Soviet Science and Its Constraints

The Social Context of Soviet Science. LINDA L. LUBRANO and SUSAN GROSS SOLOMON, Eds. Westview Press, Boulder, Colo., and Dawson, Folkstone, England, 1980. xvi, 240 pp. $24.50. Special Studies on the Soviet Union and Eastern Europe.

Anyone desiring a balanced, lucid, and penetrating discussion of the strengths and weaknesses of science in the Soviet Union may do one of two things: either digest a mass of diverse primary and secondary publications in several languages or read Thane Gustafson's paper "Why doesn't Soviet science do better than it does?" in *The Social Context of Soviet Science*. Gustafson's contribution alone would make this volume essential reading for individuals concerned with Soviet or American science. The other six contributions render it obligatory. Linda Lubrano and Susan Gross Solomon have brought together the elements of a first-rate analysis of social factors in Soviet science and technology, placing those enterprises in a comparative framework that elicits important insights about the American scientific community and the nature of science itself.

One of the many themes running through this collection is the issue of technological innovation in Soviet research and development. Problems in the introduction of new technology have characterized Russian/Soviet industry for a long time and have been studied extensively by economists. The paper on basic research by Gustafson, that on applied research by Bruce Parrott, and Kendall Bailes's discussion of Soviet technical specialists add to previous economic analyses a solid understanding of the ways Soviet scientific institutions function and some of the additional obstacles to innovation they engender.

Gustafson's analysis of Soviet academic institutes shows that the system of education, the structure of the institutes themselves, and difficulties in obtaining equipment all encourage top scientists to devote their attention to pure research rather than practical applications. Lack of "market incentives" is only part of the problem. The educational system selects top candidates for special training emphasizing theory. Research is conducted in large, block-funded institutes run by powerful senior scholars who tend to shun new concepts and risks while assigning applied work to their junior colleagues. Prohibitive difficulties in obtaining instrumentation further encourage researchers to focus on theoretical (or "blackboard") problems. Thus the structural and cultural attributes of Soviet science—its "social context"—have a major negative influence on innovation. Russian/Soviet scientists' preference for theory over applied research also emerges strikingly from Mark Adams's discussion of the biologists N. K. Kol'tsov and B. L. Astaurov.

Institutional constraints to innovation are the major topic in Parrott's discussion of Soviet applied research. The overriding difficulties appear to lie in incentives and communication. To attract an adequate number of individuals to applied research it is necessary to provide material rewards. This leads to goal displacement, as the rewards become the researcher's main objectives. Since such rewards are based on plan fulfillment rather than actual introduction of production innovations, there is little to encourage the adoption of new techniques. Innovation is not directly profitable and may reduce production in the short run. The lack of adequate channels of communication also retards technical development. Since Academy of Science institutes have no ties to production, applied research performed there is frequently ignored by industry. Poor communication among R & D agencies leads to much duplication of effort, a situation for which statistics on patents give eloquent testimony. One of Parrott's major contributions is to show that the prevailing system is strongly supported by a large segment of the scientific community. That bureaucrats willingly accept a system that provides security and stability at the expense of creativity and quality is hardly surprising. The degree to which a similar "accommodation" has been accepted by a significant part of the scientific-technical intelligentsia helps to explain the obstacles to reform and the stability of the larger Soviet system.

Though not primarily concerned with innovation, Bailes's summary of recent Soviet sociological research concerning technical specialists also touches on the issue. Bailes points out that most young Soviet engineers shun careers in production, leaving such jobs to technicians and individuals trained on the job (*praktiki*). These cadres tend to be much less interested in acquiring additional education or exploring possibilities for innovation. Similar problems also may be seen among engineers. Bailes cites one study indicating that more than one-third of the young engineers in Leningrad rarely read technical literature. This suggests that scholars might study with profit such questions as the number, quality, and availability of Soviet scientific periodicals.

A second broad theme that emerges from many of these studies is the value of a comparative dimension. Gustafson analyses the relative strengths and weaknesses of Soviet and American basic research and relates these differences to the underlying national cultures. The Soviet system provides the potential for concentrating enormous resources on crucial problems, while promising planning and coordination for the system and guidance by senior colleagues for young researchers. If more often it produces conservatism, deference to superiors, and logrolling, this may reflect the general respect for authority and aversion to uncertainty, conflict, and spontaneity that characterize the society. Americans' relatively higher tolerance for risk and conflict, belief in individual initiative, and lack of respect for authority all contribute to a system that is much more dynamic, competitive, and productive. This system offers greater rewards to young scientists but provides much less security. Gustafson is careful to point out that these differences are not exclusively "national." When large, block-funded institutes have been established in the United States, they have experienced many of the problems seen in Soviet institutions. An examination of the West European and Japanese situations would help to clarify these issues.

The contributions by the volume's editors are comparative in somewhat different but no less valuable ways. Solomon discusses the development of studies of Soviet science in the West, noting that such studies were from the outset "contextualist" (that is, viewing science as connected with the surrounding social environment). As these studies have become more sophisticated in their treatment of the Soviet Union, they have come to resemble recent social studies of Western science. Lubrano uses an underlying assumption of the "normality" of Soviet science to generate highly significant information about the scientific collectives that play such a crucial role in

Soviet life. Like Gustafson, she calls attention to the need to differentiate between attributes of large organizations and the special features of Soviet institutions.

Loren Graham's superb concluding paper is both a summary of the comparative issues and a presentation of important research on the highly pertinent topic of attitudes toward genetic engineering. Graham indicates ways in which the other studies contribute to an understanding of "the Soviet Union, the nature of science, and the common problems of industrialized nations." He then goes on to expand our knowledge of all three subjects. Genetic engineering raises some of the most complex moral issues confronting scientists today, and an examination of how these issues have been handled in another society may help us to develop our own approaches as well as to understand the other society.

Highly speculative discussions of genetic engineering began in the Soviet Union in the late 1960's. The nature of these discussions changed as the field developed, and especially after a Soviet delegation attended the 1975 Asilomar conference. While major attention in the United States was focused on unintended dangers that might result from genetic research, Soviet scientists stressed the threat of "careless or ill-intentioned individuals." Graham rightly attributes this difference to Soviet biologists' fears of political controls after the experience of Lysenko. Their delicate balance between the Marxist "philosophical interpretation of science" and the objective "evaluation of science itself" by scientists is jeopardized by questions about who should determine the parameters of permissible scientific research. The Soviet debate over genetic engineering is fascinating in itself, but Graham also directs our attention to larger issues. These include Soviet scientists' particular difficulty with the relationship between scientific knowledge and social values; the undeniable fact that "external" factors are influencing the development of the field of human biology; and the underlying similarity of the debate over genetic engineering in the two societies. That in both countries we find scientists concerned with political interference, philosophers concerned about preserving ethical values, and numerous individuals concerned with traditional morals and the potential misuse of scientific knowledge suggests that this problem is a "common dilemma of all industrialized societies."

There are numerous other themes in this volume that could be discussed, such as the institutional characteristics stressed in several of the contributions. Mark Adams demonstrates that institutional structure was crucial to geneticists' ability to continue their work in a hostile ideological environment. Those who find the stress on institutions outweighing the "social" element in the book should pay particular attention to Gustafson's reminder that institutions and education are major mechanisms for maintaining historical traditions. Another general subject, discussed by Lubrano, Adams, and Gustafson, is the importance of informal contacts and networks in the highly structured and constrained Soviet environment. But to do justice to all the important issues raised in this book is impossible.

One could, of course, quibble here and there. There is no index. Adams's treatment of Dubinin is somewhat inconsistent (compare pp. 189 and 192). A bibliography or series of bibliographical essays would have been very useful. There are a few typographical errors, although none impede comprehension. Such oversights are distinctly minor when compared to the contribution this volume makes to our knowledge of science and society in the Soviet Union and in all nations where scientific research is a major endeavor.

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Communities in Decline

The Dying Community. Papers from a seminar, Sante Fe, N.M., Sept. 1976. ART GALLAHER, JR., and HARLAND PADFIELD, Eds. University of New Mexico Press, Albuquerque, 1980. xiv, 306 pp. $25. School of American Research Advanced Seminar Series.

Several conceptions of both community and death cohabit uneasily in this diffuse, uneven, and yet encouragingly broad and novel symposium. The most compact groups of participants include anthropologists with sociocultural (Gallaher, Padfield) and archeological (W. Y. Adams) fields of concentration and sociologists with theoretical (A. J. Vidich) and agrarian (A. L. Bertrand, W. Rohrer) interests, although even their common concerns are at best loosely defined. Substantially if somewhat eclectically extending the approach is a scattering of single representatives of other disciplines: resource economics (M. Clawson), child psychiatry (D. A. Looff), gerontology (M. Wylie), social psychology (H. Levin), and modern American literature (D. Quantic). One stated objective of the conveners and editors was to develop a general conceptual framework for the study of community decline and dissolution, a task undertaken primarily in their joint introduction and in separately authored chapters by them, Adams, and Vidich. Other chapters are largely concerned instead with examining more empirically the causes and human consequences of this process, for example with respect to attitudinal changes, minorities, children, and the elderly.

The focus of most contributors is on slowly withering, small settlements in the relatively recent or contemporary United States, as more active population elements detach themselves from static conditions or depleted resources and are attracted to the wider opportunities in metropolitan centers. (Held in 1976, the symposium failed to take notice of even more devastating abandonments in urban ghettos like the South Bronx, or to anticipate the Frostbelt-Sunbelt transition of more recent notoriety.) But community also sometimes stands for entire social systems, most lastingly and impressively embodied in ancient urban capitals that once stood at the heads of complex settlement hierarchies. Only in that case do ruins attest to death as a complete and unambiguous cessation of life in a particular set of loci, even if for causes that, as Adams notes, seldom have been satisfactorily explained by historians or archeologists. Additionally, community is sometimes used in a less geographically specified sense, such as a relatively well-defined, self-conscious, and depressed region like Appalachia that is dependent on, peripheral to, and perhaps (in the view of some contributors) exploited by modern industrial civilization.

Crossing over by degrees into a more metaphorical realm, the coeditors speak of the approaching "global extinction of a heretofore universal form of association." Regarding the growth of urbanism, centralized government, bureaucracy, technology, and capital-intensive industry as cumulative and irreversible, they depict small towns and rural communities as generally limited to passive, inadequate responses that lead to a slow, demoralizing retreat before massive exterior forces. Yet by their own accounts death is in many cases neither immediate nor assured. While describing it as "perhaps *the* secular phenomenon of the industrial age," Gallaher and Padfield go