COMMENTARY

The Hidden Agenda of Science Studies for Developing Countries

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Editor's Note: *This paper was stimulated by Michael Moravcsik's 1985* 4S Review *article, "Science in the Developing Countries," and explores the assumptions behind the research program that Moravcsik proposes. It argues that science in developing countries needs to be viewed in full recognition of the relatively marginal role that national science is able to play in the flows of technology and knowledge that power economic development. An alternative research agenda for science studies follows this shift in perspective. Responses to this commentary will appear in a future issue of* S&TS.

Introduction: Identifying the Hidden Agenda

Professor Moravcsik, in his recent article, "Science in the Developing Countries," published in *4S Review*,[1] has focused attention on developing countries as an unexploited field for research in science studies. He points to two sources of motivation to do such research — one academic, the other practical. As an academic motivation, he proposes that developing countries offer a different domain to test theories and histories derived within advanced country studies. As a practical motivation, Moravcsik proposes that because most of the developing countries are in the process of building their science infrastructures, "factual information on the problems and circumstances that exist" would assist them.

Both of these goals are commendable. But the research program proposal that follows is a distraction from the issues of real importance that developing countries confront. Developing countries are in a situation of *increasing* disadvantage with respect to their dominance by advanced country-induced knowledge flows. They do not have time to play on the edges of "interesting" academic questions, but *for the sake of survival*, must focus very scarce science (and all other) resources where they can have maximum impact. The sort of "factual information" that Moravcsik proposes is marginal rather than central.

What is basically wrong with the Moravcsik proposal is that, in spite of claims to the contrary, it assumes a theory about the role of science in the development process that is patently incorrect for developing countries. His assumed theory is that if a developing country builds science institutions as in the West, then "even a minor amount of improvement in science development would have a large impact."[2] This assumed theory never quite reaches the surface, but underlies almost all the research questions he proposes concerning, for example, "the nature of science," "motivations and justifications," "requirements for productive scientific work," the popular development of "scientific thinking," "development and maintenance of scientific manpower," and so on. They *all* focus on building *science*, and assume *more* science is good. Such a view can otherwise be described as a "cargo cult of science."[3] As with New Guineans building ceremonial landing strips for aircraft during World War II in the false belief that this would attract planes loaded with industrial society's "cargo," the cargo cult of science assumes that by building good research institutions, appropriate development *will* follow.

However, the reality in developing countries is that science is but a marginal add-on to the knowledge flows that transform their social and economic life. The real thrust of technological progress is likely to follow from where the nation is positioned in relation to *access* to international technology, and the nation's *bargaining power* to obtain it on favorable terms. With massively higher expenditures on leading edge technologies in the West, the developing nations can expect to gain a marginal toe-hold on the future through national research, but that's all.[4] Such a purchase on the future will however only follow if a clear priority focus is developed and the very scarce national resources are concentrated and supported to give this focus a strong power of resolution. Thus, a view of developing countries' science that assumes more science' and better quality' science per se are good avoids the more fundamental concern about how this research should be *targeted* to make any difference at all.

Furthermore, in developing countries, science is not bedded into a rich and well-prepared national technological environment like it is in the United States,

Germany, or Japan. So, no matter how "good" the science is, it simply is unlikely to *connect* with the surrounding user environment as it can in these advanced nations. Thus, while good quality "undirected" science in the West *may* produce spin-offs that quickly come to rest in commercial development, "spin-offs" in developing countries whirl out into a vacuum.[5] There is also a severe danger, indeed an almost universal danger, that *because* the technological environment of developing countries is poor, any research results that have real industrial potential will be swallowed up by international interests simply because local industry will be unable to *translate* this knowledge effectively into commercial practice. Thus, the more that national research concentrates on aping *science*-centered practices of the West to the detriment of developing a different science that first and foremost *links* with a different environment, the more the research is likely to become irrelevant to pressing development issues. Even more insidiously, the model is likely to aid and abet the very forces that hold the national technology and economy into international obeisance in the first place.

While the science-centered model feeds *disconnection* from the local knowledge-flow milieu, it also feeds *connection* with the international centers of science development (both in international legitimation of research topics that mirror advanced nation research concerns, and in career structures that are built on international *discipline* contribution rather than local problem solving). So the model feeds the very fires that are ignited from advanced nation application of science, that burn the center out of the fabric of the developing nation's own economy. The cargo cult approach may lead to a higher international profile in publications, but not to a central influence on the nation's own development process.[6]

Such a set of conclusions simply cannot be seen when one stands within a narrowly defined perspective that studies "science." It only becomes clear when one stands apart and looks at national science as *one* element in a far more pervasive knowledge generation and flow process.

It follows from this shift in perspective that one asks quite different research questions in science studies than those proposed by Moravcsik. First, a very high priority must be given to understanding how national science, whatever its quality,' can be effectively *targeted* towards the most critical development contributions in the particular national context. Second, an equally high priority must be accorded to understanding how to construct *knowledge bridges* that link indigenous research with its social and economic environment. However, while these are priority questions in their own right, they also *frame* any other science studies questions about any aspect of the research process, and its comparison with practices in the West. This is so because, along with the priority accorded to targeting and linkages, one moves from a position (such as Moravcsik's) that assumes external power to be irrelevant to internal science direction and use, to one that assumes that external commercial and international power commands, transforms, and filters the way science is conducted and used. We can choose in our science studies to conduct research as if such an environment does not exist, or we can choose to address our questions towards what can be done *within* an international power frame to foster greater power for national science. The ideology is written into the questions.

Examples of More Appropriate Science Studies Questions

Some examples might assist the reader to see the sort of science studies questions that follow from the shift in perspective proposed in this critique. The examples relate to the highest priorities — "targeting," "linkages," and the "research process." As will become quite obvious, the questions are not just about science, but treat science as one component in an overall knowledge-flow system; without knowledge of the rest of the system, knowledge about science is irrelevant.

Targeting

1. What are key links in the technological system of the national economy that have been broken by the introduction of modernizing technologies? What are the key "gaps" in the national technological system that only national science is likely to fill?
2. What areas of scientific research can be selected and fostered to reintegrate higher and lower technological systems within the economy?
3. What areas of fundamental research need to receive greatest financial support with respect to:
   - potential contribution to the development of critical national physical and social resources;
   - "generic" technologies that could have the greatest multiplier effect through the total economy?

Linkages

1. What can case studies of successful vs. unsuccessful technology transfer from government laboratories tell us about the conditions that determine success and failure in terms of:
   - laboratory liaison with users in formulating research questions;
   - the linkage of ongoing research with user interest;

- the role of fundamental research in solving practical problems;
- the influence of laboratory patterns of expectations and rewards on the encouragement or discouragement of effective targeting of research towards user needs, and involvement of scientists in the full transfer process;
- the role in laboratory/user liaison of alternative types of institutional mechanisms within the laboratory structure, such as commercial or liaison units, advisory committees, and joint researcher-user projects;
- the technological "receptivity" of users to the technological changes introduced by laboratory research;
- the levels of associated technical support provided during technology transfer;
- the levels of associated managerial, capital, and other support provided during technology transfer?

2. How can "success" vs. "failure" in the application of national scientific effort be defined and indicated in, for example:
   - national economic contribution, impact on redistribution of social and economic advantage, technological multiplier effect within the economy, and contribution to national resource ownership and exploitation;
   - impact on upgrading the technological sophistication of the user environment;
   - contribution to the national scientific stock of knowledge; contribution to the international scientific stock of knowledge?

Research Process

1. How does the mode of *formulation* of research projects relate to subsequent application success in terms of:
   - disciplinary vs. problem centered/multidisciplinary focus;
   - organizational strategies that encourage single vs. multidisciplinary approaches to research;
   - modes and efficiency of access to international scientific literature and data base sources;
   - modes and efficiency of access to national and international sources of information on the kind of problem being researched?
2. In what ways is the national scientific capability transformed from a Western "universalistic" science model according to:
   - organizational, bureaucratic, planning, reward, and status systems;
   - local cultural influences on, for example, the meaning of research, the actions that are appropriate in dealing with the organization's user environment, conflicts between modernizing and traditional cultures;
   - international vs. local connectedness of the national scientific enterprise, as demonstrated in, for example, publication patterns, international flows of scientists, and patterns of training?
3. What are the effects of such transformations on local research and application effectiveness?

Concluding Remarks

The alternative perspective presented in this critique does not deny that the particular conditions of science in developing countries are worthy of study. Rather, it suggests that behind the approach presented by Moravcsik lies a hidden agenda that more accurately reflects the ideological location of science in advanced nations, and seriously distracts from an understanding of science in developing nations. In particular, the "cargo cult" perspective on science studies reifies national science above the total pattern of knowledge flows that create technological and economic development. The perspective assumes that what is good for science in America is good for science in the Third World, and that the radically different power of science within these two contexts is irrelevant; the perspective further assumes that generalized rather than targeted growth of science is an appropriate strategy for a nation where scientific resources are extremely scarce. As soon as one looks outside the laboratory window in the Third World, it becomes very clear that these assumptions are simply incorrect. Meanwhile, there is a desperate need for information as a platform for Third World science policy, so that distraction in science studies towards the ideological assumptions of the West could be dangerously misleading to the science policy that evolves within the Third World. It could indeed contribute to retaining the Third World in the position of relative powerlessness they presently are seeking to escape through national scientific effort.

It is for this reason that the intention of this paper was to demonstrate that when one commences with the alternative assumptions that science is for the knowledge-poor, and is set within an internationally dominated power environment, a quite different agenda of science studies questions emerges.

Footnotes

1. Michael J. Moravcsik, "Science in the Developing Countries: An Unexplored and Fruitful Area for Research in Science Studies", *4S Review*, 3, 2-13 (1985).

2. Ibid. p. 3.

3. For a detailed presentation of the way that such a "cargo cult" of science can distort research practice in a developing country, see Stephen Hill, "Contrary Meanings of Science - Interactions between Cultural and Personal Meanings of Research in a Developing Country Research Institution." Pp. 195-230 in Stuart S. Blume (ed.), *Perspectives in the Sociology of Science*, London: John Wiley, 1977.

4. The present critique is intentionally a perspective' paper. The assertions here about the role of science in Third World countries are supported by a detailed analysis of science in the Asian and Pacific region. This evidence is presented in A. Rahman and S. Hill, *"Science, Technology and Development in Asia and the Pacific - Progress Report, 1968-1980"*, UNESCO: SC82/CASTASIA II/ Ref 1, (1982).

5. Even within the most advanced countries, the incidence of significant spin-offs from fundamental research is severely restricted. The assumed centrality of such a concept derived from the rather more spectacular advances that have followed in technologically-rich environments of the American space program massively funded electronics research, and so on. When looked at the other way around, i.e., in terms of the relative contributions to the pattern of technological changes that have occurred in *general* industrial development, the significance of "spin-offs" is radically reduced; "spin-offs" only come to rest when there is a highly receptive technological environment awaiting them. See R. M. Bell and S. C. Hill, "Research on Technology Transfer and Innovation." Pp. 225-274 in F. Bradbury et al. (eds.), *"Transfer Processes in Technical Change."* The Netherlands: Sijthoff and Noordhoff, 1978.

6. This "other view" of the role of science in developing countries is now being recognized, not only within some academic circles, but also by policy decision-makers in the Third World. To take but one example, since UNESCO's 1982 CASTASIA II Conference (on Science, Technology and Development within Asia) — where Government Ministers from the 26 nations of the region participated — there has been a growing realization within government circles in the region that there is a need to switch gears to a "demand" or environment-centered approach to science from a "cargo cult" perspective. This has emerged particularly in High Level Regional Conferences and Training Programs that the Center for Technology and Social Change has been organizing over the last two years.

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