Book Reviews

Manning a New Technology: A Case History

Scientific and Managerial Manpower in Nuclear Industry. JAMES W. KUHN. Columbia University Press, New York 1966. 229 pp. $7.50.

James W. Kuhn tells here the interesting story of the manpower problems encountered by the Atomic Energy Commission and the electrical utilities in harnessing nuclear energy for the practical production of electric power. The account is based on a study conducted by the Conservation of Human Resources Project at Columbia University, and the author presents a wealth of information collected during the study through interviews with informed representatives of most of the major industries and groups that played a role in the nuclear-power revolution, as well as from documentary sources. The abundant details, and Kuhn's succinct comments and conclusions, will engage the attention of anyone concerned with the management of research and development.

The nuclear-power industry was chosen for study because "trained manpower played a key role in its creation and expansion." In fact, Kuhn tells us, the earliest efforts directed toward producing nuclear power originated in make-work designed to retain and occupy the specialized scientific talents and skills that would be needed in case serious difficulties arose in the plutonium-production reactors.

Discussing the AEC's manpower policies, Kuhn observes that there never really was a gross shortage of technical personnel, except of the truly gifted men so essential in the expeditious solution of a succession of complex problems. The Commission's on-the-job training programs for both professional and semiskilled personnel were highly successful, and the new technology was speedily routinized so that it could be handled by workers with only limited technical backgrounds. Much of the later progress in nuclear-power technology is attributable to these measures, which expanded the country's pool of trained manpower.

In industry, Kuhn reports, a host of major problems stemmed from the failure of many company officials to recognize the development of nuclear power as revolutionary progress rather than as merely an advancement of a conventional technology. The traditional "lean" manpower policies of the electrical utilities were not adequate to cope with the rapidly expanding technology and with the rigid regulations necessitated by military potential and by the possible hazards to public health and safety. The pressures for short-term returns on investments created additional difficulties. It was the threat of public power that forced the utilities to revise their policies and outlook and to become acquainted with the possibilities and limitations of nuclear power. This they did effectively by learning to work with government officials and with a variety of consultants—scientists, research engineers, university scholars. Kuhn draws a lesson here regarding the importance, for innovatory development, of the initial selection of personnel:

> The men called upon as advisers or used as managers and employees can determine the pace and direction of an organization's attack upon, and use of, a technology, fixing the perspective in which it is seen and thus influencing the strategies for approaching the perceived problems.

Throughout, Kuhn makes crystal clear that the demands of nuclear technology have broken through institutional boundaries within which men were accustomed to work. He says in his foreword:

> The major manpower innovation which characterized the manufacture of the bomb and the later successful development of nuclear power initiated a vast proliferation of group research in which physicist, engineer, chemist, mathematician, and many others had to work together, learning from each other and contributing to solving the successive barriers that blocked their way.

And he returns to this theme in his concluding chapter, "Manpower lessons":

> The most hopeful approach toward meeting the manpower problems of rapid technological change may lie in fostering a greater variety of organizations and institutional arrangements through which the work of developing a technology can be carried on. Such an approach can help to increase the opportunity for individuals to escape limiting positions and restrictive assignments, and then better prepare themselves for the changing demands of technology. The more alternatives that are available for individuals, the more responsive firms and organizations are apt to be to their needs and demands, and the less scholars, officials, and experts need resort to exhortation to solve our manpower problems.

The book is a significant contribution and sets the stage for the study of numerous questions that must be answered in effecting major advances in the development and utilization of technical manpower.

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Radiowaves

Tropospheric Radiowave Propagation beyond the Horizon. FRANÇOIS DU CASTEL, E. Sofaer, tr. Pergamon, New York, 1966. 248 pp., illus. $11.50.

This volume is a partial translation of du Castel's 1961 book *Propagation Troposphérique et Faisceaux Hertziens Transhorizon.* Only those chapters dealing with tropospheric propagation are included, and these have been revised and updated in the translation.

The introduction contains a brief review of the lively development of divergent theories of tropospheric propagation. Du Castel gives credit to his co-workers and himself for developing the whole theory, in a 1960 paper, by synthesizing the scattering theory and the reflection theory. The six remaining chapters deal with both theoretical and experimental investigations. These are presented in such a way as to be useful for both the student and the practitioner. The first chapter deals