Book Reviews

Rational Methods

Systems Analysis in Public Policy. A Critique. IDA R. HOOS. University of California Press, Berkeley, 1972. viii, 260 pp., illus. $10.

The last few decades have witnessed the rise of a collection of tools, techniques, and approaches bearing, confusingly yet appropriately, a variety of labels—systems analysis, operations research, systems theory, mathematical programming, and planning, programming, and budgeting, to name a few—but all having to some degree the purpose of "rationally" understanding, developing, or managing solutions to a large class of problems. The movement began with military tactical problems, rapidly spread through the strategic and industrial-commercial arena, and is now making its appearance in the realm of public policy, where eloquent advocates foresee it as sweeping through the public-systems swamplands bringing optimal solutions and efficiency in its cleansing flood. Some of us, having found that it carries a good many fingerling ideas and intellectual bonefish as well as occasional meaty catches, have weakly called for quality control—some way of policing the purveyors and evaluating the produce. Others have suggested that poor systems analysis is the rule rather than the exception, and that pseudoscience, salesmanship, and useless mathematics are the order of the day. Ida Hoos is determined to set matters straight. Unfortunately for serious critics (and for honest systems analysts, who need some good ammunition in their battle with the fakers), her book is an uneven presentation. At times persuasive and concise, it is more generally overbearing, repetitious, and one-sided. It is also poorly titled—it perhaps should have been called "Improper Systems Analysis and Inappropriate Technology, with Some Examples in Public Policy: A Diatribe."

The book begins with an attempt at definition and description of the theory and practice of systems analysis; proceeds to its transfer from the military-industrial milieu to public affairs; discusses examples of poor analysis applied to waste treatment, supersonic transport, education, and health; discusses implications of associated management information systems; and closes with a chapter on "futurology." The weakest chapters are those that deal with semantics, theoretical and practical underpinnings, and defects of systems analysis not particularly related to its use in public systems. Hoos is in a constant pique because no one can define categorically such terms as systems analysis, operations research, systems engineering, systems management. She seems even more upset that some analysts don't care. She has a fervid desire to show that "systems theory" à la Bertalanffy or Ellis and Ludwig (which she thinks should be the theoretical basis for practical systems analysis) is ridiculously general and vague. In fact, systems theory is about as important to practical analysis as RNA structure is to a stud farmer.

The confusion associated with putting systems theory in the same bed with for example PPBS (planning, programming, and budgeting systems) is not only annoying to the professional reader but deceptive too. It masks the more important argument that poor analysis, arbitrary criteria, conveniently inappropriate constraints, and the equating of ignorance with unbiasedness are to be guarded against in *any* kind of prescriptive study. There are other indications that the author's knowledge of the area is superficial, as when she says that "game theory, input-output analysis, and linear programming . . . form the essential core" of operations research and systems analysis or that among mathematical models of conflict "the Monte Carlo is perhaps best known"; or confuses the claim of accuracy of analysis (which may be spurious) with its "mathematical precision" (which, barring errors, is valid); or does not differentiate between mathematical techniques (linear programming, game theory, simulation), approaches to problem solving (mathematical modeling, operational gaming), and management aids (PPBS, information systems).

These chapters also first bring to light a theme that is repeated, with minor variations, throughout the book. After quoting Kenneth Boulding's observation that the quantification of subordinate goal variables introduces elements of ethical danger because it "can easily lead to failure to bear in mind that they are in fact subordinate"—a reasonable caveat—she adopts the premise that systems analysis "limits the focus to those aspects which can be expressed quantitatively, and which fit certain models." Apparently unaware of advances in (or the existence of) utility theory, she raises this argument time and again as justification for *never* using analytical techniques in matters in which morality or human desires are involved—that is, in any important problem.

Hoos's critique is most valid, and professional, in the chapters dealing with the fascinating justifications and mystifications surrounding even the worst analysis, and the inevitable flow of experts and expertise from the aerospace-industrial world to general governmental agencies. There she is in her own element of sociology and policy research. But bias weakens even that presentation. The excesses of evangelism, "government by contract," self-ordained "experts," the imposition of ideas by professional intimidation, the concealment of limitations and defects, all are made to seem unique properties of systems analysis. Nowhere in the book is there an example, or even mention made, of a reasonable or useful systems analysis in *any* area of study. Nowhere does it appear that systems analysis, like other methodologies, can have well-founded theories as well as harebrained ones, dedicated and resourceful practitioners as well as incompetents and charlatans, and a spectrum of practicality of results.

The discussion of actual analyses is similarly one-sided. Ironically in every case it is the fact that assumptions are made explicit in the study under attack—a nominal virtue of systems analysis—that enables the attack to hit home. Thus, when a poorly fabricated "bad effects" index is shown to be on an ordinal scale but used as if on a ratio scale, Hoos (with the aid of reference to a criticism by—you guessed it—some operations researchers) merely points out *bad* analysis, but ignores the chance to ameliorate its effects by devising, for example, a better index.

There is the distinct impression throughout the book that the present "muddling through" based on the completely internalized criteria of the decision-making few is to be preferred to any attempts to explicate, much less "rationalize," the process in which they are embedded. Rather than appreciate the fact that in systems analysis uncertainty must be *accounted for* and *incorporated*, Hoos treats this as grounds for accusing the analyst of trying to "manage and control" it.

The general misuse of technology (not necessarily associated with systems analysis) is also discussed, with emphasis on educational devices and on management information systems (MIS). These once fertile fields have been plowed so often by so many others that it is not surprising to find no new insights or syntheses here. (The MIS material appeared in abbreviated form in *Management Science*, June 1971, and was severely and appropriately criticized by E. C. Nelson in the February 1972 issue of that journal.)

Finally, one must make mention of the author's literary style. The volume reads as if it were put together out of a number of separate papers (my guess is five); that would explain the extensive repetition of ideas, arguments, and phraseology (I stopped counting *gemütlich* and *Weltanschauung* after five uses apiece). An example of the author's verbiage at its worst: "this concrescence of interests leads to an intense degree of commensality, where the condition of mutual sustenance thrives in the environment surrounding system analysis"; and at its best: "[a particular subjective bias] may be camouflaged by methodological purfling and technical footling." The characters of the book are as black-and-white as those in an Alan Drury novel. Systems analysts use "facile equations" and "arbitrary and unchallenged presumptions," they are from "ranks . . . swelled by university based or associated entrepreneurs, often in institutes" (the author, whose claim to expertise in analyzing systems analysts derives from her experience in retraining the work force, is associated with the "Institute" of Economic Affairs and is "based" at the University of California, Berkeley); they protect "vested business and professional interests" while weaving a "semantic web permeated with salesmanship" in order to "ply their trade wherever there is a willing customer"; the result, obtained by traveling "a pre-magnetized course," is eventually "thoughtfully placed" in one of "a plethora of little journals." On the other hand, the poor governmental clients, who are "otherwise well informed and sophisticated persons," should rather seek out, presumably, omniscient persons who would discover "solutions [which] face pragmatic tests" by means of "normative, value-laden compassionate judgment," "anchorage in appropriate discipline and theory," and "political and social rationality" (as contrasted to economic rationality), which "reasonably, logically and necessarily [why not rationally?] belong in government decisions. . . ."

There is a paragraph, which the author may accuse me of quoting out of context, that I cannot disagree with:

> Systems analysis has a great future as a means to justify or to shake up the bureaucratic status quo. The kind of case made for maintaining or abandoning the existing organizational structure depends on the way objectives and performance measures have been devised. Functional and jurisdictional re-alignments, supported by "rational" and "logical" arguments and crafted in the name of more efficient operation, can be proposed and defended. "Scientific" cooperation can be cited as reason for attacking a problem not only across traditional bureaus and divisions but also outside jurisdictional units and boundaries. In effect, here is a tool for *circumventing traditional checks and balances* and undermining, for better *or worse,* the bureaucratic structure. Moreover, the techniques of systems analysis can, if used astutely, remove highly charged political issues from the arena of public debate by *relegating* them to "scientific" appraisal. They can, by the same token, enable public officials to examine questions implicit in many problems but avoided because of their politically sensitive nature. [Italics added.]

The book under review concentrates on implications of the italicized words and the pejorative quotation marks in this paragraph; it neglects its nonfacetious interpretation.

Comparing the methodology of systems analysis to divination by "observation of the flight formations of birds or examination of the viscera of beasts," Hoos remarks that "for the uninitiated, understanding is less important than believing." One straightforward conclusion she neglects is that there should be fewer "uninitiated" in public policy-making positions. Her harangue will not greatly advance their sophistication.

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On Analytical Techniques

New Directions in Atomic Physics. EDWARD U. CONDON and OKTAY SINANOĞLU, Eds. Yale University Press, New Haven, Conn., 1972. In two volumes. Vol. 1, Theory. xiv, 250 pp., illus. $12.50. Vol. 2, Experiment. xvi, 164 pp., illus. $7.50. Yale Series in the Sciences.

These two volumes comprise 17 chapters by 13 lecturers at a NATO Advanced Study Institute in Izmir, Turkey, during the late summer of 1970. The informal atmosphere of the lecture room is captured best by the experimentalists, particularly Kastler. His contributions on optical pumping are marked by plenty of diagrams, a direct and uncomplicated style, and even occasional recapitulation. Marrus, too, gives an account of recent experiments with atomic beams in a sound, straightforward presentation.

The contributions of the theoreticians tend to be review articles of varying complexity and conciseness. Garstang's description of astrophysical applications is directly based on a wide variety of physical phenomena, but most of the other articles limit themselves to more sober aspects of the N-body problem. It is here that something of a difficulty becomes apparent. For the new directions that the reader can expect to learn about are recent developments in a subject that goes back almost half a century. The analytical and computing techniques have receded from their simple origins to a point where considerable expertise is required to follow them in any reasonable detail. Merzbacher describes the methods of second quantization with the clarity that has come to be expected of him, but other writers are more ambitious and consequently run greater risks in attempting comprehensive expositions. It would be difficult, for example, to appreciate Moshinsky's analysis of the $2s$-$2p$ shells without some prior knowledge of the theory of compact groups, though his lengthy introduction is excellent. As for Wybourne's chapter, the widespread use of the algebra of plethysm makes his description of group-theoretical methods rather more remote. But at least these articles yield their fruit when read in conjunction with readily available textbooks. The same cannot always be said of those contributions that depend critically on the use of computers. As soon as the writer calls for his first subroutine, the vital thread linking the initial hypotheses to the final numerical result is