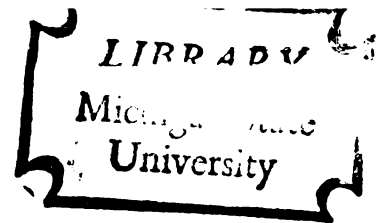




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**THE MEANING AND MEASUREMENT
OF ORGANIZATIONAL PRODUCTIVITY**

By

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ABSTRACT

THE MEANING AND MEASUREMENT
OF ORGANIZATIONAL PRODUCTIVITY

By

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This paper identifies the problems in both meaning and measurement of productivity at the organizational level and presents some solutions to those problems. The reasons for the current problems are explored and a review is made of past approaches and perspectives on productivity. Adopting a multi-disciplinary stance, this review includes the productivity literature from several fields, enunciating the inconsistencies and current confusion and then attempting a theoretical integration for solving both conceptual problems and measurement problems. Central to this integration is the differentiation of performance productivity and financial productivity. Performance productivity measures reflect a concept of productivity that is independent of the components' monetary values, while financial productivity measures include such values and value changes. This distinction allows the development of a more useful approach to the meaning and measurement of organizational productivity.

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THE MEANING AND MEASUREMENT OF ORGANIZATIONAL PRODUCTIVITY

Productivity is a word often heard in organizations today. In the last fifty years, the concept of productivity has gradually come to be a key concept in business and government. Spurred by the international concern for productivity after World War II, productivity has become a dominant theme in assessing economic activity.

Psychologists have not been immune to this epidemic usage of the concept of productivity. The last quarter-century has seen much written about the improvement of productivity, the meaning of productivity, social and psychological factors that affect productivity, etc. Today, the concept of productivity has emerged in several areas of psychology, in addition to its prominent place in economic research and in general business usage.

But one viable question remains: to what extent is productivity important to modern organizations? Is it merely a vestige of the past or is it a future-oriented concept useful in dealing with current problems? The research literature and practicing managers generally agree on this point: productivity is important.

For managers, productivity is important as a means of organizational control. Management theorists feel that the primary function of management is the control of productivity. Umstot, Bell, and Mitchel (1976) report that "concern for productivity is still the dominant focus of managers" (p. 379). Beginning with Drucker (1954), productivity has been proposed as an important element in the development of human resources. This thinking is continuing today with the dual emphasis on productivity and the quality of work life (Hackman and Suttle, 1977).

For researchers, productivity has been a fundamental criterion variable. Countless research studies have used some measure of productivity as an indicator of significant change within the organization. For example, within the field of organization development, productivity increases are often cited as evidence that a change program has been successful (Walton, 1972; Gibson, 1973; Huse and Beer, 1971; Bowers, 1976; etc.). Research on group behavior (e.g. Wilson, Aronoff, and Messe, 1975) and individual motivations (Greenberg and Leventhal, 1976; Adams and Rosenbaum, 1962; etc.) have demonstrated the usefulness of productivity measurement. From the original Hawthorne studies (Roethlisberger and Dickson, 1939) until today, productivity has been an important research variable. Thorelli (1960) summarized the perspective of many researchers when he noted that "productivity must ultimately be the payoff variable in research on problems of organizations" (p. 5).

Yet with all the emphasis on productivity, there are still many basic issues that are unresolved. There are many definitions of productivity that have been presented in the literature, with no one definition being satisfactory. Even beyond the formal definition of productivity, there is no agreement as to what the concept entails. It has become a vague, poorly defined word that has been easily adapted to fit almost any context. Even within its home field of economics, productivity research has sparked a never-ending controversy as to what is meant by the word. The issues are further clouded by measurement problems. Given the confusing state of the art with regard to conceptualizing productivity, there is little wonder that there is disagreement surrounding productivity measurement.

This paper will review the basic issues of the meaning and measurement of productivity as it relates to organizations. A conceptual distinction is proposed to help resolve these issues. Then the measurement literature is reviewed and some proposals are made for future productivity research.

The Meaning of Organizational Productivity

Performance Productivity versus Financial Productivity

It is helpful to distinguish two basic types of productivity. The first type will be called "performance productivity;" the second will be called "financial productivity." These two types of productivity will be defined and extended to both conceptual and measurement problems.

The definitions of performance productivity and financial productivity are based on a systems definition of productivity. The context of system as used in this paper is that of a social system rather than the cybernetic concept of system. As used in this paper, productivity means, "given a system, a mathematical relationship between system output and system input." Then, performance productivity is "given a system, the ratio of output to input expressed in terms of a non-monetary unit of measurement (energy, time, physical quantities, psychological variables, etc.)." Financial productivity is "given a system, the ratio of output to input expressed in terms of a monetary unit of measurement." The differentiation then, is in the units of measurement and therefore, the orientation of the measure and its uses. This simple condition, however, gives us the frame of reference to understand productivity problems, because the development of a productivity measure is dependent on the selection of one of these forms, depending on the objectives of the measure.

Performance productivity measures relate non-monetary output with non-monetary input. Utilizing the same output and input, financial productivity measures convert these to dollars (or some other relevant monetary units). In the former instance, the word "performance" was

chosen since the measures typically reflect those factors under the control of the organization or worker and thus are specific feedback for performance. In the latter instance, the word "financial" was chosen in order to reflect the monetary measurement units.

Performance productivity includes such measures as five cars per hour, ten pins per bowl, eight completed passes out of ten attempts, six bolts per machine hour, words typed per minute, miles per gallon, tons shipped per year, six servings per can, and one thousand bachelor diplomas per year. Financial productivity measures include such measures as \$1,000 of steel produced per \$595 of materials, \$9.50 of food served per dollar of waitress time, \$100,000 in ticket receipts per \$50,000 game, and 1.523¢ of bolts produced per dollar of machine time. In the former, both input and output are expressed in non-monetary units; in the latter, both input and output are expressed in dollars.

The selection of one of these types is dependent on the objectives of the measure. Performance productivity is useful for such things as materials comparison, job design, certain cases of performance feedback for employees, comparison of plants, production analysis, etc. Outside microeconomic units, performance productivity is usually the most important analysis tool because monetary values are often very difficult to establish or are irrelevant. A family looking for the most efficient ways of cooking meals, washing dishes, and keeping a clean house is looking at performance productivity measures. An educator looking for the optimum conditions for learning a given subject considers performance productivity measures. Even inside the firm, industrial engineers use performance productivity measures to set standard times for operations.

Financial productivity measures are also useful for certain objectives. Since financial productivity measures attempt to include market effects of prices, costs of inputs, etc., it is the type of measure to use where the objectives include such effects. Decisions between the implementation of two manufacturing processes would include financial productivity data. Long-range planning of a firm would include financial productivity measures. A pay bonus plan for a firm might be based on financial productivity measures in order to reflect the changing financial status of the firm.

In light of the distinction between performance productivity and financial productivity, it appears that these two types of productivity have been confused and debated. It is suggested that the two approaches have different objectives, different procedures, different problems, different uses, and different results. Individuals promoting or dealing with some aspect of productivity have often been biased toward one of these types and it has limited the interaction with those biased toward the other aspect. The most serious effect, though, has been that the development of the productivity concept has been stymied. Hopefully, the clear differentiation of these two types of productivity will aid in removing these unwelcome barriers.

Hybrids of Performance Productivity and Financial Productivity

In all cases hitherto discussed both the input and output have had the same type of unit of measurement. That is, they have both been either monetary units or non-monetary units. There are two more possibilities, making a total of four possible combinations. In one case, the output can be based on performance measures and the input on financial measures. Thus there are two hybrids. These hybrids are given

special names to enable proper discrimination. Also, possible uses can be given for each type, along with pertinent examples (see Table 1).

As we can see from the chart the differentiation of performance productivity and financial productivity provide a framework for analyzing productivity measures. There are endless varieties of measures in each category. The division of these four basic types of measures gives an orientation to analyze how effectively the measure meets its objective and what its limitations are.

The most popular economic measure of productivity is output per hour. As we can see from the chart, it is only one type of measure. When the output is expressed in floating dollars it is a "financial productivity of a performance input" measure, i.e., output is in dollars, input is in hours worked. When the output is expressed in constant dollars, the measure is a pure performance productivity measure. This is the case most often encountered. Constant dollars are performance measures (rather than financial measures) since the measures do not reflect actual economic value of either the inputs or the output. The reason most output per hour figures use constant dollars to measure the output is that it is usually the best measure for aggregating the diverse goods and services produced by the economy. Thus the productivity measures available on the national, international, sector, and industry level are only performance productivity measures. The immediate limitations are that we know nothing of the financial productivity of labor, which is very significant information in financial decisions.

Importance of Productivity

Productivity has been proposed as a key concern for the society as well as for organizational psychologists. Herbert Stein, in a bulletin

Table 1
Performance Productivity versus Financial Productivity

Output	Input	Name	Examples	Objectives
Performance	Performance	Performance Productivity	--Miles per gallon --Cars produced per hour --Words typed per minute	Apart from the value of either the input or the output, to identify the quantity produced per quantity of input
Financial	Financial	Financial Productivity	--Dollars of food sold per dollar of waitress time --Ticket receipts per \$10,000 game --Return on investment	Including the changes in values of both input and output, to identify the value of the output per dollar of input
Financial	Performance	Financial Productivity of a performance (non-monetary) input	--Dollar sales per salesman --Total dollars of production per month --Dollar output per man-hour --Values of bolts produced per kilowatt hour	To identify the dollar value produced for a given level of physical quantity
Performance	Financial	Performance Productivity of a financial input	--Students taught per legislature dollar --3 balls for a quarter --miles of road built per tax dollar	To identify the physical output for a monetary unit of input

from the Bureau of Labor Statistics (Bulletin 1714) to the National Commission on Productivity (Stein, 1971), establishes some reasons for the national importance of productivity at the present. First, pressures on the American economy are great, both through the market process and the political process. As the American economy has grown so rapidly, the expectations of workers and consumers have grown concomitantly. These claims require increasing levels of productivity. Second, in recent periods, the rate of growth of both the GNP and productivity has slowed, leading to a deterioration in the real wages of workers. Third, productivity "is a way of increasing the ability of people to do what they want to do," including a higher standard of living, a choice of leisure through vacations and earlier retirement, and by providing the resources for improving the quality of the environment. Fourth, the economy is approaching the period where maintaining the rate of growth of productivity will be difficult. One of the main reasons for growth in productivity is the shift of agriculture workers into industrial jobs. At the present, that shift is nominal and the more important shift is the shift from manufacturing workers to workers in the service sector. The fifth reason for the concern for productivity is the remarkable growth of Japan and several Western European countries. Their growth rates have emphasized to many Americans the necessity for the concern about levels of productivity.

One of the primary economic arguments for the importance of productivity is that productivity must rise as fast as costs (particularly labor costs) in order to prevent inflation. Bloom (1971) asserts that the wage-price dilemma is primarily a productivity problem. Modest productivity increases are swamped by massive wage adjustments and

result in higher prices. Thus productivity must be a vital concern for the control of costs and prices in the economy.

One political reason for concern for productivity is the economic stance it gives America in international relations. Teplow (1954) noted the image of American productivity was that "we are and always shall be leaders in this field" (p. 17). Beller (1967) suggests that complacency about productivity improvement will lead to other countries becoming leaders in the industrial realm. This will have a negative impact on the bargaining issues of international problems. The command of productivity is a leadership position America cannot afford to lose. Now, in spite of that, Japan is overtaking America in productivity and economists are not particularly concerned (for example, see Stein, 1971). This inconsistency needs to be recognized and dealt with more realistically.

Beller (1967) identified the importance of productivity in the universal goals of greater leisure, rising income, and lower costs. Labor benefits from productivity increases through such changes as the decrease in the work week and earlier retirement. Therefore, although productivity is not typically a goal of labor unions, it has been an important key to the realization of the goals of American labor.

Thus productivity is "perhaps the most important single indicator of our national well-being" (Slesinger, 1969, p. 14). Stein (1971) suggested that productivity is important for restoring the rate of gain in average real income and for meeting the growing demands placed on the economy expressed through the political situation and the growing expectations of workers and consumers. Therefore, the proper viewpoint for productivity must be a very broad one.

This striving for higher productivity must not be viewed as a whip-cracking exhortation to "work harder" in order to raise some arbitrary abstract measure of economic performance....Increasing productivity may thus be regarded as the keystone to an improved standard of life and environment for all of society. (Stein, 1971, p. 3)

For development of particular industries, productivity is also a vital concern. Industries that cannot maintain productivity increases are forced to maintain relatively high prices and are therefore subject to foreign competition (such as the fishing industry), stiff competition from other related industries (such as the railroad industry being replaced by the trucking industry), intense social pressures (such as the health care services), or even governmental regulation (such as the railroad industry). Jacks (1968) emphasized to the steel industry, where the biggest technological advance in two decades has come from another country, that productivity gains, although they have been significant in the past decades are even more important for meeting foreign competition.

Beller (1967) was concerned with developing a social role for productivity. The drastic difference of the capability of American enterprise and the actual conditions of the workers, he felt, was sufficient reason for redirecting productivity efforts. "The importance of increasing productivity is apparent. However, a society...must increase productivity without injuring millions of people in the process" (p. 10). He added that society should be concerned with the proper distribution of productivity gains. Government interest in human capital formation is very important. These human investments are as important as the investments in machines. Equal opportunity in

education and employment, racial discrimination, and investment in minorities are all issues related to the productivity of human resource investment.

Definitions of Productivity

One of the primary problems in the productivity literature is the lack of agreement regarding the definition of productivity. In general, there is a great deal of confusion regarding the meaning of productivity--among scientists and managers.

The present study attempts to review and contrast the definitions presented in the literature. The review will include those definitions presented over the last quarter century. Many articles on productivity fail to give any definition of productivity, thereby side-stepping the morass of unsatisfactory definitions already presented. Nonetheless, some articles do present the main idea of "productivity" as perceived by the authors, without presenting a formal definition. In those cases, the main ideas will be included as definitions. Thus while all the entries are not the formal presentation of the author as a definition, they are the expression of the main concept of productivity as presented by the author.

There are three main approaches to defining productivity (see Table 2). First, productivity can be defined as a quality or state of being. This is the basic historical definition and still is the primary dictionary definition. However, the verbalization of this quality has never been adequately accepted by most productivity researchers and consequently, no single statement of this quality has been successful as a definition. The quality is the fundamental meaning of the word, but the verbal expressions of this quality are unsuccessful as a

Table 2

Definitions of Productivity

A. Productivity is a quality or state of being:

1. Davis (1951) - "Quality or state of being productive."
2. Davis (1951) - "The possession or use of power to create, to bring forth, or to make."
3. Steiner (1949) - Measure of performance or potential."
4. OECD (1955) - "The measure of economy of means."
5. Littre (1883) - "Faculty to produce."
6. French National Committee for Productivity (1955) - "The measurement of the economic soundness of the means."
7. Fabricant (1962) - "A measure of our power to produce the goods and services we need and want."
8. Odiorne (1959) - "An accrual to the nation or the group resulting from the best combination of hundreds of controlling factors-- sound organization of production and distribution, a stable money system, adequate bank credit, a solid foundation of science and technology, ample natural resources and knowledge of how to use them, stable government, and a sound set of moral and social values in the population."
9. Davis (1951) - "Degree to which power to make or provide goods or services which have an exchange value is utilized."
10. Fenske (1965) - "The magnitude of productiveness."

B. Productivity is the efficiency of resource utilization:

1. Langenberg (1952) - "Efficient expenditure of a number of resources."
2. Jerome (1932) - "Yardstick for net efficiency of our industrial

Table 2 (cont'd.)

system in delivering goods to the final consumer."

3. OECD (1955) - "Utilization of resources in relation to some standard."
4. Beller (1967) - "Productivity is a measure of efficiency in production."
5. Brower (1974) - "The efficiency with which the organization uses inputs to produce its goods or services."
6. Thorelli (1960) - "The relationship between goal achievement (output) and resources expended (input)."
7. English (1951) - "A qualification of the efficacy of human industrial endeavour."
8. U. S. Chamber of Commerce (1954) - "Rate at which we convert work and raw materials into useful goods and services."
9. "Productivity, the last frontier" (1958) - "A measure of efficiency with which the resources at work are utilized."
10. Fabricant (1959) - "A measure of efficiency with which the resources are converted into the commodities and services that men want."

C. Productivity is a ratio of output to input:

1. Greenberg (1973) - "Measure of relationship between quantity of resources used and quantity of output."
2. Stein (1971) - "The most commonly used definition of productivity is real output per hour of work."
3. Mark (1971) - "Productivity is loosely interpreted to be the efficiency with which output is produced by the resources utilized. A measure of productivity is generally defined as a

Table 2 (cont'd.)

ratio relating output (goods and services) to one or more of the inputs (labor, capital, energy, etc.) which were associated with that output. More specifically, it is an expression of the physical or real volume of goods and services related to the physical or real quantities of inputs."

4. International Labor Office (1969) - "The ratio between output and input."
5. Bureau of Labor Statistics (1974) - "A concept that expresses the relationship between the quantity of goods and services produced--output--and the quantity of labor, capital, land, energy, and other resources that produced it--inputs."
6. Stephenson (1965) - "Expression relating the performance achieved--output in a given period--to identifiable and tangible input factors."
7. Chaumet (1961) - "Expressed by the ratio $\frac{\text{OUTPUT}}{\text{AGGREGATE INPUT}}$."
8. Vincent (1961) - "Productivity, as everyone knows, is expressed by a fraction whose numerator represents an output and whose denominator represents one or more of the factors of production which contribute to this output."
9. French National Committee for Productivity (1955) - "The relationship (measurable) between product and factors."
10. French National Committee for Productivity (1955) - "Production per factor unit."
11. Siegel (1955) - "The class of conceivable measures depicting output per unit of associated input in a sequence of compared periods."

Table 2 (cont'd.)

12. Steiner (1949) - "Output per unit of input."
13. Diebold (1952) - "The quotient obtained by dividing output by one of the factors of production."
14. Diebold (1952) - "Output per unit of labor input."
15. Fourastie (1957) - "Productivity = $\frac{\text{Output}}{\text{Labour Input}}$."
16. Dean (1960) - "The ratio of physical output to a single input factor, usually labour, also measured in physical terms."
17. Woodhall and Blaug (1968) - "The ratio of some specified output to the inputs of resources required to produce it."
18. Lomax (1965) - "Output per unit of labour input, per unit of capital input, or per unit of combined labour and capital utilised."
19. Easterfield (1961) - "The ratio of some measure of output of a firm, or a lower productive unit (down to the individual worker or machine), to a measure of the input of some or all of the factors of production required (labour, raw materials, machine time, and so on)."
20. Borch (1965) - "The ratio of output to input."
21. Fenske (1965) - "The amount of goods and services produced by a unit of a productive factor in a specific period of time, or the average amount of goods and services produced by a unit of the productive factor in a specific period of time."
22. Schulz-Mehrin (1955) -
"Productivity = $\frac{\text{Output measured in physical quantities}}{\text{Input measured in physical quantities}}$."

definition. The second possibility for approaching the definition of productivity is that of the efficiency of resource utilization. There are various ways of describing this efficiency concept, and it, too, touches on an important aspect of the productivity concept. This approach has been a very popular approach for defining productivity and is one used by many managers. The class of things that are considered as resources varies from person to person, but the same general idea is apparent throughout the definitions. The third approach to the definition of productivity is the mathematical comparison of the output and input. This is usually done through the form of a ratio. This definition has gradually become the most popular definition in the last quarter century. The basic reason for this development is the increasing emphasis in science, and particularly economics, on quantification. Since this trend in quantifying concepts is very likely to continue, this approach to defining productivity will probably continue to be popular.

One of the elements of this quantification phase is the relative objectivity that it allows in comparison to the completely conceptual definitions of the first two approaches. Consequently, one would suspect that it would be possible for the field of productivity researchers to centralize on one definition of productivity using this third approach. This has not been the case. Instead, the number of definitions has increased even more, as every conceivable twist is made in the definitions. Different authors want different limitations placed on what can and cannot be considered as inputs and outputs. Other authors want it to only represent a ratio, some a fraction, some simply a comparison of any sort. Some want the only input to be labor. Others want all the

inputs to be devoid of price changes. Some want the definition to be limited to only one factor input. Some want it to refer only to aggregate inputs. And the list goes on and on. There is little agreement and few efforts are being made to integrate the definitions into some acceptable standard definition. The definitions have continued to proliferate as various researchers express their perspectives on productivity. The result of this individualism, however, is a state of conceptual confusion unparalleled for a concept that has been investigated for over two centuries.

Thus there have been three approaches to defining productivity. The notion of productivity as a quality is rare in the recent literature. General business literature tends toward the resource utilization definition, while researchers emphasize the output/input definition. Productivity as "output per unit of labor" or some similar definition is an extreme form of operationalism that avoids theory. Productivity theory which leads logically to some particular definition of productivity (with the exception of the classical micro-economic theory of production) continues to be non-existent and yet is currently ignored by researchers. This paper proposes that the concepts of performance productivity and financial productivity, based on a systems concept of organizations, provide the foundation of a productivity theory with a definition of productivity developed from and consistent with that theory.

Perspectives on the Meaning of Productivity

Given this range of definitions, what is the essence of productivity? What is the fundamental meaning of the concept and how does that meaning have value to organizations and psychologists?

The meaning of productivity has had a long history. Quesnay, a physiocrat of the eighteenth century, first used the word in an article in 1766 (cited in OECD, 1956). For over a century, the meaning was very vague and was not pursued consistently. In the early twentieth century, economists began to attach a more precise meaning. Attempts were made to define and measure the concept. Although there was general progress, the results were something less than optimal:

Beginning at least two centuries ago, economists concerned themselves with production and productivity. We groped and fumbled a good deal at first. But today after successive clarifications, most economists agree that any activity or contribution of one of the factors of production which increases the value of the materials worked upon, is productive. (Maverick, 1955)

The current perspective of the Bureau of Labor Statistics on the meaning of productivity is represented by Bulletin 1714, prepared by the BLS for the National Commission on Productivity. In the first of two papers of that bulletin, Stein (1971), of the President's Council of Economic Advisors, explained that "the most commonly used definition of productivity is real output per hour of work." The basis for this definition lies in its (1) important social implications in meeting individual and social desires, (2) economic significance in comparison with prices and wages, and (3) "estimates of productivity defined in this simple way are available to permit interesting and analytical comparisons of different times and countries, whereas more sophisticated measures are not." Stein acknowledges the common criticism of this definition as reflecting only quantity and not quality. Another problem of such a definition of productivity discussed by Stein is the failure

to recognize consequences of economic externalities (such as pollution) not included in the output per hour measure. Stein concludes that the output per hour figure is too simple to be adequate for many purposes, although it is sufficient for certain analytical purposes.

In the second paper of the same bulletin, Mark (1971) presents another definition of productivity:

Productivity is generally defined as a ratio relating output (goods and services) to one or more of the inputs (labor, capital, energy, etc.) which were associated with that output. More specifically, it is an expression of the physical or real volume of goods and services related to the physical or real quantities of inputs. (p. 7)

Productivity concepts and measures are then grouped into two classes. The first class contains measures that relate output to one input. The second is the class of concepts and measures that related output to a combination of inputs. The first class measures only one input, but does not measure the specific contribution of that input. Rather, these measures reflect the interaction of many interrelated influences on this input in the production process. This interaction of factors is a major productivity problem that is generally unrecognized.

Davis (1951) considers productivity in its general sense to denote "the quality or state of being productive" or "the possession or use of power to create, to bring forth, or to make." Noting that it is common practice to define productivity as the "output per unit of labor time expended," he feels that this popularity is due to the social interest in labor savings, although it removes the confusion from neither the analysis nor interpretation of productivity. He gives two

reasons for the unacceptability of this definition: (1) this mathematical definition is as applicable to other inputs as it is to labor, and (2) the meaning of the ratio is not fixed, making interpretation a risky business. It also reflects changes in other factors in addition to the changes in the utilization of labor. He concludes that "the meaning of productivity in the economic field may be stated as the degree to which the power to make or provide goods or services having exchange value is utilized as measured by the output obtained for the resources expended."

Other definitions have been proposed which avoid the notion of a property of materials, people, etc. Fabricant (1962) defines productivity in the broadest terms as "a measure of our power to produce the goods and services that we want." Diebold (1952), echoing the business community, defines productivity as the "quotient obtained by dividing output by one of the factors of production." Labor, too, has addressed the issue of productivity. Beller, an AFL-CIO economist, defines productivity as "a measure of efficiency in production" (Beller, 1965).

Still another definition of productivity provided by the BLS is shown in Bulletin 1811 (Bureau of Labor Statistics, 1974) where it was explained to be "a concept that expresses the relationship between the quantity of goods and services produced--output--and the quantity of labor, capital, land, energy, and other resources that produced it--inputs" (p. 1). Notice this definition has no direct implication of the necessity of a ratio as in other definitions.

Fenske (1965), after reviewing several definitions of productivity, proposed that productivity be defined as:

the magnitude of productiveness; the amount of goods and services produced by a unit of a productive factor in a specific period of time, or the average amount of goods and services produced by a unit of the productive factor in a specific period of time. (p. 21)

This definition is an attempt to define productivity while avoiding certain problematic words (output, input, efficiency, ratio, etc.). However, the definition appears to be synonymous with several related definitions and offers nothing different conceptually.

Thus, various persons and groups have taken different perspectives on productivity. For theoretical economists, it is often a quality or state of being which describes the firm that is being productive. For the econometrician/statistician, it is a rather narrow ratio of physical goods and services produced to the number of labor hours used. The political perspective sees productivity as a measure of national health which is vital for industrial growth and international economic stability. To the manager, it is a measure of the quality of performance for his/her division. To the worker, it is just another way of getting you to work harder. To the accountant, it is a set of costs and budgets which reflect the financial performance of the organization. To the industrial engineer, productivity means standard times for the individual operations in plant production and assembly. For the organization development practitioner, productivity is often an indicator of the success of an intervention. Finally, for the behavioral scientist, productivity is a dimension of organizational effectiveness and is thus a useful criterion variable in organizational research.

Unfortunately, there is little collaborative effort among these groups on productivity issues. It is clear that all of these groups

offer an important perspective on organizational productivity. It is also clear that each of these groups have an impact on organizations. These perspectives are therefore interdependent, requiring mutual responsibility for achieving the optimum results in an organization. This interdependence suggests, and indeed demands, collaboration and communication among these parties on achieving a common perspective in order to control organizational productivity.

The Measurement of Organizational Productivity

After the concept of productivity has been clarified through a consideration of the definitions and meaning, it is necessary to operationalize the concepts. This second phase is the measurement phase. It includes the development of measurement procedures and techniques and the substantiation of how these measures represent measures of the aspects of productivity they intend to measure.

In the past, various attempts have been made to measure organizational productivity, although none have been used on anything more than a very limited scale. While proponents of productivity measurement point out many uses of a measurement system, little measurement development has been accomplished. At the firm level, productivity measurement in the United States is virtually nonexistent. The situation in Europe is the same (Nanninga, 1975). Apparently, most managers have not found the information provided by productivity measures available to be worth the time and expense necessary to develop them.

Nonetheless, productivity continues to be an important topic that has not declined in popular usage. The "pep talks" on improving productivity continue (though no measures are available to know when the goal is reached). It continues to be an important topic in wage negotiations. Government agencies are still being formed and funded to improve productivity at the national level and the industry level. Psychologists still point to it as an important element in the success of longitudinal organizational development. Economists still point to it as the major element for survival for the firm. So with all this interest in productivity, all of the groups (agencies) should find productivity measurement to be

of value. Unfortunately, there are few adequate or accepted measures available.

Accountants are not familiar with productivity measures at the organizational level, since most of the accounting books and textbooks do not even mention the word "productivity," or explain how to measure it. The lot for measuring has usually fallen to economists who have given particular meaning to the word and developed special techniques of measuring it at the national level. Consequently, when economists were called upon to measure productivity at the firm level, the measures were merely miniaturization of the national accounts and procedures. Unfortunately, this approach has limited value, since most of the macro-economic measures are only basic measures available on the national level (Bureau of Labor Statistics, 1971) and do not take account of many important aspects of individual organizational performance. Consequently, economic measures of productivity are generally over-simplified measures of output-per-hour that relate production output to the time used by the production workers. Thus, important aspects of organizational functioning are ignored. No account is made of the cost of the production labor. No account is made of the prices of the output and how it changes over several periods. No account is made of the very important divisions of administrative personnel--sales, accounting, financial executives, research and development, marketing, purchasing, etc. No account is made for the output of the employees other than the actual physical labor done, including new ideas for future improvements, additional training for broader skills, group meetings to develop a cohesiveness among the work group, and the important aspects of developing an organization.

This narrowness of the economists has been a disadvantage. The limited measures have only had limited usefulness. Usually, the result is something like a series of indices for several years that show that productivity rose during this period and declined during that period. The user is left to interpret the data and decide why the index rose or fell. This is interesting to the managers and executives of an organization, but it does not give them any information on how to improve it in the future. The simple measures are easily discussed but not so easily understood in the light of the many factors that have affected the measures.

Although accountants have not traditionally used the word "productivity," they have measured productivity at the organization level in certain respects. The determination of profit is a form of productivity measure, although it is expressed as a difference of output minus inputs rather than a ratio of output to input. It is, however, an output/input approach to measuring organizational performance. Standards for work performed are productivity measures. If these are aggregated for all applicable areas of the organization, a productivity measure can be developed (Ross and Bullock, in press). Budgets, particularly flexible budgets, are productivity measures, since for accomplishing certain objectives (output) the department is programmed to achieve a certain level of costs (input). It is unlike the economists' measure of productivity since it does not compare the present performance to historical performance but rather to the expected performance that should have been accomplished.

Productivity is actually under continuous measurement in your plant, whether you're conscious of it or not....

Most of these methods measure productivity by inference; they rely on the fact that there is a reasonably consistent relationship between a variable that is easy to watch and actual plant production. ("Productivity", 1971, p. 52)

Thus if one does not restrict the meaning of productivity to a limited class of processes and systems, the measures take on much more meaning. What accounting as a field has done is to develop these productivity measures, almost always for sub-divisions of the organization, without ever invoking the word "productivity." It would be virtually impossible to have an accounting system that did not measure productivity in one way or another, since it is such a basic concept of accountability that it is impossible to ignore. The actual word "productivity" is not used due to the hapless history the concept has had. It has been primarily owned by the economists, who have only developed the measures in certain ways.

Unfortunately, there is little research on the measurement of productivity at the organization level. Correspondingly, there are few organizations systematically measuring and monitoring productivity at the organization level. This level of productivity measurement has been researched by four main studies, with a multitude of smaller publications addressing one particular aspect of measurement at the organization level. However, these studies have been inadequate in developing valid measures for organizations. Consequently, the area continues to remain undeveloped.

Considering the plethora of exhortations to improve organizational productivity it is surprising to discover that there are no generally useful and valid techniques for measuring productivity at the company level. From a research standpoint, this is unfortunate due to the fundamental

position of firms as the basic unit of economic activity. On one side is a host of economic research on the industry, sector, and national level. On the other side, is an equally large volume of engineering research on work measurement of particular workers. Between these two well-researched areas is the virtually unresearched area of organizational productivity measurement.

There are measurement problems in organizational productivity measurement, but these problems are not insurmountable and are no more debilitating than typical accounting problems. What then are the reasons for the lack of research on organizational productivity?

One reason for the lack of research is the inability of some studies to overcome the technical difficulties involved in productivity measurement. Basic decisions on the identification and quantification of output and input have been difficult. Consequently, many studies have simply failed to develop an adequate or representative measure of productivity.

Secondly, the development of an information system for an organization requires an understanding of economics, accounting, and organizational behavior in order to be successful. Many studies (some published but most unpublished) have failed to satisfactorily account and integrate the varied perspectives that must be dealt with in developing organizational productivity measures. This necessity for a multidisciplinary approach has been a barrier for many researchers.

The third possible reason for the lack of research on organizational productivity is the tendency of organizations to take a short-range view. Productivity measurement does not usually give specific information about any one of the smaller decisions that a manager must make in the course of the work day. That information is given by other techniques and

sources of information. Productivity measurement gives information about a series of decisions and the overall productivity of the organization over a period of time. The feedback is for medium-range and long-range decisions and company policy (for example, expansion, product diversifications, etc.). Most organizational systems are not designed to reinforce long-range perspectives of its managers, but rather emphasize the short-run profit position. This has adversely affected the measurement of productivity on the organization level.

Fourth, the lack of organizational productivity measurement is due to the lack of clear applications of the information. Since the information is broad and encompasses several accounting periods, the usefulness and interpretation of the information is dependent on the resourcefulness and perspectives of those that use the information. Unlike other measurement techniques that have a specific purpose (machine purchase or not, make or buy decisions, etc.) productivity measures can be used for many things. This further highlights the necessity for a common measurement approach. Part of the range of decisions that can be made from the productivity information is based on the particular measurement procedures that are developed; however, it is not always possible to specify ahead of time which particular techniques the measurements will use. For this reason it is not always possible to specify the complete list of uses that the measurement will have, although there are many common objectives for the use of productivity measures.

The fifth possible reason for the lack of productivity measurement at the organization level is the particular development of the field of accounting. Most accounting books never mention the word "productivity" in the entire book, although many measurement developed in accounting

are for the evaluation of performance. Thus, organizational accountants are unconcerned with the field of productivity measurement and how to apply the measurement principles to their organizations.

Economics has also had an adverse effect on the development of the measure of organizational productivity. The over-emphasis on labor productivity and the output per man-hour measure of labor productivity has led to a justifiable scepticism on the part of managers of the usefulness of using productivity data when they realize the complex importance of materials, capital, risk-taking on the part of the organization, managerial decision-making, etc. Thus the manager is aware of many factors that affect organizational productivity and views a single index of organization productivity as a questionable practice. Even the economic formulation of "total factor productivity" is inadequate to any manager aware of the complexity of his own organization. Thus the oversimplification of the outputs and inputs by economists has prevented the development of measures that give sufficiently detailed information about the complex state of affairs inside the organization.

Seventh, a study for the National Center for Productivity and Quality of Working Life has documented that the predominant attitude toward productivity in the United States is a negative one. This was shown by a Harris Poll done for the Center (National Center for Productivity and Quality of Working Life, 1971). This most unfortunate situation is perhaps the result of the narrow perspective that has been applied to productivity. It has come to have a "cracking the whip" connotation. Thus the employee cringes when the word "productivity" is mentioned since the next expectation is of some exhortation to improve productivity by working harder and putting out more effort. As a consequence of this

situation, employees have generally developed a negative connotation toward the word. Thus, the situation has arisen where productivity is proclaimed as the primary factor responsible for raising man from poverty (Kendrick, 1961) and at the same time most people harbor strong negative feelings and attitudes toward the word. How paradoxical that the factor that national economists bill as the factor responsible for bringing mankind from the bonds of poverty is sorely detested by most of the population! Certainly some dreadful harm has been done to distort this concept to the point that the very people that it helps dislike it. If it has done so much for mankind, why is it so hated?

The last reason is the unsatisfactory state of the literature. Articles and books on productivity measurement are not integrated into any one field. Instead, the information is spread over many areas: general business magazines, journals in accounting, economics, and organizational psychology, trade journals, government publications, European documents and studies, finance publications, engineering books and articles, labor union publications, etc., etc. This endless array of perspectives and approaches has never been integrated and has contributed to the difficulties of developing a unified measurement of organizational productivity.

Thus there are eight basic reasons for the lack of measurement of organizational productivity. First, there are basic measurement problems that have not always been overcome in the development of the measures and these failures have hindered the attempts of other researchers. Second, the field is a peculiar combination of economics, accounting, and organizational behavior and this multidisciplinary combination has not been appealing to most prospective researchers. Third, business emphasizes

short-term goals rather than long-range goals, obviating the usefulness of a long-range measurement tool like productivity measurement. Fourth, it is not always possible to adequately specify in advance exactly how the measure will be used after it is developed. Fifth, accounting, as the field of business measurement, has given little attention to productivity measures for the organization. Sixth, economics had promulgated an oversimplified view of the complexities of business and caused a justifiable degree of scepticism regarding the utility of the measures that are generated. Seventh, there exists in the American population (and other countries) a negative attitude toward the concept and improvement of productivity. Eighth, the productivity literature is spread over many diverse areas and has not been integrated, so that the researchers or practitioners cannot readily understand the concepts of productivity or apply measurement techniques to them.

Methods of Measurement

There are two primary methods of productivity measurement. One is the econometric/statistical method and the other is the accounting method. The economic method is generally best for the economic analysis of the productivity of countries, sectors of an economy, and industries. The accounting method is generally best for the analysis of the productivity of organizations, individuals, groups of individuals, physical processes, etc. Whereas the economic method involves the statistical manipulation of aggregate measures of the output and input of an economy, the general accounting method is basically a counting and direct measurement method. Since the economic method normally relies on the validity of production functions and sampling procedures, it is an indirect means of measurement. The accounting measurement technique is often, therefore,

more valid and reliable, although it is often not feasible for a diverse economy or for extremely large groups. Both measurement techniques are dependent for their validity on the strengths and weaknesses of the conceptual basis of the measurements.

Within the field of economics there are two basic approaches to the measurement of productivity (Kleiman, Halevi, and Levhari, 1966). The traditional approach has been through the use of the production functions. Most of the economic studies in the literature have utilized one or more production functions in measuring productivity. This approach is used to explicate such concepts as the quality of capital (Domar, 1963), quality of labor (Philpot, 1970), and technical progress (Beckmann and Sato, 1969). In recent years, another approach has been used to attempt to measure what is known as total factor productivity (Kendrick, 1961; Rymes, 1968). This approach has used the company-based data on input and output as aggregated by governmental agencies and used it in a type of measurement that closely resembles the direct accounting approach to measurement, although it relied on economic concepts and assumptions for its development. Thus on the national level, economists have measured productivity primarily through the use of production functions, but also through the use of direct measurement techniques.

On the other hand, the accounting method is more of a direct measurement method, although it is normally used for the analysis of productivity at the organization level, individual level, and process level. After the outputs and inputs have been identified, it is a counting process to determine the level of output and input and then a simple ratio is formed to compare the two. The usefulness of this technique lies in its simplicity and its validity. This is the process that an

individual uses when he/she determines an automobile's gas mileage. This is the process that is used to determine the purchase of machinery within an organization for the purpose of decreasing the hours required to make a unit of a product. It is versatile, relatively simple to develop, and does not depend on the validity of production functions. The problems of the accounting method are in the lack of theory and the oversimplification that often results from focusing on specific ratios.

There is one branch of the accounting technique of productivity measurement that deserves special mention here. It is the technique of the system of ratios for the analysis of productivity at the organizational level. This system uses the basic accounting ratios derived from the accounting reports and develops a more or less structured system whereby these ratios are analyzed in order to determine organizational productivity. The problem with this system lies in the exclusivity of the interpretation and application of each ratio, since different individuals attach varying degrees of significance to the individual ratios. The system, however, has great potential for developing an overall perspective of the integrated activities of the organization.

Perspectives on Organizational Productivity Measurement

Thus, although the word "productivity" has been distorted to the point that it is despised rather than respected, productivity measurement is still important. Furthermore, measurement has been vital for many years.

To be fair this is really one of the most important points that has emerged from the reports of the visits to the U.S.A. organized by the Anglo-American Council on Productivity. The best American methods can be spotlighted because they indulge to a far greater extent than we do in methods of accounting for management control; and

thereby reveal the factors we are seeking and permit of the comparison that not only are we slow to make but to a great extent not equipped to make. (English, 1951, p. 358)

Chappell (1961) noted that interest in productivity measurement was only a part of the total trend of quantifying every possible business activity. The background for productivity measurement was the measurement of production volume, capital investment, plant capacity, time studies, work measurement, predetermined production plans, etc. Thus productivity measurement was a logical extension of these earlier attempts to establish the output/input ratios. The value of productivity measure is that it pinpoints the output values against specific input values. It is also more objective than other solutions as far as the problem of quantifying productive efficiency. Furthermore, it provides invaluable assistance for planning, economic operation, and effective control. It is also useful for interfirm comparisons. He also emphasized that if measures were to be used for various groups, including trade unions, the measures would have to be understood and accepted by all those involved, a criteria that productivity measures have not met.

Measurement, then, is a key link in productivity analysis. This is generally agreed upon for all levels of productivity concerns. Econometricians are still working on national productivity measures. At the organization level, there is also general agreement on the necessity of some form of productivity, although there is not as much agreement on the difficulty of measurement at this level. Davis (1947) asserted that despite these difficulties, it is nonetheless essential to find a way of developing adequate productivity measures--not only for the whole economy, but also for sectors, firms, and even individuals.

Since productivity is conceptualized in a number of ways, there is a corresponding range of differences of opinion as to the difficulty of productivity measurement. At the organizational level, the problems of productivity measurement are usually recognized as being rather large ones and problems which make research difficult. On the other hand, other experts think it easy. Altenkirch (1957) humorously noted the range of opinions on productivity measurement at the organizational level.

- Expert No. 1: Productivity Measurement is very simple.
- Expert No. 2: It is not so easy to measure productivity as people generally think.
- Expert No. 3: Don't bother to measure productivity-- it is as impossible as squaring the circle or creating the perpetum mobile.

For general economic development, whether through productivity centers or through the interests and efforts of industry associations, measurement at the organization level is the key for understanding the factors affecting productivity and the clarification of methods of improving productivity. Davis (1947) agreed, doubting that the conditions which influence productivity can be meaningfully studied as national aggregates. Since the actual changes in efficiency are not made on the national level, measurement emphasis should be concentrated at the factory, farm, and mine level. This emphasis includes measures of the various combinations of labor, capital, and materials. This potent argument has not received adequate attention, unfortunately, and emphasis is still concentrated very heavily on the sector and national levels.

The posture of the European Association of National Productivity Centers is meaningful to note. While the United States is just beginning to experiment with the formation of National Productivity Centers, the European (and Asian) Productivity Centers have been in successful operation for many years. These centers are in the process of systematically dealing with practical steps for productivity improvement at the company level (Integrator, 1973). Set up by the post-war concern for economic improvement in Europe, the centers have come a long way since the 1950's and the early struggling with productivity measurement. Utilizing methods and ideas generated all over the world, these centers have been actively promoting pragmatic solutions to the productivity problems of the individual countries (Integrator, 1974).

Therefore, one of the most important of all the possible levels of productivity measurement is the organizational level, the area that has received the least attention in the last two decades. It is also important for understanding the productivity of small groups and individuals since they are part of the organization as a functional unit. Thus the organization serves as the fulcrum for productivity measurement linking the other levels of productivity measurement. For this reason and for many others, it is vital that research on organizational productivity be increased.

But the primary problem in the area of organizational productivity measurement is not the interest or the lack of understanding of the importance. The primary barrier to organizational productivity measurement is the inadequate measures that are available, which are merely adaptations of economic measures used on more macro levels. This is most unfortunate since these measures are extremely narrow.

Thus, production and productivity measures often refer to narrowly defined industries, to industry groups, to broader economic sectors, or to the entire economy. Productivity ratios and time series are also computed occasionally for individual workers, occupations, operations, processes, plants, or firms. (Siegel, 1955, p. 389.)

Also unfortunate is the fact that nothing has changed over the years in this situation. Output per hour is still looked upon as the measure of productivity, labor is still the only input that is generally considered, and performance productivity concepts are still dominating. These and the many other limitations point to the need for drastic changes in measurement procedures.

But almost all economic statistics are only estimates. Reliable data are difficult to get, and they are subject to errors and different interpretations. The output-per-manhour data reflect such factors as technology changes, capital investment, and labor skills. But they do not measure labor's contribution....And year-to-year changes in output-per-manhour are irregular. They don't necessarily indicate long-term trends.... Even the definition of manhours may differ....Different figures for the same industry may stem from sampling and reporting differences. Other flaws may be due to statistical weighting, erroneous shipment data, and unrepresentative sampling. ("Productivity", 1971, p. 48)

Measurement Literature on Organizational Productivity

Over the last quarter-century, however, several attempts have been made to go beyond informal estimates of productivity. In particular, there have been four main studies which serve as the basic literature on productivity measurement at the organizational level. The four publications are spread over a period of twenty years and do not represent an integrated development. The studies have developed vastly different measures of productivity with varied results. The net result of the

field, however, is that few if any organizations are longitudinally measuring productivity. The reasons are not perfectly clear, but the benefits of understanding, measuring, and controlling productivity are still great enough to warrant further research.

In addition to these four main studies, there are innumerable smaller studies that approach only one aspect of productivity measurement. Since these studies have been reported in a wide range of journals, they are often inaccessible to the researcher. Attempts at integration are virtually nonexistent. Many of the articles are iterations of other accounts of productivity and have very little marginal contributions. Others restate the ideas for a particular industry or trade.

The most recent attempt to explain organizational productivity was Greenberg (1973). In this monograph, Greenberg presents a practical approach to productivity. In contrast to other publications on productivity, the monograph addresses itself to many types of organizational situations. Although the publication attempts to be practical to many situations, it suffers with the limitations of the depth to which it went. The objective at practicality is an admirable goal, although the monograph falls short of the goal. Productivity measurements are not practical at the present time and as more measurements are developed, it is hoped that the emphasis on practicality will continue.

Another strong point of the Greenberg monograph is that it is oriented to the managers of an organization. Most productivity publications have some limited audience in mind, seriously limiting the influence of the effort. Thus, rather than address the issues to the company economist or the company statistician or the company accountant, this monograph discusses the issues in relation to the perspective of the

decision-makers of the organization. This is a most important step in the actual implementation of productivity measures, since a review of the literature shows that managers are not comfortable with the interpretation of broad measures of productivity that have little to do with the operating language that they are accustomed to.

Whereas Greenberg (1973) only presented the very basic issues of measuring productivity, Kendrick and Creamer (1965) discussed the issues in more depth. The intention of the publication is to serve as a handbook for the company economist to use in the measurement of productivity from the economist's perspective. Although the book may be useful for those who are interested in applying the traditional micro-economic model, it fails as a handbook for those with a different perspective of organizations. It fails to consider the accounting problems inherent in such an approach and the psychological and organizational consequences of implementing a productivity measurement system. It also fails to present the measurement system in the light of the desired objectives of the organization or researcher and instead presents a basic approach that attempts to be applicable to a host of objectives. Unfortunately, most of the main objectives of any productivity measurement system that are outlined by the authors are not met by the measurement system that is presented. The most notable example here is the objective of basing wage negotiations or wage increases on the measures that are presented by the authors. The problem is that the measures are performance productivity only, while the questions to be answered are financial productivity questions. The issues here are more complex and are not at all met by the measures presented.

In addition to covering productivity measurement in more depth than the Greenberg monograph, the Kendrick and Creamer monograph shows how the measures are actually developed in organizations and discusses some of the major problems that they encountered in this implementation. Six case studies are presented and the various situations are described in some detail. Thus one of the advantages of this monograph is that the description of the various measures provide a meaningful backdrop from which to compare future measures and the elucidation of the various situations that are important determinants of the types of productivity measures that should be used in a given situation.

There were two studies in the mid-1950's that are still important in productivity measurement at the organizational level although they do not receive the attention that they are due. The two publications are entirely different approaches to the same problem of the measurement and meaning of productivity at the firm level. One is the highly individual work of Davis (1955), while the other is the result of the group of economists and government officials in the European Productivity Agency of the Organization for European Economic Cooperation (1956). One of the differences of the two publications is the degree of consistency within the books. Whereas Davis (1955) systematically develops the concept of productivity and discusses the ramifications of his arguments, the EPA book is a series of essays from various economists about what productivity meant to them. There was no agreement in the EPA book as to the essence of productivity, the definition of productivity, the meaning of productivity, the various related concepts of productivity, the future of productivity as a field of study, the difficulty of measuring productivity, the limitations of productivity measurement, the scope

of productivity measures, etc. These economists were part of the American assistance to post-war Europe and the attempt of the EPA was to culminate the effort into a coherent book regarding the issues of productivity. Unfortunately, they were unable to reach consensus about the meaning and measurement of productivity. Consequently, the three short volumes serve as much to confuse the reader as to enlighten.

With regard to the measurement systems presented in these two publications, different results were obtained. Davis approached the topic with a distinct emphasis on the accounting problems. The EPA books emphasized the development of measurement systems that had the most relevance for the comparison of productivity across firms. This was the antecedent for the European drives for inter-firm comparisons.

In addition to these four studies there have been numerous smaller studies regarding productivity measurement at the organization level. Most of these are oriented to industrial situations and manufacturing plants. The economic model predominates the discussion and consequently many of the studies are but minor variants of the others. Langenberg (1952) provided one of the earliest proposals--and one of the most successful ones--for a plan of productivity accounting. The orientation of the measure was to provide managers with criteria for the evaluation of long-term performance. Although there was no theoretical foundation for his measures, Langenberg was aware of the limitations of the government measures. By weighting physical production by the fixed standard cost of the base period, Langenberg was able to generate productivity measures for payroll hours, depreciation, and repair and maintenance.

Kempster (1954) used the same approach and attempted to develop an output per hour measure of productivity. The economists' influence through

government indicators is apparent in most of the articles on productivity measurement, and is apparent here. Kempster concluded that productivity measurements were useful, but that cost systems gave them as much information about productivity as their productivity measurements did.

Another example of the early work of accountants can be found in a brief article by the British Institute of Incorporated Accountants (1951). They attempted to develop measures of capacity uses, operating efficiency, and overall efficiency. They emphasized the importance of value added for the measurement of production output and developed several other basic ratios of performance that they felt might be useful in certain situations.

Ernst (1956) attempted to measure productivity through a production function. Through a survey questionnaire Ernst developed an equation that reflected labor and technology inputs in the production of the output for a group of companies. Labor is measured as hours worked, while technology is measured by the number of kilowatt hours used by the firm. Ernst failed to establish the usefulness of this production function in either organizational research or in organizational management. Consequently, the production function approach has not been used to understand organizations except by some economists.

James and Rooney (1957) attempted to develop a productivity statement to be used on the same level as an income statement. With primarily an accounting viewpoint, they used their cost systems to quantify direct labor, direct materials, and indirect manufacturing expense. Although this approach may be extremely useful in a proper form to managers of a company, it has not been used.

Because of the problem of measuring productivity through one ratio, another approach is to develop a set of ratios. Hoffman (1956) presents such a case. Through the use of operating ratios and financial ratios, he attempts to develop control ratios for use in a firm. There are many indirect applications of the operating ratio approach to productivity measurement. One example is Abb (1961), who developed a productivity measurement system for small businesses. Abb contended that there were three primary ratios: return on investment (profit/capital), profitability (proceeds/costs), and productivity (output/input).

Geary (1965) used this approach in attempting to develop productivity measures based on the information already developed in production companies for government reporting purposes. The primary orientation of this system is economic although the system is sufficiently practical to be used in modern organizations. Unfortunately, the measurement system does not have a decision-making perspective and has not been widely used.

Rimer (1965) attempted to develop an efficiency profile for measuring organizational performance. Fourteen measures were used to compare ideal performance with actual performance, and all were expressed in terms of a percentage. The data for the measures is derived from the sampling of work time according to preset criteria. The primary problem with this approach is the inability to establish ideal performance.

The industrial engineering approach to productivity measurement is exemplified by English (1951). Based on a definition of productivity as "a qualification of the efficacy of human industrial endeavour," the measurement system isolated six productivity factors--design, method, facilities, activity, application, and quality. English proposed that productivity be measured through the use of index hours which would be

compared to national standards for utilization. Such a system of standards has not been developed and consequently this approach is not used.

One unusual attempt to measure productivity was Martin (1959). He proposed that it was possible to develop a universal method of measuring productivity based on the statistical sampling of work measurement of production workers. Martin develops a unique jargon of productivity terms and uses them to explain this system. The basic orientation is industrial engineering. In addition to being enormously expensive (requiring over twenty thousand observations by the members of the organization), the measurement system gives no information about change over time and is merely a static reading of organizational performance. Consequently the measurement system has not been used.

Schultz-Mehrin (reviewed in "Productivity measurement and cost analysis", 1955) used productivity as the basic unit of a triad of three ratios that should be important to operating managers.

$$\text{Productivity} = \frac{\text{Output measured in physical quantities}}{\text{Input measured in physical quantities}}$$

$$\text{Profitability} = \frac{\text{Proceeds of the sale of the output}}{\text{Costs of the inputs}}$$

$$\text{Rentability} = \frac{\text{Profit (or sales minus purchases)}}{\text{Capital applied}}$$

The emphasis here was also on cost control and value to the operating managers. The book is unusual in that it considers the theoretical perspective of the various ratios that are presented.

Another technique of measuring productivity at the organization level is to use the production functions as a measure of the progress

of the firm. Although these have been used for many years, their usefulness has not been demonstrated to any great extent. Nevertheless they are hailed as the "true measure" of productivity at the organization by some economists (Ernst, 1957). Usually these are based on the marginal productivity functions of the Cobb-Douglas type and its later versions, although their usefulness has been seriously questioned. Thus, their attempts are to find the best approximation to the "true production function" (e.g., see Ernst, 1957).

English (1951) also took steps to make productivity measurement a successful venture. Being a production engineer, English defines six main productivity factors: design, method, facilities, activity, application, and quality. Three additional factors were identified as supervision, administration, and maintenance. English suggests that finance be excluded in order to promote analysis across firms. Rather than emphasizing budgetary control and standard costing, he developed a system of "index hours" based on work evaluation such as time study. Index hours were a peculiar form of equivalents that attempted to convert such things as buildings, services, and tools to index hours based on national standards of conversion tables that related the pound sterling in index hours. Thus, the average factory building would be roughly .5 to 1.0 index hours per square foot per annum. This attempt to convert everything into engineering terms was unsuccessful and has never received serious attention.

Another attempt to make productivity measurement practical for business managers was Lauzel (reviewed in "Practical accounting for managers", 1959). The accounting approach to productivity measurement was presented from the perspective of the operating manager. The wide

range of tools available for answering managerial problems are outlined and explained. There are three major sections of the book: the relation of accounting to social question, economics, and management, the explanation of various accounting techniques, and the application and exploitation of these techniques. The very broad usage of productivity is employed to show how costs can be effectively controlled in an organization, including the use of inter-firm comparisons.

Another strain of organizational productivity measurement has been work measurement. McCarr (1962) combines the labor productivity measures with time studies to produce productivity work measurement. This is done by comparing the output in physical units with the time expended in the production of the manpower. Inputs are the number of workers. Productivity work measurements attempt to measure the contribution inputable to the particular workers and to the particular groups. Work measurement shares the common base of comparison with the base period. In productivity measurement, the indices indicate the rate of change of productivity, but not the level of productivity. Therefore, resort is made to interfirm comparisons. Productivity work measurement is based on statistical time standards, which are averages of recorded data on individual performance, and are expressed in man-hours per work unit. It can also be applied to the organizational functions--typing, delivering packages, etc. The key advantage is simplicity--no detailed method recording, no need for allowances for fatigue, etc. The method is not ordinarily used on the indirect or administrative fields, since in these fields it is not possible to have engineered standards.

Although the main issues for total organization productivity measurement are by no means settled, emphasis is being placed currently on

the productivity measures for sub-organization levels. Recently, the National Science Foundation Division of Advanced Productivity Research and Technology announced the provision of \$1.6 million dollars for productivity measurement research in the administrative services, including eight areas: accounting and auditing services, budget and management analysis, purchasing management, distribution, sales and marketing management, public information programs, personnel administration and training, inspection and quality control, and computing and information services (National Science Foundation, 1975). Administrative services, the knowledge-based functions of an organization, are growing significantly as part of the managerial movement that is affecting American business. This is a direct response to the over-emphasis upon the productivity measurements of economically-based productivity studies when only production workers are studied. Although much needs to be done on performance measures for administrative services, such an emphasis without a corresponding emphasis directed toward whole organizations is unfortunate.

One recent article on productivity measurement is Craig and Harris (1973). This study also uses the economic model of organizational functioning to develop productivity measures. However, the model includes one major innovation in organizational productivity measurement--that of utilizing the service value of capital as the input of capital. The output for the measures was the value added by production and the inputs were labor and capital. They develop a comprehensive measurement system that is similar to the total factor productivity model explained by Kendrick and Creamer (1965). Unfortunately, many of the issues concerning productivity were not discussed, so the impact of the system has been minimal.

Thus, like the conceptual literature on productivity, the measurement literature is a disjointed collection of various individual efforts. Again it becomes clear that there is no mutuality or integration. Researchers have tended to disregard each other's contributions. Various groups concerned with organizational productivity have pursued entirely different routes with little collaboration. As a result, even those seminal ideas and measures which show promise as integrative tools have not been utilized. Consequently, the measurement literature has not demonstrated a cumulative progress that is essential for measurement development.

Summary and Conclusions

This paper makes a basic differentiation between performance productivity and financial productivity. Performance productivity measures quantify relationships between input and output independent of changes in value. Financial productivity measures monitor input-output relations that include changes of values in both input and output.

In applying these two concepts to analyzing organizational productivity, this study took a multi-disciplinary approach. Two aspects of productivity were explored--the meaning of productivity and the measurement of productivity. A review of the literature revealed that there is little agreement on these two issues and consequently, little direction on the measurement of productivity for organizations or researchers. This unfortunate situation needs to be resolved. Steps were taken in this thesis to develop a theoretical perspective that will integrate the variety of perspectives into a cohesive framework.

Performance productivity and financial productivity are proposed here as fundamental concepts which can provide the nucleus for conceptualizing organizational productivity. Each productivity researcher must reckon with performance productivity and financial productivity criteria. The need for recognizing these criteria is evidenced by past research. The usefulness of the distinction is primarily a subjective evaluation since the measurement system has not operated longitudinally at the time of this writing. Its primary usefulness is in suggesting an organization of the productivity literature and guiding the design of a measurement system.

This fundamental distinction has different implications for the several parties concerned with organizational productivity. For government funding

agencies, it suggests that the coordination of productivity studies should be sensitive to the proper balance of performance productivity and financial productivity research. To the manager, it suggests that optimum resource management is dependent on sensitivity to both performance and financial criteria. To the accountant, it suggests that attention must be paid to both performance productivity and financial productivity objectives and that organizational measurement systems must be adequate to fulfill both sets of objectives. To the economist, the distinction suggests that while the stated objectives of productivity research include both performance and financial objectives, the measurement has shown a strong bias toward performance productivity measures, excluding financial productivity measures that may be more appropriate to meeting the objectives. And, lastly, to the organizational psychologist, the distinction suggests that the factors affecting these two types of measures are very different and that singular measures of organizational productivity focusing on only one of these two aspects are inadequate for research.

When this study began, it was not possible to clearly identify the usefulness of developing an economic model of organizational productivity and using the measures in either the management of the firm or in scientific research. There were several unresolved issues. First, the literature could not confirm that it was even feasible to do. Second, the objectives of developing such a measure were not clear. Third, the probability of successfully implementing such a measurement system could not be estimated accurately. Fourth, the pertinent issues involved in the actual implementation of these measures could not be determined. Fifth, the process of developing such a measure was unclear. Sixth,

since there are a variety of perspectives and measure in the literature it was difficult to determine the appropriate viewpoint to use in this measurement system. Seventh, the psychological and organizational effects of using such a system in an ongoing organization had never been determined. Eighth, there was no clear statement of the technical problems that would be encountered in the development of the measure.

These issues are interrelated. Clarification of the perspective and objectives will suggest solutions to technical difficulties. The objectives also provide a basis for system evaluation. Measurement development impinges on guidelines and limitations of implementation. Finally, the usefulness of the measurement system to the organization is dependent on the technical features of the measurement system and its perspective and limitations, as well as the situation-specific interaction of the organization's managers and those that develop the measurement system.

Based on the distinction between performance productivity and financial productivity, progress has been realized on resolving at least some of these issues. This distinction gives direction for establishing objectives of an organizational productivity measurement system. The differentiation also allowed a rudimentary categorization of the perspectives encountered in a review of the literature. Although much work remains to be done in developing the ramifications of performance productivity and financial productivity, it has been useful for beginning to give conceptual coherence to the organizational productivity literature.

The distinction also guided the development of a productivity measurement system designed by the author concomitantly with this study. Even though a full account of the measurement system is inappropriate here, the development of the system aided in the resolution of several issues. The

feasibility has been confirmed for designing an appropriate measurement system. The distinction also pinpointed technical problems. An adequate (though seldom optimal) solution was found for each of the accounting difficulties encountered. The design of the measurement system also clarified the development process. The reports on these activities are available from the author as working papers. Since the measurement system is only beginning the implementation phase at the time of this writing, questions regarding the actual utilization of a productivity measurement system in organizations are just beginning to be explored.

The current research suggests priorities for dealing with these productivity issues. Progress on measurement development is needed, given the modicum of measurement systems. Although the number of alternatives is growing, researchers have little direction in the development of organizational productivity issues. As attention is focused on measurement, more adequate solutions can be found for the technical problems in measurement.

A roughly equivalent need is felt for conceptual development. Performance productivity and financial productivity are basic concepts that are the foundation for developing useful measurement systems; however, work is needed on building more substantive theory. In particular, distinctions must be made between productivity and the related concepts of efficiency, effectiveness, profitability, etc. Solid theoretical differentiations would allow the establishment of accepted conventions in verbal usage, which are currently non-existent. Clearer definitions, even if reflecting the perspectives of the several parties concerned with organizational productivity, would aid in the development of measurement systems that operationalize more precisely that definition.

Even more important than conceptual analysis and theoretical development is the need for applied research testing the influence of various factors on performance productivity and financial productivity. As theoretical models of organizational productivity are developed, it is imperative that field research test these models. Organization change projects have a specific need for valid models that would guide the organization development effort. There is certainly no lack of suggestions, as both the psychological literature and the economic literature propose factors which affect organizational productivity. There is, however, a need for field research in ongoing organizations to test these factors. The fruits of such research can be jointly shared by managers and social scientists. Behavioral science would gain knowledge of the factors that affect organizational effectiveness, while practicing managers would be able to utilize their resources more efficiently than is currently the case.

But the most significant productivity issue is the lack of interchange between those parties who are concerned with organizational productivity. Although the field of organizational productivity suggests mutuality of concepts and measures, there is little consolidation. Managers are isolated from the researchers who develop measurement systems. Accountants have pursued more restrictive measurement approaches than has been necessary. Even among researchers, there is little correlative exchange. Economists work in one sphere, psychologists in another. Government agencies pursue still a different course and have not shown a consistent effort at integrating the various approaches at the organizational level.

Are we then content with our mutual isolation? Is the sanctity of our recluse worlds more expedient than a constructive dialectic? I think

not. At the risk of interrupting our self-imposed solitude, it is essential that managers, accountants, economists, psychologists, and government representatives work more cohesively. Common efforts at conceptualizing productivity need to be made. Measurement systems need to be developed that are useful to both managers and researchers. Economic and accounting measurement techniques need to be merged. Finally, organizational psychologists and managers need to utilize these measurement systems to isolate and control those factors which affect productivity without sacrificing the human system and at the same time improving the quality of working life.

There has been little cumulative growth around organizational productivity. This accumulation is both a characteristic of and a requisite for the scientific study of organizational productivity. The continuing absence of this accrual is directly attributable to the relative isolation of those studying organizational productivity.

International interest in productivity provides an even broader perspective for interpreting organizational productivity research. It piques the curiosity of any serious citizen to contrast the English and Japanese experiments on productivity. While it is beyond the scope of this paper to analyze fully the cultural factors in organizational productivity improvement, it is certainly worth noting that various countries have demonstrated very different concerns for productivity improvement. The English economy has suffered for the lack of productivity concern at the national level and the organizational level. The Japanese economy, although experiencing other difficulties, has demonstrated substantial productivity improvement due to organizational and national commitment to productivity. This provocative contrast suggests the possibility of fruitful research on the effects of various national and cultural commitments to productivity.

There have been many historical problems with research on productivity. This heritage has had a strong negative influence on the utilization of productivity information. It will continue to have such an effect for many years. Whether it will continue to stifle the research has yet to be determined. What is needed is the persistent effort of many scholars and interests of institutions and organizations. There is some evidence that such interests exist and that the resources are available. It is hoped that the study of organizational productivity will continue and that progress will be realized in both the areas of meaning and measurement of productivity. It is important that the scientific method and rigorous logic supplant the narrow perspectives that have dominated the field. Without such progress, the control of productivity will never be possible.

The development of productivity research is dependent on the various communities that have impact on the research. The academic community can contribute by committing itself to a sustained effort to identify and research the various problems associated with understanding and measuring productivity. The business community can contribute by allocating its resources for the improvement of productivity while improving the quality of working life. The community of service organizations can contribute by amplifying its interest in productivity issues. The government agencies can contribute by coordinating these resources and by taking more adequate steps to communicate the importance of productivity and its role in working life. Thus, the future of productivity research is in the hands of the several communities who can contribute their interest and resources to the scientific study of productivity problems. On the whole, the prospects for the continued growth in productivity research are good. Whether the necessary commitment can be obtained remains to be seen.

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