terms of its Timing, Integration, Costs and Sustainability (i.e., TICS). We proceed to ask a series of questions which are relevant to our technology.

Timing: Technologies must be developed, tested, implemented and long-range problems. In the workshop, some production scientists were advocating the elimination of summer following in the Northern Great Plains as a measure to counteract the problem of saline strip that is destroying thousands of acres of previously productive land. In contrast to this short range solution to an immediate problem, several plant scientists were proposing the development of previously underutilized crops (dahila, pennycress, and so on). These latter technologies were intended to address a long-term solution to a long-term problem. TICS also examines relationships of technological solutions to agricultural problems to evaluate the change along a temporal dimension. If, in our example, we assume that (a) more technologies in this cluster of components rather than a simple, single innovation and that (b) each technology tends to develop jointly, with the development of one component, the others then the TA

...in some technological changes, the transition costs may exceed the gains realized by the new technology.

Competing factors of a proposed technological solution

What are the expected costs of capital and operating costs?

What are the estimated costs and benefits of such a system?

What are the estimated costs of maintenance and improvement of such a system?

What are the estimated costs and benefits of each component?

Based on the information generated by the above questions, the social scientist may assess costs in more detail than the expected time to fulfill a technological function or the expected impact of the problem, in the absence of the proposed technology. Moreover, the analysis reveals a detailed scheduling of events to be compared to expected impacts.
Socio-Economic Contributions to Technological Assessments: The TICS Approach

Continued from p. 18

must be needed with native USSR and followed for at least a year after the transition process. The last revenue during this transition represents part of the loss of shifting from one farming system to another. It is not surprising that in some cases transitions may exceed the gains realized by the new technology. Such transition costs must be paid by someone, and generally:

- **Who** pays the transition cost? If additional or private industry research will be necessary, then this should be explicitly stated or estimated.

- **What is the relative capital/labor intensity of the proposed technology?**

With rising incomes, capital intensive technologies that might require farmers to have significant investments may have negative impacts on certain farmers. We have the answers to these questions based on these variables.

Moreover, this question is extremely important in evaluating technologies which might be of potential benefit for our foreign assistance program. And finally:

- **Practitioner Anthropology**

| Is there a current or anticipated future demand for the proposed technology? If so, by whom? |
|---|---|
| **Sustainability.** Sustainability is an important component of technologies. A variety of developing agricultural strategies are considered by farmers, however, the sustained use of certain practices can have long-term effects on the environment and society. The technological changes may not always yield stable ecological and socio-economic conditions and will therefore cause production with higher socio-economic stability. Sustainability can be approached from three perspectives: |
| **Technical sustainability.** Will the system hold together and can it be maintained through time? |
| **Economic sustainability.** How important is the net interest rate, inflation, energy costs, market prices and other economic factors in maintenance of the proposed technology? |
| **Form and sustainability.** Can the proposed technology generate a form of family or corporate formation over time? |
| **Community sustainability.** Will the proposed technology lead to increased community solidarity in our rural regions or increased social alienation? |

For example, some technologies being proposed demonstrate large new forms and information equipment. Since the distribution of such equipment is a key economic and political group in the rural world, such technological changes might have a strong influence on community politics and social structure by redefining the economic base of a segment of the community.

**IMPLEMENTATION**

Imagine yourself faced with the task of evaluating access to alternative technologies being suggested for a client of agricultural or any other technological problem. You understand the idea that conducting a TICS assessment increases the capability and knowledge of a local technical consultant or social scientist. Our society produces many technologies as fast as the social scientists lack TA capabilities to evaluate them. Moreover, graduates and undergraduates training programs continue to improve training in this area, despite the obvious potential of active social science involvement in the pressing social technology issues of our society. Consequently, it is probable to have the technological advocates themselves address these questions, assisted by the world or economic scientist. The approach demands information that only the technological advocate himself will have. In the case of the agricultural water use TAN, the following approach has been advocated:

- **Each technology advocate will be asked to consider these three questions in their proposals.**
- A panel of 3-4 socio-economic reviewers will suggest changes, additional considerations and, on new occasions, work directly with the advocate to foster acceptable outcomes.
- Finally, the panel reviews all the proposed technologies and TICS proposals and compares the proposed technologies.

In this manner, socio-economic questions are not only integrated into the evaluation of a technology assessment but also are used to guide the training and education of government agents.

Theodore E. Downing