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BOOK REVIEWS

Natural Resource Information for Economic Development

By Orris C. Herfindahl. Published for Resources for the Future, Inc., by the Johns Hopkins Press, Baltimore, Md. 212 pages. 1969. \$7.

Exploration economics and the effective use of natural resource information for developing countries are described in this book. The author presents practical concepts from which policymakers may derive effective development strategies.

Early in the book Herfindahl points out the dilemma of collecting data in developing countries. Government agencies collect too little relevant information on resources--or they collect too much. The author leaves the impression that, most frequently, they collect too much--and a great deal of uncertainty exists regarding its use and application.

The impression should not be given that this is a "toolmaker's" book, because it isn't. Traditional ideas about the role of capital and natural resources in development relationships are discussed early. This early section merges neatly, however, with subsequent discussions of the usefulness and capabilities of other tools for deriving resource information. These tools include, among others, soil surveys, aerial photos, and possibly, orbiting sensors.

The major emphasis of this book is on how information systems can be used to provide inputs for government programs of natural resource development. Herfindahl repeatedly stresses that information on natural resource development is capital. He asserts that, while this is not a new concept, viewing investments in natural resource information in this manner will aid in its organization and administration for final investment decisions.

One of the most useful sections of this book, although all too brief, is chapter IV. In it, Herfindahl has assembled natural resource data about Latin America from many different sources, and seasoned it with personal observations made during his stay there.

He developed simplified investment models to illustrate that better performance in resource use is possible. His case is well-documented, even though optimality is specified in his models. He implies that a relationship

exists between the marginal cost of information and the marginal returns derived from its concomitant development.

Policymakers and planners should find useful ideas on organization of information activities in chapter VI. Two strong points are made here: (1) It is impossible to collect all the "necessary" information to solve a problem because its solution would depend on information gathered earlier, and (2) it is desirable to collect only enough information to meet the needs because excess data are irrelevant.

Although we can't estimate the value of information, Herfindahl points out that we should be able to specify marginal changes in organization and administration of resource information programs over time. He also raises a question for both developing and developed countries: Should studies of natural resources be integrated, i.e., should several types of data be collected simultaneously?

In summary, Herfindahl makes three strong points in his book: (1) Information, like other inputs, costs money; (2) information is a type of investment; and (3) information, to be effective, must have a strategy employing economic theory in its use. He makes all these points well.

Dwight M. Gadsby

America the Vanishing: Rural Life and the Price of Progress

Edited by Samuel R. Ogden. Stephen Greene Press, Brattleboro, Vt. 242 pages. 1969. \$6.95.

The protection of our environment has become a major public issue. Fortunately, some people in the past have seen the problems and have provided bases for action. The Department of Agriculture, particularly, has long urged and carried out programs for the protection of our natural resources--water, land, forests, and vegetation.

Throughout our history, Americans have written of the beauties of nature and of the destruction of resources. In the present anthology, 36 authors express themselves on one or another of these topics. The volume is divided into five sections subtitled "The Unspoiled

Land," "Years of Spacious Living," "Going Back to the Soil," "The Price of Progress," and "Looking for a Silver Lining."

Thomas Morton wrote in his journal of New England in 1622: "...with all her faire indowments, I do not think that in all the knowne world it could be paralel'd." Near the end of the volume, Barry Commoner writes: "As a biologist, I have reached this conclusion: we have come to a turning point in the human habitation of the earth....continued pollution of the earth, if unchecked, will eventually destroy the fitness of this planet as a place for human life...."

Between Morton and Commoner, such writers as John Audubon, John Muir, Henry David Thoreau, Hamlin Garland, David Grayson, E. B. White, and Rachel Carson trace the changes from a rural society in an unspoiled environment to an industrial society in a nearly ruined environment. Economic development in this Nation is exacting a price, and farming is deeply involved.

This nicely designed and printed volume, with a number of apt illustrations, is recommended to the economist interested in a philosophical and literary approach to the environmental crisis facing us today.

Wayne D. Rasmussen

Building Cooperative Movements in Developing Countries—the Sociological and Psychological Aspects

By Konrad Engelmann. Frederick A. Praeger, New York, Washington, London. 239 pages. 1968. \$15.

This book should appeal to students of cooperation and particularly to those having a working interest in the development of cooperatives in emerging countries. The author is a highly competent student and practitioner of cooperative development in these countries.

As the title indicates, emphasis is on the sociological and psychological aspects of cooperative development. Obstacles to progress in cooperative movements are examined as well as factors that appear responsible for success. These are some of the highlights of Engelmann's book.

Strong nationalism is viewed as both a favorable and an unfavorable influence to cooperative development. On the positive side, cooperative development can be tied in with nationalism as a patriotic duty, as has been done in Egypt. This does not disturb the author, provided proper safeguards are taken to insure the eventual establishment of coopera-

tives as democratic enterprises. On the negative side, strong nationalism is often coupled with undemocratic measures on the part of political leaders. This can lead to use of cooperatives primarily for political purposes.

Government initiative and aid in building cooperative movements are considered an absolute necessity in most developing countries. The danger of government-sponsored cooperatives becoming tools to implement state policies is recognized but is not considered incompatible so long as the ultimate objective of cooperatives as economic enterprises is maintained.

A definite distinction is made between government-sponsored cooperatives combined with educational efforts and cooperative development as carried out in most Communist countries. Cooperative development in most Communist countries is viewed as a misuse of these enterprises to undermine private ownership, destroy individual action, and suppress basic principles of cooperation.

In every chapter, the importance of education in general and cooperative education in particular is emphasized. The author has a firm conviction that cooperative development cannot succeed in the absence of adequate understanding by the majority of those to be served.

The author suggests that the foundation of cooperative development should be laid in small districts. Here there is a better understanding of needs and less chance of bureaucratic obstruction and delay.

For those interested in the role of cooperatives in land reform programs, the author's appraisal of the "Nawag" experiment that was conducted in Egypt beginning in 1955 is informative. He considers it to be the turning point in that country's agrarian-reform program.

On coordination of cooperative aid to developing countries, the author recommends a system of compulsory mutual exchange of information among all organizations and institutions working on cooperative development in a country. I find this idea difficult to accept. It seems illogical to argue, as the author does, for cooperation on a democratic basis and then to say that coordination must be compulsory.

Another idea advanced in this book that I have some difficulty with is that the progress of cooperative development has often been retarded because of overemphasis on technical factors and neglect of human and social aspects. I believe many cooperative students would hold just the reverse.

Cooperative monopolism is rejected as being just as detrimental to economic development as monopolism by proprietary enterprises.

On cooperative farming the author is cautious, stating: "No form of cooperation presents graver sociological and psychological problems than cooperative production."

These are some of the interesting ideas in this book. There are more. Its author is to be commended for his significant information and insights on the building of cooperative movements in developing countries.

Job K. Savage

Readings in the Modern Theory of Economic Growth

By Joseph E. Stiglitz and Hirofumi Uzawa. The M.I.T. Press, Cambridge, Mass. 497 pages. 1969. \$12.50.

Our national policy of increasing economic growth, induced in part by the Cold War rivalries among the major world powers, has attracted wide attention to the subject. The interest in growth goes beyond the desire for increased standards of living; the continuous formulation of new growth techniques and tools has become almost indispensable to the national survival of this country.

The readings in this book try to analyze the basic structure of the processes of economic growth. The main purpose of modern theory is to understand allocations in the output, employment, and capital stock of a growing economy and the movement in the distribution of income among the factors of production. The empirical facts that the modern theory of growth attempts to explain are quite different from those which were faced by classical theory. As an illustration, part III describes how the Cambridge Growth and Distribution Theory differs from the neoclassical model, and shows how modern theory of growth questions the fundamental empirical laws expounded by classical theory.

The major readings discuss the basic growth models of Harrod, Domar, Tobin, Solow, and Swan (most of the other readings are comments on these basic models). Modern theory makes significant criticisms of the fundamental empirical laws but, because of divergent study results, falls short of invalidating them. As a case in point, in questioning Harrod's principle of the neutrality of technical change, Solow asserts that an estimated 88 percent of the growth of output per man was due to technological change, while Jorgensen

and Griliches contend that almost none of the growth in output per man is attributable to technical change.

One major difference in the two theories is their attitudes toward the investment function. In neoclassical models no essential consideration is given to investment. In modern theory, the determination of investment follows the Keynesian approach: At any point in time, the level of investment is fixed; the elasticity of investment with respect to variations in monetary and fiscal policy during this period may be negligible.

On overall examination, the differences between the two schools are understandable. The neoclassicists are committed to an economic theory that assumes rational motivation, while the modern theories assume that man is not moved only by economic motives. Therefore, each school erects models structured to be consistent with its belief in economic behavior. Obviously, the results will be different.

The book is valuable in that it cites the important argument in growth theory. It is important, however, to note that on neither side is there complete agreement on all points. Accordingly, no basic tenet defining the differences between the two will ever be agreed upon by either side.

Jack Ben-Rubin

Capital and Development Planning

By Sukhamoy Chakravarty. The M.I.T. Press, Cambridge, Mass. 344 pages. 1969. \$12.50.

Professor Chakravarty states that the intention of his book is "to explore in some detail the theory of optimal economic growth, which has developed during the last decade or so, and to indicate the insights this theory can offer into the problems of planning capital investment decisions." Using the technique of variational calculus and the principles developed by Bellman and Pontryagin, Professor Chakravarty proceeds to elucidate the mathematical theory of intertemporal planning.

He adopts the utility maximizing approach and starts by considering the main choice variables that are present in the notion of an intertemporal optimum: the problems of choosing the length of the planning horizon, problem of choosing the desired terminal stock of capital if the planning horizon is finite, and choosing an intertemporal utility function. These problems are considered in the context of both simple aggregative models and multi-sector models.

In chapters 2 through 4, the discussion emphasizes the aggregative aspects of an optimal investment program and ignores the structural features connected with an investment program. In finite aggregative models, the problem is formulated to maximize an integral of instantaneous utilities over the given time, subject to initial and terminal capital stock restrictions. One awkward feature of these models is the phenomenon of capital decumulation in the terminal year. However, as the author points out through helpful numerical illustrations, this difficulty can be eliminated by appropriate assumptions as to the marginal utility schedule relative to the terminal stock ratio. The alternative is to use an infinite-horizon model. In such a model, if population is assumed to increase indefinitely at an exponential rate, there appears the problem of choosing to maximize utility on a per capita basis or on a total basis. When per capita consumption is involved in the utility function, then we have a meaningful solution; the "golden rule" path gives maximum indefinitely sustainable utility of consumption per capita. When utility is measured in total terms, such a reference path can no longer be used as a bounding device for arbitrary feasible paths. Thus, one is back to the choice of using a finite planning horizon with all its difficulties, expressing preferences on a per capita basis, or using a discount factor for time.

These models show that inability to reach the desired future rate of capital formation is due to unwillingness to reduce current consumption. An equally important factor, in the short run, is the limited capacity of the domestic capital goods industry. In chapter 5, Chakravarty considers two-sector models with shiftable and nonshiftable capital. In the shiftable capital model, he demonstrates that the optimal time path is independent of the productivity of capital in producing consumer goods. With nonshiftable capital, however, the optimal solution generally implies a mixed policy of first letting consumption remain constant and then following an exponential time path for consumption. In the latter case, the major problem seems to be the determination of appropriate switching points.

In chapters 6 through 8, the main concern is with linear multisector models in the context of both a Leontief and a Von Neuman economy. Chapter 6 deals with problems of existence of growth paths, their uniqueness, and the requirements of nonnegativity. The author demonstrates that an open dynamic model is well suited for determining the terminal levels of

capital stocks in the different sectors and shows that within an indecomposable dynamic Leontief model there lies a particular solution that ensures a maximum equiproportionate growth rate for all sectors. However, if the models rule out excess capacity, then, starting from arbitrary initial conditions, one may get configurations involving negative output levels or negative values for capital stock. Thus, the models would lose any predictive or normative significance. As a result, in chapter 7, the dynamic Leontief model is generalized with the introduction of nonnegativity constraints and a terminal capital sector in the form of a boundary condition on a problem involving temporal utility maximization. But again, there is the problem of flip-flop behavior associated with linear technologies. Chapter 8 develops the same theme further but with the assumption of a nonlinear objective function.

Thus, Chakravarty does an excellent job in providing insights to the problems of planning capital investment decisions. However, contrary to his assumption that the mathematics used in this volume is well within the reach of anybody who has a working knowledge of calculus and matrix algebra, including linear programming, many economists will find it difficult to follow the various mathematical arguments, derivations, and proofs. For those who do have a "working" knowledge, the appendices to this volume provide an excellent summary of different optimization techniques. Others might want to consult first a book like R.G.D. Allen's *Mathematical Analysis for Economists*.

The reviewer's only complaint is not so much with Chakravarty as it is with the "profession" in general, that is, the assumption that the supply of capital is the major obstacle to growth. This may be true for underdeveloped economies, but it is quite debatable in the case of developed economies and especially in regional development, where the availability of skilled labor might be more crucial. Furthermore, Chakravarty dismisses the consistency approach in favor of utility maximization. In planning regional development, where to date little has been done, the complexity of the problems may warrant the use of consistency models where one does not seek to maximize any explicit welfare function. However, the volume does serve as a valuable treatise for researchers concerned with developmental questions. It not only provides the necessary mathematics but should give new vistas for researchers concerned with regional and rural area development.

M.F. Petrusis