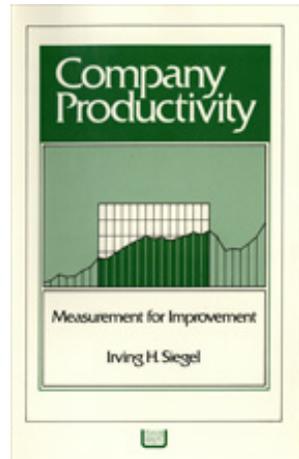

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Orientation and Overview

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Chapter 1

Orientation and Overview

The Subject

The theme of this monograph is fairly suggested by the title: Companies may help to raise their own productivity, significantly and relatively inexpensively, by measuring it. The direct effect of a company measurement program could be amplified by coordination with other extant or planned managerial undertakings to improve company performance. Furthermore, the extensive participation of companies in monitoring their own productivity could have a salutary spillover effect on the national base of “atomic” data, which is always inadequate to the varied demands of national policy.

The improvement of company productivity is ever a timely subject and nowadays seems even more so. Thus, against the backdrop of chronic inflation that plagued the late 1960s and the 1970s and still rages, it is clear that the survivability, autonomy, and profitability of companies are closely linked to ability to control costs of production. The upgrading of company performance, furthermore, ought to benefit the national productivity rate, which has slowed disappointingly in recent years. All Americans have a stake in the recovery of the national productivity pace—as a requisite for eventual mastery of inflation, for continuing competitiveness in world markets, and for the maintenance of high-level employment and customary living standards.

The Book and the Title

The content and structure of this book are succinctly summarized by key words in the remaining chapter titles. Thus, the next three chapters are concerned with the *why*, *what*, and *how* of company productivity measurement, and the final chapter offers some *examples*. Services as well as manufacturing, the traditional area of productivity measurement, are covered in the examples. Appendix notes expand a few of the remarks made in the text. The rest of this chapter touches selectively and briefly on topics treated later.

Two words in the title require early elucidation. First, “productivity” has many contemporary connotations, but it is restricted here to a preferred professional usage. It is defined, for the purposes of this monograph, as a family of ratios of quantity of output to quantity of input.¹ This “quantity form” is dimensionally equivalent to a “price form,” which is also of practical and theoretical interest and will be considered at some length later.²

The second word requiring explication is “company.” It here refers to company components also (e.g., divisions, plants, departments, and cost centers); and, less obviously, it is broadly construed to include government agencies and elements thereof (e.g., bureaus, offices, sections, and work centers).

Extension of the meaning of “company” to include government agencies is apt. Increased interest in the productivity of government operations at all levels has led to serious confrontation of the difficulties besetting the measurement of services in general. The progress made in measurement in the

1. By courtesy and convention, an output aggregate that is expressed in constant dollars (current dollars adjusted for price change) is regarded as a “quantity.”

2. In index-number design, construction, analysis, and interpretation, it is important to distinguish between the mere satisfaction of a dimensional criterion and the satisfaction, in addition, of the stricter requirements of algebraic compatibility. An agreeable “cancellation of words” in a dimensional formula (verbal algebra) is not the same as the achievement of algebraic consistency in the detailed structures (aggregates) representing those words (literal algebra).

public sector is transferable to measurement relating to services performed in the private sector. It also has lessons for company measurement, whether in the services or in manufacturing.

Productivity Concepts

In the definition of “productivity” given above, the word “family” is not gratuitous. Although many different productivity measures are conceivable, the denominators most frequently encountered and most accessible to companies refer to labor input. Thus, a company that has decided to track its own productivity would be well advised to start, say, with global and detailed measures of output per employee-hour. (This ratio is dimensionally equivalent to the quotient of average hourly earnings of employees and unit labor cost—its price form.) Since capital (the other major “factor input” that is conventionally recognized) is difficult to quantify plausibly, a company would probably get an earlier positive payoff by proceeding next to measure output per unit of a significant “intermediate input,” such as energy or a critical material. Most estimates of capital quantity are of doubtful quality, even if makers and users who want them badly are not inclined to show warranted circumspection. A “naive” alternative approach merits company consideration: the use of energy consumption as a proxy for capital services.

Recognition that productivity has a price form as well as the more conventional quantity form can aid in the design and interpretation of company measures. Many so-called “productivity” ratios, for example, do not satisfy our quantity definition, being “hybrids” with numerators expressed in current dollars (e.g., value added per man-hour).³ From the price form, it is easy

3. Despite the preference for a strict productivity definition, this monograph recognizes, and explicitly states, that even crude measurement can help a company to improve its performance.

An appendix note (pp. 78-79) shows that a productivity change may be expressed approximately as a difference rather than a ratio. When the change is large, however, the approximation is poor. The same stricture applies to a fashionable use—or misuse—of mock calculus to define discrete productivity change as a difference between instantaneous rates of change in the numerator and the denominator.

to see the algebraic linkage of such hybrids to the preferred quantity ratios (e.g., value added per man-hour is the product of output per man-hour and unit value added). Furthermore, for companies that have the necessary technical talent and data, an opportunity exists to construct productivity measures that meet the quantity and price criteria literally as well as dimensionally. Such sophisticated measurement systems would also routinely yield algebraically compatible cost indicators (e.g., unit value added). Since cost is a much more familiar accounting concept than productivity, a design that accommodates them both should appeal more strongly to skeptical executives.

End Products and Subproducts

The measurement of a company's or a government agency's output (and hence its productivity also) may focus either on end products or on subproducts. Typically, emphasis is placed on end products—on the final goods or services destined for markets or ultimate users. Every end product, however, may also be described, exhaustively and without double counting, as the sum of results (subproducts) emerging from a set of organizational subactivities.⁴ A subactivity corresponds to a unitary process or coherent combination of such processes—to a work or cost center, to a sequence or cluster of such centers, or to a still larger component of organization (e.g., a company department or a government bureau).

A shift of emphasis in measurement from end products to subproducts could have many advantages. Subproducts are usually more homogeneous and, therefore, more amenable to arithmetic treatment. In short periods, they can also be matched more closely with their required inputs. They are suitable building blocks for output measures intended to meet general organizational needs (such as company planning and forecasting) and for

4. An end product may also be regarded as the immediate result of a terminal organizational subactivity. This fact correctly suggests that measurement in terms of end products without adjustment for inventory change could yield a distorted picture of a company's output performance.

consistent detailed measures intended to meet the needs of operational managers. Subproduct measurement also could point the way to rationalize production by, say, a reorganization of workflow or plant layout. Thus, it could help a company to avoid concentration on simply doing better what a company should no longer do at all.

A complete fine-grained monitoring system, however, also has drawbacks. It is less familiar than a system based on end products. More important is its expensiveness to implement and maintain. Apart from the cost of generating and recording adequate data is the cost of continual subproduct revision that the very success of the system may suggest. Accordingly, a company that undertakes monitoring may find it practical to start with a compromise between end product and subproduct measurement, as the next section proposes.

Company Systems and Strategies

Although many variables necessarily influence the actual shape of a monitoring program, a company is much more likely to embark on a two-tier program than to try construction of a comprehensive hierarchical battery of measures from the work (or cost) centers upward. Indeed, a company should begin on a modest scale rather than reach far beyond its grasp; and, if it does begin modestly, it can more comfortably change course along the way. After all, a measurement system is to some degree experimental; it should ideally remain evolutionary, adaptable to changing circumstances and requirements as these are revealed. The most important continuity is of the will—of top-level commitment and support.

A two-tier system attempts to accommodate simultaneously both the general needs of the helmsmen at headquarters and the specific needs of line management. Accepting the certainty that a comprehensive, integrated, “bottom-up” measurement system will be slow in developing and may never mature, it seeks broad company measures for use in such functions as forecasting, planning, and comparison against “the competition.” At the same

time, it moves toward monitoring subactivities on a selective basis. It focuses first on work centers, or on combinations having functional coherence, that are significant from the standpoint of cost, profitability, or continuity of production.

A company would do well to build on whatever foundations already exist, or at least to take them into account in a fresh approach. Where a "management information system" is in operation, for example, the periodic printouts may contain primitive productivity or quasi-productivity indicators that are not recognized as such. Where "work measurement" is practiced at all, a beachhead may be available for initiation of a more complete, formal system of subproduct monitoring through time. Even after a company has inaugurated, say, a dual-track program, it could benefit from review of its workflow and data base "as if" it were interested in the design of a hierarchical measurement system to accommodate the needs of headquarters and inward-looking management.

The time appears right for breaching the Chinese wall that too long has separated the "productivity measurement" art of the economic statistician and the "work measurement" art of the industrial engineer. The blending of these arts, to which some impetus should have been given by the recent and prospective advances in the assessment of government performance, would surely improve the outlook for integrated company measurement. Experience gained in a broader technical context might, for example, indicate the kinds of compromises that could reasonably be made in the combination of work centers and subactivities (to withstand the threats of reorganization to continuity of productivity time series) yet yield acceptable figures at manageable cost.

The statistician's approach has typically favored construction of output measures based on end products or final products, with acknowledgment made only indirectly of subproducts in the adjustment for inventory change. The engineer has typically concentrated on the measurement of a static "efficiency" ratio based on the "actual" and "standard" times required for the

performance of an individual or small-group task. But, as an appendix note shows, such ratios may be “dynamized” and combined for many work centers to provide productivity measures of a kind preferred by the U.S. Bureau of Labor Statistics. A convergence, in short, is perceivable as the statistician’s art develops downward toward work centers and as the engineer’s extends upward—to a meeting at the subproduct interface.

Whatever choice a company makes, the specific design and installation of a monitoring system will surely not be trauma-free. The task force or steering group chartered by high company authority must gain the confidence of managers of other esteemed cost-control systems already in the field. It needs to enlist lower-echelon employees in the selection of measurement criteria and in other ways to make them feel that the system is “theirs.” It has to review existing data bases, start two-tier measurement, “sell” the system with seminars and briefings, write instructions, designate “local” productivity officers, arrange for training, engage outside consultants, and provide a blueprint for future evolution and conduct of the measurement program. Guided by a vision of the ultimate or ideal system, it should nevertheless proceed by realistic incremental steps toward phased subgoals. It should keep responsibility for delivery of a “turnkey” operation, using outsiders for assistance only on specific technical tasks. Obviously, the list of cautions could be lengthened formidably; but comfort should also be taken from the experience that even a crude initial measurement effort can help raise productivity and that serious analysis and interpretation may compensate in some degree for limitations of the emerging figures.