Enterprise models are another field where input–output techniques are used. This work started in 1964 with the development of a model in physical units for the Ashan Iron and Steel Corporation. A few other models for iron and steel plants were developed later. Other branches using these models are chemistry, rubber production, the production of bicycles and cotton milling. These are all activities with a rather clear structure of inputs and roughly linear production functions. In a specific model for a chemical plant, the relation between output and operation time was also analysed.

In the last (nineteenth and non-Chinese) contribution Karen R. Polenske gives a short review of the characteristics of the input–output work in China. In Chinese input–output tables no imputations were made and producers' prices were used. The tables were in physical units or valued at current prices (which were kept constant over a 30-year period however). The accounting of producer and consumer subsidies was almost neglected. No attention was paid to secondary products. Since China lacks a comprehensive statistical accounting system, the authors of the tables used a variety of methods for data compilation. In recent years, however, the Chinese started to organize the collection of data and their processing, storage and analysis systematically. The available computers are sufficient for this work. The Chinese are very good at constructing mathematical models but have almost no experience in using them to solve the problems which arise in a market economy.

Jiri Skolka
Austrian Institute for Economic Research,
Vienna, Austria

Effektivnost' Obshchestvennovo Proizvodstva i Mezhotraslevije Modeli

V. G. Papava

Tbilisi, Mecniereba, 1988, 270 pp.

The book is centred around the concept of productivity. In Papava's definition productivity means the surplus of an industry's output above the amount consumed in the process of production. Productivity is easy to determine in extraction and agriculture where means of production have essentially the same natural form as output (coal produced with energy, grain produced with grain) but the concept may be generalized to more complex situations where means of production are delivered by other industries. Productivity in this more complex case might be investigated with input–output models.

Productivity in a static input–output model requires that there be a non-negative gross vector X for which net output $Y = (I - A)X$ is non-negative. Productivity of the static input–output model is a well-researched area. It depends exclusively on the structure of the matrix A of input–output coefficients. Several necessary and/or sufficient conditions of productivity of the static input–output model have been formulated: the Hawkins–Simon, the Perron–Frobenius, the Brower–Solow conditions etc.

The main contribution of the book is that it generalizes the concept of productivity to what it calls extended (one period, with accumulation of capital) and dynamic (many periods) input–output models. There are several models in each category differing mainly in their classification of capital goods (according to producing industry, to consuming industry or both). For each model sufficient conditions are given for an initial capital stock Φ and gross output X to produce non-negative net output Y and non-negative accumulation $\Delta\Phi$. The economic interpretation of all these sufficient conditions is similar. All of them require—beyond productivity of the A matrix—that unit capacity produces in every industry more than is needed from the industry's output by all the industries for pursuing their respective productions at unit level. In reality the condition is fulfilled only by so called non-asset-producing industries, not by asset-producing ones, as calculations with a 17-sector model of the Georgian economy demonstrate.

Therefore the requirement of productivity should be relaxed; this is done in Chapter VI of the book. The concept of partial productivity is introduced. An $\hat{A}$ coefficient matrix is called partially productive if it contains an $\hat{A}_{11}$ submatrix of maximal dimension. Necessary conditions for the productivity of models with a partially productive coefficient matrix are given.

We find also chapters on efficiency measurement of fixed assets (here the author warns against the practice of attributing all output to one production factor, be it labour or capital) and on the measurement of structural change (Euclidean distance, entropy etc.).

A. Szegö