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AN INVESTIGATION INTO THE ORIGIN OF THE SYSTEMS CONCEPT

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AN INVESTIGATION INTO THE ORIGIN OF THE SYSTEMS CONCEPT

CHAPTER I

INTRODUCTION

The Problems and Objectives

The startling changes in industrial technology which have occurred since the second World War have been paralleled by significant changes in the theory and practice of management. These changes, although more subtle than those arising from technological innovation, have nevertheless had a great impact upon the teaching and practice of management.

One of the major managerial concepts that has come to the forefront during the past twenty-five years and particularly during the last decade is that of the "systems concept." The extent to which this idea has pervaded the field of management is evidenced by the fact that the term is now incorporated into the working vocabulary of academicians, practitioners of the art, and writers of business literature. However, understanding of the concept does not appear to be commensurate with its usage. This may be due in large part to semantical problems arising from

inconsistent employment of the term. This confusion is not limited to the use and meaning of the term "systems concept," only, but also covers the origin of the concept itself and the definitions and implications of such closely related terms as "system," "system hierarchy," and "system boundary."

A preliminary investigation into the subject suggests that these terms and concepts take on different definitive dimensions depending upon the objectives of the writer and the context in which they are employed. For example, the term "system" is commonly used to define a set of accounting rules and regulations as in an "accounting system," to describe the physical facilities and rolling stock of a bus company as in a "transit system," the procedure for selecting men for the armed services as in the "selective service system," and the means whereby one expects to "beat the odds" at Las Vegas as his "system."

In contemporary business literature many individuals are treating the "systems concept" as being something new, while some even go so far as to imply that application of the concept to business is also new. In this writer's opinion neither claim is correct. Moreover the development of today's "systems concept" has been evolutionary in nature rather than revolutionary. In fact it is quite conceivable that the development of the concept over the years has been brought on by necessity. As businesses have

increased in size and complexity, a more sophisticated managerial viewpoint or concept of the whole organization is mandatory to its continued success and the achievement of strategic goals.

The primary purpose of this study is to examine, from a historical point of view, the origins and growth of what is referred to in contemporary business literature as the "systems concept." To aid in this investigation into the antecedents of the "systems concept," an examination and analysis of several closely related terms and concepts such as "system," "system boundary," and "system hierarchy" will be carried out first. This examination and analysis of pertinent terms and concepts will be made to determine whether and to what extent there exists a common meaning among the terms as they are used by various contemporary writers. Clarification of the definitions of these terms should assist in dispelling some of the semantical problems surrounding their use and that of the "systems concept."

A secondary objective of this study is to determine whether the evolution of what is now referred to as the "systems concept" paralleled the evolution of business structures. That is, given that business structures over the years have in a general sense increased in size and complexity, has the evolution of the operational definitions generally paralleled this change?

For the purpose of orienting the reader to the subject of "systems" and the "systems concept" the following

representative operational definitions were selected from contemporary business literature. Gibson defines a system as "an integrated assembly of interacting elements designed to carry out cooperatively a predetermined function."¹ If applied to a business these "interacting elements" could be functional departments such as accounting and manufacturing or parts of such departments such as an auditing or production control group. From this we can see that a department can be considered, at one and the same time, as a system made up of a number of smaller groups or subsystems or as an element or subsystem of a larger more inclusive group such as a division. Likewise the division could be considered a subsystem of a larger group such as a company. This design in which systems nest within other systems which in turn nest within still other systems is referred to as a "system hierarchy" and is more fully explored in the next chapter.

Ralph Martin, among other contemporary writers, advances the idea that these components, elements, or subsystems should be viewed as making up a synergistic whole.² This, in contemporary literature, is referred to as the "systems concept."

¹Ralph E. Gibson, "A Systems Approach to Research Management," *Research Management*, (July, 1962), pp. 216-217.

²E. W. Martin, Jr., "The Systems Concept," *Business Horizons*, (Spring, 1966), p. 63.

Although the "systems concept" is most often used in an organizational context, it should not be construed to refer only to organizations.¹ For example, Chopin (1810-1849) in response to a query as to what performers should seek to achieve in interpreting musical compositions stated:

An artist should never lose sight of things as a whole. He who goes too much into details will find that the thread which holds the whole thing together will break, and instead of a necklace, single pearls will remain in his stupid hands.²

What Chopin was conveying to his audience was that the whole is different from the sum of its constituent parts, and if an individual insists on treating the components of the whole separately without considering their interrelation and interdependency then he can expect that the total will be less than that of the whole. This latter point is a succinct recognition of the concept of synergism.

The Justification for a Historical Investigation

A historical investigation into the origin of the "systems concept" appears to be justified on a number of grounds.

¹See Sir Arthur Conan Doyle's "The Adventure of the Bruce Partington Plans," *The Annotated Sherlock Holmes*, Vol. II, ed. by William S. Baring-Gould (New York: Clarkson N. Potter, Inc., 1967), pp. 433-434. Holmes is describing his brother Mycroft's government job to his colleague Dr. Watson.

²Abram Chasins, *Speaking of Pianists*, (New York: Alfred A. Knopf, 1958), p. 224.

First, this investigation attempts to clarify what is meant and what is implied when the term "systems concept" is used. That this clarification is needed is evidenced by the increasing frequency in which the term "systems concept" and other closely related terms are found in contemporary business literature. This increase in the appearance of the term "systems concept" has too often been accompanied by a "definitive ambiguity" brought on by the writer's contextual use of the term or his failure to clearly define its implications to his topic. This has brought about much of the present semantical confusion noted by a number of writers.¹

A second justification for this investigation and one closely related to the first is that there appears to be a need to resolve the question as to whether the "systems concept" is new or old. Some writers contend that the concept is old,² while others make emphatic statements stressing the newness of the concept.³ Writers who stress the newness of the concept generally date its origin to

¹See William R. King, "The Systems Concept in Management," *Journal of Industrial Engineering*, (May, 1967), p. 320; John Dearden, "How to Organize Information Systems," *Harvard Business Review*, (March-April, 1965), pp. 65-66.

²Allan Harvey, "Systems Can TOO Be Practical," *Business Horizons*, Vol. 7, No. 2 (Summer, 1964), p. 63.

³See Walter S. Fedor, "Management by Systems," *Chemical and Engineering News*, (August 28, 1967), p. 123; John W. Field, "A New Brand of Data Processing Manager--Part II," *Computers and Data Processing*, (September, 1964), p. 40; W. R. King, "Systems Concept in Management," *Journal*

the early 1940's, while those who insist that the concept is old have avoided indicating how old.¹

To resolve the issue as to whether the "systems concept" is old or new and to approximate the date of its origin, it appears that a historical approach is mandatory.

A third justification for this study concerns the broader search for principles or theories in a field or discipline. For the academician, knowledge as to the origin and evolution of ideas and concepts provides a better base for refinement and synthesis than ignorance. This search for generalizations and the accumulation of knowledge provides for better understanding of man, his organizations, and his environment. It provides a means for predicting the future and arriving at desired ends consciously. For the practitioner of the art it is of immense practical value, and for the business historian such investigations justify his title.

A final justification for this investigation is to attempt to evaluate the contributions of selected writers on the subject. To do so it is not only necessary to

of Industrial Engineering, (May, 1967), p. 320; Ira C. Wilson and Marthann E. Wilson, *Information, Computers, and System Design* (New York: John Wiley & Sons, Inc., 1965), p. 182; Robert F. Baker, "A Practical View of the Systems Approach," *Traffic Quarterly*, (October, 1967), p. 471.

¹One notable exception is that by Norman E. Daniel and J. Richard Jones, *Business Logistics* (Boston: Allyn and Bacon, Inc., 1969), p. xi.

evaluate the merits of any proposals they may have offered, but to ascertain the originality of the ideas and concepts upon which their conclusions and recommendations are based. Implicit and explicit claims of originality are often made because the writer is historically ignorant of the knowledge in the field, or because for other, less honorable, reasons he feels that the reader will not be aware of the true facts, or because he fails to recognize the concept or idea in unfamiliar garb.

Scope and Limitations of the Study

This study is limited to a historical investigation into the origin of the "systems concept" as it applies to business organizations and the development and exposition of terms and concepts needed to support such an investigation. Chronologically it spans the period from about 1800 to the present time. It is further restricted to the consideration of American and European literature.

The justification for limiting the study to business organizations is that to include consideration of its application to such diverse fields as psychology, public administration, biology, physics, and sociology would require a knowledge and expertise that this writer does not possess. The reason for further restricting the study to American and European literature is based on an assumption that the literature relevant to this study logically finds its roots in these two locations. This is because of

commercial and business dominance of American and European nations during the last two and a half centuries.

It is not to be assumed, however, that by thus restricting the study, this writer is implying that business and public administration or sociology, for instance, have nothing in common. The purposes for restricting the scope of the study are simply those of convenience and manageability.

Some Investigative Problems

Preliminary inspection of some of the major issues involved seemed to indicate that there would be certain problems in executing this study. Some of these problems arise from the very nature of such an investigation, namely that of selecting and interpreting the thoughts and ideas of others as they expressed themselves in writing. This problem is compounded by the semantical problem that was perceived early in the investigation. Another problem that confronts any investigator and particularly one who chooses a historical approach is the chance of overlooking relevant information. A third problem concerns the determination of the true date of each writer's contribution.

The problem of selecting and interpreting the contributions of writers is in large degree subjective in nature. The measure of what is significant and relevant to the subject of inquiry seems to find no consensus among investigators. This may result from differences in experience, intellectual

capacity, prior knowledge, and personal biases as well as the selection of criteria for the evaluation process.

Where a problem of semantics exists, as in this study, the task of defining the primary terms and concepts and the development of the evaluation criteria is of paramount importance. In spite of defining the terms and concepts and developing an evaluation criteria there will always remain ample opportunity for criticism by those whose viewpoint or objectives are not congruent with those of the writer.

The possibility of overlooking relevant information is of particular concern to a historical researcher. The chance that relevant information may be overlooked increases as the historical period under consideration expands. The ability to locate books, pamphlets, papers, periodicals, and documents depends upon the time and resources available to the researcher. The problem is compounded in instances where few or no copies were made or preserved, and where references to the source documents are missing or inadequate. Since it is impossible to say that somewhere in the total relevant literature of the period under discussion some pertinent development may not have been overlooked, this writer does not claim to have examined every piece of literature.

The problem of determining the date of contribution is more common than generally supposed. It is not simply a matter of noting the copyright date of the source since it

may not be the first one; it may not be copyrighted at all, or its publication may have followed the actual presentation by a substantial period of time. In this study, the date of a writer's contribution was assumed to be the earliest date of its publication or its alleged presentation if the latter appears substantiated. Where more than one writer made contributions in the same period of time, the sequential presentation of their respective contributions is arbitrary and is not to be taken as implying which was first.

Research Methodology

This study is divided into three distinct phases. The first phase consisted of a search of contemporary literature and reference to authoritative sources in an attempt to define the principal terms and concepts relevant to the study and to develop "evaluation criteria." The objective in examining and evaluating the primary terms and concepts pertinent to this study was to reduce as much as possible, the semantical problem that this writer believes to exist, and to provide a basic vocabulary that will be of assistance to the reader of the subsequent discussions. The objective for developing "evaluation criteria" was to be able to judge the contributions of writers on organization and management in respect to what is currently referred to as the "systems concept." This "evaluation criteria" is the "yardstick" upon which each writer's contribution would be measured.

The second phase of the study involved a chronological search of business literature for possible contributors from the past. The total number of books and articles examined in the course of this study is estimated at 300 books and 125 articles. Some were closely scrutinized and are included in the bibliography while others were only superficially examined because it was felt that a closer inspection was not justified. Whether an author would be included in this study as a primary contributor to the historical development of the "systems concept" was determined by how adequately his contribution fulfilled the "evaluation criteria." Based on the dates on which these contributions were first enunciated or reduced to writing, they were analyzed, evaluated, and arranged under one of three successive chronological periods. Each of these periods is presented hereinafter as a chapter.

The choice as to the number of chronological periods and the particular beginning and ending dates for these periods required a compromise between the best means of reaching the objectives sought in this study and the quantity of material available. Consideration was given to the historical development and changing economic importance of various business organization forms, what appeared to be a significance increase in sophistication of the "systems concept," and the quantity of material available. It was originally planned, for example, to have the first period

encompass the time of the earliest "find" (1813) to the beginning of the "scientific management" era taken as 1885. Most of the basic industries of the United States, except for the railroads, were only in their early stages of development by the end of this period. The period witnessed a relative decline in the economic importance of the proprietorships and partnerships, and the appearance of their chief economic successor--the corporation. For these reasons it was felt that if a relationship existed between the concepts held of the business entity, as enunciated by the business writers of the period, and the sophistication of the structure of business, as evidenced by legal form, size, etc., then by limiting the first period to the years 1813 to 1885 this relationship might better be observed and evaluated. However, a preliminary examination of the quantity of materials available during this period disclosed that it would be insufficient to strongly support such a division.

For these reasons it was felt that the longer period of 1813 to 1914 would better suit the exposition in support of the study's primary goal of approximating from a historical point of view the origin of the "systems concept." This dating would still allow an appraisal by inference of any relationship that might exist between the development of such a concept and the increasing sophistication of the business entity during this and successive periods.

The third and last phase consisted of an overall summary of the most pertinent writing of each of these three historical periods. This is followed by a list of conclusions that are most relevant to the objectives of this study. These would include both explicit expositions of ideas and concepts by various writers whose contributions were included in this study, as well as what this writer deems reasonable to deduce from the evidence presented.

Further Organization of the Dissertation

Chapter II is subdivided into two sections for the purposes of emphasis and as an aide to the reader. The first section consists of a discussion of the etymology of the word "system," the contemporary use of the word "system" and the phrase "systems concept," and several closely related terms. The connotations of these terms and concepts are noted and summarized. The second section deals with the development of the criteria to be used throughout the remainder of this study for evaluating the efforts of writers on the subject of systems in order to ascertain whether or not they have a "systems concept" view of the business organization.

Chapter III involves an examination and evaluation of pertinent writings from the earliest found by this writer (1813) to the beginning of World War I. It was during this period that the economic importance of various forms of business organizations shifted from proprietorships

and partnerships to that of the corporation. The typical firm at the beginning of the period was dominated by the owner-manager while the close of the period saw the hired manager coming into prominence. This change came about for several reasons among which was the tremendous growth in population, the greater need for capital to purchase machinery and erect ever larger factories, and the scarcity of managerial talent. Changes in the size and complexity of industry during this and subsequent periods seem to be reflected in the successively more sophisticated concepts held of the business entity by managers.

Chapter IV consists of an examination and evaluation of the relevant writings concerning the development of the "systems concept" between 1914 and 1940. This period started and ended with the American economy preparing for the two World Wars. The seller's market enjoyed by many businesses during the first World War was rapidly replaced by a buyers market after the War. Business organizations continued to grow through the first half of the period but with the onset of the great depression their growth was generally arrested. Organizational and financial problems that heretofore had been of minor or little concern to business took on more ominous overtones as the economy slowed. After having fluctuated at a relatively low level of activity, the economy at the end of the 1930's turned upwards under the stimulus of preparation for World War II.

The most significant writings of the period seem to reflect the concern of managers and academicians over the ability of businesses to cope with the problems just mentioned. Much of the later writings on systems and the "systems concept" seem to find their most recent parentage in the efforts of the writers of this period. The criteria set forth in Chapter II are used to judge the contributions of the writers of this period in terms of how well or to what extent they have perceived the business entity as a "system."

Chapter V carries the discussion full circle in that we reach the contemporary period from which we originally drew the material for defining certain terms and concepts and for developing and prescribing the criteria set forth in Chapter II. In this period, starting from the beginning of the second World War to the present, there are hundreds if not thousands of writers who have employed in one way or another the verbiage of "system." Again, as in the preceding chapters, this writer presents a number of examples which are felt to be most cogent to the objectives of this study. The contributions of these writers are analyzed and a conclusion is reached as to how well their efforts measure up to the criteria formulated in Chapter II.

Chapter VI is a summary of the most significant findings stemming from this study. The discussion includes a recognition of the semantical problem which has pervaded

the study, the need and development of a suitable evaluation criteria, and a summary and evaluation of the contributions of the major writers for each of the three historic periods using the aforementioned criteria. A number of conclusions, deemed reasonable by this writer in light of the evidence presented, are presented in this final chapter.

CHAPTER II

ETYMOLOGY, DEFINITIONS, AND "SYSTEMS CONCEPT" CRITERIA

This chapter is divided into two major sections or parts. The first part begins with an inquiry into the etymology of the word "system." Following this will be a discussion and analysis of the current meaning of the word "system" as found in contemporary business literature. On this basis a definition thereof will be offered. Next will be a discussion and analysis of the meaning and connotations of the term "systems concept," followed by the contemporary meanings of a number of closely related terms and words. A summary and a number of conclusions relative to the etymology of "system," and contemporary definitions of the "systems concept," the terms "system hierarchy," "subsystem," and "system boundary" will close the first section of this chapter.

The discourse on etymology and definitions in the first part of this chapter provides the foundation for the development of criteria which go to make up the major topic of the second part. This "systems concept" criteria will be used throughout the remainder of this study to

evaluate the extent to which various writers viewed the business entity in terms of the "systems concept."

Etymology of "System"

It is a maxim in lexicography to resort to a dictionary to determine the etymology and current meanings of a word. The etymology of the word "system" can be ascertained by referring to Webster's *Third New International Dictionary*, Unabridged.

The English word "system" is a noun and comes directly from the late Latin word *systema* which has as its direct ancestor, the Greek word *systema*. *Systema*, in turn, is derived from another Greek word *synistanai*, meaning to bring together. *Synistanai* is formed from the preposition *syn* (with) and the verb *histanai* (to cause to stand). From this we can say that "system" suggests "things that have been caused to stand together."¹

The word "system," like many other words, has taken on additional meanings through the passage of time. Several of these are pertinent to the discussion which follows and in reflecting the modifications that have ensued from its origin.

1. "Complex unity formed of many often diverse parts subject to a common plan or serving a common purpose."

¹S. R. Heller, Jr., "What is a System?" *Naval Engineer's Journal*, (February, 1968), p. 25.

2. "An aggregation or assemblage of objects joined in regular interaction or interdependence: a set of units combined by nature or art to form an integral organic, or organized whole: an orderly working totality."
3. "The structure or whole formed by the essential principles or facts of a science or branch of knowledge or thought: an organized or methodically arranged set of ideas, theories, or speculations."

The connotations or implications of the foregoing meanings are orderliness, regularity, logic, organization, totality, and unity.¹

As previously noted the word system is a noun -- whence comes the adjective "systems" in "systems concept" or "systems analysis"?

It is commonplace. . .to see the noun pluralized and then transformed into an adjective or an adverb. . .Contrary to erudite opinion, this is NOT bastardization of language, but rather it is a verbiculture conceived of necessity."²

The two adjectives "systematic" and "systematical" have, along with "system," a common heritage. Webster defines these as:

¹S. R. Heller, Jr., "What is a System?" *Naval Engineer's Journal*, (February, 1968), p. 25.

²*Ibid.*, p. 26.

reduced to or presented or formulated as a coherent body of ideas or principles: offering or constituting a complete scheme, outline, or classification and "marked by or manifesting system, method, or orderly procedure."

Again, the connotations are orderliness, regularity, organization, logic unity, and totality.¹

In terminating this discourse on lexicography, it should be noted that the coined word "systems," as an *adjective*, has not to date been entered into a dictionary of recognized authority.

System and Systems Concept

Today's management texts and periodicals abound with definitions of system and systems. Some are parochially defined to fit the author's theme while others are so all encompassing that little is excluded and hence little, if anything, is defined. As a consequence, there exists a semantical problem that has confused even those who are supposedly best informed on the subject--the writers of management literature. To gain an appreciation of this semantical problem, a number of recently offered definitions will be presented. It is not to be assumed that these definitions are the total thoughts of their authors on the subject. They do, however, represent in capsule form

¹Heller does not support this inclusion of unity and totality as being connoted by the definitions of systematic and systematical.

what the writer means when he uses the term "system." The following section will explore more fully what some of these authors see as being implied by their definitions as they relate to the business entity.

System

Timms, when asked the question, "What is a system?" replied, ". . . a system is anything you want it to be."¹ Another author defined systems as "a series of steps designed to bring about a desired result."² A third author defined a system as ". . . a collection of entities or things (animate or inanimate) which receives certain inputs and is constrained to act concertedly upon them to produce certain outputs, with the objective of maximizing some function of inputs and outputs."³ Another writer said that "any system is a logical configuration of the significant elements in a selected problem area."⁴ Yet another author has contributed the following definition:

¹Howard L. Timms, *Introduction to Operations Management* (Homewood, Illinois: Richard D. Irwin, Inc., 1967), p. 83.

²*Encyclopedia Dictionary of Systems and Procedures*, prepared by the Prentice-Hall Editorial Staff (Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1966), p. 616.

³*Operations Research and Systems Engineering*, Editors Charles D. Flagle, William H. Huggins, and Robert H. Roy (Baltimore, Md.: The John Hopkins Press, 1960), p. 141.

⁴Adrian M. McDonough, *Information Economics and Management Systems* (New York: McGraw-Hill Book Company, Inc., 1963), p. 122.

"a system can be any activity that provides information to form the basis of performing operations and making decisions." He continued by saying that "a system can be any set of procedures or devices that can be put together to get desired results -- either tactical or strategic."¹

Perhaps a more inclusive and sophisticated definition is that offered by Johnson, Kast and Rosenzweig. They define a system as "an array of components designed to accomplish a particular objective according to plan."² Relating this to the various parts and interest in a business organization, they state that these components form "a system of interrelated parts working in conjunction with each other in order to accomplish a number of goals, both those of the organization and those of {the} individual participants."³ Finally, one writer defined a system as "an assemblage of objects or functions united by some interaction or interdependence."⁴

In summarizing this discussion on system definitions an attempt will be made to abstract any common denominators

¹Walter S. Fedor, "Management by Systems," *Chemical and Engineering News*, (August 28, 1967), p. 125.

²Richard A. Johnson, Fremont E. Kast and James E. Rosenzweig, *The Theory and Management of Systems* (New York: McGraw-Hill Book Company, Inc., 1967), p. 113.

³*Ibid.*, p. 11.

⁴Harold Koontz and Cyril O'Donnell, *Principles of Management: An Analysis of Managerial Functions*, 4th Ed. (New York: McGraw-Hill Book Company, Inc., 1968), p. 43.

found in those definitions offered, and using these synthesize them into a definition of system. The definitions offered can, with few exceptions, be viewed as consisting of two major parts, a subject and a predicate.

Looking over the definitions offered we can note some similarity in respect to the subject. For example, ". . .a collection of entities or things. . .";¹ ". . .a logical configuration of the significant elements. . .";² ". . .an array of components. . .";³ and ". . .an assemblage of objects of functions. . . ." could be restated as: "a group of related components."

The second part or predicate answers the question why we are interested in "a group of related components." Making reference again to our definitions we note phrases such as ". . .designed to bring about a desired result";⁵ ". . . constrained to act concertedly upon them to produce certain outputs with the objective of maximizing some function of inputs and outputs";⁶ ". . .designed to accomplish a particular objective according to plan";⁷ and ". . .put

¹Kershner, *A Survey of Systems Engineering Tools and Techniques*, p. 41.

²McDonough, *Information Economics and Management Systems*, p. 122.

³Johnson, et al., *The Theory and Management of Systems*, p. 113.

⁴Koontz et al., *Principles of Management*, p. 43.

⁵*Encyclopedia Dictionary of Systems and Procedures*, p. 616.

together to get desired results."¹ These predicates are adequately summarized by Johnson, Kast and Rosenzweig as noted above "designed to accomplish a particular objective according to plan."²

This writer's synthesized definition of a "system" based on the above analysis would be: "a group of related components designed {put together} to accomplish a particular objective according to plan."

In concluding this section, it can be said that even though specific definitions offered by contemporary writers appear to vary widely, the connotations of these definitions show less variance. It seems reasonable to assume that many, if not all, of these definitions were designed or tailored by their authors to fit the objectives of their article or book. Hence some of those definitions presented are general while others explicitly reflect the author's intended use. This semantic problem can be summarized, as one writer puts it: "Although the words 'system' and 'systems' are becoming hackneyed, they do

⁶Flagle, et al., *Operations Research and Systems Engineering*, p. 141.

⁷Johnson, et al., *The Theory and Management of Systems*, p. 113.

¹Fedor, "Management by Systems," p. 125.

²Johnson, et al., *The Theory and Management of Systems*, p. 113.

convey an important idea which has proven very fruitful in technical thought and expression."¹

The Systems Concept

This section will present the views of various writers of what is currently referred to as the "systems concept."

King defined the term as follows:

The systems concept or viewpoint is the simple recognition that any organization is a system which is made up of segments, each of which has its parochial goals. Recognizing this, one can set out to achieve the overall objectives of the organization only by viewing the entire system and seeking to understand and measure the inter-relationships, and to integrate them in a fashion which enables the organization to pursue its strategic goals effectively.²

This writer pointed out that if an organization accepts the "systems concept," some functional units within the organization may not achieve their parochial goals because, what is "best" for the organization as a whole is not necessarily "best" for each functional unit of the organization.

Pertinent to the relationship between the systems concept and the functional form of organization are the observations made by Terry, Hopeman, and Allen, respectively.

¹Ralph E. Gibson, "A Systems Approach to Research Management," *Research Management*, Vol. 18, p. 321.

²W. R. King, "Systems Concept in Management," *Journal of Industrial Engineering*, Vol. 18, p. 321.

Terry, in describing the basic theses underlying the various schools of management thought including a "Systems Management School," observed that this school "violates the traditional functional departmentation of an enterprise"¹ in that "systems cut across departmental lines and relate activities in a heretofore unorthodox manner."² Hopeman, reflecting views similar to those expressed by Terry, notes that the systems approach is a significant departure from traditional management. Management under the systems approach is concerned with meeting the overall objectives of the organization rather than being concerned with meeting the objectives of a narrow functional specialty.³ Allen, enumerating the warning signs indicating the need for structural organizational change, states that the first signs are "usually excessive centralization, delays in decision making, difficulties in coordination between functions, managerial deficiencies, and difficulties in establishing controls."⁴ The functional organization, according to Allen, encourages narrowness of managerial viewpoint, tends to force coordinating activities to the

¹George R. Terry, *Principles of Management* (Homewood, Illinois: Richard D. Irwin, Inc., 1968), p. 101.

²*Ibid.*

³Richard J. Hopeman, *Systems Analysis and Operations Management* (Columbus: Charles E. Merrill Publishing Co., 1969), p. 4.

⁴Louis A. Allen, *Management and Organization* (New York: McGraw-Hill Book Company, Inc., 1958), p. 86.

top of the organization, and discourages the development of "total enterprise" managerial talent. Later he notes that "close coordination among functions is necessary for effective operation of the enterprise as a whole."¹

One writer ventured the opinion that the difference between business success and failure might lie in management's willingness to accept the "systems concept" for their own organization. He noted that "the {systems} concept reorients management thinking to bring about more thorough consideration of more alternatives, simultaneous focusing on technology and costs, better definition of problems, and the reintegration of formerly separate functions." He continued by saying that "unlike many management fads, the systems approach is not a technique, but a way of thinking."² The idea that the "systems concept" reorients management thinking is endorsed by Harvey in an often-quoted article entitled, "Systems can TOO Be Practical." He notes that management, in attempting to control and coordinate the business entity, "has wrenched this entity apart and divided it into functions, authorities, and responsibilities"³ and that what the "systems concept" does is to reverse the process and view the business entity as a whole.

¹*Ibid.*, p. 88.

²"Systems Concept: Another Managerial Revolution?" *Steel*, (June 15, 1964), p. 25.

³Harvey, "Systems," *op. cit.*, p. 64.

Another endorsement of this view comes from the Senior Editor of *Chemical and Engineering News*. He states that "systems are a think and rethink operation." He notes that "the systems style. . .has a number of distinct characteristics, such as emphasis on information planning and forecasting, deliberate selection of goals and objectives, and a strenuous effort to integrate various disciplines into a workable framework."¹

A fourth author commented that "the systems concept does not provide a set of rules for solving problems, but it is a useful device for viewing many phenomena."² Still another writer offered the following: "the systems concept is primarily a way of thinking about the job of managing. It provides a framework for visualizing internal and external environmental factors as an integrated whole."³ Another writer endorsed this same point of view, observing that it (the systems concept) is a frame of mind.⁴

The foregoing definitions and descriptions of what is meant by the term "systems concept" provides us with a number of explicit and implicit properties. Most of these definitions taken individually, however, provide only some of these characteristics. The first characteristic

¹Fedor, "Management by Systems," p. 133.

²Martin, "The Systems Concept," p. 63.

³Johnson, et al., *The Theory and Management of Systems*, p. 3.

⁴Fedor, "Management by Systems," p. 130.

is that of serving as a means of viewing as a whole the various elements comprising the organization and its environment. A second is that of recognizing what is known as the synergistic effect (i.e., the total is greater than the sum of its parts). A third characteristic is that of recognizing the importance of the interrelation between the parts or elements.

Some connotations would include logic since purposeful behavior must, at a minimum, be perceived as being logical; wholeness and unity are implied when we purposefully piece together the various elements; and organization is implied when we emphasize the importance of interrelationships. These connotations are in essence the same as that derived from the etymology of the word system.

Some Other Definitions

In this section we will present definitions for three closely related terms or concepts related to systems thinking. These ideas will reflect those currently found in systems literature. These terms are: "Hierarchy," "Subsystem," and "Boundary." In conjunction with the previous discussion, these terms and concepts will provide the basis for establishing the conceptual yardstick which will be used throughout the remainder of this dissertation for evaluating the writings of various authors.

Hierarchy and Subsystems

The definitions of "system" and "systems concept" presented in the previous section make no reference to size. If we consider the switch, electrical wiring, and the motor on a drill press as a power system, and the drilling, inspection and transfer of parts as comprising a production system, we note two basic characteristics of systems. The first is that systems vary in size¹ and secondly that larger systems can be viewed as being made up of smaller systems.² These smaller systems are often referred to as subsystems. The concept of system hierarchy concerns this "nesting" of smaller systems within larger systems.

Heller presents a means for clarifying the concept of a hierarchy of systems. This approach is known in the study of semantics as "the ladder of abstraction." In essence it is the arranging of words or terms in descending order of abstraction with each lower level being included in the level immediately above it. As one goes down this ladder each level becomes more definitive and concrete.³ In Table I, the column headed "System" is an example of a "ladder of abstraction." What is a component or a subsystem at one level becomes a system at the next lower level. The

¹Gerald Nadler, *Work Systems Design: The Ideals Concept* (Homewood, Illinois: Richard D. Irwin, Inc., 1967), p. 3.

²E. W. Martin, "The Systems Concept," *op. cit.*, p. 63; Timms, *Operations Management, op. cit.*, p. 85; Charles L. Hughes, *Goal Setting* (New York: American Management Association, 1965), p. 93.

TABLE I¹

BUSINESS ORIENTED HIERARCHY OF SYSTEMS AND COMPONENTS

<u>Function</u>	<u>System</u>	<u>Component or Subsystem</u>
Produce the goods and services wanted by society	American Business	Automobile Industry
Manufacture Automobiles	Automobile Industry	General Motors Corporation
Manufacture Chevrolets, etc.	General Motors Corporation	Delco-Remy Division
Manufacture Auto-electrical components	Delco-Remy Division	Generator Department
Manufacture Automobile Generators	Generator Department	Armature Section
Wind Armatures	Armature Section	Testing Group
Test Generators for Electrical Resistance	Testing Group	John Brown's Group
Test Armatures for Chevrolets for Electrical Resistance	John Brown's Group	Joe Doaks

function of any of the systems is included in and is ancillary to the function of the system at the next higher level.

¹Heller, "What is a System?" *op. cit.*, p. 27.

²Adapted from Heller, "What is a System?" p. 24, terms are those of the author.

The Boundary Concept

The concept of boundary is a convenient means of separating the elements or components of a system from its environment.¹ This should not be construed to mean that a physical separation is a requisite of a system or that this "boundary" is impervious to information or other inputs or that the elements of one system belong to that system only. The boundary concept provides a necessary means of eliminating from consideration the infinite number of less significant elements² that could conceivably be included in a system. These less significant elements are those perceived as having little or no effect upon the results. It is a means of reducing the number of variables to manageable size for purposes of analysis.

Obviously then, the selection of which elements to include in or exclude from a system is crucial. In conjunction with our previous discussion of system hierarchies, it is evident that as increased numbers of related elements are included in a system we move up the system hierarchy.

¹Warren B. Brown, "Systems, Boundaries, and Information Flow," *Academy of Management Journal*, Vol. 9, No. 4 (December, 1966).

²In a system whose boundary is defined as including a motor, pump, and controls the shape or color of the switch button would generally be excluded from consideration if the primary objective of the system was functional.

From the foregoing discussions we can conclude that systems are hierarchical in nature and can be viewed as being made up of numerous subsystems which in turn are made up of sub-subsystems.¹ It is this writer's opinion that much of the confusion surrounding systems literature stems from three major sources. The first of these is that writers fail to clearly define the system under discussion (a problem of boundary). The second is that they fail to relate the system they are discussing with other systems (a problem of system hierarchy). A third source of confusion stems from authors trying to "reinvent the wheel" and to build monuments. In support of this writer's contention that some of the present confusion is derived from other writers "reinventing the wheel" is Ross-Skinner's statement following his discussion of the conceptual basis of the systems approach: "Here is a clear recognition of the systems approach that is being 'newly discovered' today."² Another writer, while acknowledging the fact that systems have been used for centuries, flatly states that "the systems concept is only about twenty years old."³

¹Timms, *Operations Management*, *op. cit.*, p. 29; Martin, "The Systems Concept," *op. cit.*, p. 63; and Hughes, *Goal Setting*, *op. cit.*, p. 93.

²Jean, Ross-Skinner, "A New Breed," *Management Review* (July, 1969), p. 52.

³Wilson and Wilson, *Information, Computers, and System Design*, *op. cit.*, p. 182.

Summary

Thus far this discourse has presented the etymology of the word system, reviewed how the word system and the concept of system are defined by a number of contemporary writers, and defined three closely related terms or concepts: hierarchy, subsystem, and boundary. In concluding this chapter these definitions, terms, and concepts will be drawn together and the criteria of a system which will be used throughout the remainder of this dissertation will be presented.

After delving into the current usage of the word system with respect to business organizations it can be concluded that:

1. Although there is an obvious semantical problem, there are a number of common elements to be found in most of the definitions cited.
2. This semantic problem stems in part from the context in which the writers define and use the term.
3. One synthesized definition, reflecting current usage of the word, would be: A system is a group of components designed {put together} to accomplish a particular objective(s) according to plan.

In reviewing current definitions of the meaning of "the systems concept," it can further be concluded that:

1. A semantic problem exists but, again, there is much similarity to be found in the definitions presented.
2. The connotations for the "systems concept" are the same broadly speaking as those for the dictionary definition for the noun "system."

Finally, from our review of the terms "hierarchy," "subsystems," and "boundary" it can be concluded that:

1. Systems are hierarchial in nature.
2. There is a semantic problem stemming from the casual use of these terms by writers and which presently permeates systems literature.
3. The boundary concept is a means of "isolating" the elements of a system for purposes of study. The redefining of a system's boundary will move it up or down in the system hierarchy.

Development of Criteria of Definition

Since we cannot escape the semantic problem associated with definitions and recognizing that dictionary definitions change over time, the criteria which follow are necessarily subjective in nature. They are what the author deems reasonable, based on the foregoing discussion, analysis, and conclusions, and will be used to evaluate the efforts of numerous writers, past and present, in regard to their contributions to the "systems concept" of a business organization.

Criteria

(1) The minimum requirement would be that the author either explicitly notes or it can be reasonably inferred from what is said and its context, that he views the business entity as being made up of parts requiring management to seek a balance between them so as to achieve a larger output or results. This larger output or result is a recognition of the synergistic effect resulting from employing the systems concept and is the primary economic justification of organization and management.

(2) In addition, the author should recognize that the business entity itself is but a system within a larger one such as that encompassing all businesses.

(3) He should also recognize the importance of communication in tying together the various components or subsystems of a business organization.

(4) He should recognize the possibility that functionalism in the extreme may not be best for the organization as a whole. The justification for this criterion was noted by King.¹ When a firm is organized according to function, each functional area has its own goals or objectives. If the primary emphasis is on achieving these functional objectives through such means as evaluating each functional

¹King, "Systems Concept in Management," *op. cit.*, p. 321.

area in terms of how much profit it produced, there is no assurance that the goals of the whole organization will be achieved either efficiently or effectively.¹ The division of an organization into many functional units, each with its parochial goals, presents the danger that the efficiencies achieved through specialization of function will be more than offset by the costs involved in coordinating and controlling these activities so as to achieve organizational objectives.

The preceding standards will be used in succeeding chapters for evaluating the words and writings of various authors on management. It is not to be expected that past authors have couched their writings in current systems terminology. What will be looked for is whether *in substance* they incorporated the "systems concept" in what they said or wrote. It is the writer's viewpoint that it makes little difference how they phrased it or what label they may have attached to it -- the only relevant issue is whether or not what they said or wrote supports the contention that they viewed in substantial degree the business entity as being a system in our current understanding of the term.

¹This idea of having each functional area contribute effectively and efficiently toward the attainment of organizational goals is included in the discussion in Chapter IV by such writers as Hopf and Barnard.

CHAPTER III

DEVELOPMENT OF DEFINITIONS RELATING TO THE SYSTEMS CONCEPT

1813-1914

The purpose of this chapter is to present the reader with a number of observations and conclusions set forth by some of the early writers on business that relate to what is now referred to as the "systems concept." After presenting the observations of these writers, an analysis and evaluation of their contributions will be made using the criteria set forth in the last chapter. This general format will be employed also for the following two chapters which cover successive periods.

During the period of time covered by this chapter, there were a number of basic changes in the forms and importance of business. The American economy up to the third quarter of the 19th century was predominantly an agricultural economy. The dominant form of business during the first half of this period was the sole proprietorship and its compound form, the partnership. Starting about the middle of the period the corporate form of business evolved and thereafter became economically dominant. The viewpoints of those writing during the period between 1800

and 1914 or certainly in the first half of the period, are primarily those of the owner-managers. The primary concern of business during the period was production for an ever-expanding market which was primarily founded in agriculture.

Builders of the Systems Concept 1813-1914

One of the first to propose a systems concept of business was Robert Owen. Though chiefly remembered for his efforts for social reform, as a pioneer of effective personnel management, and as a successful textile manufacturer, he was also a prolific writer of pamphlets and a persistent speaker on other, broader concerns of management. In addition to the time he spent in developing the community of New Lanark in Scotland into a "Village of Co-operation," Owen spent long periods of time in the United States between 1824 and 1828, establishing New Harmony, perhaps the most famous of these villages of cooperation.¹ The preface that accompanied one of his essays entitled "The Formation of Character" (1813) was an address "to the superintendents of manufactories, and to those individuals generally, who, by giving employment to an aggregated population, may easily adopt the means to form the sentiments and manners of such a population." His message began as follows:

¹Lyndall Urwick and E.F.L. Brech, *The Making of Scientific Management*, Vol. II (London: Management Publishing Trust), pp. 51-56.

Like you, I am a manufacturer for pecuniary profit. But having for many years acted on principles for reverse in many respects of those in which you have been instructed, and having found my procedure beneficial to others and to myself, even in a pecuniary point of view, I am anxious to explain such valuable principles, that you and those under your influence may equally partake of their advantages.

By those details you will find, that from the commencement of my management I viewed the population, with the mechanism and every other part of the establishment as a system composed of many parts, and which it was my duty and interest so to combine, as that every hand, as well as every spring, lever, and wheel, should effectually cooperate to produce the greatest pecuniary gain to the proprietors.

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Indeed, after experience of the beneficial effects, from due care and attention to the mechanical implements, it became easy to a reflecting mind to conclude at once, that at least equal advantages would arise from the application of similar care and attention to the living instruments. And when it was perceived that inanimate mechanism was greatly improved by being made firm and substantial; that it was the essence of economy to keep it neat, clean, regularly supplied with the best substance to prevent unnecessary friction, and, by proper provision for the purpose, to preserve it in good repair; it was natural to conclude that the more delicate, complex, living mechanism would be equally improved by being trained to strength and activity; and that it would also prove true economy to keep it neat and clean; to treat it with kindness, that its mental movements might not experience too much irritating friction; to endeavor by every means to make it more perfect; to supply it regularly with a sufficient quantity of wholesome food and other necessities of life,

that the body might be preserved from being out of repair, or falling prematurely to decay.¹

Another English writer, Andrew Ure, in 1835 noted that the rate of profit for a manufacturing enterprise is often in just proportion to the magnitude of the business. In his discussion of the requirements and the gains that may accompany large scale operations, he noted that it is in the best long-run interest of manufacturers to sell for a small profit per unit since large profits would entice others to enter the business with the effect of "entailing a ruinous depreciation of the goods."² Furthermore, he notes that:

It is the practice of many manufacturers, in consequence of the advantage of operating on a large scale, to manufacture beyond the amount of the orders they have received, and to export the surplus, at a price which keeps down foreign competition. The profits on the greater portion indemnify them for the losses on the smaller. This cannot be called an act of speculation, but of necessity. The excess must be exported, or the system of operating on the grand scale must be abandoned.³

Both Owen and Ure are advocating a means of integrating parts of the business entity to achieve a greater pecuniary profit. Owen sees the value of considering the whole man

¹Robert Owen, *A New View of Society*, First American Edition from the Third London edition (New York: E. Bliss & E. White, 1835), pp. 442-443.

²Andrew Ure, *The Philosophy of Manufacturers* (London: Charles Knight, 1835), pp. 442-443.

³*Ibid.*, p. 443. This in modern terminology is referred to as "dumping."

in conjunction with the machine; he sees that personnel management pays.¹ The system he visualizes is certainly not sophisticated by today's standards but neither was his business. In essence, he sought a better, i.e., more profitable, combination of man and machine. Ure, like Owen, emphasizes the objective of profit but sees a need for businessmen to balance the gain from large scale production against the possible losses in selling the excess output at prices that do not fully cover costs so that foreign competition will be minimized.

Jules Dupuit, another early writer who was a French engineer, explaining how a shipper might choose between road and water carriage, observed:

The fact is that carriage by road being quicker, more reliable and less subject to loss or damage, it possesses advantage to which businessmen often attach a considerable value. However, it may well be that the saving of 0 fr.87 induces the merchant to use the canal; he can buy warehouses and increase his floating capital in order to have a sufficient supply of goods on hand to protect himself against the slowness and irregularity of the canal, and if all told the saving of 0 fr.87 in transport gives him an advantage of a few centimes, he will decide in favor of the new route. . . .²

Again like Owen and Ure, Dupuit's primary business objective is profit maximization.

¹Urwick and Brech, *Scientific Management*, op. cit., p. 55.

²Jules Dupuit, "On the Measurement of the Utility of Public Works," reprinted in *International Economic Papers*, No. 2, translated from the French by R. H. Barbock (London: Macmillan and Company, Ltd., 1952), p. 100.

The first unequivocal pronouncement of the "systems concept" found by this writer is to be noted in Henry Towne's "The Engineer as an Economist." In this monograph before the American Society for Mechanical Engineers in 1886 Towne observed that:

To insure the best results, the organization of productive labor must be directed and controlled by persons having not only good executive ability, and possessing the practical familiarity of a mechanic or engineer with the goods produced and the processes employed, but having also, and equally, a practical knowledge of how to observe, record, analyze and compare essential facts in relation to wages, supplies, expense accounts, and all else that enters into or affects the economy of production and the cost of the product.¹

He states further that successful management of industrial works is dependent upon possession of these qualities by one or more persons. The highest effectiveness is attained if they are united in one person "who is thus qualified to supervise, either personally or through

¹Henry Robinson Towne, "The Engineer as an Economist," Trans. ASME, Vol. 7 (1886), p. 428. See *The Golden Book of Management*, edited by Lyndall Urwick (London: Newman Neame, Ltd., 1956), for one editor's evaluation of the importance of Towne's contribution to the field of management. Towne's major contribution to management was "the leading part he played in persuading his fellow engineers to extend the traditional scope of their professional interests to include management subjects." During the course of his career, Towne was a practicing engineer, president of Yale and Towne Manufacturing Company, and vice president and later president of the ASME. He was a strong supporter of the Taylor system of management and worked out a modified form of a profit-sharing plan as a substitute for the traditional piece-rate system.

assistants, the operation of all departments of a business, and to subordinate each to the harmonious development of the whole."¹ Later he noted that "the matter of shop management is of equal importance with that of engineering, as affecting the successful conduct of most, if not all, of our great industrial establishments, and that the management of words has become a matter of such great and far reaching importance as perhaps to justify its classification also as one of the modern arts."²

In the twenty-four year period between the contributions of Towne and Robb whose observations relative to the systems concept will be discussed later, there were a number of writers who singly and collectively produced a historical body of management literature which later would be categorized under the general caption "Scientific Management." The individuals who made significant contributions to the "science of management" included F. W. Taylor, Harrington Emerson, Henry Gantt, Frank and Lillian Gilbreth, and Morris Cooke. None of these people as far as this writer has been able to determine made a significant contribution to the evolution or development of the "systems concept" view of business.

This writer has concluded, after having reviewed the writings of the "Scientific Management School," that the primary reason those major contributors to the "Scientific Management School" were not also major contributors to the

¹*Ibid.*, p. 429.

²*Ibid.*

evolution of the "systems concept" was because their primary concern was aimed at increasing the output of the individual worker and not in looking at the organization as a whole. This is not to say that these writers did not occasionally indicate an awareness of the need for such a viewpoint.

Emerson, for example, in *Twelve Principles of Efficiency*,¹ noted in discussing the need for reliable, adequate, and permanent records that "We ask the price of coal per ton, but rarely know whether it contains 10,000 or 15,000 heat units per pound."² Here he clearly implies the need for considering more than price and to that degree it fulfills the criterion of recognizing the interrelations and interdependency of parts of the whole. However, when his writings indicating a "systems concept" view of business are compared to those of Towne and Pobb, his appear to be the less significant contribution.

Another prominent writer on scientific management and a close associate of Taylor was Henry Gantt. In the preface to the second edition of his book, *Work, Wages, and Profits*³ Gantt makes the following observation on the subject of management systems:

A system of management especially designed for economical production is a mechanism which is

¹Harrington Emerson, *Twelve Principles of Efficiency*, (New York: The Engineering Magazine Company, 1912).

²*Ibid.*, p. 210.

³Henry L. Gantt, *Work, Wages, and Profits*, 2nd ed., (New York: The Engineering Magazine Company, 1913).

successful only when all parts work in harmony. The men who form a part of this mechanism must be trained individually and collectively.¹

This writer, after having read Emerson's view on work, wages, and profits, concluded that his observations were similar to those of Emerson. He does recognize the inter-relation and interdependency of parts of a whole but his concentration appears to be focused upon the lower levels of the organizational hierarchy. His contribution adds very little if anything to the observations of previous writers such as Towne.

The most dominant personality of the "Scientific Management School" was Frederick Winslow Taylor. Although a prolific writer, Taylor has failed to provide clear evidence that he viewed the business entity as a system. In reading Taylor's *Scientific Management*² one is constantly waiting for him to make some explicit observation that would place him among the major contributors to the development of the "systems concept." This writer has failed to find such evidence.

In testimony before a Special Committee of the House of Representatives in 1912 Taylor refers frequently to systems, old systems, "piece-rate system," "our system," "task system," "the system" and the systematizing of work.³

¹*Ibid.*, p. 7.

²Frederick Winslow Taylor, *Scientific Management* (Comprising: *Shop Management*, *The Principles of Scientific Management* and *Testimony Before the Special House Committee*), (New York: Harper & Row, 1947).

³*Ibid.* See *Testimony*, pp. 5-7, 141-142.

In each case he seems to be relating a specific set of rules or a procedure to the accomplishment of a specific task.

The closest Taylor comes in enunciating a "systems concept" view of business is in his "mental revolution."¹ Even here cooperation and coordination are between two parties--labor and management. No specific mention is made as to whether either party seeks a balance between their many possible actions or activities so that their total reward or objectives can be maximized.

It does appear, however, that individuals such as Taylor would most certainly have answered in the affirmative if asked about the need for and the importance of a "systems concept" view. If the "systems concept" view of business is internally logical, then it could be argued that Taylor's "mental revolution" embodies the "systems concept."

No mention will be made of the writings of the Gilbreths and that of Morris Cooke because their writings, in this writer's opinion, do not adequately support the thesis that they had a "systems concept" view of the business entity. They, like other members of the "Scientific Management School," dwelt primarily on problems affecting the output of individual workers and did not deal with broad organizational problems and concepts.

A relatively sophisticated analysis and statement of the "systems concept" can be found in Russell Robb's

¹*Ibid.* See Testimony, pp. 26-28, p. 250.

²*Classics in Management*, Ed. by Harwood F. Merrill (New York: American Management Association, 1960), pp. 174-175.

Lectures on Organization, published in 1910.¹ Robb clearly recognizes that the trend of business enterprises is toward greater size and complexity. He observes that this complexity necessitates a great amount of analysis simply to clearly define the problems. One of these problems accompanying the increase in size of modern industrial organizations is that these organizations must be looked upon as something more than a machine, "a cold-blooded product of synthesis, as an artificial sort of being that recognizes such realities as order, system, discipline, skill, and ability but has no place anywhere for the "spirit" of anything."²

He continues by noting:

If we are to look upon "organization" as something more than "system," it is to be a sort of organism, we must recognize another factor, and that is esprit de corps. It induces enthusiastic and unselfish working together, with regard more to the whole result than immediately to one's own personal part in the achievement. It leads one to do his part well for the advancement of the whole. It leads one to see the advancement in his part because the whole is gaining in achievement and stability.³

Later he observes that even though organizations are not difficult to sketch on paper and that they always have a workable look except in the simplest of organizations,

¹*Classics in Management*, Ed. by Harwood F. Merrill (New York: American Management Association, 1960), pp. 174-175.

²*Ibid.*, p. 174.

³*Ibid.*, pp. 174-175.

"there is a constant call for the unscheduled cooperation, for the action that can be secured only through a genuine, lively, and loyal interest in the success of the whole undertaking."¹ The factors that make organizations, such as "structure, lines of authority, responsibility, division of labor, system, discipline, accounting, records, and statistics. . .esprit de corps, cooperation, and team play"² vary in relative importance depending upon changes in organizational objectives, conditions, and resources.

In the 1910 edition of his book, *Factory Organization and Administration*, Diemer outlined the mental framework and methods that he felt to be desirable for an industrial engineer:

He considers a manufacturing establishment just as one would an intricate machine. He analyzes each process into its ultimate, simple elements, compares each of these simplest steps or processes with an ideal or perfect condition. He then makes all due allowances for rational and practical considerations and establishes an attainable commercial standard for every step. The next process is that of attaining continuously this standard, involving both quality and quantity, and the interlocking or assembling of all of these prime elements into a well arranged, well-built, smooth-running machine.³

¹*Ibid.*, p. 175.

²*Ibid.*

³Hugo Diemer, *Factory Organization and Administration*, 2nd Ed. (New York: McGraw-Hill Book Company, Inc., 1914), pp. 10-11.

Later, in discussing control, he notes that to lay out a new organization or to analyze an existing one it is first necessary to determine the processes and activities required of plant, equipment, and the individuals. Following this analytical step is the more difficult, synthetic one which results in the most efficient possible "engine of industrial production." "We must determine which of these prime elements are to stand alone, and which are to be combined, so that the general result will make a well-arranged, well-built, smooth-running machine, as it were, of the entire aggregation."¹

Under the topic "Specialization," Diemer states that although specialization is an economic necessity, over-specialization is to be avoided. A high degree of specialization among laborers, mechanics, and minor bosses is safe but for those who make up the backbone of a successful organization, we should avoid over-specialization since it may result in thwarting their ambition.²

The next year (1911) Louis Brandeis published an article entitled "Scientific Management and Railroads" which contained part of his brief previously submitted to the Interstate Commerce Commission. What Brandeis says closely echoes the thoughts presented earlier by Diemer

¹*Ibid.*, p. 24.

²*Ibid.*, p. 25.

as to the role of the efficiency (industrial) engineer:

The action of the efficiency engineer working under scientific management has been aptly compared to a machine. He considers a business as an intricate machine. He analyzes each process into its ultimate units, and compares each of the smallest steps of the process with an ideal of perfect conditions. He then makes all due allowance for rational and practical conditions and establishes an attainable commercial standard at every step. Then he seeks to obtain continuously this standard, involving both qualities and quantities,--the interlocking or assembling of all these prime elements in each process into a well-built, smooth-running machine; and when there are, as usual, several processes in each department and several departments in the business, all the departments as well as all the processes must be co-ordinated, so that the machinery of the whole business works with equal smoothness.¹

This mechanistic approach is reminiscent of Owen and typifies for many the pioneers of the scientific management school. In describing the role of the efficiency engineer neither Diemer nor Brandeis go on to explain what is implied under departmental co-ordination.

Another by-product of the Interstate Commerce Commission hearings of 1911 into the needs and justification for a railroad rate increase was Kendall's paper entitled "Unsystematized, Systematized, and Scientific Management."² Originally published by the Amos Tuck School in 1911, it

¹Louis D. Brandeis, "Scientific Management and Railroads," *The Engineering Magazine*, (1911), p. 8.

²Henry P. Kendall, "Unsystematized, Systematized, and Scientific Management," *Bulletin of the Taylor Society*, Vol. VIII, No. 5 (October, 1923), p. 189.

was reprinted in the *Bulletin of the Taylor Society* some twelve years later. The paper, according to Kendall, was similar to the one he had previously written for the Commission. The objective of the paper was to clarify "what was meant by Scientific Management, a term then unfamiliar."¹ The logical conclusion the reader must reach, on the basis of Kendall's stated objective of clarifying the meaning of "scientific management" is that few had heard, read, or understood what Taylor and others had said in respect to "scientific management" before the Commission.

Kendall classifies all types of management as falling into one of three categories: Unsystematized, Systematized, or Scientific.² To illuminate the differences in the essential features of these three basic types of management, each is described and compared with the other two types. In describing the fundamental problems encountered by most organizations he says:

Any manufacturing or mercantile business made up of different processes more or less inter-dependent must, to secure the best results, be so organized that the separate processes and the unit members within these will be brought into systematic connection and operation as efficient parts of the whole. To bring about and maintain this is the function of management.

¹*Ibid.*, p. 189.

²By "unsystematized management" Kendall means unorganized in the sense that there is no conscious plan. This is essentially a restatement of F. W. Taylor. Under "systematized management" Kendall would include most business enterprises. This is the type of management where plans are made and "systems" are developed but they are not "scientific."

To do it to the highest known degree is possible only by what we choose to call the science of management.¹

Although Kendall's discussion of the various types of management then practiced is not the concern of this paper, his concluding remarks as to the superiority of "scientific management" are illuminating as they add support to previous observations regarding the need for consideration of the whole as being more than the sum of its parts. "In the systematized plant the system in one department has been planned especially for that department, and is not a part of the system framework which pervades the whole, as in Scientific Management, and it is a constant fight to maintain such independent systems and especially to change and modify them with changed conditions or the increased growth of the business."²

Another writer, Hamilton Church, commenting on what "scientific management," is or is not, observed that the increased pace of industry at that time (1911) was a by-product of scientific management. Scientific management, according to Church, has for its end and objective "intensive production" and is comparable to "intensive culture" in agriculture. Scientific management having brought on this increasing intensity of production is

¹Kendall, *op. cit.*, p. 189.

²*Ibid.*, p. 199.

superior to other forms of management in coping with the consequences. He notes that:

. . .The greater intensity of operation it {Scientific Management} sets up has necessitated the "tuning up" of a number of subordinate activities in manufacturing plants that were not regarded as factors of great importance until intensive production found out their weak points. It has also brought into prominence the ethical, or as it is sometimes termed, the "human" element in management, as one of the most necessary subjects of study in the whole problem.

. . . Chief among the subordinate activities which have gone through the process of "tuning up" are those that can be grouped under the term "co-ordination." In other words, they secure regular and simultaneous effort on the part of a number of individuals, or departments, for the execution of a common aim, viz., the manufacture of a given piece.¹

Church and L. P. Alford in an article written the following year observe, under a section headed "Division of Effort," that there are limiting considerations to the principle of specialization and "it is not merely a question of dividing to the bitter end. There are cases in which it is better to combine operations, or in fact execute them simultaneously."² The limiting conditions that should govern the application of the principle of specialization, they observe, have not as yet been formulated.

¹A. Hamilton Church, "The Meaning of Scientific Management," *The Engineering Magazine*, Vol. 41, 1911, p. 99.

²A. Hamilton Church, "The Principles of Management," *American Machinist*, (May 30, 1912), p. 858.

Analysis and Evaluation

Having summarized the contributions of a number of writers judged by this writer to be the most significant during the period 1813 to 1914, an analysis and evaluation of their offerings will be made. The criteria developed in Chapter II will be used in determining whether and to what extent they contemplated the organization as a system.

Owen, in his address "to the superintendents of manufacturing" duly recognizes his business as being a "system composed of many parts."¹ His perception of the business as being primarily mechanical in nature was illustrated by his definition of his duty and interest being to combine in such a manner that every hand, wheel, spring, and level should cooperate to product the greatest pecuniary gain for the owners.² His argument is that an investment in personnel relations would yield not a return of five, ten, or fifteen percent but often fifty and in many cases a hundred percent.³ In essence, what he is recommending is that manufacturers shift their emphasis from the purely mechanical aspects of production to one in which concern is given to the human element. To so reallocate the firm's resources, he argues, would result in a greater pecuniary return and happiness for the owners and greater comfort for the employees.⁴ Owen's recommendation implies that a synergistic effect will result if employers switch their effort and emphasis toward the human factor.

¹Owen, *op. cit.*, p. 22. ²*Ibid.*

³*Ibid.*, p. 23.

⁴*Ibid.*, p. 24.

Evaluating Owens' address (using the criteria developed in Chapter II), it can be concluded that it meets the minimum requirements of a good definition in that it recognizes the business as a system, even though a simple one, and the synergistic effect resulting from employing the "systems concept." He does not indicate that he sees his business as being a subsystem of a system comprising all businesses, nor does he indicate that he recognizes the role of communication.¹

Ure, another English writer, clearly recognizes the trade-off principle and the resulting synergistic effect obtained in employing it. Both Ure and Owen hold essentially the same unsophisticated concept of the business enterprise. That they should hold such a view is anything but unnatural since the business entity of that day was anything but sophisticated. Evaluating Ure's writings, the same conclusions can be drawn as those for Owen.

In Henry Towne's "The Engineer as an Economist" there is a greater appreciation of the complexities involved in "harmoniously developing the whole." He enumerates a number of factors that must be considered in developing this whole, and recognizes the synergistic effect resulting from subordinating department objectives to organization objectives. From Towne's argument for having one person or

¹It should be noted that Owen was addressing himself to the primary, and in some cases the sole, owners of mills whose livelihood was made in superintending. The happiness of which Owen speaks is of a gratuitous nature that may accrue to the mill owners as a by-product of taking care of their "animate machines."

his qualified assistants see to it that the various sub-systems (departments) be integrated into a whole, it can be concluded that he is viewing, unlike Owen and Ure before him, a business in which it is no longer economically feasible for one man to personally supervise every facet.¹

In evaluating Towne's writings, it is clear that he recognized "the systems concept" as it applies to sub-systems (departments) and the system or business entity as a whole. He does not, however, furnish sufficient evidence regarding the importance of communication to justify an assumption that he fully recognizes the importance or cruciality of communications to the "systems concept."

Russell Robb's exposition implies that the business entity of which he writes is more complex than that of previous writers whether they be English, French, or American. Furthermore he explicitly expresses the multiple objectives commonly sought or expressed by today's organizations in contrast to Owen's and Ure's profit.²

Employing the criteria developed in Chapter II it can be said that Robb fully meets the first, possibly the second, and the third--i.e., he views the business entity as a system requiring management to seek a balance between the parts with the objective of obtaining the

¹Towne, *op. cit.*, pp. 428-429.

²Merrill, *op. cit.*, pp. 174-175.

synergistic effect, possibly that the business entity is part of a larger economic system, and the importance of communication. *Espirit de corps* is the factor, according to Robb, that will encourage the acceptance of the "systems concept."¹

Diemer perceives his "engine of industrial production" as taking the analogous form of a machine much as Owen did some eighty years earlier. Like Robb, Diemer's business entity is more complex than that written about by earlier writers. Diemer is one of the first, if not the first, writer to recognize both the analytical and synthetical aspects of organization and that over-specialization is not only possible but not necessarily desirable.²

Again using the criteria expounded in Chapter II, it can be concluded that Diemer has adequately fulfilled the requirements of "system-synergistic" recognition. His writings do not support the thesis that he fully recognized the importance of communications to the "systems concept"--not even to the extent of Robb--nor that the business entity can be viewed as a component of a larger system.

Brandeis' presentation so closely follows that of Diemer's that what was said of Diemer can also be said of Brandeis.

¹*Ibid.*, p. 174.

²Diemer, *op. cit.*, p. 24.

In Kendall's discussion there is a more sophisticated recognition of sub-systems and the interdependency of these components in achieving a synergistic effect for the whole. To ascertain the optimum combination of inputs Kendall proposes the science of management or "scientific management." Recognition is made of the increased and increasing complexity of the business entity and the accompanying problems brought on by organizational growth.¹

Criteria wise, Kendall's writings fulfill those noted for Robb and Diemer.

Church using the term "tuning-up" recognizes the concepts of balance, interdependency, and synergism. Like Kendall, Church is advocating "scientific management" as the means of achieving a solution. An explicit recognition of the human element, reminiscent of Owen, is made, but the perception of its role appears to be more sophisticated than that presented by Owen.

As with Robb, Diemer, and Kendall, Church's writings adequately fulfill the criteria of recognizing synergism, interdependency, and balance but do not adequately imply a recognition of the importance of communications, or that the business entity can be viewed as a sub-system of a larger system, or that functionalism in the extreme may not be optimum in terms of the whole.

¹Kendall, *op. cit.*, pp. 189-199.

The last writer mentioned was Alford who, in a joint effort with Church, gave recognition, as did Diemer, to the undesirable condition of overspecialization when considered from the position of what is best for the business entity as a whole. Coordination of effort, they conclude, should begin the moment specialization begins and the greater the division of effort the more difficult coordination becomes and the less flexible becomes the business organization.

Whether Alford's contribution alone meets the criteria set forth in Chapter II is questionable. The joint effort, however, adds depth and breadth to the aforementioned writings by Church in that they clearly recognize the limits of functionalism.

CHAPTER IV

THE SYSTEMS CONCEPT 1915 - 1940

The format of this chapter will follow closely that of Chapter III. The quantity of material available during the quarter century covered by this chapter was a virtual flood in comparison with that of the preceding century. In general a greater insight is shown by the writers during this period in regard to their perception of the business entity with its ever growing tendency toward increased internal complexity and its interdependency on other businesses and publics. The quantity of material available during this period and the repetitiveness of the views and insights proffered by various writers makes it mandatory that a selection be made as to what should be included in this presentation. The material presented is, in the judgment of this writer, representative of the views of those writers who contributed to what we now refer to as the "systems concept."

During the years immediately preceding World War I, American industry had been chiefly concerned with problems associated with producing for an economy in which both consumption and prices were rising. The sellers' market

that business enjoyed before and during the war suddenly, with the cessation of hostilities, changed into a buyers' market.¹

The Development of the Systems Concept 1915 - 1940

This change from a war time economy to a peace time economy caught many American businesses unprepared organizationally. One such company was Du Pont. As a consequence of having to divest itself of much of its investment in the explosives industry which it had previously dominated, Du Pont's growth policy was changed from one of horizontal integration to one of diversification. The financial consequences were that from 1917 to 1921 the Company lost approximately 30 million dollars. A subcommittee on organization was set up to study this problem and after many months of work, it concluded that the basic cause, other than that assignable to the change accompanying the change from an inflationary expansion to deflationary contraction economy, was attributable to inability of the organization to adjust to growth.²

The subcommittee's recommendations, according to Dale, "may well be the most complete exposition of organization principles made up to that time; they were certainly

¹H. S. Person, "Scientific Management and Economic Planning," *Bulletin of the Taylor Society* (December, 1932), p. 216.

²Ernest Dale, *The Great Organizers* (New York: McGraw-Hill Book Company, Inc., 1960), p. 55.

more systematic and better tested than the work of Taylor, Gantt, or Gilbreth, the pioneers of scientific management.¹ The principles set forth in these reports applied to both the management and supervisory levels of organization. The most basic of these principles was "the linkage of the object of organization, defined as the 'process of disposing or arranging constituent or inter-dependent parts into an organic whole' with 'the attainment of maximum results with minimum effort.'"² The criteria set up to accomplish the desired results included one of "Coordination of Economically or Market-Related Effort."³ Under this it was observed that "it is often more necessary to combine related efforts which are unlike"⁴ than to combine like efforts. This later concept is the basis for the classical functional organization. The justification for combining unlike activities in some instances lies in the fact that to do so is more economical than segregation.

Under the criterion of the "Ideal Organization" it is noted that "The ideal condition is one in which every unit or group is so coordinated and controlled that each functions to the best advantage with respect to its own

¹*Ibid.*, p. 56.

²*Ibid.*

³*Ibid.*, p. 57.

⁴*Ibid.*

the merchandising policy makes a team of these two branches of the business which pulls closely together."¹

A broader treatment of the problem arising from functional maximization is discussed by Schulze in an article entitled "Planning Applied to Administration" which appeared in the *Bulletin of the Taylor Society* the same year.² The object of Schulze's discussion was to "focus attention upon the administration function of business."³ In addressing himself to the function of planning, he observes that it is obvious that it should not be confined to the factory:

Wherever a task is to be accomplished it {planning} comes into play. Indeed its greatest and most important need lies in connection with establishing the task for the entire business and in coordinating the accomplishment of each branch or department with the common purpose of the enterprise.

Now a business has other things to do besides manufacturing goods, important though that function may be. It must sell them; it must provide finances; it must purchase. It must warehouse and distribute the finished product. It must handle a certain amount of miscellaneous clerical routine. It must determine to what purpose the profits are to be put. It must look into the future and plan to harmonize the future course of the business with the tendencies in the world outside of its four walls.

¹*Ibid.*

²J. William Schulze, "Planning Applied to Administration," *Bulletin of the Taylor Society*, Vol. V, No. 3 (June, 1920).

³*Ibid.*, p. 120.

work and the work of the whole Company. . . .Each unit should be so organized as to contribute to total organic unity."¹

Much of the writing during this post World War I period was concerned with problems of a lesser degree than those experienced by Du Pont. Proposals concerning the solving of interdepartmental problems became more common as the years passed, indicating an increasing awareness of the interdependency existing between departments and the possibility of interdepartmental conflicts in achieving departmental goals. Dennison, presiding over a conference of sales executives held in 1920, observed that among the other problems faced by sales executives in the then existing buyers' market, merchandising policy was often set either too much by the factory or too much by the selling end. This one-sided control over merchandising policy he concludes "strains and forces the other branches of the business."² This problem necessitates the "coordination of the two interests; a merchandising machinery which shall take into account, as well as any human machinery can, the special possibilities of the factory and the selling department equally, so that

¹*Ibid.*, p. 61.

²Henry S. Dennison, "Proceedings of a Conference of Sales Executives," (Part I, "A Statement of the Problem"), *Bulletin of the Taylor Society*, Vol. V, No. 5 (October, 1920), p. 200.

Planning in the sense in which it is used here applies, or should apply, to all these activities. And it should apply to them collectively, as well as singly. In other words, it applies with emphasis to the administrative activities which, as we have said, comprise the direction of the complete business, both as to the future and in the present.¹

Later, in discussing the factor of profits, he notes that it is not enough to define the goal which the company has planned and strived for--it is necessary to consider profits in light of the firm's financial condition. These two objectives of administration--profits and the concern's financial condition are not always in harmony "hence in the consideration of the profit a business plans to make, it is quite important that the plans be laid with a view toward keeping profits within proper limits as it is to attempt to earn all the profits which the traffic will bear."²

The organizational problems encountered earlier by Du Pont were similar to those of other corporations. One of these corporations was General Motors whose existence and many of its subsequent organizational problems was primarily attributable to its architect, William C. Durant.

General Motors in 1920 consisted of a number of essentially autonomous companies operating within a corporate

¹*Ibid.*, p. 121.

¹*Ibid.*, p. 125.

organizational framework which provided little control or coordination. The need for organizational change was less apparent while the company was growing rapidly and did not become of prime importance until the economic recession which followed the first World War. One of the Company's vice presidents, Alfred P. Sloan, Jr., who was later to become its chief executive, formulated a plan for reorganization. Although not adopted until a number of years later, the plan reflected the influence of similar reorganization plans such as the one used by Du Pont. The plan and philosophy of organization that Sloan proposed was aimed at preserving the advantages of decentralized operations but with a measure of centralized coordinated control.¹

One of the basic managerial concepts held by Sloan can be found in his book, *Adventures of a White-Collar Man*. Sloan states:

I would say that my concept of the management scheme of a great industrial organization, simply expressed, is to divide it into as many parts as consistently can be done, place in charge of each part the most capable executive that can be found, develop a system of coordination so that each part may strengthen and support each other part; thus not only welding all parts together in the common interests of a joint enterprise, but importantly developing ability and initiative through the instrumentalities of responsibility and

¹*Readings in Management*, ed. by Ernest Dale (New York: McGraw-Hill Book Company, 1965) p. 215.

ambition--developing men and giving them an opportunity to exercise their talents, both in their own interests as well as in that of the business.¹

Du Pont and General Motors, although perhaps the most noticeable examples of organizations striving for survival and growth during the post World War I recession period, were not alone in their struggle. Among the writers who sought to give partial solutions in the way of techniques or a philosophical outlook were those who presented papers before the Taylor Society. Richard Feiss in a paper entitled, "Scientific Management During Times of Depression,"² noted that the improvement in operating conditions, the primary object of "scientific management," does not as a rule reduce the expense of supervision, clerical work, or other indirect activities. It is generally necessary to increase these costs if direct payroll costs are to be reduced. He concludes that "the most significant measure of efficiency is a decrease in the direct expense apportioned to the product."³ However, he later notes "that an increase in the proportion of indirect expense to direct expense is a proof of better management and great efficiency, provided the total expense chargeable to the product does not increase."⁴

¹Alfred P. Sloan, Jr., *Adventures of a White-Collar Man* (New York: Doubleday Doran & Company, Inc., 1941), p. 135.

²Richard A. Feiss, "Scientific Management During Times of Depression," *Bulletin of the Taylor Society*, Vol. VII, No. 4 (August, 1922).

³*Ibid.*, p. 127.

⁴*Ibid.*

A second writer discussing how the planning department can be used by management as a tool of control concluded that the analysis of expenditure statements, use of budgets, product standards, and knowledge of costs and capacities make it possible for management to map out a complete program for the next season or year. This program in the writer's words pictures:

All the activities of all the branches of the business--procurement, production, sales, finance, industrial relations--in which each is represented in its relation to the other and to the whole. It does away with the disconnectial, disjointed manner of operating so painfully familiar where the production people are working on one schedule, the purchasing agency on another, the sales organization on a third, the financial man trying to keep up with all three and the personnel director being pulled four ways at once. In other words, it is possible to have all of these activities properly coordinated, each working independently on its own part of the scheme but fully conscious of the fact that it is a part of the whole and not a thing apart and distinct. . . .The common knowledge that each is working with the same end in view, and that all parts must be equally well done, stamps out--possibly slowly at first but none the less surely--the petty, selfish, competitive actions and thoughts that inevitably exists when all are working without coordination.¹

The following year there appeared in the *Bulletin of the Taylor Society* an article by its managing director, H. S. Person. Person noted that "the problems of the enterprise as a whole are similar in broad outline to the

¹Keppeler Hall, "The Planning Department as an Instrument of Executive Control," *Bulletin of the Taylor Society*, Vol. VIII, No. 3 (June, 1923), p. 108.

problems of the shop, but on a greater scale."¹ Later on he concludes that "it is not sufficient merely to stabilize the operations of the shop when there are orders (this is what "scientific management" in its early developments has accomplished); it is even more essential to stabilize² the business and assume a predetermined regular flow of orders (which is what scientific management in its later development is accomplishing in a number of enterprises)."³

Sheldon, a British author, contends that at the head of every business there should be some centralizing agency. This agency, Sheldon notes, is best vested in a single individual and not in a committee. In essence he argues that a committee can criticize and approve but cannot of itself construct.⁴ What is needed he concludes:

. . . is a single mind which can devote itself wholly to the regulation of inter-functional activities, to the molding of the form or organization, and to the business of thinking constructively. Such a mind could view the whole of administration, from the buying of materials and reception of customers' orders to the sale of the product, and, at the same time, accumulate information upon the best theoretical and actual

¹H. S. Person, "On the Contribution of Scientific Management to Industrial Problems," *Bulletin of the Taylor Society*, Vol. VIII, No. 3 (June, 1923), p. 117.

²See H. S. Person, "Scientific Management and Economic Planning," *Bulletin of the Taylor Society*, (December, 1932), pp. 204-221 for a much more complete development of the concept of industrial stabilization.

³Person, "Industrial Problems," *op. cit.*, p. 117.

⁴Oliver Sheldon, *The Philosophy of Management* (New York: Pitman Publishing Corporation, 1923), pp. 235-236.

methods of industrial management, with the view to their application to the particular business. Such work, such viewing of a business as a whole, presents different problems from the direction of a single function. It is a study not of perpendicular management only. . .but also of horizontal management--that is, management as it concerns cross-relationships: and cumulative management--that is, management as it concerns the welding together of several parts.¹

Percival White in 1927 provides one of the first, if not the first explicit description of the synergistic effect in business organization. "In a good organization each of its members puts his best foot foremost, while drawing his lame foot out of the way. That is, the strength of the members is magnified out of proportion to their actual numbers."² Later, in discussing the function of marketing, he observes that "hitherto there has been little conscious endeavor to relate all the marketing activities to a scientifically planned system of organization wherein each particular function operates in coordination with the whole."³

Between 1928 and 1935 there were numerous writers extolling the virtues of cooperation and coordination within and between the functional areas or departments of a firm and a few who generalized to cover the relations between

¹*Ibid.*, p. 236.

²Percival White, *Scientific Marketing Management* (New York: Harper & Brothers Publishers, 1927), p. 68.

³*Ibid.*, p. 96.

firms. What they said, however, differed little if any from what had already been said. They provided no new insights into the problem of organization nor did they reach any new conclusions. Hence what they had to say would add little to this inquiry.

In 1935 Hopf, in a paper presented at the Six International Congress for Scientific Management held in London that year, proposed "optimology--the science of the optimum."¹ This new science, Hopf argues, is more inclusive than the science of management since the inevitable outcome of the science of management with its creation of vast combinations of men, methods, and money must, after defeating its own end, lead to disaster.² Although the term optimum or optimology failed to catch on at the time of its introduction by Hopf, it is common place in the jargon of present day writers on economics, management science, and business.

An optimum state of a business enterprise is achieved, according to Hopf, when an equilibrium is perpetuated among the factors of size, costs, and human capacity which promotes to the highest degree the regular realization of the business' objectives.³

¹Harry A. Hopf, *Management and the Optimum* (Privately printed, 1935).

²*Ibid.*

³*Ibid.*

Acknowledging a science of management, Hopf argues that the superiority of the science of optimology is that it raised synthesis from the functional level achieved in the science of management to the structural level. This difference in perspective, he notes, clearly separates the contributions of Taylor and Fayol.¹

In concluding Hopf's contribution to the historical evolution and development of the "systems concept," the writer can do no better than to reproduce at this point Hopf's closing remarks:

In the last analysis, the problem of establishing an optimal size of organization resolves itself into the ascertainment of that level of effectiveness on which all the vital factors are so perfectly balanced and executive talent and capacity are so purposeful and successfully employed, that maximum service and profit possibilities are regularly realized. The fact that such a goal is difficult of attainment is no reason for not recognizing its existence and, at least, striving to approach it.²

Another writer, and the last whose contributions will be discussed in this chapter, who concerned himself with efficiency and effectiveness was Chester I. Barnard. Barnard, reflecting the influences of such persons as Mayo, Roethlisberger, and Follett, writes with the outlook of a social

¹*Ibid.* Hopf credits both Oliver Sheldon's "The Philosophy of Management" (1923) with delineating a philosophy definitely pointing in the direction of the optimum and E.A.G. Robinson's "The Structure of Competitive Industry" (1931) for considering the principal phases of the optimum from an economist's point of view.

²*Ibid.*

scientist--moralist--practitioner of the art. Having defined what he means by efficiency, effectiveness, and equilibrium, Barnard addresses himself to the concept of system.

He notes that each organization is a component of a larger system which we have called a "cooperative system," the other components of which are physical systems, social systems, biological system, persons, etc. Moreover, most formal organizations are partial systems included within larger organization systems. The most comprehensive formal organizations are included in an informal, indefinite, nebulous and undirected system usually named a 'society.'¹

To his questions as to whether the whole is more than the sum of its constituent parts: "whether a system should be considered as merely an aggregate of its components; whether a system of cooperative efforts, that is, an organization is something more or less than or different from its constituent efforts; whether there emerge from the system properties which are not inherent in the parts,"² he replies that when an organization or a "cooperative system" is formed something new is created whose quantity and quality is more or less than the sum of the efforts of those making up the organization.³ His definition of a formal organization is that of a "system of consciously coordinated activities or forces of two or more persons."⁴

¹Chester I. Barnard, *The Functions of the Executive* (Cambridge, Mass.: Harvard University Press, 1966), pp. 78-79.

²*Ibid.*, p. 79.

³*Ibid.*

⁴*Ibid.*, p. 81.

Analysis and Evaluation

In terms of the criteria set forth in Chapter II, the contribution of Du Pont's subcommittee on organization would fulfill the minimum requirement of viewing the business entity as being made up of parts which require management to seek a balance between them in order to achieve a larger output or results. Under their definition of the "Ideal Organization" recognition is made that "each {unit or group} functions to the best advantage with respect to its own work and the work of the whole company."¹ From this we can easily infer a recognition of a system hierarchy. On the subject of communications, the report provides little explicit recognition of its importance in tying together the business system's components. As to recognizing the limits of functionalism, the report is explicit when it states that it is sometimes more economical to combine unlike activities that are related than to combine like activities.²

In summary, it can be concluded that the 1919 Du Pont report fulfills three of the criteria but falls short in that it did not explicitly acknowledge that a group may not function to its best advantage but yet by doing so contribute more toward the objectives of the firm as a whole.

¹Dale, p. 61.

²Dale, p. 57.

Secondly, the report did not, and perhaps in all justice could not have been expected to do so, explicitly state the importance of communication. It appears to be implied in its emphasis on coordination and control that communication has not been overlooked, but it is not stressed to the degree that its importance requires.

Dennison's presentation is not a philosophical treatise on organization in its broader aspects but a parochial treatment of the need and advantages of two departments working toward a common goal. Appraising what was said, it can be inferred that the author recognizes interdependency of functions, the synergistic effect, and the need for the balancing of departmental objectives for the betterment of the whole. In summary it can be concluded that Dennison recognizes at this time little more than Ure or Owen, for instance, did over a century earlier.

Schulze's treatment is much broader than that of Dennison's and clearly notes or implies that the author perceived the business as being made up of interdependent parts requiring coordination and that a synergistic effect might be forthcoming as a result, balancing the various parts with an eye on the whole. The system envisioned in Schulze's article includes the functional departments or areas of finance, manufacturing, sales, and purchasing connected together by planning within and between departments or areas. Criteria-wise, Schulze amply fulfills the

requirements of systems recognition and recognition of the need for communication, but falls short on recognizing the business entity as a subsystem of a larger system and that functionalism in the extreme may not be beneficial when considering the objectives of the whole.

Sloan's contribution can be stated simply: he recognized the business as a group of interdependent parts making up a system, he recognized the synergistic effect, it is implied that he recognizes the importance of communications in noting that he wants to preserve the advantages of decentralization but that to do so requires centralized coordinated control, and lastly, he recognizes the fact that functionalism has its limitations.

From Feiss' article, although short in length and focusing primarily on the problems of costs, it can be inferred from what he says that he recognizes the business entity as a system of interrelated parts. That he recognizes the possibility of a synergistic effort is supported by his contention that by employing more indirect labor and less direct labor the total cost chargeable to a product may not increase. This, according to Feiss, is the proof of better management and greater efficiency.¹ There appears to be no support for contending that he recognizes any limitations

¹Feiss, p. 127.

to functionalism, that he views the business entity as a subsystem of a larger system such as one encompassing all businesses, or that he recognizes the importance of communications to the "systems concept."

Hall's presentation, unlike that of Feiss, explicitly recognizes the business as a system. Hall does not give evidence that he recognizes system synergism nor that he sees his business system as a subsystem of a larger system. Finally, he does not make any observations regarding any possible limitations of functionalism.

From Person's article, drawing a parallel between the problems of the enterprise and the shop, it can be said that he recognizes, at least in a fundamental sense, that the smaller organizational units are components of a larger organization. Secondly, he seems to imply that there is more to stabilize than the units and this is the whole organization and a greater system from which the organization seeks to solicit a regular flow of orders. This greater system must be society or a system consisting of the firm's customers.¹

In total, Person does not provide the reader with much on which to judge whether he has a "systems concept" view of business. The most that can be said is that he probably sees the business entity as a system.

¹Person, p. 117.

Sheldon's argument in defense of a centralizing agency consisting of one individual who could perceive the whole needs of the organization as well as its parts and would regulate the interfunctional activities of the parts with their many cross-relationships indicates that he views the business as a system made up of interrelated and interdependent parts. He sees, as a primary task of management, the welding together of the several parts into a whole and indicates specifically the need and uses for information. Sheldon does not, however, seem to recognize the synergistic effect and any possible limitations to functionalism.

Percival White's observations support the thesis that he clearly understands the synergistic effect and views the business entity as a system. The importance of communication and the limitations of functionalism in the extreme are not explicitly noted nor does there seem to be sufficient evidence to justify any contention of implication on the part of White.

Thus far in our discussion, various concepts and views of organization and the business entity have been presented. Although various writers, on the basis of the criteria set forth in Chapter II, meet the minimum criterion of viewing the business entity as a system of interrelated and interdependent parts, there seems to be no other common thread tying together their efforts over the years. In addition to meeting the minimum criterion, various writers

fulfill one or more but not all of the other criteria. There are two remaining writers whose efforts in respect to the "systems concept" follow basically the same pattern as previous writers. However, their efforts seem to justify setting them off on the basis that what they have said in respect to the "systems concept" is indisputably more than a rehash of views previously expressed.

Hopf in his "science of optimology" raises the "systems concept" from a functional level to a structural level, i.e., from a system composed of sub-units of a department to one composed of departments which in turn are made up of these sub-units. This broader and seemingly deeper perspective of organization with its recognition that all sub-systems are not equally important in achieving the nebulous "optimum" for the system as a whole and seems, to this writer, to be a significant enough increase in analytical sophistication to warrant additional comment. Hopf's writings fulfill the criterion of system recognition, imply a recognition of synergism, and the realization that functionalism in the extreme may be detrimental to the whole, but fails to note the importance of information to the maintenance of a system.

Barnard, like Hopf, adds a more sophisticated understanding to organization than did those writers who preceded him. Barnard talks of various types of interacting and interrelated systems and an "infinite, nebulous, and indirected

system usually called society."¹ This observation would support the contention that he fulfills the minimum criterion of system recognition and that of recognizing the business entity as a part of a larger system in a most sophisticated manner. A third criterion of synergism recognition is adequately fulfilled in his discussion regarding whether the whole is greater than the sum of its parts.² The fourth criterion of recognizing that functionalism in the extreme may not be in the best interest of the whole is not explicitly mentioned but may be implied from his comments on his "cooperative system."³

In summary, the evolution of the "systems concept" as noted or implied in the writings between 1915 and 1940 was neither profound nor continuous. Writers such as Dennison seemed to see the firm in terms not too unlike those of previous writers fifty years earlier. On the other hand, writers such as Sloan, Barnard, and Hopf seemed to hold a perception of business organization that seems contemporary even today. The next chapter covering the period dating from the second World War to the present will include writers who clearly have read the history of business organizations and some who lead one to believe that their insights came straight from the brow of Jove,

¹Barnard, p. 79.

²*Ibid.*, pp. 79-81.

³*Ibid.*, p. 81.

CHAPTER V

THE SYSTEMS CONCEPT 1941 - 1969

The primary objective of this chapter is to trace the evolution of the "systems concept" from the beginning of World War II to the present. This will bring our discussion full circle in this investigation since the criteria set forth in Chapter II were developed from an analysis of the writings on business and organization by numerous writers during the last decade. The virtual flood of material available during the period between the World Wars has become nothing less than an avalanche since World War II. Since much of what was presented is repetitive in nature, it was necessary, as was the case in the preceding chapters, to sort and select material which presents, in the writer's opinion, a fair representation of the thoughts of the period in respect to the topic of inquiry. As was the case in the exposition of the preceding period, this presentation will not show a constant, smooth, or orderly development of the "systems concept" as it is understood today, but on the contrary, it will show many regressions, simplifications, and instances where the writers chose to emphasize certain aspects of the evolving concept at the expense of confusing

and at times completely obscuring the fundamental concept. After presenting a survey of the material pertinent to the evolution of the "systems concept," an appraisal and evaluation of each writers contribution will be made.

The Development of the Systems Concept 1941-1969

One of the most significant developments in organizational theory that occurred during the period of the second World War was the application of the principle of specialization (division of labor) to the work of managing to a greater degree than had been done theretofore. This gave an additional dimension to geographical and product decentralization. This new dimension was one of decentralizing decision making, i.e., having the authority to make decisions as close as possible to the situation requiring it.¹

It seems advisable to include a brief note concerning the "weapons systems" concept as it was developed during the second World War. The justification for doing so is that some writers² credit or infer that from this "weapons systems" concept evolved the "systems concept" of today. For example, in "Information, Computers, and

¹Harold P. Smiddy and Lionel Naum, "Evolution of a Science of Managing in America," *Management Science*, Vol. 1, No. 1 (October, 1954), p. 26.

²Ira C. Wilson and Marthann E. Wilson, *Information, Computers, and System Design* (New York: John Wiley and Sons, Inc., 1965), p. 182.

System Design" (1965) Ira and Marthann Wilson make the observation that

while systems have been used for centuries, the systems concept is only about twenty years old. This concept considers all the components of a bomber as one weapons system instead of separately as an airplane, an ordinance system, radars, bombing equipment, and many other systems....¹

That this is little more than nonsense has been demonstrated in the foregoing exposition. The fact does remain that the rudimentary "systems concept" held by pre-World War II writers was developed, adapted, and implemented further by military planners during the second World War. One military definition of what constitutes a weapons system is that it is:

...an instrument of combat, such as an air vehicle, together with all functioning equipment, the skills necessary to operate the equipment, and the supporting facilities and services required to enable it to be a single unit of striking power in its operational environment.²

The ability to handle problems of overwhelming magnitude in the 1940's compared to those encountered in the first World War was, according to Smiddy and Naum, "due in no small part to the newly developing techniques of organizational communications."³

¹Letter from Johanna de Onis, Reference Librarian, United States Military Academy, West Point, New York, December 17, 1969. Material based on articles by Major General J. McCormack, Jr., and Alain C. Enthovan.

²*Ibid.*

³Smiddy and Naum, *op. cit.*, p. 26.

Among those who had worked at establishing a factual basis on which communication systems could be predicted, and who came to realize the resemblance of communications in large social patterns to those of specific electrical and mechanical systems was Norbert Wiener. Wiener observed that one of the most interesting aspects of the world was that it may be considered to be made up of patterns which may be characterized not by the intrinsic nature of the elements making up the pattern but the order in which these elements make up the pattern.¹ Furthermore, such a pattern "can be used to convey information and will usually convey more information than the statement of isolated facts since it also conveys interrelations."² Shannon, of the Bell Telephone Laboratories, and others carried Wiener's concepts into areas which provided the management scientist with working theories on communications. They established the importance of communications to the effective and efficient operation of any system involving more than one element and concluded that what was true of an electrical network was true in greater degree of a corporate enterprise.³ They showed that in terms of the enterprise as an organic whole, effective operation can only be achieved when the directive

¹*Ibid.*, p. 27.

²*Ibid.*

³*Ibid.*

information coming from the decision making process is applied as close as possible to the point of action and that the channels of information, transmission, and performance feedback are soundly conceived.¹

In addition to new theories on communication, there evolved through this period a whole new set of quantitative tools and approaches to managerial problem solving which came to be known as operations research or management science. The practical implementation of many of these operations research techniques had to await the development and general introduction of the digital computer. With the aid of the computer the management scientist sought to achieve Hopf's elusive optimum.

One of the management scientists who contributed significantly to the new field was Simon. He, perhaps more than any other writer during this period, saw the field of administration through the eyes of an operations researcher. Relative to the primary task concerning the evaluation of the "systems concept, Simon observed that in designing administrative organizations "over-all efficiency must be the guiding criterion. Mutually incompatible advantages must be balanced against each other...."² If this position is valid, Simon contends, it "constitutes an indictment of

¹*Ibid.*

²Herbert A. Simon, *Administrative Behavior* (New York: The Macmillan Company, 1945), p. 36.

much current writing about administrative matters."¹

Later on he notes that a valid approach to the study of administration

requires that all the relevant diagnostic criteria be identified; that each administrative situation be analyzed in terms of the entire set of criteria; and that research be instituted to determine how weights can be assigned to the several criteria when they are, as they usually will be mutually incompatible.²

In discussing what constitutes a relevant description of an organization, Simon contends that it should be designated as far as possible, for each person in the organization, the decisions that person makes and the influences on him in making these decisions. Descriptions of administrative organizations currently found in literature, Simon argues, fall far short of this standard since they confine their description to the allocation of functions and to the formal structure of authority. Little attention is paid to other types of organizational influence or to the systems of communication. Not only do these current writers fail to define the extent to which authority is actually exercised or by what mechanisms, but they also give no indication of the extent that coordination is required by the nature of the work of these subsystems.³

¹*Ibid.*

²*Ibid.*

³*Ibid.*, p. 37.

Later, in discussing the "criterion of efficiency" as it applies to administration, Simon notes that such a criterion is analogous to the maximization of utility in economic theory. Though he uses a different term, what Simon is concerned with in defining his criterion of efficiency is what Hopf earlier had called optimality--"the science of the optimum."¹ This problem of defining system efficiency would concern many writers after Hopf and Simon.²

For fifteen years following Simon's contribution, much was written on organization theory and management. Many worthy observations were made during this period which contributed to the development of what later would be referred to as the "systems concept," but they did not

¹Harry A. Hopf, *Management and the Optimum* (Privately printed, 1935).

²See Charles Z. Wilson and Marcus Alexis, "Basic Frameworks for Decisions," *Journal of the Academy of Management*, Vol. 5, No. 2 (August, 1962), pp. 150-164; Peter Drucker, *Managing for Results* (New York: Harper & Row Publishers, 1964), p. 83; Giuseppe M. Zerrero di Roccafererra, *Operations Research Models* (Chicago: South-Western Publishing Company, 1964), pp. 26-27; Billy E. Goetz, *Quantitative Methods* (New York: McGraw-Hill Book Company, 1965), pp. 22-23; Leonard J. Garrett and Milton Silver, *Production Management Analysis* (New York: Harcourt, Brace & World, Inc., 1966), pp. 65-66; Leonard W. Hein, *The Quantitative Approach to Managerial Decisions* (Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1967), p. 2; Ralph Deutsch, *System Analysis Techniques* (Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1969), pp. 55-81; Donald A. Pierre, *Optimization Theory with Applications* (New York: John Wiley & Sons, Inc., 1969); Elwood S. Buffa, *Modern Production Management*, third edition (New York: John Wiley & Sons, Inc., 1969), p. 481.

individually constitute a significant contribution. For example, Barnard in his book, *Organization and Management* (1949) made the following observation:

The primary efforts of leaders need to be directed to the maintenance and guidance of organizations as whole systems of activities. I believe this to be the most distinctive and characteristic sector of leadership behavior, but it is the least obvious and least understood. Since most of the acts which constitute organization have a specific function which superficially is independent of the maintenance of organization--for example, the accomplishment of specific tasks of the organization--it may not be observed that such acts at the same time also constitute organization and that this, not the technical and instrumental, is the primary aspect of such acts from the viewpoint of leadership.¹

Barnard's observations seem to supplement those previously made by Simon rather than to add an entirely new dimension.

Drucker, another writer who made a number of meritorious observations, noted in an article entitled "'Management Science' and the Manager" that "because of the complexity of the business enterprise managerial decisions should, to be effective, let alone to be productive, be based on a vision of the whole." In discussing the manager's decision making problem he observes that:

He has been forced instead to make decisions in respect to a part--and hope for the best. He makes a decision on the physical level and hopes it will "work out" on the economic and the human level--or vice versa.

.

¹Chester I. Barnard, *Organization and Management* (Cambridge: Harvard University Press, 1949), p. 89.

Unless he can attain a view of the whole he is forced to try to obtain the optimum for a partial area regardless of the effect on the whole. He is forced to take one characteristic of the business for the whole. He is thus forced to sub-optimize: to obtain a partial or local optimum at the grave risk of damage to the other parts and to the entire business.¹

Drucker's observations add little to those already made by Simon. His discussion is narrower in that he does not include consideration of the possible limitations to functionalism, the synergistic effect, or the idea that a business may be looked upon as being a subsystem of a larger, more inclusive system.

In 1961, Scott in an article entitled "Organization Theory: An Overview and an Appraisal"² defined what he considered the pertinent points in what he termed "modern organization theory." Modern organization theory, from Scott's point of view, accepts system analysis or the view that the only meaningful way to study organization is to study it as a system.³ In defining system he acknowledges that this theory

is in no way a unified body of thought. Each writer and researcher has his special emphasis when he considers the system. Perhaps the most evident unifying thread in the study of systems is the effort to look at the organization in its totality.⁴

¹Peter F. Drucker, "Management Science and the Manager," *Management Science*, (October, 1954), p. 120.

²William G. Scott, "Organization Theory: An Overview and an Appraisal," *Current Issues and Emerging Concepts in Management*, Edited by Dalton E. McFarland (New York: Houghton Miffling Company, 1966), pp. 161-67.

³*Ibid.*, p. 161

⁴*Ibid.*, p. 162.

What Scott described was a "systems concept" theory of organization. His theoretical construct includes recognition of a system composed of subsystems of individuals, formal and informal organizations, and physical elements. The unifying force, or what Scott calls the linking processes, consists of communication, balancing, and decision making. Communications in modern organization theory is studied as a system and "acts not only as stimuli resulting in action, but also as a control and coordination mechanism linking the decision centers in the systems into a synchronized pattern."¹ Balance refers to the means whereby the various parts of the system are maintained in a harmoniously structured relationship.²

A somewhat different approach is proposed by Longenecker who synthesizes the "management process school" and the "systems concept." This view is similar to that presented by Johnson, Kast, and Rosenzweig's in an article entitled "Systems Theory and Management" published the same year as that of Longenecker.³ He observes, like many writers before and after him, that the "systems concept" entails the idea of parts or units functioning in combination with other units. "Collectively they comprise a system--

¹*Ibid.*, p. 164.

²*Ibid.*

³Richard A. Johnson, Fremont E. Kast, and James E. Rosenzweig, "Systems Theory and Management," Article 51, as quoted by William T. Greenwood, *Management and Organizational Behavior Theories: An Interdisciplinary Approach* (Cincinnati: South-Western Publishing Company, 1965), pp. 846-867.

either conceptual or physical in nature."¹ Echoing Scott, Longenecker observes that communications and decision making provide the linkages for integrating these separate parts or subsystems into a comprehensive business system.² The importance of communications increases as one goes from the areas of physical processing to those concerned primarily with decision making.³ The managerial role must be viewed in its relationship to the total organization, and the objective of managerial activity should, ideally, be to maximize the output of the total system.⁴ In discussing the "systems concept" as it relates to planning, Longenecker observes that it "highlights the relationships between the corporate system (that is, the business firm) and its environmental systems."⁵ Additionally, its implications call for the integration of short and long run planning into one overall plan.⁶ The "systems concept," when applied to managerial decision making, brings out the numerous complexities stemming from the many facets of the problem that must be considered and reconciled. The objectives of the various system parts may be somewhat

¹Justin G. Longenecker, *Principles of Management and Organizational Behavior*, 2nd ed. (Columbus, Ohio: Charles E. Merrill Publishing Co., 1964), p. 27.

²*Ibid.*, p. 28.

³*Ibid.*, p. 493.

⁵*Ibid.*, p. 121.

⁴*Ibid.*, p. 29.

⁶*Ibid.*

conflicting in nature, and to achieve one could decrease the probability of attaining the others.¹ The control activities, whose objective is to maintain the output which will satisfy system requirements, comprises an essential subsystem of the total operating system. These system requirements include the coordination and effective performance of all the other subsystems, such as production sales, and finance, in such a manner that organizational objectives will be achieved.²

Another exposition of the "systems concept," published the same year as Longenecker's book, is found in Allan Harvey's article entitled "Systems can TOO be Practical," (1964).³ Harvey, like Wilson, acknowledges that the concept while not new, found its origin in military problem solving.⁴ Commenting on the claim by many proponents of the "systems concept" that it is new, he observes that research into the builders of our great corporations from Theodore Vail of A T & T to Alfred Sloan will disclose that these business leaders viewed the business entity as an integrated whole, that is, as a system.⁵ Management, according to Harvey, has "wrenched

¹*Ibid.*, p. 148.

²*Ibid.*, p. 545.

³Allan Harvey, "Systems Can TOO Be Practical," *Business Horizons*, (Summer, 1964), pp. 59-69.

⁴*Ibid.*, pp. 59-60.

⁵*Ibid.*, p. 63.

this entity apart and divided it into functions, authorities, and responsibilities; when the systems approach puts it all together again, it is only restoring to the business its real and inherent unity."¹ What Harvey seems to have in mind is that in the process of increasing organizational efficiency, management has subdivided the functions and assigned the responsibilities with too little concern for the effect on the organization taken as a whole. The "systems concept" view of business reintegrates these functions, responsibilities, and authorities by considering each in terms of its effect on other functions, responsibilities, and authorities as well as the total organization.

Harvey observes that the proponents of systems thinking have done their "brain child" a number of injustices. First they have led people to think that the concept was new, and second, they have clothed "it in unintelligible jargon and elaborate mathematics."²

In discussing how cost reduction of a particular function affects the profit of the firm, he notes that

The profit of the business can be determined only when we consider the effect of this function on all the others, on the interrelationships between them and on the ability of the business to achieve its growth and profit objectives. That kind of thinking is the very essence of the systems approach.³

¹*Ibid.*, p. 64.

²*Ibid.*, pp. 63-64.

³*Ibid.*, p. 62.

Other than mentioning that the "systems concept" approach to problem solving "provides a solution that is almost invariably the most profitable one," Harvey gives no other indication that he recognizes system synergism. He also fails to indicate that the firm is but a subsystem of a larger system.

Harvey concludes his article by summarizing what the systems approach accomplishes: First, it frees the organization from the organizational straitjacket imposed by dividing it up by functions, divisions, products, or by geographical areas. Systems thinking recognizes the integrity of the interrelationships that exist between functional areas. Second, the approach allows management to make decisions with full knowledge of their impact on total cost. Third, new techniques and technology can be put to profitable use sooner if considered from the "systems concept" approach than if viewed from a point which aims at respecting arbitrary divisions of authority and responsibility. Fourth and last, the concept places a solid foundation under the firm's information and control procedures. These two flows--information and control--when united, make the business an integrated entity.¹

Garrett and Silver in their book, *Production Management*, note that "part of the glamor that has been attached to contemporary {quantitative} decision {making} techniques

¹*Ibid.*, pp. 68-69.

stems from the widespread uncertainty about how they should be used and what they can and should do."¹ They conclude that firms who use these techniques to solve production problems employ either the use of interdisciplinary teams or an over-all, or systems, viewpoint or both.

In discussing the systems viewpoint approach they note that:

The first characteristic of taking a systems viewpoint is peculiar to contemporary decision approaches. The entire firm is viewed as a single operating system and is considered to be the appropriate arena for problem solving. . . .The objective of this approach is to identify all significant interactions between the problem area and the operation of the firm as a whole. . . .The systems approach, on the other hand, will often produce decisions that may be viewed as burdensome for a particular department since optimization is desired at the firm level and is intended to produce the greatest over-all net benefit.²

They observe later that all of the interrelated problems which may be uncovered by employing this systems viewpoint approach cannot all be solved at once. The important point to remember is that when a problem area is studied, consideration is given to its interaction with the other problems in the total system. Furthermore, while this approach may not yield an optimum solution, the suboptimum solution arrived at is close enough for effective decision making.³ In a footnote they make the observation

¹Leonard J. Garrett and Milton Silver, *Production Management Analysis* (New York: Harcourt, Brace & World, Inc., 1966), p. 65.

²*Ibid.*, pp. 65-66.

³*Ibid.*, p. 66.

that decision making at all levels in the organization, to be consistent with the systems viewpoint, necessitates a high degree of statesmanship and maturity on the part of management and requires the training and education of present and potential executives with this broader perspective.¹

Terry, another contemporary writer, in describing the perspective of what he terms the Systems Management School notes that systems are the focal points around which the Systems Management School is built.² He notes that systems can be thought of as an organized whole made up of parts related in such a manner as to form an orderly totality.³ Each system he notes is a self-contained unit but at the same time it is related to a system of a wider order that represents the integration of a number of systems of a lower order. This systems school, according to Terry, violates the traditional functional departmentalization in that systems cut across departmental lines and relate their activities in a heretofore unconventional manner.⁴ Implementation of systems management, he notes, is assisted by the use of the computer. This allows great masses of data to be processed so as to help determine the relationship among the parts of the system and their interaction. In this school the "big picture" is emphasized. This allows management

¹*Ibid.*

²George R. Terry, *Principals of Management* (Homewood, Illinois: Richard D. Irwin, Inc., 1968), p. 101.

³*Ibid.*

⁴*Ibid.*

to determine more precisely how the various parts of the system act and react so that they can bring about the desired results.¹

In an article in *Management Review*, entitled "Management Systems Engineering: A New Discipline," Roy Fenstermaker concludes that due to the increasingly complex problems faced by management in achieving their objectives they are turning more and more to the discipline of management systems in seeking an answer to these problems.² He describes a management system as consisting of

the arrangement and integration of personnel, equipment, services, and data for the effective planning, direction, and control of an organization. The basic elements of a management system are: people, equipment, information, integration, and objectives. . . . This process of logically sequencing activities and decisions leading to the definition, development, and operational implementation of business management systems is the concern of the relatively new discipline called management science, management technology, or management systems engineering.³

According to Fenstermaker, the development of this new discipline has been hastened by such factors as increased business complexity which increases geometrically the connections between operations and increases the problem of control, the increasing need for a communications system

¹*Ibid.*, p. 102.

²Roy Fenstermaker, "Management Systems Engineering," *Management Review*, (October, 1969), p. 2.

³*Ibid.*, pp. 2-3.

to provide the information for better decision making, the need to integrate the functional procedures to avoid duplication and increase effectiveness, the need to tie together functional areas, and the permeating influence of the computer.¹ This management systems engineering approach, the author notes, "works primarily through the phased application of a systems approach to conceptualization, definition, design, development, tests, evaluation, and operational implementation of the business system."²

In discussing the development phase in the systems engineering approach, the author makes the point that it is vital at this time to integrate the parts of the system and to establish compatible external interfaces with related systems and subsystems.³

From the time of Simon's observations to the present, there has been an ever increasing volume of material written on systems, system analysis, and the "systems concept." Most of what has been written is, at best, little more than a paraphrasing of what others have previously offered; at worst, it has obscured the basic

¹*Ibid.*, p. 5.

²*Ibid.*

³*Ibid.*, p. 11.

concepts involved and has raised the question whether they, like the human relations school, will be cast into limbo. Scott recognized this some years ago when he observed that:

Modern organization theory, 1960 style, is an amorphous aggregation of synthesizers and restaters, with a few extending leadership on the frontier. For the few, it is well to admonish that pouring old wine into new bottles may make the spirits cloudy.¹

Some of these cloudy spirits have resulted from illogical arguments. For example, two writers discussing the terms optimum and suboptimum as they are used to measure system efficiency make the following statements:

Optimizing a part of a system (sometimes called suboptimization) does not necessarily improve overall system performance. Suboptimization may increase the total cost of the system or degrade some desired system property. Nor does optimizing all parts individually always result in an overall optimum. Good system design seeks an overall optimum. Hence, suboptimization should be avoided.²

There is in this writer's opinion nothing incorrect with the first two statements; however, the statement regarding optimization of all parts individually is illogical since it does not follow from the first two, which implies a recognition of the incompatibility of subsystem objectives.

¹Scott, p. 173.

²Wilson and Wilson, p. 191.

The last statement appears to be incorrect. Since if the first two statements are correct, then suboptimization of one of more subsystems would be an implied and inherent requirement for system optimization.

Another source of confusion stems from the misdirecting of the basic concepts to support an author's argument. For example, Klein in an article entitled "Computer in the Boardroom" states that the "total systems concept" is the goal of management effort and the investment of funds.¹

This is nothing less than the complete monitoring of the business enterprise by a computer, or a group of interconnected computers; the automatic control by the machines of inventories, production scheduling, shipments, accounting, payrolls and all other operations that can be reduced to mathematical representation; and the limiting of direct human control to such functions as setting over-all objectives and reacting to such totally unexpected situations as earthquakes or wars.²

In light of multiple goals, expectations, and the state of technology, Klein's observations seem to contribute little toward clarifying and pushing back the frontiers of organizational theory.

Most recent writers³ discussing the "optimum" have

¹Herbert E. Klein, "Computer in the Boardroom," *Duns Review and Modern Industry* (September, 1964), p. 134A.

²*Ibid.*

³See Peter F. Drucker, "Management Science and the Manager," *Management Science* (October, 1954), pp. 118-126; C. West Churchman, Russell L. Ackoff, and E. Leonard Anoff, *Introduction to Operations Research* (New York: John Wiley & Sons, Inc., 1957), pp. 5-9; Charles Z. Wilson, "Basic Framework for Decision," *Current Issues and Emerging Concepts*

recognized the concept that to optimize a system, it is generally necessary to suboptimize its component subsystems. Additional sources of confusion in "systems literature" first mentioned in Chapter II include the phenomenon of synergism, and an incomplete description of the system being discussed.

One recent writer recognizing both the semantic problems and those stemming from incomplete, it not inaccurate, offerings by contemporary writers on systems provided us with the following:

Essentially the system concept is that of examining the overall interactions of a group of items rather than focusing attention on the operation of each of the components in term. To paraphrase a well-known saying: The system concept is that of observing the forest as an entity rather than observing the individual trees.¹

He later observes that the system can contain within its structure subsystems, each of which has all the attributes of a system when considered separately.² In discussing optimality he notes that the systems analyst faced a dilemma in selecting the criteria for the whole. For those who are

in Management, Vol. II, Edited by Datton E. McFarland (New York: Houghton Mifflin Company, 1966), pp. 118-119, Guisepppe M. Ferrero di Roccafererra, *Operations Research Models* (Cincinnati: South-Western Publishing Company, 1964), pp. 26-27; Ralph Deutsch, *Systems Analysis Techniques* (Englewood Cliffs: Prentice-Hall, Inc., 1969), pp. 55-56.

¹Ralph Deutsch, *Systems Analysis Techniques* (Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1969), p. 2.

²*Ibid.*

disposed toward seeking optimal solutions, Deutsch suggests that "the system analyst is well-advised to carefully consider system solutions which suffice as well as solutions which optimize."¹ His differentiation of sufficing from optimizing is the same as that provided by Simon some twenty-five years earlier.² No explicit mention is made of synergism or of a possible conflict between a functional organization structure and the "systems concept."

Analysis and Evaluation

In Simon's contribution there is a clear definition of systems, a recognition of the limits of functionalism, and a recognition of the importance of communication. No explicit mention, however, is made of the business entity as being a subsystem of a larger system. He is not explicit regarding any possible conflict between a functional organizational structure and the "systems concept."

Longenecker's presentation is much more sophisticated than those presented up to that time in that it recognizes all of the criteria set forth in Chapter II and relates the "systems concept" to each of the functional areas. He does not, however, provide an explicit acknowledgement that he recognizes the concept of synergism.

¹*Ibid.*, p. 80.

²Herbert A. Simon, *Administrative Behavior: A Study of Decision-Making Process in Administrative Organization* (New York: The Macmillan Company, 1948), p. XXV.

Harvey, although incorrect in dating the origin of the "systems concept," does give recognition of the definition of the "systems concept" as it relates to a business and acknowledges the conflict that may exist between an organization structured on functions and the "systems concept." There is little evidence that he recognizes the concept of synergism as it applies to a business, nor does he explicitly state that a business entity may be viewed as a subsystem of another more inclusive system.

Garrett and Silver view the firm as a system of interrelated and interdependent parts and recognize the hierarchical nature of systems; however, they do not give explicit recognition to the firm as being a subsystem of a more inclusive system. Furthermore, they do not consider the possibility of synergism, the role and importance of communication in tying together a system, nor the possible limitations of functionalism.

Terry recognizes that the firm is made up of many subsystems that require integration into a more inclusive system. Explicit recognition is given to the limits of functionalism and the role of communications in tying together the system. No explicit recognition is made of the firm being a subsystem of a more inclusive system, but it seems reasonable to infer that he does recognize this point.

There is a clear recognition of the firm as a system made up of a number of subsystems in Fenstermaker's contri-

bution. Recognition is also given to the role and importance of communication as an integrating and controlling force. There appears to be little evidence to support a contention that he recognizes the firm as a subsystem of a more inclusive system. It seems reasonable to infer from his observations on the need to integrate functional procedures and the permeating influence of the computer in integrating what has heretofore been treated as separate functional consideration that he recognizes that functionalism may have its limitations.

Deutsch's book is the last source mentioned in this investigation. In his presentation he clearly recognizes that the business entity is a system, and that systems are composed of subsystems which in turn can be viewed as systems. No explicit mention, however, is made of the concept of synergism or of a possible conflict between a functionally oriented organization and the "systems concept."

In concluding this chapter it should be noted that the evolution of the "systems concept" during the past quarter century has progressed slowly although writing about it has been endless. The basic concept has been elaborated upon upon and its use as an analytical tool is rapidly spreading. In this respect it may be that it, like scientific management, will require a great period of time to mature and an even greater period of time to be widely adopted.

CHAPTER VI

SUMMARY AND CONCLUSIONS

One of the first problems encountered in this study was that of semantics. Common words such as "system," "system boundary," and "system hierarchy" take on new definitive dimensions when incorporated into the jargon of a group or discipline. Compounding the problem is the special use of these words, terms, and concepts by writers who fail to inform their readers that they have inadvertently or purposely limited their meaning by their context. Even so, an analysis of the use of the word "system" and the phrase "systems concept" reveals a high degree of similarity among the implicit and explicit definitions offered by various writers. As a consequence, a composite or synthesized definition can be made which when applied to the literature in the field ought to prove satisfactory. The synthesized definition formulated by this writer reflecting contemporary usage of the word "systems" was that a system is a group of components designed {put together} to accomplish a particular objective(s) according to plan.

The development of criteria for determining whether and how well various writers perceived the business entity

as being composed of interrelated and interdependent parts or subsystems has been of the greatest importance to this study. Without such criteria any evaluation would be most arbitrary. Even so, considerable subjective judgment on the part of this writer was required when stating what could reasonably be inferred from the writings of those major contributors.

These evaluation criteria, based on an analysis of what contemporary writers explicitly noted or implied as being included in the "systems concept," were developed as a "yardstick" to measure the efforts of writers on "systems" and the "systems concept." The criteria consisted first of a minimum requirement which demanded that the writer either explicitly note or that it can be reasonably inferred from what he has said that he views the business entity as being made up of many functional parts requiring management to seek a balance between them so as to maximize the objectives of the organization taken as a whole. The second criterion used was that the writer recognizes that the business entity is but a subsystem of a larger more encompassing system. The third criterion decided upon was that the writer recognizes the importance of communication in tying together the components or subsystems of a business organization. The last criterion was that the writer recognizes the limitations of functionalism.

Using the above criteria as a "yardstick," a review of American and European business literature was made for

3 possible contributors to the formulation of what is now known as the "systems concept." A secondary objective was sought. This was to ascertain whether a parallel development existed between the complexity and sophistications of business structures and the evolution of the "systems concept."

The primary research was broken down and presented in three consecutive periods starting with 1813 and continuing to the present time. The selection of the number of periods and the years to be included in each period was arrived at after considering the objectives sought and the amount of material available.

The first period investigated was a century long--beginning in 1813 and ending in 1914. It was the period which saw, in large degree, the economic eclipse of the single proprietorship and the partnership and the subsequent rise to dominance of the corporate form of organization. It was also during this period that the basic industries of the United States were built and the change from being fundamentally an agricultural nation to an industrial nation took place.

In respect to the primary objective of this study, namely that of examining the origin of the systems concept, the earliest expression found by this writer was that of Robert Owen in 1813. From his address it can reasonably be concluded that he viewed the business organization as a

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system. His view, although probably radical and sophisticated for the times, did not consider, however, the possibility that the business system was but a subsystem or component of a larger and more inclusive system, the importance of communications to the "systems concept," nor did he entertain the idea that there may be a limit to the economics of functionalism.

Following closely on the heels of Owen's contribution were those of Ure and Dupuit. Like Owen, they held a relatively unsophisticated view of business holding the primary objective of business to be that of profit maximization for the owner-manager. What can be said for Owen's contribution is equally valid for those of Ure and Dupuit. Whether the contributions of Ure and Dupuit are original or borrowed is not known, but they added little, except in the way of examples, to what Owen had stated previously.

To Henry Towne is owed the recognition of having put forth the first unequivocal pronouncement of the "systems concept" in his famous paper, "The Engineer as an Economist," given before the A.S.M.E. in 1886. Towne's view of the business entity was considerably more sophisticated than that of Owen, Ure, and Dupuit. Except for his failure to acknowledge the importance of communications to the "systems concept" and to recognize a possible limitation of functionalism, Towne fulfilled the criteria set forth in Chapter II.

5 Russell Robb's contribution followed that of Towne by a quarter of a century. This was the period in which men such as Taylor, Gantt, Metcalfe, Emerson, and Church made many significant contributions to business literature--contributions which did not however explicitly include that of developing what was later called the "systems concept." Robb's recognition of the multiple objectives of business indicated an understanding of the increasing complexity of business organizations that had occurred since Towne's observations. In regard to fulfilling the "systems concept" criteria, Robb's contribution added little to what Towne had observed previously. He did, however, provide the observation that esprit de corps is the element necessary to encourage individual acceptance of the "systems concept" view of a business.

To Diemer is owed the recognition that he was the first writer to see that over-specialization was possible and not necessarily desirable from an overall company viewpoint. His failure to recognize the importance of communication and that the business entity could be viewed as a component of a larger more inclusive system raised some doubts as to his total contribution in respect to the development of the "systems concept" of business.

Kendall's contribution was primarily one of clarifying that which previous writers had observed. In terms of the "systems concept" criteria, Kendall fulfilled that of

6 system recognition, recognition of a possible synergistic effect, and implied that he viewed the business organization as a component of a larger system and the importance of communications to the "systems concept" view. He did not, however, give recognition to the possibility that extreme functionalism may not be in the best long run interest of the organization as a whole.

Church's contribution is very similar to that of Kendall, including his advocacy of "scientific management." His inclusion and concern for the human element reminds one of Owen.

The second period examined in this study encompassed the period just prior to World War I to the beginning of World War II. The period began with the industrial emphasis on output for defense. This was followed after the conclusion of hostilities by a period of severe adjustment, which in turn was followed by a period of "normalcy." The early 1930's saw the country in a depressed economic condition. This condition generally prevailed until the later 1930's at which time preparation for another conflict brought some relief to the industrial sector and the general economy.

One of the more significant contributions to the evolution and development of the "systems concept" during this period appeared in a Du Pont subcommittee report on organizational problems issued in 1921. Explicit recognition

7 was given in the report that the business was a system of interrelated and interdependent parts and that ideally each part should function to the best advantage in respect to its own activities and to that of the organization taken as a whole. The report also explicitly recognized the limits of functionalism when it suggested that it is sometimes more economical to combine unlike activities than to combine like ones. The major shortcoming of the report in respect to the "systems concept" criteria was that the importance of communication was not given great enough emphasis.

A second major contributor of this period was Alfred Sloan, Jr. Evaluating his contribution against the criteria, it was concluded that he perceived the business entity as a system and recognized the synergistic effect and the limitations of functionalism. Strongly implied in his writings is a recognition of the importance of communications.

To Sheldon goes the credit of providing the most explicit pronouncement of the function and importance of communications to an organization up to this time. He adequately met all the "systems concept" criteria except that he did not seem to recognize the synergistic effect or any possible limitations to functionalism.

Two individuals whose contributions consisted of more than a restatement of their predecessors are Hopf and Barnard. Hopf's "science of optimology" raises the

8 "systems concept" from one level in the systems hierarchy to a higher one. His concept of system goes beyond that considered previously to the consideration of larger and more encompassing sub-units. In evaluating Hopf's efforts it was concluded that he clearly saw the business entity as a system, implied a recognition of the synergistic effect, and that functionalism in the extreme may be detrimental when considering the effects on the total organization. Hopf did not explicitly state nor does it seem reasonable to say he implied a recognition of the importance of communication to the "systems concept" of business.

Barnard writes about many interacting and inter-related systems whose most inclusive system is called society. He was the first writer whose literary efforts explicitly or implicitly fulfill all the "systems concept" criteria developed at the onset of this study. With Barnard's contribution the second period of our investigation reached an end. With the possible exception of Sloan, Hopf, and Barnard the period did not produce many profound insights nor evidence a smooth continuity of development to what is referred today as the "systems concept" of business.

The last period covered by this study stretched from 1940 to the present time. The period began with the major nations of the world either preparing for or engaged

9 in warfare, and throughout much of the period a state of quasi warfare prevailed and influenced the development of organizational structure, communications, and outlook. The "weapons systems" concept employed by military planners during this period was a logical adoption and adaption of the "systems concept" as promulgated by numerous writers on organization and management prior to the second World War. That the military planners contributed to the clarification and development of the "systems concept" is undeniable. However, it is patently incorrect to credit them with conceiving the idea or concept, as it has, in the course of this investigation, has demonstrated that this was not the case.

Two recent writers whose contributions reflected an attempt to unify the various ideas which are implied or explicitly included in the "systems concept" as presently employed were Simon and Longenecker.

Simon provided a succinct discussion of how to approach the study of administration. In doing so he synthesized the fruits of many previous writers into a "system concept" framework. Echoes of Hopf's "science of optimality" are readily discernable in his "criteria of efficiency." In total, Simon's contribution was more significant than that of adequately fulfilling the "systems concept" criteria. His efforts reflected a high level of sophisticated understanding of the literature in the field and an ability to

synthesize and present these ideas and concepts in a most comprehensible manner.

Longenecker's presentation, except that it did not give explicit recognition to the concept of synergism, fulfilled the "systems concept" criteria. He succeeded in applying the "systems concept" to the various functional areas of organizational activity and in doing so, his efforts represented one of the more significant advances in organizational theory in recent years.

Among the many contemporary writers whose literary efforts include consideration of the "systems concept" are Garrett and Silver, Fenstermaker, and Terry. Their efforts individually or collectively do not appear to this writer to add materially to the knowledge, understanding, or the implementation of the "systems concept" as it applies to business. This seems to be the case for most, if not all, of the writings during the last five or so years. That is, there does not seem to have been a generally recognized, significant breakthrough in this general area during the last five years.

Conclusions

Some of the pertinent points brought out by this historical investigation into the origin of the "systems concept" as it applies to business can be summarized as follows:

1. The "systems concept" view of business, in its rudimentary form, was promulgated at least as early as 1813 and hence is not wholly new as some present writers proclaim. To support this conclusion, this writer has presented the views of approximately twenty major writers prior to the second World War. It is reasonable to conclude that those who contend that the concept is new are in error--perhaps as much as one hundred and seventy-five years.
2. The evolution of the "systems concept" seems generally to have followed that of business organizations in regards to complexity and multiple objectives. Starting out as a simple expression based primarily on the need for cooperation and coordination to increase profits, the concept grew to the point that today it includes the recognition of the many internal and external "publics" that need to be considered if "optimum" results for the organization as a whole are to be realized. The objectives sought from employing the "systems concept" began with profits and have since increased in scope to include recognition of the many publics with which the firm is related.
3. The evolution of the "systems concept" was slow and erratic. There were periods in which

little or no progress in regards to completeness and sophistication are perceivable. This erratic development is in evidence even in contemporary "systems" literature.

4. A semantical problem exists in regard to what precisely is meant by the terms "systems concept" and "systems." The context and the objectives sought by the writer appear to be a major factor in generating and in perpetuating this problem.
5. The military has contributed to the development of the "systems concept" by requiring a recognition of the concept as it applies to the procurement, installation, operation, and maintenance of military equipment. To state that the "systems concept" owes its origin to the military is to overstate their contributions. The evolution of the "systems concept" does owe, however, some of its present sophistication to the military. Their adoption and adaptation of the concept required a recognition of many more subsystems than previously considered and placed a major emphasis on the value of communications.

Other conclusions that seem warranted as a result of this investigation are:

1. Even though the "systems concept" was recognized in part by many individuals during the last one hundred and thirty-five years, relatively few of the most prominent names commonly associated with the development of management thought, and primarily those in the "scientific management school" have been primary contributors to the evolution of the "systems concept."
2. There has developed during the last decade what might be called a systems cult which has produced much of value to organizational theory and also much confusion. This confusion has resulted primarily from semantical problems including the introduction of a new jargon, overselling the virtues and advantages to be derived from a "systems concept" view of the business, and failing to indicate any shortcomings due to difficulties in implementation and maintenance.

The writer, having the benefit of historical perspective in making this study, has observed that the general development of what is now popularly called the "systems concept" seems to have evolved from the two more simple and basic concepts of cooperation and coordination. This suggests that there is a hierarchy of "systems concepts" that coincides roughly with the development of business organizations.

That is, as organizations grew in size and complexity they could no longer be adequately described in simple and unsophisticated terms. As each new function or sub-function was added, the organization not only became more difficult to manage but required a more sophisticated concept to adequately describe it. As a result, greater recognition of the interrelationships and greater interdependency between functions was required. The "nesting" of subsystems within systems increased in number as did the number of systems. The hierarchy of systems and subsystems which adequately portrayed the single proprietorship with few functional divisions no longer adequately described the corporate form with its multitudinous functional subdivisions of responsibilities. A close scrutiny of the evidence seems to justify the contention that there is a hierarchy of "systems concepts" that parallels the development of business organizational structure from the simple proprietorship and partnership to the complex corporate form of the present time.

The writer also concludes that the primary reason why the "systems concept," as defined today, was not enunciated in earlier times is that it would have amounted to a description or a presumption of a concept that had, at that time, no real world meaning. The simpler and most prevalent organizational forms, such as the single proprietorship and a partnership in the 19th century, along with the production of simple goods and wares did not produce the

requisite conditions which would have stimulated the development of such a sophisticated viewpoint.

In conclusion, this writer would like to point out that he does not claim to have found the origin of the "systems concept" nor does he believe he has conclusively proved that a parallel development exists between the "systems concept" of business and the increased complexity of organization structures of business. What has been accomplished is that the "systems concept" is far from new and that there definitely seems to be a correspondence between the development of the "systems concept" of a business organization and the overall development of the organization itself.

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