The Relationship Between Administrative Activities and Hospital Performance

An empirical study of the relation between managerial techniques and organizational performance in 30 medium-sized community general hospitals

Duncan Neuhauser, Ph.D.

Research Series 28

1971

TABLE OF CONTENTS

ACKNOWLEDGEMENTS

This research was financed by a grant from the United States Public Health Service (HS 00080) to the Center for Health Administraion Studies, Graduate School of Business, University of Chicago.

A particular debt of gratitude is owed to Selwyn Becker, George Bugbee, Odin W. Anderson, and Nicholas Dopuch, among many others. In addition, I would like to thank the three hundred or more health professionals who gave of their time to provide the information required here. The Joint Commission on the Accreditation of Hospitals deserves special thanks for the use of their records.

FOREWORD

Assessment of hospital and medical care attracts the concern of the best minds in the health field. Among many disciplines and professions there appears to be acceptance first of the difficulty of gauging quality, and second, of the vital importance of arriving at a simple and objective method of doing so.

Professionals can judge each others performance, and may quantify those judgments. However, at best there are variations in judgment between professionals, and at worst, error, bias and favoritism. The hunt continues for reliable measures.

The primary problem is the intangibility of the product. Good health has many facets. Also, any single procedure or act may be precisely performed, yet inappropriate. Every human is different, whether patient, physician or nurse. Medical care, next to motherhood, must be the most personal of relationships, thus implicitly subject to great variation and uncertainty.

Quality assessment, then, is extremely difficult, but the need has become a pressing national requirement. How can government justify spending billions for medical care if unable to tell whether it is good and the price is right?

Against this background of difficulty and national concern, the author set to work. As the first Ph.D. student to enroll and be granted a degree in the Center for Health Administration Studies at the University of Chicago, he elected to make such contributions to this problem as his doctoral research would permit. With his basic discipline in behavioral science, special study in organization theory and the quantitative skills required for a Ph.D. in the Graduate School of Business at the University of Chicago, the author cautiously began to joust with the problem; namely, how organization of resources in the hospital is related to efficiency and quality of care.

Organization theory, or how work is performed, is taught at the University of Chicago by a faculty adept in quantitative methods and impatient of surmise. Their tutelage gave the sound approach evident in this research. Professor Selwyn Becker deserves special mention for his wisdom generously dispensed.

Bachelor's degree from Harvard College, Master's in Hospital Administration from the University of Michigan, several years in Ph.D. studies at the University of Chicago, and then Research Associate at the

Center for Health Administration Studies brought the author understanding of the hospital and health field. Such a broad approach to knowledge is time consuming. It can only be the privilege of a qualified few. It may be anticipated that those who demonstrate the talent and stamina for success will provide insight for scholarly and constructive criticism and planning. New answers are badly needed to the problem of better organization of the ever more complex job of patient care.

This multidisciplinary education in the author's instance required heroic personal investment of time and money and good use of opportunities offered. The University of Chicago has rich resources made possible by generous support from many sources. The Center for Health Administration Studies came into existence through gifts from the pharmaceutical industry. Continuing and vital support has come from the W. K. Kellogg Foundation, but of fundamental importance has been a seven year programmatic grant, HS 00080 from the National Center for Health Services Research and Development of the United States Public Health Service. This basic support for a research staff has brought flexibility and encouraged grants for specific projects from many private and governmental agencies.

This study only scratches the surface of the massive problems of hospital administrative structure and quality assessment. It does provide approaches which others will build on. The author has shown intelligence, ingenuity and stubborn determination, and always cheerful tolerance of the rigorous course he has so successfully run. All of these qualities are evident in this important research which sheds new light on the complexity of hospital organization. The need for more knowledge if hospital performance is to be improved and assessed is a national imperative.

GEORGE BUGBEE

February 4, 1971

INTRODUCTION

Public concern with high hospital costs has made the question of improving hospital performance a vital one. This research project is an attempt to see what effect different hospital management techniques have on costs and quality of care. It is believed that this represents a unique effort at empirical research in an area where opinion and speculation have prevailed.

The theoretical framework used here is derived from the Entrepreneurial Theory of Formal Organizations of Selwyn Becker and Gerald Gordon.[1] This theory yields a number of hypotheses about management and organizational performance which are tested here using data from a sample of thirty short-term community general hospitals in the Chicago area ranging in size from 100 to 530 beds. Because it is widely believed that the variables under consideration are very hard to measure, some effort has been made to describe and validate the measures used.

The results show that differences in management make a predictable and significant impact on hospital performance. The results of this research have a number of implications for the hospital field and these are discussed.

[1] Becker, Selwyn W. and Gerald Gordon. "An Entrepreneurial Theory of Formal Organizations Part I," *Administrative Science Quarterly*, Vol. 11, No. 3, December, 1966, pp. 315–344.

CHAPTER I

THE DERIVATION OF THE THEORETICAL FRAMEWORK

In turning to the literature on management and organization theory for insight into the techniques of good management, it became clear that the degree to which managers impose rules and regulations on their organizational subordinates[1] is one of the central variables in the literature and the impact of these rules and regulations on organizational performance one of the major unresolved issues.

In his review of the organization theory literature in 1966, D. J. Hickson[2] found that "the degree to which organizational roles are defined" is an important variable in over a dozen organizational theories, although this variable was disguised under as many different names. (See Table 1.) Hickson found no consensus among those writers as to the effect of managerial rules and regulations (specified procedures or role specificity) on organizational or individual performance.[3]

In accordance with the Entrepreneurial Theory we will use the term *specification of procedures* which is defined as follows: A procedure is specified when a superior requires that a subordinate perform a task or a set of tasks in a given manner. Conversely, a procedure is unspecified when the organizational member specifies his own procedure. The degree to which procedures are specified is defined as the percent of time a worker spends carrying out procedures defined by others above him in the administrative hierarchy.

The Case for Specified Procedures

A number of writers have emphasized "that clear lines of authority and responsibility are desirable as is clear role definition."[4] These writers tend to emphasize *monocratic* control of the organization through the use of *rules and regulations* specified by *hierarchical superiors* for *subordinates* and sanctioned by the *authority of office*. This approach is

[1] Many different words are used with overlapping meanings including rules, regulations, policies, procedures, directives, orders, commands, etc.

[2] Hickson, D. J. "A Convergence in Organization Theory," *Administrative Science Quarterly*, Vol. 11, 1966–67, pp. 224–237.

[3] *Ibid.*, p. 232.

[4] Hickson, *op. cit.*

TABLE 1

HICKSON'S TYPOLOGY OF THE TERMINOLOGIES USED BY VARIOUS STUDENTS OF ORGANIZATION STRUCTURE FOR SPECIFICITY OF ROLE PRESCRIPTION*

STUDENTS OF ORGANIZATION STRUCTURE†	TERMINOLOGIES FOR SPECIFICITY (OR PRECISION) OF ROLE PRESCRIPTION	
	Higher specificity	Lower specificity
Structure analysts (Sociologists and administration theorists)		
Weber	Traditionalistic, bureaucratic	Charismatic
Burns and Stalker	Mechanistic	Organic (or organismic)
Barnes	Closed system	Open system
Whyte	Formalized	Flexible
Hage	High formalization (standardization)	Low formalization
Crozier	Routinized	Uncertain
Gordon and Becker	Specified procedures	Unspecified
Thompson	Overspecification	Structural looseness
Litwak	Weberian	Human relations
Janowitz	Domination: manipulation	Fraternal
Frank	Well-defined (and overdefined)	Underdefined
Simon	Programmed	Nonprogrammed
Presthus	Structured perceptual field	Unstructured
Bennis	Habit	Problem-solving
Structure designers (Management writers)		
Taylor	Scientific task determination	Personal rule-of-thumb
Fayol, Urwick, Brech	Clear statement of responsibilities	Personalities predominant (rather than intended design)
Brown	Explicit authority and accountability	Undefined roles and relationships
Structure critics (Social psychologists)		
Likert	Authoritative	Participative
McGregor	Theory X	Theory Y
Argyris	Rational organization	Self-actualization

* Hickson, D. J. "A Convergence in Organization Theory," *Administrative Science Quarterly*, Vol. 11, 1966–67, p. 227.

† References on following page.

REFERENCES—TABLE I

Weber, M. *The Theory of Social and Economic Organization*, trans. by A. M. Henderson and T. Parsons, Glencoe, Illinois: Free Press, 1947.

Burns, T. and G. M. Stalker. *The Management of Innovation*, London: Tavistock, 1961.

Barnes, T. "Industry in a New Age," *New Society*, Vol. 18, January, 1963, pp. 17–20.

Whyte, W. Foote. "Incentives for Productivity: The Bundy Tubing Company Case," *Applied Anthropology*, Vol. 7, 1948, pp. 1–16.

Hage, J. "An Axiomatic Theory of Organizations," *Administrative Science Quarterly*, Vol. 10, December, 1965, pp. 289–320, esp. p. 295.

Grozier, M. *The Bureaucratic Phenomenon*, London: Tavistock, 1964.

Gordon, G. and S. Becker. "Changes in Medical Practice Bring Shifts in the Patterns of Power," *The Modern Hospital*, February, 1964, pp. 89–91+.

Thompson, V. A. "Bureaucracy and Innovation," *Administrative Science Quarterly*, Vol. 10, June, 1965, pp. 1–20.

Litwak, E. "Models of Bureaucracy which Permit Conflict," *American Journal of Sociology*, Vol. 67, 1961, pp. 177–184.

Janowitz, M. "Changing Patterns of Organizational Authority: The Military Establishment," *Administrative Science Quarterly*, Vol. 3, March, 1959, pp. 473–493.

Frank, A. Gunder. "Administrative Role Definition and Social Changes," *Human Organization*, Vol. 22, Winter, 1963–1964, pp. 238–242.

Simon, H. A. *The New Science of Management Decisions*, New York: Harper, 1960.

Presthus, R. V. "Toward a Theory of Organizational Behavior," *Administrative Science Quarterly*, Vol. 3, June, 1958, pp. 48–72.

Bennis, Warren G. "Leadership Theory and Administrative Behavior: The Problem of Authority," *Administrative Science Quarterly*, Vol. 4, December, 1959, pp. 259–301.

Taylor, F. W. *Scientific Management*, New York: Harper, 1947.

Fayol, H. *General and Industrial Management*, London: Pitman, 1949.

Urwick, L. F. *The Elements of Administration*, London: Pitman, 1947.

Brech, E. F. L. *Organization: The Framework of Management*, London: Longmans, Green, 1957.

Brown, W. *Exploration in Management*, London: Heinemann, 1960.

Likert, R. *New Patterns of Management*, New York: McGraw-Hill, 1961.

McGregor, D. *The Human Side of Enterprise*, New York: McGraw-Hill, 1960.

Argyris, C. *Understanding Organizational Behavior*, London: Tavistock, 1960.

Argyris, C. *Integrating the Individual and the Organization*, London: Tavistock, 1964.

described by Max Weber[5] as his bureaucratic authority pattern which he considered to be the most efficient of his authority patterns. More recently Jerald Hage (1965) used Weber's approach to develop his "axiomatic Theory of Organizations." Hage states that:

The combination of centralization (of decision making) and formalization (specification of procedures) is nothing more than coordination. There are individuals who supervise and who have rules or standards by which to evaluate the performance of their subordinates which not only result in more uniformity of behavior but in a higher volume of production as well.[6]

Henri Fayol also takes this position by suggesting that "the soundness and good working order of the body corporate depend on a certain number of principles, laws, and rules."[7] Frederick W. Taylor followed the same philosophy in his scientific management.

[5] Weber, *op. cit.*

[6] Hage, Jerald. "An Axiomatic Theory of Organizations," *Administrative Science Quarterly*, Vol. 10, 1965, pp. 289–320, esp. p. 297.

[7] Fayol, Henri. "General Principles of Management," reprinted in H. F. Merrill, ed., *Classics in Management*, New York: American Management Association, 1960, p. 217.

If you allow each man to go his own way, just exactly as he pleases, without any regard for science, science melts right away. You must have standards.[8]

Other writers emphasizing the importance of managerial rules on organizational efficiency are L. Urwick,[9] Webster Robinson,[10] E. F. L. Brech,[11] and Pfiffner.[12]

With respect to American general hospitals, the findings of Georgopoulos and Mann support their contention that:

Formal organizations typically depend on attaining predictability regarding performance through a structure of explicitly defined and regulated statuses and roles and an elaborate system of programmed coordination. The greater the pressure for exact and prompt coordination, moreover the greater the tendency toward explicit regulation of behavior, hierarchical relationships, impersonality and ultimately well-defined patterns of deference and social distance. To a large measure, the community general hospital exhibits this structure.[13]

Although Georgopoulos and Mann say that many decisions in hospitals are made by employees, they note that:

The emphasis on formal organizational mechanisms and procedures and on directive rather than 'democratic' controls along with a number of other factors, gives the hospital its much talked about 'authoritarian' character which manifests itself in relatively sharp patterns of super-ordination—sub-ordination, in expectations of strict discipline and obedience, and in distinct status differences among organizational members.[14]

They suggest that this "authoritarianism" is due to the low tolerance for error and concern for maximum efficiency and predictability of performance and that this type of control pattern exists because it is more functional than not.[15] They say that, "increased professionalism and

[8] Taylor, Frederick W. "The Principles of Scientific Management," in H. F. Merrill, *op. cit.*, p. 113.

[9] Urwick, L. *A Dictionary of Industrial Administration,* John Lee, ed., London: Isaac Pitman & Sons, 1928.

[10] Robinson, Webster. *Fundamentals of Business Organization,* New York: McGraw-Hill, 1925.

[11] Brech, E. F. L. *Organization: The Framework of Management,* London: Longmans, Green, 1957.

[12] Pfiffner, John M. and Frank P. Sherwood. *Administrative Organization,* Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1960, p. 221. See also Pfiffner, John M. "The Effective Supervisor: An Organization Research Study," in Keith Davis and William G. Scott, *Readings in Human Relations,* New York: McGraw-Hill, 1959, pp. 286–298.
Pfiffner, John M. "The Effective Superior," *Personnel,* May, 1955, pp. 530–540.

[13] Georgopoulos, Basil S. and Floyd C. Mann. *The Community General Hospital,* New York: The Macmillan Co., 1967, p. 363.

[14] *Ibid.*, p. 7.

[15] *Ibid.*, p. 8, 9.

specialization have also had the effect of sharpening some of the status differences among the people working in the hospital—and sharp status distinctions bespeak of some authoritarianism."[16] Their empirical evidence supports their contention that the clarity of organizational rules and regulations leads to increased organizational coordination. Coordination is in turn related to good patient care.[17] It is important to note that these findings refer primarily to nurses, technicians, and other hospital employees rather than to physicians. Therefore, their findings may not apply to physicians.

Specification of Procedures Questioned

A number of questions have been raised as to the efficacy of specified procedures. These are:

(A) Hierarchically imposed rules have "unintended consequences" which do not always aid the owner in achieving his goals. According to Robert Merton, "unchallenged insistence upon punctilious adherence to formalized procedures . . . may be exaggerated to the point where primary concern with conformity to the rules interferes with the achievement of the purposes of the organization in which case we have the familiar phenomenon of the technicism or red tape of the official."[18]

(B) Rules may or may not be adhered to. Gouldner, in his study of a mining firm, found that many rules were ignored. He called this phenomenon "mock bureaucracy."[19]

(C) Rules may be imposed in a manner which workers find intolerable. Rules may be imposed in a cruel, arbitrary, or contradictory manner.[20]

P. Blau and W. R. Scott make this distinction:

an authoritarian approach which is not to be confused with the exercise of effective authority involves a somewhat rigid and domineering pattern of close supervision.[21]

[16] *Ibid.*, p. 12.

[17] *Ibid.*, p. 490.

[18] Merton, Robert K. *Social Theory and Social Structure,* Revised Enlarged Edition, Glencoe, Illinois: The Free Press, 1957, Ch. 6, p. 199.

[19] Gouldner, Alvin W. *Patterns of Industrial Bureaucracy,* Glencoe, Illinois: The Free Press, 1954.

[20] White, Ralph and Ronald Lippitt. "Leader Behavior and Member Reaction in Three 'Social Climates,' " Dorwin Cartwright and Alvin Zander, *Group Dynamics,* 2nd Edition, Evanston, Illinois: Row, Peterson and Co., 1962, Ch. 28.

[21] Blau, Peter and W. Richard Scott. *Formal Organizations,* San Francisco: Chandler Publishing Co., 1962, p. 148.

(D) Rules may or may not be appropriate to the intent of the owner. To quote Harold Leavitt: "like other tools, authority can be used expertly or blunderingly."[22]

The Case Against Specification of Procedures

The Human Relations school provides an approach which is in some important ways contradictory to the monocratic approach discussed above. In general terms, this school advocates the position that the most efficient way to make organizational decisions is through a *participatory, democratic* process by which a *group* of *peers* arrives at a *consensus* more through *education* than through the authority of office.[23] The Human Relations school has been concerned with a cluster of other different variables but only one—participatory decision making (unspecified procedures) concerns us here. The case for unspecified procedures is made by Katz and Kahn:

> By and large, those organizations in which influential acts are widely shared are most effective. The reasons for this are in part motivational, having to do with implementation of decisions, and in part non-motivational, having to do with the excellence of decisions.[24]

Douglas McGregor also advocates this approach in his Theory Y[25] as does Rensis Likert in his theory of participative management:

> The low producing managers in keeping with traditional practices feel that the way to motivate and direct behavior is to exercise control through authority.[26]

Chris Argyris, in emphasizing the value of self-actualization, says: "As management controls are increased, the degree of frustration, failure, short-time perspective and conflict will increase" and "Increasing the degree of directive leadership, increasing the degree of management controls increases the antagonisms of workers toward the organization."[27] The Human Relations school has tended to support the idea that "No normal person is happy in a situation which he cannot control to some extent."[28] This is reflected in the effect of participatory management on morale. However, it is not clear that high morale or job satisfaction is always related to higher organizational efficiency.[29]

As Lowin points out in his review of this literature there have been a number of empirical studies relating participation to efficiency.[30] The results have been mixed—some showing participation to be efficient while others show it to be inefficient. These mixed results have led to a number of efforts at a synthesis.

Attempts at a Resolution

A number of studies attempting a resolution of this problem are reviewed by Lawrence and Lorsch.[31] They propose, and provide evidence to support the hypothesis that high specification of procedures is efficient where the environment is stable, predictable, unchanging and non-complex. Conversely, where the environment is unstable, diverse, and rapidly changing unspecified procedures are more efficient.

In short, the efficiency of specification of procedures depends on the complexity of the task-environment faced by the organization.

Complexity is one of the key variables in the Entrepreneurial Theory, which we are now in a position to describe.

[22] Leavitt, Harold J. *Managerial Psychology,* Revised Edition, p. 166.

[23] For a review of the relevant literature see Lowin, Aaron, "Participative Decision Making: A Model, Literature Critique, and Prescriptions for Research," *Organizational Behavior and Human Performance,* Vol. 3, 1968, pp. 68–106.

[24] Katz, Daniel and Robert L. Kahn. *The Social Psychology of Organizations,* New York: John Wiley & Sons, Inc., 1966, p. 368.

[25] McGregor, Douglas M. "The Human Side of Enterprise," in Harold J. Leavitt and Louis R. Pondy, ed. *Reading in Management Psychology,* Chicago: University of Chicago Press, 1964, p. 267 (see pp. 275–278).

[26] Likert, Rensis. *New Patterns of Management,* New York: McGraw-Hill, 1961, pp. 99–100. Also see his "modified theory" in Likert, Rensis, "A Motivational Approach to a Modified Theory of Organization and Management," Mason Hare, ed., *Modern Organization Theory,* New York: John Wiley & Sons, 1959, Ch. 7. See esp. p. 211, and Likert, *The Human Organization,* New York: McGraw-Hill, 1967.

[27] Argyris, Chris. *Understanding Organization Behavior,* Homewood, Illinois: The Dorsey Press, Inc., 1960, pp. 15, 18. Also see Argyris, Chris, "The Individual and Organizational Structure," in Davis and Scott, *op. cit.*

[28] Whyte, William F. *Money and Motivation,* New York: Harper & Bros., 1955, p. 94.

[29] Katz and Kahn, *op. cit.*, p. 373.

[30] Aaron Lowin, *op. cit.*

[31] Lawrence, Paul R. and Jay W. Lorsch. *Organization and Environment,* Division of Research, Graduate School of Business Administration, Harvard University, Cambridge, 1967, Ch. 8 especially.

CHAPTER II

THE ENTREPRENEURIAL THEORY OF FORMAL ORGANIZATIONS

The reasoning of the Entrepreneurial Theory of Formal Organizations goes as follows: By definition, each formal organization has a legal owner who creates the organization to achieve his goals.[1] In the case of voluntary hospitals, the owner is the corporation represented by the Board of Trustees or equivalent group. The owner has the legal right to specify procedures for his employees. Ordinarily, the owner hires a manager (the hospital administrator) as his agent who specifies procedures for him.

The Entrepreneurial Theory assumes that the owner, or his agent, prefers to specify procedures to the extent that this maximizes the benefits of coordination. This way he retains control over his organization consistent with goal achievement. The owner will only relinquish control if he can increase goal achievement.

The more complex the task-environment, the more procedures there are to be performed by the organization. The more complexity, the more difficulty for the owner and his agent in specifying the same proportion of total procedures, given some degree of urgency. As complexity continues to increase, the owner will eventually be forced to bring into the organization employees who are able to specify their own procedures. These employees who specify their own procedures are defined as *professionals.*

Coupling

To continue the logic of the Entrepreneurial Theory, an organization may face different task-environments. One authority pattern may be appropriate for one task-environment, but not for others. Therefore, given different task-environments, it would be more difficult to divide the organization into subcomponents with different authority patterns to the appropriate task-environment. In this way loss of control is minimized. Instead of giving up all his control to others, because part of his organization's task-environment is complex, the owner can retain control in the non-complex areas. The Entrepreneurial Theory defines subcomponents with different authority patterns as "coupled."

[1] A more thorough discussion of the variables used here will be found in Chapter III.

Hospitals

In general hospitals, the most complex task-environment is the treatment of the patient. There is a wide range of variation between patients, by disease and by age, which requires different forms of treatment.[2] Treatment procedures are frequently difficult to specify and are never specified for more than one patient at a time. This complexity is reflected by the long period of training required of physicians and the extensive scientific literature on medical care. In sharp contrast to medical care is the low complexity of the task-environment of such hospital departments as housekeeping, laundry, stores and purchasing. Here, production activities are comparatively simple, routine, and stable. It is consistent with the Entrepreneurial Theory that these departments are under the hierarchical control of the hospital administrator, while physicians have considerably more autonomy. The logic of the Entrepreneurial Theory suggests that hospitals will be coupled organizations. Procedures for non-complex activities will be specified hierarchically while procedures for complex activities will be specified by the colleagues (i.e., the physicians).

Because hospitals are coupled organizations they have appeared to some researchers as anomalies. Charles Perrow in his review of the literature on organizational studies of hospitals says:

> The most important insight, or perspective, which has influenced the study of general hospitals is the way in which they deviate from the standard bureaucratic model of large scale organizations. This has probably been the most basic, underlying concern in the significant studies of general hospitals.[3]

J. A. Spencer, an English hospital administrator, also noticed this "paradoxical" combination of participatory decision making and hierarchy within hospitals:

> Complexity is a further characteristic of the hospital's organization which is dictated by its function. As medical knowledge increases so do the demands for the skill and effort of the already numerous and diverse groups of professional, technical, and ancillary staffs who provide service to the patient. And because these skills are highly interdependent, the work of all these people must come together in the right way and at the right time if each patient is to receive proper care.
>
> The coordination of such functions would be reasonably simple if each

[2] Commission on Professional and Hospital Activities, *Length of Stay in Short Term General Hospitals (1963–1964)*, New York: McGraw-Hill, 1966.

[3] Perrow, Charles. "Hospitals: Technology, Structure and Goals," in James March, ed., *Handbook of Organizations,* Chicago: Rand McNally, 1965, pp. 910–971.

treatment were the same. . . . But in hospitals . . . every patient must be treated as a separate entity to which the care has to be tailored. And because the patient's needs may change unpredictably in the course of his treatment, planning can rarely be far ahead and must always be adaptable . . . Coordination then depends on cooperation and improvisation by staff at all levels. . . . In this situation authoritarian patterns of organization are inappropriate; no system devised by authority can be flexible enough to fit all the intricacies of individual patient care. In the ward at night and in emergencies at anytime everything depends on the readiness of people in different jobs to help each other. Coordination becomes self-coordination.

Why, then, are hospitals a byword for authoritarianism? . . . Supervisors expect strict obedience from subordinates; and hospitals probably have more rules and regulations than most organizations. They are, in short, models of bureaucracy. And this is the paradox of the hospital as an organization. It is—and must be—both authoritarian and permissive, highly formalized and yet loose-knit.[4]

Visibility of Consequences

As has been discussed in Chapter I, a hierarchical procedure specified may be inappropriate, unenforced, or have unintended consequences. Because of this the Entrepreneurial Theory says that linking specification of procedures with the appropriate task-environment is necessary but not sufficient to achieve efficiency. In order for the owner's actions to be adhered to appropriately and minimize unintended consequences, the owner must be aware of the effects of his actions. The extent to which the owner can be and is aware of the effects of his actions and the functioning of his organization is defined as "visibility of consequences."

Assume a rational owner: that is, he will attempt to achieve his goals in an efficient manner. Given high visibility of consequences, the owner will be able to specify those procedures which will maximize efficiency and eliminate inappropriate procedures or when he does not specify procedures he will be able to bring into the organization the personnel needed for goal attainment. In short, high visibility of consequences is more likely to produce appropriate and, therefore, efficient behavior with respect to the goals of the organization.

Reports

Reports[5] on organizational performance are primarily designed to make administration and the Board aware of the degree to which the

[4] Spencer, J. A. *Management in Hospitals,* London: Faber and Faber, 1967, pp. 38–39.

[5] The existence of reports is an aspect of specification of visibility procedures in the Entrepreneurial Theory as distinct from specification of production procedures which we have abbreviated to specification of procedures for the sake of clarity.

organization is meeting its objectives. In hospitals, these reports include inpatient statistics, cost reports, attitude surveys, etc.

Using the reasoning outlined above, given high complexity of the task-environment the owner will find it efficient not to specify production procedures, instead, he will employ workers who can specify their own procedures. Whatever the degree of complexity, the use of reports will tend to increase efficiency. This is because the use of reports tends to increase managerial awareness. For one thing, this allows the owner to make the correct decision as to whether he should specify procedures or not.

The owner can also change the degree to which procedures are specified by changing employees. If the owner wishes to specify fewer procedures he can replace existing employees with those who are able, through training or experience, to specify their own procedures.

The Entrepreneurial Theory would predict that the relationship between specification of procedures and efficiency depends (1) on the complexity of the task-environment, and (2) on visibility of consequences. In addition, it is important to distinguish between specification of procedures and the use of reports.

The Non-Medical Component

Given low task-environment complexity, the Entrepreneurial Theory would make the following predictions:

Hypothesis	I.	The specification of procedures is positively related to efficiency.[6]
Hypothesis	II.	Visibility of consequences and the use of reports are positively related to efficiency.
Hypothesis	III.	The higher the visibility of consequences the more likely that the extent of specification of procedures will be optimal.
Hypothesis	IV.	The effect on efficiency of specification of procedures, the use of reports and visibility of consequences are positive and additive.

Given high complexity, the Entrepreneurial Theory would predict that low specification of procedures will be more efficient. Their reasoning is as follows. A complex task-environment is one in which it is difficult to specify procedures and difficult to select the right response at the right

[6] The words efficiency, performance, and goal attainment are used interchangeably here.

time. Given increasing complexity, the owner will find it increasingly difficult to specify procedures himself and he will be increasingly forced to bring people into his organization who can specify their own procedures and perform the required tasks (i.e., professionals). If the owner persists in specifying procedures with increasing complexity, he runs an increasing risk that either his procedures are ignored or that they are inappropriate. In this case, we predict that it will be more efficient not to specify procedures. Other things equal, the use of managerial reports will tend to increase visibility of consequences regardless of the level of complexity. The higher the visibility of consequences, the more likely the owner is to specify the appropriate number of procedures: more for low complexity, less for high complexity.

Given high task-environment complexity, the following predictions are derived from the Entrepreneurial Theory.

Hypothesis V. The use of reports and visibility of consequences are positively related to efficiency.

Hypothesis VI. Specification of procedures will be negatively related to efficiency.

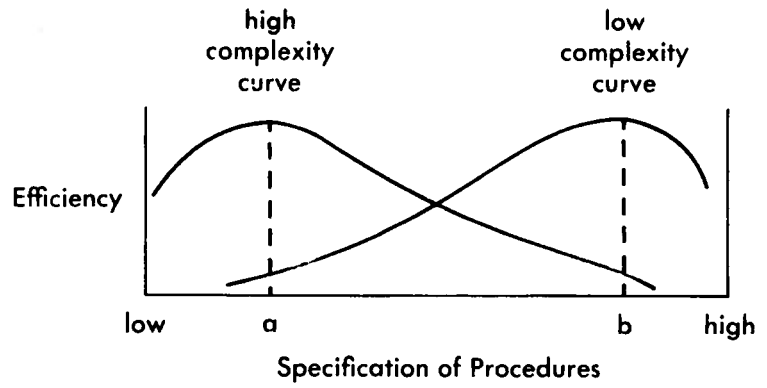
Hypothesis VII. The higher the visibility of consequences the more likely the extent of specification of procedures will be optimal.

Hypothesis VIII. The negative effects on efficiency of specification of procedures, and the positive effects on efficiency of the use of reports and visibility of consequences are additive.

Curvilinearity

Our hypotheses have been stated in terms of straight line relationships.[7] It seems quite possible that the relationship between specified procedures and efficiency may be curvilinear. This potential modification of the Theory warrants further discussion.

The curvilinear hypothesis would suggest that for a given level of complexity it is possible that either too few or too many procedures can be specified. This suggests an optimal level of specified procedures to be associated with a given level of complexity. This optimal level will be at a more specified level of procedure for low complexity and a less specified level of procedures for high complexity. This can be diagrammed as follows:



We have hypothesized that to be off the optimal point will be associated with low visibility of consequences. Given low visibility of consequences we might expect a certain amount of random behavior from management. Given the high complexity curve, we would expect that the chances are much greater of observing errors of too highly specified procedures. Given the low complexity curve we would expect that the chances are much greater of observing errors of too little specification procedures. This being the case, the observable range of hospitals in the "real world" may appear to present linear relationships. That is to say, we may only observe hospitals in the "a" to "b" range in the preceding diagram.

These hypotheses introduce the following variables: complexity of the task-environment, specification of procedures, managerial reports, efficiency, and visibility of consequences. These variables are defined and potential operational measures reviewed in the next chapter.

[7] This is overwhelmingly the case in the literature reviewed in Chapter I. For an exception, see Emich, Arnold F. "Control Means Action," *Harvard Business Review*, Vol. 32, No. 4, 1954, pp. 92–98. A curvilinear relationship would be consistent with the economic theory of the production function. For example, see Leftwich, Richard *The Price System and Resource Allocation*, Revised edition, New York: Holt, Rinehart & Winston, 1962, Ch. 7, pp. 107–117.

CHAPTER III

THE VARIABLES

We have postponed a more detailed discussion of the variables until after Chapter II so that they may be viewed specifically in the context of the Entrepreneurial Theory and in relation to the design of this study.

Complexity of the Task-Environment

To start, it is necessary to describe the concept of the task-environment. To a greater or lesser extent the tasks being performed by organizational workers depend on the demands placed upon that organization by the environment. To some extent, the organization can modify the demands of the environment and perform some tasks which are not demanded and refuse to perform others. For example, a hospital may be compelled by law to treat all patients who come to its emergency department. To this extent this hospital is unable to modify the demands of its environment. The concept of task-environment takes this difference into account and implies that the tasks performed by the organization are partly imposed by the environment and partly under the control of the organization.[1] Thus we are concerned with the tasks being performed in the hospital and implicitly realize that they are to a greater or lesser extent defined by the environment.

In the context of the Entrepreneurial Theory, organizational complexity is a function of a number of different components. These are:

a) The *urgency* with which an appropriate decision must be made. By and large, patient care decisions are more urgent than non-patient care decisions.

b) The *number* of different tasks being performed. The more different tasks, the more complex.[2]

[1] Thus when we deal with complexity and Lawrence and Lorsch, *op cit.*, talk about environment we are using different words to describe a very similar concept.

[2] This measure of complexity has been proposed by Victor Thompson and Hage and has been used empirically by Heydebrand and Hage and Aiken.
Thompson, Victor A. *Modern Organization*, New York: Alfred Knopf, 1965, p. 13.
Hage, Jerald. "An Axiomatic Theory of Organizations," *Administrative Science Quarterly*, Vol. 10, 1965, pp. 289–320.
Heydebrand, Wolf. "Bureaucracy in Hospitals," unpublished Ph.D. dissertation, Department of Sociology, University of Chicago, 1965. Anderson, T. R. and S. Warkov, "Organizational Size and Functional Complexity," *American Sociological Review*, Vol. 26, 1961, pp. 23–28, measured complexity by dividing hospitals into tuberculosis hospitals (single purpose, low complexity) and general hospitals (multi-purpose, high complexity). Morrill, Richard, "A Principle Components Analysis and Classification of Chicago Area Hospitals," May, 1967, mimeographed, Chicago Regional Hospital Study Paper 19, Hospital Planning Council, Chicago, Illinois, found size and complexity to be the two major factors describing hospitals.
Hage, Jerald and Michael Aiken. "Routine Work, Social Structure, and Organizational Goals," unpublished paper, 1968. Other measures of complexity are scope of services offered (Georgopoulous and Mann, *op cit.*), extent of departmentalization (V. Thompson, *loc cit.*), and mean level of training required (Hage, *op cit.*). Weiland, George F. "Complexity and Coordination in Organizations," unpublished Ph.D. dissertation, University of Michigan, 1965, Weiland uses a number of measures of complexity, but fails to distinguish between size and complexity.

c) The degree of *interrelatedness* of the various tasks. The more different tasks, the more complex the possible interactions between them,[3] and the more joint activities likely to be undertaken.[4]

d) The *difficulty* involved in specifying the tasks. The more difficult it is to specify the task, the longer the training required to learn how to specify it.

e) Finally, there are formal *legal restrictions,* professional ethics, union rules, and such which prohibit the manager from specifying certain procedures.

The Medical and Non-Medical Components of the Hospital

The fact that patients vary widely according to their type of illness, treatment is specified for each patient individually, skills of diagnosis and treatment (including surgery) are difficult to perform, decisions must often be made very rapidly, there exists a vast scientific literature on medicine, and the extensive training required of physicians all suggest that the medical component of the hospital has a high level of task-environment complexity.

In contrast, the non-medical component of the hospital performs tasks which are comparatively simple, repetitive, requiring less scientific knowledge and less training, suggesting a lower level of task-environment

[3] Graicunas, V. A. "Relationship in Organization," in *Papers on the Science of Administration*, Institute of Public Administration, Columbia University, New York, 1937, pp. 183–187. Cited in: Albers, Henry H. *Organized Executive Action*, New York: John Wiley & Sons, 1961, pp. 75–77.

[4] Aiken, Michael and Jerald Hage. "Organizational Interdependence and Intra-Organizational Structure," mimeographed paper, 1967, also see Bass, B. M. *Leadership, Psychology and Organizational Behavior*, New York: Harper & Row, 1960, p. 343. (interaction complexity)
Udy, S. H., Jr. "Technical and Institutional Factors in Productive Organizations: A Preliminary Model," *American Journal of Sociology*, Vol. 67, 1961, pp. 247–254. (combined effort)

complexity. For these reasons, the medical component will be said to have high complexity and the non-medical component low complexity.[5]

Organizational Performance

The words, performance, efficiency, effectiveness, productivity, and degree of goal achievement are not clearly distinguishable in the literature on organizations. Different writers use different definitions which are not always explicitly stated.

In the context of the Entrepreneurial Theory we are concerned with the degree to which the owner's goals are achieved.

With respect to the hospitals in our sample, the assumption has been made that the goal with respect to the non-medical component is the production of a group of ancillary services in an efficient manner. The assumption has been made that the goal of the medical component of the hospital is high quality of medical care.

Efficiency and the Non-Medical Component of the Hospital

What we wish to measure is the cost of a standardized unit of service provided by this component of the hospital. The closest approximation possible will be to develop a cost-based measure of efficiency for a number of key departments for which we can measure their output in fairly constant terms.

Because there is no widely accepted cost-based measure of efficiency for this part of hospitals, this cost index of performance will have to be validated. This will be done by comparing the cost index to a number of other measures of non-medical component efficiency. These include a measure of output per man-hour, a rating by a panel of hospital experts and the evaluation of the surveyor of the Joint Commission on the Accreditation of Hospitals.

These measures are described and validated in Chapter V.

The Measurement of Quality of Care—(Physician Component of the Hospital)

What we wish to measure here is the quality of medical care provided by the physicians practicing in the hospital.[6]

[5] In addition, complexity measures will be obtained within both of these components to check for differences across the hospitals in our sample. In dividing the hospital into components, we have imposed a dichotomy on a continuous variable. Each job or department could be scaled on a continuous index of complexity. By using a dichotomy, and by excluding nursing which is halfway in between, we have covered up much of the subtler differences in complexity.

[6] It would be nice to equate quality of care with costs, but this is far beyond the current state of the art. Even the measurement of quality of care is widely regarded as exceedingly difficult if not absolutely impossible.

The most outstanding study of the quality of medical care provided in a hospital was done over a century ago and seems to be ignored in the current voluminous literature on this subject. This was done by Florence Nightingale at Scutari Hospital during the Crimean War (1854–1856). Before she came 420 soldiers out of 1,000 admitted died. Afterwards, only twenty-two soldiers out of 1,000 admitted died. As far as is known, these differences remain unquestioned to this day.[7]

Nightingale's observations show that the quality of medical care can be measured if the differences are great enough. This implies that the difference between a good and not-so-good hospital in the United States today is comparatively small, so that Nightingale's gross measure of quality is no longer adequate.

Added to the problem of developing refined measurement there has been some resistance to measuring the quality of care as reflected in the (until very recently) widely held professional ideology that "There is only one level of medical care: the very best."[8] Sidel states some of the reasons for this.

> The demonstration of a less than optimal result may lead to criticism or legal action against the physician or hospital and, even if it can be "proven" that the care given was up to standards prevailing in the community, the physician or institution suffers from the criticism. As in many professional groups, it is very difficult to induce physicians to criticize the results obtained by colleagues.[9]

There is very little point in undertaking a major review of the literature on the measurement of quality of care because there are several extensive bibliographies and reviews of this literature already available.[10]

[7] Strachey, Lytton. *Eminent Victorians,* New York: Capricorn Books, 1963, p. 154. Perhaps Strachey would have been delighted to debunk her impact at Scutari, but even he does not.

[8] McNerney, Walter *et al. Hospital and Medical Economics,* Hospital Research and Educational Trust, Chicago, 1962, Vol. I, p. 622, and Vol. II, p. 1288.

[9] Sidel, Victor W. "Techniques for Assessment: Validity and Limitations," paper presented at First National Congress on Socioeconomics of Health Care, January, 1967, A.M.A., Chicago, p. 3.

[10] Sidel, *op cit.*

Shapiro, Sam. "End Result Measurements of Quality of Care," *Milbank Memorial Fund Quarterly,* Vol. 45, No. 7, 1967.

Sheps, M. C. "Approaches to Measuring Hospital Care Quality," *Public Health Reports,* Vol. 70, February, 1955, p. 198; September, 1955, p. 877.

Peterson, Osler. "Medical Care in the U.S.," *Scientific American,* Vol. 209, No. 2, August, 1963, pp. 19–27.

Price, Philip, Calvin Taylor, James Richards, and Tony Jacobsen. *Performance Measures of Physicians,* University of Utah, August, 1963, mimeographed.

Peterson, Osler. "Medical Care: Its Social and Organizational Aspects: Evalua-

The techniques used to measure quality of medical care can be divided into four types: (*a*) structural measures, (*b*) process measures, (*c*) general attitudinal measures, and (*d*) end result measures. Examples of each type are listed in Table 2-I.

TABLE 2-I

SUMMARY OF TECHNIQUES USED TO MEASURE THE QUALITY OF MEDICAL CARE*

Structural Measures
Scope of Services Offered
Quality of Physician Education
Percent of Residency Positions Filled (teaching hospitals)
Process Measures
Appropriate Use of Treatment Techniques
Observation of Medical Practice
Record Review
Medical Errors
Expert Evaluation
Outside Expert Evaluation
The Medical Staff's Self-Evaluation
Where Physicians, Themselves, Get Treatment
Accreditation
End-Result Measures
Death Rates, Survival Rates
Disability Rates, Days of Work Loss by Patient Population
Infection Rates
Adverse Drug Reactions
Patient Satisfaction

* This list is meant to be suggestive rather than exhaustive.

Structural Measures

The structural measures consist of characteristics of hospitals which are presumed to reflect quality of medical care. These measures include the following: Scope of Services available in the hospital,[11] Quality of Physician Education,[12] and Percent of Internship and Residency Positions filled[13] among others.

With respect to the education of the medical staff, Lyden, *et al.* in their study of medical school graduates found a "High and low road" of medical training.[14] The poor students (as judged by admissions test scores) tended to go to poorer quality medical schools, had low test scores, took their internships in non-medical school affiliated hospitals and became general practitioners. The good students tended to finish in the top half of their class, went on to internships and residencies in major teaching hospitals and became specialists. The best students tended to go into teaching and research rather than full time practice.

Therefore, an index of quality of care will be developed based on the extent and quality of training of the medical staff.

Process Measures

This technique requires looking at hospital activities (processes) which are presumed conducive to high quality of care. One major technique here is to have physicians observe and evaluate the practice of other physicians.[15] An alternative to this is to analyze the medical records to see if appropriate activities have been carried out.[16]

The process approach includes efforts to get at specific indices of physician behavior such as the number of single unit transfusions given,[17]

tion of the Quality of Medical Care," *New England Journal of Medicine,* Vol. 269, December 5, 1963, pp. 1238–1245.

Rosenfeld, Leonard S. "Quality of Medical Care in Hospitals," *American Journal of Public Health,* Vol. 47, July, 1957, pp. 856–865.

Ellwood, Paul. "Quantitative Measurement of Patient Care Quality," *Hospitals JAHA,* Vol. 40, December 1, 1966, p. 42, December 16, 1966, p. 59.

Kerr, Markay and Don Trantow. *Defining, Measuring and Assessing the Quality of Health Service: An Annotated Bibliography,* Minneapolis, Institute for Interdisciplinary Studies, American Rehabilitation Foundation, no date, mimeographed.

DeGeyndt, Willy and Karen Ross. *Evaluation of Health Programs: An Annotated Bibliography,* Minneapolis: Systems Development Project, September, 1968.

Kurtz, Norman and Thelma Zwerdling. *Explorations on Quality of Medical Care,* Michigan Health and Social Security Research Institute and Brandeis University, February 27, 1969.

DeGeyndt, Willy. "Five Approaches for Assessing the Quality of Care," *Hospital Administration,* Winter, 1970, Vol. 15, No. 1, pp. 21–42.

[11] Roemer, Milton, A. T. Moustafa, and C. E. Hopkins. "A Proposed Hospital Quality Index: Hospital Death Rates Adjusted for Case Severity," *Health Services Research,* Vol. 3, No. 2, Summer, 1968, p. 96.

[12] Peterson, Osler, Fremont Leyden, H. J. Gerger and Theodore Colton. "Appraisal of Medical Student's Abilities as Related to Training Careers After Graduation," *New England Journal of Medicine,* Vol. 269, No. 28, 1963, pp. 1174–1182.

[13] Carroll, Jean. "The Structure of Teaching Hospitals," unpublished Ph.D. dissertation, Department of Sociology, University of Chicago, 1969, p. 20.

[14] Lyden, Fremont J., H. Jack Geiger, and Osler L. Peterson. *The Training of Good Physicians,* Cambridge: Harvard University Press, 1968. Also Osler L. Peterson, "Medical Care in the U.S.," *Scientific American,* August, 1963, Vol. 209, No. 2, pp. 19–27.

[15] Peterson, Osler L., L. P. Andrews, R. S. Spain, B. G. Greenberg. "An Analytical Study of North Carolina General Practice 1953–1954." *Journal of Medical Education,* Vol. 31, Part 2, Dec., 1956. Kenneth Clute, *The General Practitioner: A Study of Medical Education and Practice in Ontario and Nova Scotia,* Toronto: University of Toronto Press, 1963.

[16] *A Study of the Quality of Hospital Care Secured by a Sample of Teamster Family Members in New York City,* New York, School of Public Health and Administrative Medicine, Columbia University, 1964.

[17] Sidel, *op cit.* Single unit transfusions are presumed to be inappropriate because the average adult can do without a pint of blood and a transfusion runs risks of infection, miss-matching and such.

the number of medical errors, the use of a stethoscope in patient examination, and so forth.

In his landmark study of the quality of medical practice of North Carolina physicians, Osler Peterson[18] observed the office practice of a number of physicians and found a wide range of levels of skill in the provision of medical care. He tried to explain these differences in competence and found that the strongest predictor of level of competence was the quality of physician training. The best physicians were those in the top half of their class at medical school and who had more training as interns and residents in medical school affiliated hospitals. A similar study was carried out in Canada by Clute.[19] He found that the good physicians were those who had more internship and residency training in teaching hospitals. Unfortunately, this detailed observation of physician activities is far beyond the scope of this study.

Expert Evaluation Measures

These include to varying degrees, evaluation of structure, process, and end results. One way to measure the quality of care is to ask for the opinions of physicians. Georgopoulos and Mann[20] asked physicians to evaluate their own hospital on a seven point scale. These physicians apparently did not know about the other seven hospitals in that sample.

A more preferable method was used by Denton, *et al*[21] who had a number of physicians rank each of a group of teaching hospitals on a five point scale. The physicians were familiar with the hospitals they ranked, but were not associated with them. This study obtained a very high mean inter-rater reliability (+.89) suggesting that these raters were all evaluating these hospitals according to the same criteria.

A somewhat different technique is to find out where physicians send their own family members for care when they are ill. The assumption behind this is that physicians will know good quality and will seek it for their family.[22]

The survey of the hospital by the Joint Commission on the Accreditation of Hospitals (JCAH) might also be included in the category of expert evaluation although their primary emphasis is on structural characteristics of the hospital. Accreditation, per se, cannot be used as a measure because all of the hospitals in our sample are accredited. However, the JCAH's physician surveyor evaluated twenty areas of the hospital separately by use of a questionnaire which the surveyor completes.[23] These evaluations are kept on file at the JCAH headquarters. We will undertake to develop a quality of care index based on these data.

[18] Peterson, O., *op cit.*

[19] Clute, K., *op cit.*

[20] Georgopoulos and Mann, *op cit.*, Ch. 5, esp. p. 223.

[21] Denton, John C., Amosa B. Ford, Ralph E. Liske, Robert S. Ort. "Predicting Judged Quality of Patient Care in General Hospitals," *Health Services Research*, Spring, 1967, pp. 26–33, esp. p. 29.

[22] Maloney, M. C., R. E. Trussell, and J. Elinson. "Physicians Choose Medical Care: A Socioeconomic Approach to Quality Appraisal," *American Journal of Public Health*, Vol. 50, 1960, p. 1678.
Bynder, Herbert. "Doctors as Patients: A Study of the Medical Care of Physicians and their Families," *Medical Care*, March-April, 1968, Vol. 6, No. 2, pp. 157–167.

End Result Measures

The major method here is to measure differences in death rates. This requires some control for differences in the severity of illness. Lipworth, *et al*[24] looked at death rates for certain types of patients. Roemer, *et al*[25] developed a death rate index which they say controls for differences in severity of illness. There are a number of other similar studies.[26]

Some other studies have attempted to look at separate populations served by different medical care systems and compare the number of disability days, or the number of days lost from work due to illness.[27] This could not be used here because of our inability both to define the population served by these hospitals and to measure that population's level of health.

More narrow measures look at hospital infection rates, patient accidents, and so forth. Some of these measures are fraught with difficulty because definitions of an infection or an accident are very flexible and vague.

Patient attitudes about the care they have received is used from time to time particularly to evaluate the non-technical aspects of their care. Because patients are not experts, this has its limitations.

In choosing the measures of quality of care, we were faced with picking those measures which have been shown to be reliable, obtainable

[23] Sample copies of the questionnaires can be found in *Five Basic Publications of Joint Commission on Accreditation of Hospitals*, Chicago, Joint Commission on Accreditation of Hospitals, December, 1965.

[24] Lipworth, L., J. A. H. Lee, and J. N. Morse. "Case-Fatality in Teaching and Non-Teaching Hospitals," *Medical Care*, Vol. 1, p. 71, April-June, 1963.
Roemer, M. I. "Is Surgery Safer in Larger Hospitals?" *Hospital Management*, Vol. 87, January, 1959, p. 53.

[25] Roemer, Milton I., A. T. Moustafa, and C. E. Hopkins. "A Proposed Hospital Quality Index: Hospital Death Rates Adjusted for Case Severity," *Health Services Research*, Summer, 1968, pp. 96–118. Also Roemer, M. I., *et al.* "Hospital Death Rates as a Quality Index," *Hospital JAHA*, November 1, 1968, Vol. 42, p. 43.

[26] Sidel, *op cit.*

[27] Shaprio, *op cit.*

without inordinate effort, and broad gage enough to reflect overall quality of care rather than some narrow aspect of it.

We were not in a position to either undertake a detailed analysis of medical records or send our own experts to each hospital. We had to rely on experts who were already familiar with these hospitals. It was also felt that the experts should not have any affiliation with the hospitals they were evaluating. The high interrater reliability obtained by Denton, et al, suggested that this technique should be used, as the way to tap into local expert knowledge about these hospitals. This is our first measure of quality of care.

We were exceedingly fortunate to be one of the first outside researchers to have access to the files of the Joint Commission on the Accreditation of Hospitals. These files contain a wealth of information on hospital performance with particular reference to quality of medical care. Indices based on these data constitute our second measure.

It seemed particularly important that we have an end-result measure of quality of care. The severity adjusted death rate index of Roemer, *et al*, has been validated and is derived from reliable statistical information (unlike infection rates), and is readily obtainable. This is our third measure.

Our fourth measure is based on the average quality of education of the medical staff. The work of Peterson and Lyden suggests the usefulness of this measure. These measures will be described in detail in Chapter VII.

Specification of Procedures

According to March and Simon, there are three basic approaches to the measurement of specification of procedures: (*a*) structural, (*b*) attitudinal, and (*c*) observational.[28]

The structural measure consists of indices based on the existence and extent of such procedure-specifying activities as budgets, job descriptions, procedure manuals, written rules, etc. The assumption is that the more of these constraints the higher the specification of procedures.

The attitudinal measures consist of asking organizational members the degree to which they think work activities are defined by their superiors.

The observational measure requires that the researcher observe organizational behavior to find out the degree of specification of procedures. This requires spending a considerable amount of time in each organization and is, therefore, beyond the scope of this study. The benefits of the structural measure are that it is easily obtained, based on comparatively clear cut definitions, comparable across organizations, and can be the basis for a measurement scale with a known zero point. The advantage of the attitudinal approach is that it is more likely to avoid the potential discrepancy (if any) between formal rules and actual practice. Its drawback is that the employees may have no basis to judge the comparative standing of their organization. Because of these differences, we will obtain both types of measures of specification of procedures.

[28] March, James G., and Herbert A. Simon. *Organizations,* New York: John Wiley & Sons, Inc., 1966, p. 142.

Visibility of Consequences (Managerial Awareness)

With respect to the Entrepreneurial Theory, visibility of consequences is defined as: The degree to which the outcome of procedure-resource interactions in the organization are knowable and known to the owner or his agent.

"Knowable" implies that there are different technologies, or environments which either enhance or diminish visibility. Aspects of this are the degree to which it is easy to measure the quality of the product produced and the degree to which the organization's competitive standing is known. The "known" aspect reflects the owner's awareness of performance. Needless to say, that former structural aspect and latter awareness aspect of visibility are potentially closely related.

Because we will be looking at a similar type of hospital, the structural ("knowable") aspect of visibility is fairly constant for all our organizations because they are all producing substantially the same product and service.

Therefore, the awareness ("known") aspect of visibility of consequences is more appropriate here. In addition, the awareness aspect is most relevant to the owner-oriented Entrepreneurial Theory. There appears to be no known attempt in the literature to measure this phenomenon.

We plan to obtain separate measures of visibility of consequences for both the medical and non-medical components of these hospitals. This will be done by asking the administrator and board chairman to tell us his perception of his hospital's comparative standing on a number of basic aspects of medical and non-medical performances. Then we will compare his perception with the hospital's true comparative standing. The more accurate his perception the higher the visibility of consequences.[29]

This measure is discussed in more detail in Chapter V.

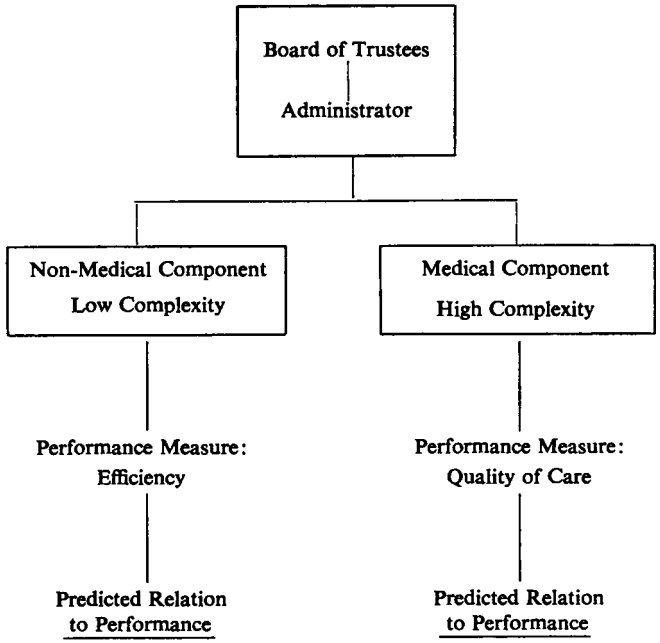
[29] The assumption here is that in order to know the consequences of the owner's actions he must have a clear understanding of the performance of his organization. For real-world organizations this measure of performance must be relative to some standard: either (*a*) this year's performance compared to last year's performance

Reports

The existence of reports will be measured by a checklist of types of reports and the frequency with which they are produced (monthly, quarterly, yearly) for each hospital in the sample.

TABLE 2-II

THE CONCEPTUALIZATION OF THE HOSPITAL, VARIABLES USED, AND HYPOTHESES TO BE TESTED



Specification of Procedures (P+)	+	−
Reports (R)	+	+
Visibility of Consequences (C_v)	+	+

both in the owner's organization or (*b*) current performance in the owner's organization compared to current performance in other similar organizations. The first requires knowledge of the owner's organization, only. The second requires knowledge of both the owner's organization and other organizations. For this reason, the second comparison calls for a higher level of awareness on the part of the owner, and is therefore, a more exacting measure of visibility of consequences.

Of course, even if these reports exist, they may or may not be used by management. For this reason reports are not expected to be perfectly related to visibility of consequences (managerial awareness).

Summary

The Entrepreneurial Theory and the definitions of the variables used here yield a simplified view of the hospital as an organization. A useful theory should simplify a highly complex reality and extract the important elements and their relationships. By way of summary, the key variables, hypotheses, and our conceptualization of the hospital are shown in Table 2-II.

CHAPTER IV

THE SAMPLE

The sample used here consists of thirty medium-sized, short term, general, non-profit, community hospitals in the greater Chicago area. These hospitals were chosen to be as similar to each other as reasonably possible, in order to eliminate gross variation in types of patients treated and variation in treatment styles.

These hospitals are all *non-profit* corporations.[1] This excludes proprietary (for profit) hospitals, city, county, state and federal hospitals.

These hospitals are all *medium-sized.* All have at least one hundred beds and none has more than five hundred and fifty beds. In this way, we hope to avoid size effect which has been noted to occur somewhere below one hundred beds.[2] The distribution of the sample hospitals by size, measured by the number of beds, is as follows:

Hospital Size (Number of Beds)	100–	200–	300–	400–	500–	Total
Number of Hospitals	9	8	7	2	4	30

They are all *short term* or acute care hospitals. That is the average length of patient stay (ALOS) in these hospitals is under thirty days. This excludes chronic disease, mental and tuberculosis hospitals, nursing homes and old age homes. The distribution of average length of stay is as follows:

Average Length of Patient Stay in Days	7–	8–	9–	10–	11–	12+	Total
Number of Hospitals	4	5	10	6	2	3	30

Since these are *general hospitals,* they admit patients with a wide range of illnesses. Thus, special hospitals such as children's hospitals and eye and ear hospitals are excluded.

They are all *community* hospitals and have the primary goal of good patient care compared with medical-school affiliated teaching hospitals which expend much more of their resources and efforts in teaching

[1] For precise definitions, see the yearly "Guide Issue" of *Hospitals, JAHA.*

[2] Neuhauser, Duncan. "Hospital Size and Structure," *Proceedings of the Ninth Annual Undergraduate Symposium on Hospital Affairs,* December, 1966, Chicago Graduate Program in Hospital Administration, University of Chicago, 1967.

medical students, interns, and residents and on medical research. This constraint excludes the largest Chicago hospitals. However, some of the hospitals in this sample have comparatively modest residency programs usually filled with foreign medical school graduates. Since the selection of this sample, a number of these hospitals have undertaken medical school affiliations. This will undoubtedly change them in the future, but this did not have any effect at the time this study was carried out.

To those unfamiliar with hospitals, this sample may appear to reflect a very special type of hospital. However, they are fairly typical hospitals.

By the choice of this sample, we have controlled (1) for major differences in technology, (2) major differences in size, and (3) for differences in organizational goals. The goal of these hospitals is to provide good quality care at a reasonable cost.

These hospitals are in one contiguous area so that their quality of care can be evaluated by physicians who are familiar with many of them. This could not be done if the hospitals were spread all over the country. By being in one area, variance in costs due to regional differences in salaries and wages and costs of supplies are minimized. Thus the impact, if any, of state and city laws is uniform.

The final criterion for the selection of this sample is that these hospitals participate in the Hospital Administration Services (HAS) data collection program. Hospitals may voluntarily subscribe to HAS for a modest fee and over half of Chicago hospitals do so. HAS is a subsidiary of the American Hospital Association. Each participating hospital sends in a monthly cost, manhour, and statistical report using standardized definitions. HAS keypunches these reports and, with the use of a computer, compiles statistics for each hospital and averages for various categories of hospitals. These monthly reports are returned to each participating hospital. In this way, the hospital is provided with basic statistics and a comparison with other hospitals in the same region and of the same size. The reason for our using HAS hospitals is to obtain cost, manhour, and output figures based on the same standardized definitions. To see if HAS hospitals differ from non-participating hospitals a number of non-participating hospitals have been included. As a result, 26 out of the 30 hospitals participated in HAS. In general, it was quite difficult to obtain comparable figures for non-participating hospitals and this is why only four are included.

Participation in HAS is often nominal. Some participating hospitals do not turn in their monthly reports routinely, and in some cases they have not turned in their data for periods exceeding a year. Occasionally the hospitals make errors in reporting and occasionally HAS makes key-

punching errors. The HAS reports had to be checked for these errors and for the problems resulting from failure to report information. Once this was done these reports appeared to be reliable. To double check these figures, they were compared with other internal operating reports and with the reports required for participation in Medicare.

Of these thirty hospitals it was impossible to collect sufficient information on three of them, partly because their business offices were in difficulty. These three hospitals have been excluded from most of the main analysis, but are described in Chapter X as brief case studies.

CHAPTER V

THE OPERATIONAL MEASURES FOR THE NON-MEDICAL COMPONENT

Herein the operational measures are defined and validated for the non-medical component of the hospital.

Efficiency (Non-Medical Component)

Five separate measures were obtained:

(1) Cost Index ($)
(2) Man-Hour Index (MH)
(3) Joint Commission on Accreditation of Hospitals (JCAH) Evaluation Index
(4) Expert Opinion Index (EE)
(5) Occupancy Rate (Ø)

(1) INDEX OF COSTS PER PATIENT DAY AND INDEX OF MAN-HOURS PER PATIENT DAY

Both of these indices are derived in the same way. They are based on the per unit costs of seven departments. These departments are dietary, housekeeping, laundry, medical records, pharmacy, laboratories, and X-ray. These seven were chosen because (*a*) they constitute important cost centers in the hospital, (*b*) they fall within the non-medical component of the hospital, and (*c*) their output can be measured in fairly constant units. Nursing has been excluded because there were no adequate output measures available. These per unit cost and man-hour figures were obtained primarily from the HAS data or comparable sources. These data were checked for errors, and where possible, verified comparison to other hospital records.

The per unit costs were obtained for each of the seven departments listed in column (*a*) of Table 5-I. The mean number of units of output per patient day for each of these departments was obtained for these twenty-seven hospitals. These mean output levels are shown for each department in column (*c*) of Table 5-I. For example, the average pharmacy in these twenty-seven hospitals filled 1.78 prescriptions per patient day. The cost index was obtained for each hospital by multiplying that hospital's per unit cost with the average level of output per patient

day for each department and summing across the seven departments. Mathematically for each hospital:

$$\$_a = \sum_{i=1}^{7} C_i \bar{U}_i$$

TABLE 5-I

THE COMPONENTS OF THE COST INDEX OF EFFICIENCY

(*a*) Department*	(*b*) Units of Output	(*c*) Mean Units of Output per Patient Day ($\bar{U}i$)	(*d*) Mean per Unit Departmental Costs (Ci)	(*e*) Mean Departmental Costs per Patient Day (*c*)×(*d*)
Laundry.....	Pounds of laundry processed	15.30 pounds	$0.096	1.469
Housekeeping.....	Square feet of floor space†	25.79 sq. ft.	$0.111	2.863
Dietary.....	Meals served	4.74 meals	$1.402	6.645
Pharmacy.....	Prescriptions filled	1.78 prescriptions filled	$1.497	2.665
Medical Records..	Per discharge‡ (reciprocal of average length of stay)	0.104 discharges	$8.245	0.857
Laboratory.....	Tests performed	2.58 tests	$1.951	5.034
X-ray.....	Exams	0.38 exams	$9.685	3.680
The Mean of the Cost Index ($)			Total:	$23.25§

* These costs include salaries and wages of departmental employees, supplies and raw materials. They exclude overhead and depreciation on equipment and plant. Thus, these are "direct costs." These costs are based on the standardized accounting definitions of the American Hospital Association's *Uniform Chart of Accounts and Definitions for Hospitals*, American Hospital Association, Chicago, 1965.

These cost and output measures for each hospital are based on twelve-month averages for the period ending in November 1968. Thus, these costs are "smoothed out" over a year and, therefore, avoid seasonal differences in patient loads.

† This housekeeping unit of output is obtained by dividing the total number of square feet in the building by the average daily census for each hospital and then taking the mean value for all hospitals.

‡ The medical records department is primarily involved in processing the patient's written medical record after the patient's discharge or death. Therefore, the most appropriate and measurable unit of output is the number of discharges and deaths. In the United States it is customary to record admissions rather than discharges and deaths. Over the period of a year and excluding newborns, the number of admissions is very close approximation of the number of discharges and deaths. For this reason admissions are used here. Because we are using a cost index per patient day, we have divided the number of admissions by the number of patient days (Admissions per Patient Day = 1/average length of stay) to spread out the cost. Thus, the average medical record department in these twenty-seven hospitals processes 0.104 medical records per patient day.

§ This sum was obtained by computer; while the rest of column (*e*) was calculated by hand. Therefore, there is a small rounding error here.

where $\$_a$ is the cost index for hospital a, C_i the actual per unit cost for department i, and $\bar{U}_i$ the mean number of units of output per patient day for the i^{th} departments in all twenty-seven hospitals.

In this way we have attempted to develop an efficiency index for the non-medical component based on a standardized level of outputs. This index excludes differences in costs due to differences in scope of services provided and differences in volume of services produced per patient day. The former is excluded in order to obtain a standard unit of output and the latter is excluded because these differences are largely due to decisions made in the medical component of the hospital. This will be discussed in more detail later on.

The mean per unit departmental costs for all twenty-seven hospitals ($\bar{U}_i$) are shown in column (*d*) of Table 5-I. By multiplying the mean number of units of output per patient day shown in column (*c*) by the mean departmental per unit costs shown in column (*d*) and summing, we obtain the mean of the Cost Index which is $23.25 for the average hospital in this sample.

The Man-Hour Index is derived in the same way, but instead of using per unit costs it uses employee man-hours per unit of output. See Table 5-II.

TABLE 5-II

THE COMPONENTS OF THE MAN-HOUR INDEX OF EFFICIENCY

(*a*) Department	(*c*) Mean Units of Output per Patient Day	(*d*) Mean per Unit Departmental Man-Hours	Mean Departmental Man-Hours per Patient Day (*c*)×(*d*)
Laundry.....	15.30 pounds	0.0344	0.526
Housekeeping.....	25.79 sq. ft.	0.0410	1.057
Dietary.....	4.74 meals	0.3118	1.478
Pharmacy.....	1.78 prescriptions	0.0848	0.151
Medical Records.....	0.104 discharges	2.5159	0.262
Laboratory.....	2.58 tests	0.3096	0.799
X-ray.....	0.38 exams	1.2259	0.466
The Mean of the Man-Hour Index		Total:	4.74

These indices do not appear to be picking up differences in capital expenditures, average length of stay, administrative overhead or quality of care. The evidence to support this contention is found in Chapter IX.

These two indices are designed so that the higher the costs and man-hours the lower the efficiency. As Table III shows, the mean of the cost

index is $23.25 and accounts for about one-third of total hospital costs which are $68.96 per patient day. Table III shows that the correlations between our cost index, and total cost (+.268) and total revenue (+.218) are small compared to the correlation between total cost and total revenue (+.913). This is in part because the index controls for differences in volume of services provided by each hospital. For example, one hospital may provide four laboratory tests per average patient day while another hospital may provide only one laboratory test per average patient day. This difference is controlled for in our cost index, because it results primarily from physician decisions, but it would be picked up by the total cost and total revenue figures. Secondly, some hospitals provide certain services (say, physical therapy) while others do not. This difference in scope of services being provided is not picked up in the cost index, but is picked up in the total cost and total revenue

TABLE 5-III

COSTS PER PATIENT DAY (PPD)

	Mean	Standard Deviation
Cost Index	$23.25	3.42
Total Cost PPD	$68.96	11.58
Total Revenue PPD	$75.02	10.13

Correlations*

	Total Cost PPD	Total Revenue PPD
Cost Index	+.268	+.218
Total Cost PPD		+.913†

n = 27.

* All correlations shown in this and other tables without parentheses are Pearson Product Moment Correlations. Statistical Significance Levels here and elsewhere for these correlations are from H. Walker and J. Lev. *Statistical Inference*, New York: Holt, Rinehart and Winston, 1953, Table XI, p. 470.

† $p < .005$.

figures. Thus the effects of different styles of medical practice (volume of services used) and scope of services provided are both taken out of our cost and man-hour indices. The resultant cost index is therefore presumed to pick up differences in efficiency within the non-medical component.

The cost index is the preferred measure of efficiency for the non-medical component compared with the man-hour index because it includes differences in salaries paid, differences in skill levels, and includes the cost of supplies.[1]

(2) MEAN EXPERT EVALUATION AS A MEASURE OF NON-MEDICAL EFFICIENCY

Seven experts with extensive familiarity with the hospitals in this sample were asked to evaluate the operating efficiency of these hospitals on a five-point scale where "1" is least efficient and "5" is most efficient.

None of these experts were employed by these hospitals and none were physicians. Their backgrounds were in administration. Each of these experts was asked if he would recommend other experts whose opinions about these hospitals were thought to be reliable. Sociometrically, these experts formed a fairly closed group. That is to say, each expert recommended most or all of the other experts on this panel, but rarely recommended anyone outside the panel.

After each expert evaluated the non-medical component of these hospitals, he verbally described the criteria he used. It turned out that each expert tended to focus on slightly different aspects of efficiency. There was no point in imposing a single criterion on all these experts, because they were all knowledgeable about, and concerned with somewhat different aspects of these hospitals. Each expert is listed by number in Table 5-IV where an outline of his reported criteria is given. In this process we have tried to maintain anonymity. The interrater reliability of these seven experts is shown in Table 5-V. The number of hospitals in each cell of Table 5-V varies according to the number of hospitals the experts evaluated.

The correlations in Table 5-V show a high degree of interrater reliability in spite of the fact that the experts used different criteria to measure efficiency. A mean expert evaluation score was also obtained. To do this the individual expert scores were recalibrated so that each had the same mean score and then the scores for each hospital were summed and divided by the number of evaluations. This was done so that an evaluator with a higher than average mean score would not be given undue weight in the aggregate score. This mean expert evaluation score will be one of our five measures of efficiency.

[1] This is true only because these hospitals are in the same area and therefore, differences in wage rates due to region are minimized. Presumably these hospitals all face the same labor market and any differences in wages are due to factors somewhat under the hospital's control. For example, a well-run hospital may be able to pay their workers less because it is pleasant to work there. If these hospitals were spread over the country, then the man-hour index may be preferred.

(3) THE JOINT COMMISSION ON ACCREDITATION OF HOSPITALS (JCAH) EVALUATION INDEX

Every three years each of the hospitals in this sample is evaluated by the JCAH for the purpose of accreditation. All these hospitals are accredited so this could not be the basis for the index. However, the files of the JCAH provide sufficient information to overcome this lack of variation. A physician evaluator in the full time employ of the JCAH evaluates up to twenty different areas of hospital operations. The evaluation of the following areas was used to compile this efficiency index.[2]

TABLE 5-IV

CRITERIA USED BY THE SEVEN EXPERTS TO EVALUATE HOSPITAL EFFICIENCY

(1) This evaluator made an effort to separate operating efficiency from how well the hospital served its community, using the former as his criterion. He said one of these hospitals had no reason for existence and that none of these hospitals were really well administered. He tended to stress the competence of the administrator and the competence of his assistants.

(2) He evaluated the hospitals on the criteria of "the biggest bang for the buck." For him none of these hospitals were so badly run to rate the lowest score.

(3) He evaluated the hospital on the basis of adequacy of the physical plant, compliance with standards, complaints from the public, and the adequacy of hospital staffing. In the best hospital he perceived a very personal concern over each patient as an individual.

(4) This evaluator filled out the questionnaire, "with a greater weight being given to what I would broadly term 'social effectiveness'—doing what needs to be done vis-a-vis health care needs for the public" rather than the dollar and cents record. For example, he thought one hospital was run purely for the benefit of the doctors rather than the community and he gave this hospital a low score.

5) He used the existence of good financial reporting, administrative cmpetence, concern for the future of the hospital, and the administrator's rapport with the board and the medical staff. One hospital got a low score for failure to have adequate financial records and another for nepotism.

(6) This person tended to evaluate the hospitals largely by his opinion of the administrator.

(7) He evaluated the hospital in part by the administrator, and in part by the physical plant of the hospital. He thought there were some good administrators in old hospitals in which case the hospital received an average score.

(1) Administration
(2) Physical Plant
(3) Medical Records
(4) Nursing
(5) Pharmacy
(6) Dietary

[2] These departments are different from those used to compile the cost and man-hour indices. There are several reasons for this. The JCAH does not divide the hospital up into the same categories as HAS does and even when they do, they subsume different concepts. For example, "plant" in HAS includes the salaries of the maintenance men, electricity costs, and the costs of running the steam plant. By contrast, the JCAH "physical plant" category appears to refer to the surveyor's opinion of the adequacy of the hospital buildings and a variety of other miscellaneous topics. The JCAH categories which appear to be most relevant to the administrative component have been included in this list. X-ray and laboratories have been excluded because the JCAH surveyor's comments are not concerned with costs but rather with the implications for the quality of medical care.

The following scoring system was used for each of these areas:

Unacceptable	1
Unacceptable/Acceptable (Half-way between)	3
Acceptable but with Major Problems Noted	4
Acceptable, No Major Problems Noted	5

Then the score for each department was summed. This gives a maximum possible score of thirty. The unacceptable category was given a somewhat lower score because all the other scores are variations on an acceptable rating.

TABLE 5-V

INTERRATER RELIABILITY FOR SEVEN EXPERT EVALUATIONS OF HOSPITAL EFFICIENCY

Correlations* Expert Raters

	2	3	4	5	6	7
Expert Rater 1	+.628†	+.711†	+.487†	+.658†	+.679†	+.414
2		+.582†	+.525†	+.706†	+.734†	+.554†
3			+.611†	+.663†	+.555†	+.659†
4				+.563†	+.688†	+.171
5					+.793†	+.483
6						+.273

Number of Observations

	2	3	4	5	6	7
Expert Rater 1	29	23	29	30	26	14
2		23	29	29	25	13
3			23	23	23	12
4				29	25	13
5					26	14
6						14

* Significance levels here and elsewhere taken from Walker, H., and J. Lev. *Statistical Inference*, New York: Holt, Rinehart, and Winston, 1953, Table XI, p. 470. All correlations shown without parentheses are Pearson Product Moment Correlations.

Some of the comments made by the JCAH surveyors are worth noting. The JCAH surveyors almost invariably praised the administrators of these hospitals. To quote a few:

"The administrator is conscientious, capable, experienced, and energetic.
"The administrator has an excellent background, good perspective of medico-administrative aspects of his hospital."
"An excellent administrator."

In a hospital which the Chicago experts considered to be poorly adminis-

tered the JCAH surveyor described the administrator as having "of average ability." This was about the least flattering statement made about the administrators of these thirty hospitals by the JCAH surveyors. It appears that the Chicago experts were much more critical than were the JCAH surveyors.[3]

Some representative comments by the JCAH surveyors about the other administrative areas of these hospitals may give some idea of their concerns.

Medical Records:
- "150–200 delinquent charts"
- "lack of information in the record"
- "many deficiencies in the sample records"
- "the attending MD's fail to correct the spelling of foreign graduates in the medical records"

Physical Plant:
- "not enough fire drill rehearsals"
- "undated fire extinguishers"
- "old and battered (building)"
- "old mattresses stored in the basement"
- "a safe clean hospital"
- "no emergency electricity for the elevators"
- "disaster plan not reviewed"

Nursing:
- "low staffing"
- "lots of foreign born RN's"
- "no patient care plan"

Pharmacy:
- "narcotic lockers are made of wood and could easily be broken"

Dietary:
- "crowded"
- "poor physical plant, old equipment, floor unsanitary and sloppy, general lack of cleanliness throughout"

It can be seen from these comments that the JCAH surveyors are not so much concerned with costs as with minimum standards of performances.[4]

(4) Occupancy Rate

This is the proportion of hospital beds filled with patients on an average day for a year's period of time.[5] This was included as a measure,

[3] The reason for this seems clear if one assumes that larger hospitals can afford to hire more experienced administrators. One might conclude that our sample of hospitals have better than average administrators, because they are larger in size than most hospitals surveyed by the JCAH.

[4] That the surveyors make more critical comments than laudatory ones should not be interpreted as a condemnation of the average hospital. It is just their task to look for problem areas.

[5] It is worth noting that this is yearly average occupancy rather than daily or weekly occupancy. The day to day fluctuations in occupancy are akin to the concept of moving along the firm's short run average cost curve. Many of the hospital's costs are fixed with respect to these short term fluctuations in occupancy. However, the hospital may be able to vary more of its costs to conform to long run average occupancy rates. Thus, the yearly average occupancy used here hardly reflects changes in the hospital's short run average cost curve.

ex-post facto, because it was found to be strongly correlated with the other measures of efficiency. This strong correlation is probably true because all our hospitals are over one hundred beds in size. In smaller hospitals the relationship between size and occupancy would seem to be stronger because of the partially random nature of hospital admissions.[6]

Validity of the Non-Medical (Administrative) Efficiency Measures

Hopefully the above discussion has brought out the complex and multifaceted nature of efficient administration. To check the validity of these measures they should be correlated with one another. These correlations are not expected to be perfect in part because of the different aspects of efficiency covered by each measure and in part because of lack of complete information on the part of the observers. Table 5-VI shows the results. First note that the cost and man-hour indices vary inversely with efficiency while the JCAH evaluation, expert evaluation

TABLE 5-VI

CORRELATIONS BETWEEN THE FIVE DIFFERENT MEASURES OF ADMINISTRATIVE EFFICIENCY

(Non-Medical Component, n=27)

	Cost Index ($)	Man-Hour Index (MH)	JCAH Evaluation (JCAH)	Occupancy Rate (Ø)
Average expert evaluation...	−.542† (−.605)	−.568† (−.547)	+.398* (+.453)	+.663† (+.686)
Cost index ($).....		+.632† (+.648)	−.505† (−.445)	−.445† (−.467)
Man-Hour index (MH).....			−.313 (−.369)	−.502† (−.525)
(JCAH).....				+.523† (+.612)

Pearson Product Moment Correlations are shown without parentheses. Immediately below them, Spearman rank order correlations are shown in parentheses. Here and in the following tables statistical significance levels are shown only for the product moment correlations for clarity of presentation.

* $p < .05$.
† $p < .005$.

[6] This correlation gives some support to Hage's suggestion that occupancy be used as a measure of organizational efficiency. Cambridge: The Commission on Hospital Care, *Hospital Care in the United States,* Harvard University Press, 1957, p. 278. Hage, Jerald "An Axiomatic Theory of Organizations," *Administrative Science Quarterly,* Vol. 10, 1965, pp. 289–320.

and occupancy rate measures vary directly with efficiency. These cost and man-hour indices are positively related to each other (+.632) and negatively related to the other measures of efficiency.

Table 5-VI shows that all the correlations are in the expected direction and that nine out of ten are statistically significant at the .05 level. These correlations provide good evidence that we are measuring efficiency. Now we can proceed to describe the measures of managerial performance.

Specification of Procedures (P+) for the Non-Medical Component

Five different measures of specification of procedures were obtained. The first is a perceptual measure and the rest are based on the existence of various formal controls.

(1) An index based on responses by department heads to three items on a questionnaire concerning the degree to which their subordinates work activities were defined to them. This is the perceived measure of specification of procedures (P+). The questions used for this measure are shown in Table 5-VII. The department heads asked were ordinarily those in charge of dietary, laundry, housekeeping, medical records, pharmacy and personnel. This is a continuous but truncated variable with a potential range of two to twelve. The mean for these twenty-seven hospitals is 9.17.

(2) Whether the hospital uses a budget or not, the budget is presumed to be a device for controlling operating costs by centralizing and defining decisions on expenditures.[7] Twenty out of the thirty hospitals in this sample used budgets. This is measured as a dichotomous variable.

TABLE 5-VII

QUESTIONS USED TO OBTAIN THE PERCEIVED MEASURE OF SPECIFICATION OF PROCEDURES FOR HOSPITAL WORKERS*

Most of the time there are rules which define what people (employees) around here are supposed to do. (*Check one*)†

.....(1) I very strongly agree
.....(2) Strongly agree
.....(3) Mildly agree
.....(4) Mildly disagree
.....(5) Strongly disagree
.....(6) Very strongly disagree

How things are done here is left up to the employee doing the work. (*Check one*)‡

.....(1) I very strongly agree
.....(2) Strongly agree
.....(3) Mildly agree
.....(4) Mildly disagree
.....(5) Strongly disagree
.....(6) Very strongly disagree

* The scoring of the first question was reversed in deriving the Perceived Worker Specification of Production Procedure Score.

† Adapted from Georgopoulos and Mann, *op. cit.*, pp. 642–646.

‡ Adapted from Aiken, Michael, and Jerald Hage. "Organizational Alienation: A Comparative Analysis," *American Sociological Review*, Vol. 31, no. 4, August, 1966, p. 497.

(3) The use of a position control. This is a system for constraining the number of employees in each department in each job classification. Sixteen out of these thirty hospitals have a position control. This is measured as a dichotomous variable.

(4) The use of a salary control system. This defines starting salaries and periodic salary increments for each type of hospital employee. Twenty-five out of these thirty hospitals have a salary control system. This is measured as a dichotomous variable.

(5) The use of written job descriptions. These define the tasks to be performed by each employee. Thirteen out of the thirty hospitals have all hospital personnel covered by job descriptions. This is measured by the percent of employees covered by job descriptions and, therefore varies from zero to one hundred.

Of these measures, those most closely related to the theoretical concept of specification of procedures are the measures of perceived specification of procedures (#1), and the percent of employees covered by job descriptions (#5). This is because they most closely reflect constraints on worker behavior.

The correlations between all five of these variables are shown in Table 5-VIII. This table shows that these different measures of Specification of Procedures are positively correlated with each other. The two preferred measures have a correlation of +.432. That the perceived measure and the other measures which rely on formal controls are positively correlated is worthy of note considering the long controversy over the difference between perceived and formal rules in organization theory.

Visibility of Consequences (Non-Medical Component)

This is measured by how accurately the administrator knows how his hospital compares with other similar hospitals in the area. The administrator was asked to rank his hospital on a five-point scale as to whether his hospital had lower, the same, or higher (*a*) occupancy rate, (*b*) average length of stay, (*c*) direct cost per meal, (*d*) direct cost per hundred pounds of laundry processed, (*e*) staffing ratio, (*f*) per diem cost, and (*g*) overall operating efficiency. The questionnaire is shown in Table 5-IX. Then the actual figures were separately and independently derived from our data. Then the twenty-seven hospitals were rank ordered from highest to lowest on each of these seven characteristics. Then the admin-

[7] Joint Commission on Accreditation of Hospitals, *Proposed Standards for Accreditation of Hospitals*, Chicago, July 1966, p. 6.

TABLE 5-VIII

CORRELATIONS BETWEEN MEASURES OF SPECIFICATION OF PROCEDURES
(Non-Medical Component, n=27)*

	Budgets	Position Control	Salary Control	Job Descriptions
	(2)	(3)	(4)	(5)
1. Perceived Worker P+....	+.128 (+.302)	+.158 (+.158)	+.123 (+.360)	+.432† (+.670)
2. Budgets Used.....		+.213 (+.429)	+.250 (+.440)	+.093 (−.011)
3. Position Control.....			+.426† (+1.00)	+.378† (+.597)
4. Salary Control.....				+.510‡ (+1.00)
5. % of Employees Under Job Descriptions.....				

* Pearson Product Moment Correlations are shown without parentheses. Immediately below them, Yule and Kendall's Q correlations are shown in parentheses for the variables after they were dichotomized at the mean.

† $p < .05$.
‡ $p < .005$.

istrator's five-point evaluations were correlated with the actual rank orders of the hospital using Pearson Product moment correlations. If this correlation (based on $n = 7$) was positive, then the administrator has an accurate picture of where his hospital stands (high visibility of consequences). If the correlation was negative then the administrator had an inaccurate picture (low visibility of consequences). This correlation is used as the measure of visibility of consequences (C_v).

In seventeen of the hospitals (the Catholic hospitals were excluded) the Chairman of the Board was asked to complete the same questionnaire and the Board Chairman's visibility score was derived in the same way. Unlike the administrator, the Chairman would occasionally leave one of the answers blank in which case it was assigned the middle score of three on the five-point scale.[8] The correlation between the administrator's visi-

[8] Leaving out the blanks would cause severe problems in comparing C_v correlations based on different n's. If the more obscure measures are most likely to be left out, then excluding blanks from the correlation would allow the respondent to be scored on the basis of the easy questions only. This seems inappropriate. Given lack of information, there seems to be a modest tendency for the Chairman to report that his hospital is more efficient than average. Leaving blank spaces in this questionnaire appears to be a symptom of low visibility of consequences. Putting in a high score for each blank would, therefore, probably produce negative C_v scores and give empirical results which are in the direction of our hypotheses. A more conservative method would be to give a score of three for each blank because the resultant C_v scores would be closer to zero. If there is any bias in using this technique it appears to be in raising the C_v scores of low visibility hospitals. This appears to be a conservative measurement technique.

TABLE 5-IX

QUESTIONNAIRE USED TO OBTAIN DATA FOR VISIBILITY OF CONSEQUENCES FOR THE NON-MEDICAL COMPONENT OF THE HOSPITAL

Hospital Name .....

Please answer the following question. Your answer will be confidential and neither your name nor the name of this hospital will be used or mentioned in any of the research reports. This is part of a larger research project of hospital organization being carried out by the Center for Health Administration Studies of the University of Chicago.

1) Compared to other hospitals of similar size in the Chicago area, how does this hospital compare? (*Check one item in each row*)

	Actual Figure (if known)	Lower (Shorter)	Slightly Lower	The Same	Slightly Higher	Much Higher (Longer)
Occupancy	.....	1	2	3	4	5
Average length of stay	.....	1	2	3	4	5
Direct cost per meal		1	2	3	4	5
Direct cost of 100 lbs. laundry		1	2	3	4	5
Per diem costs	.....	1	2	3	4	5
Staffing ratio (employees per 100 patients)	.....	1	2	3	4	5
Overall operating efficiency		1	2	3	4	5

bility and the Chairman's visibility is $+.249$ ($n = 17$).[9] In these hospitals the mean visibility score for the administrator is $+.401$ ($n = 17$) while the mean visibility score for the Chairman is $+.129$. For those concerned with current levels of managerial performances in hospitals it may be comforting to know that the means are positive. For the administrators, four out of seventeen had negative correlations which indicates not just lack of information but misinformation as to how their hospital compares. For the Chairmen, seven out of seventeen had negative correlations.

Reports (Non-Medical Component)

This is measured by an index based on the extent and frequency of reports being compiled in the hospital on a routine basis. See Table 5-X for the list of reports used in this index. If the report did not exist the score was zero. If the report was compiled yearly, the score was 1, if semi-annually 2, if quarterly 3, and if monthly 4. These scores for each type of report were then summed to form the reports index (R). The maximum possible score is 44. The observed mean score for these twenty-seven hospitals is 22.33.

[9] The Pearson Correlation is +.249 and the Rank Order Correlation is +.149.

This ends the description of the variables and their validation for the non-medical component of the hospital.

TABLE 5-X

THE EXISTENCE OF OPERATING REPORTS

	Yes/No	Frequency (MQY)*
FINANCIAL		
Operating Expense		
Capital		
Cash Flow		
Manpower		
Overtime Worked		
OTHER		
Turnover		
Absenteeism		
Disciplinary Action		
ATTITUDE QUESTIONNAIRES		
Patients		
Personnel		
Physicians		

* M = Monthly.
Q = Quarterly.
Y = Yearly.

CHAPTER VI

TESTS OF THE HYPOTHESES CONCERNING THE NON-MEDICAL COMPONENT OF THE HOSPITAL EMPIRICAL EVIDENCE

HYPOTHESIS I:

Specification of procedures is positively related to efficiency.

This hypothesis is tested by correlating the five measures of specification of procedures (P+) with the five measures of efficiency. The prediction is that the (P+) measures will be negatively correlated with the cost and man-hour indices and positively correlated with the JCAH evaluation, the mean expert evaluation, and occupancy rate. The results are shown in Table 6-I. Of the twenty-five correlations shown in Table 6-I, twenty-three are in the predicted direction and thirteen of these are significant at the .05 level or better. Note that the strongest correlations are for perceived specification of procedures and for the proportion of employees covered by job descriptions. Of the five operational measures of (P+) used here, these two are closest to the theoretical concept of specification of procedures.

TABLE 6-I

EFFICIENCY AND SPECIFICATION OF PROCEDURES*
(Non-Medical Component) (n = 27)

	MEASURES OF EFFICIENCY				
	Cost Index (1)	Man-Hour Index (2)	Expert Evaluation (3)	JCAH Index (4)	Occupancy (5)
Perceived Worker P+ (1)	−.469†	−.483†	+.371†	+.384†	+.540‡
Budget (2)	−.024	+.214	+.064	+.151	+.174
Position Control (3)	−.340†	−.658†	+.257	+.163	+.141
Salary Control (4)	−.120	−.210	+.362	+.021	−.011
Job Description (5)	−.565‡	−.495‡	+.504‡	+.462†	+.348†

* Pearson Product Moment Correlations are shown here. Yule and Kendall's Q and rank order correlations were also obtained with very similar results. These other correlations have not been shown for clarity of presentation. The same approach has been taken for the rest of the relevant tables in this chapter.

† $p < .05$
‡ $p < .005$

It was interesting to observe the comments of the department heads when they filled out the questionnaire on perceived specification of procedures. Several times the department heads in laundry, dietary, and housekeeping became somewhat disturbed by the two questions on specification of worker procedures. They had heard a great deal about "participation," "letting the workers set their own work pace," and "letting them work without close supervision." But they seemed to have tried this unsuccessfully. They found that they had "to tell their workers what to do" and "keep an eye on things" or nothing would get done. Some of them were rather upset about the discrepancy in their minds between theory and practice. It was quite consistent with the Entrepreneurial Theory that this conflict was felt most strongly in dietary, housekeeping, and laundry, which have the least complex tasks and the least professionalized workers. This conflict was not prominent in medical records and pharmacy where the workers are relatively more skilled and the tasks somewhat more complex.

An unexpected finding: The following finding was not predicted before analyzing the data, but seems reasonable in retrospect. The department heads were asked to what extent they felt that their own procedures were specified for them. The three questions used here are shown in Table 6-II. Unlike the other measures of specification of procedures,

TABLE 6-II

QUESTIONS USED TO OBTAIN DATA FOR THE MEASURE OF PERCEIVED DEPARTMENT HEAD SPECIFICATION OF PROCEDURES*

How much does your job give you a chance to do things the way you want to? (*Check one*)
..... (1) an excellent chance to do things the way I want to
..... (2) a very good chance
..... (3) a good chance
..... (4) a fair chance
..... (5) little chance

On the job, how free do you feel to set your own work pace? (*Check one*)
..... (1) I feel completely free to set my own work pace
..... (2) quite a bit of freedom to do so
..... (3) some freedom
..... (4) little freedom

If you have a suggestion for improving the work or changing the set-up in some way, how easy is it for you to get your ideas across to your superiors? (*Check one*)
..... (1) it is very difficult to get my ideas across
..... (2) it is rather difficult
..... (3) it is not too easy
..... (4) it is fairly easy
..... (5) it is very easy

* These questions are adapted from Georgopoulos and Mann, *op. cit.*, pp. 642–646, and Aiken and Hage, *op. cit.*, p. 497.

in four out of five correlations between perceived department head specification of procedures and efficiency the relationship is negative. The one exception is the correlation with the man-hour index, but this is not statistically significant. The results are shown in Table 6-III, below.

It appears that the tasks of the department heads are far more complex than those performed by the non-supervisory employees below them in the hierarchy. As one moves up the bureaucratic hierarchy, the tasks performed become more complex and the encumbent has more leeway in making decisions.[1]

TABLE 6-III

CORRELATIONS BETWEEN PERCEIVED DEPARTMENT HEAD SPECIFICATION OF PROCEDURES AND HOSPITAL EFFICIENCY

(Non-Medical Component) (n = 27)

Efficiency Measure	Correlations Product Moment
Cost Index (1).....	+.285
Man-Hour Index (2).....	−.065
Expert Evaluation (3).....	−.384*
JCAH Evaluation (4).....	−.224*
Occupancy (5).....	−.113

* $p < .05$

It seems that the good administrator hires "professional" department heads who know their jobs, can function autonomously, and will specify procedures for the workers in their departments. These results seem quite reasonable on the face of it.

HYPOTHESIS II:

Visibility of consequences (C_v) and the existence of reports (R) are positively related to efficiency.

The test of this hypothesis is shown in Table 6-IV and the results support the hypothesis.

As predicted, (R) is negatively related to the cost and man-hour indices and positively related to the expert evaluation, JCAH index, and

[1] Jaques pointed out this increased leeway in his study of the time span of discretion. This would suggest that procedures should be most highly specified for workers and less specified as one moves up the hierarchy.
Jaques, Elliott. *Time Span Handbook,* and *Equitable Payment,* London: Heinemann, 1964 and 1961, respectively.
This is not inconsistent with classifying whole departments or organizations as having greater or less specification of procedures.

occupancy. This is also true for the administrator's C_v score for all twenty-seven hospitals and the Chairman of the Board's C_v score for seventeen hospitals.

The Entrepreneurial Theory would predict that the correlation between owner (Board Chairman) (C_v) and efficiency would be greater than the correlation between owner's agent (Administrator) (C_v) and efficiency. This is because the owner's agent may not have sufficient incentive to achieve the owner's goals given an unaware or apathetic

TABLE 6-IV

CORRELATIONS BETWEEN EFFICIENCY, REPORTS, AND VISIBILITY OF CONSEQUENCES (Non-Medical Component)

	Measures of Efficiency					
	Cost Index (1)	Man-Hour Index (2)	Mean Expert Evaluation (3)	JCAH Index (4)	Occupancy (5)	n
Reports (R).....	−.320	−.298	+.390*	+.391*	+.237	(27)
Visibility of Consequences (Administrator) (C_v).....	−.122	−.180	+.037	+.233	+.133	(27)
Visibility of Consequences (Administrator) (C_v).....	−.116	−.235	+.195	+.011	+.145	(17)
Visibility of Consequences (Board Chairman) (C_v).....	−.670†	−.483*	+.492*	+.382	+.460*	(17)

* $p < .05$
† $p < .005$

Board. If the Board is unaware of what's going on then the administrator may not make the effort required to maintain an efficient organization. To test this, the administrator's C_v score was correlated with efficiency in the same seventeen hospitals where we had Board Chairmen C_v scores. Table 6-IV shows that the correlations with efficiency are higher for the chairman's C_v score than for the administrator's C_v score. This finding supports the Theory and suggests that the Board of Trustees play a very important role in promoting hospital efficiency.

The correlations between C_v and R are expected to be positive. The use of reports (R) should increase awareness (C_v), but no relationship between the two was observed for the non-medical component. The

correlation between administrator C_v and the report index (R) was −.123. The correlation between the Chairman of the Board's C_v and the reports index (R) was +.024. Perhaps this is because nearly all these hospitals used the HAS data collection program which gives sufficient information to answer the questions on our Visibility of Consequences Questionnaire for the non-medical component. In spite of the fact that nearly all the hospitals had this basic level of reports, some of the administrators and board chairmen familiarized themselves with this information and others did not. Perhaps this is the reason for the negligible correlations observed here.

Further Analysis of Differences in Complexity

Compared with the medical component, the non-medical component of the hospital has been defined as having a low level of task-environment complexity. A further refinement is to obtain a measure of complexity for each of the non-medical components in the sample. In this way the non-medical components could be divided into high and low complexity groups. The complexity measure used here was based on the existence of fifteen different types of technical personnel employed in the non-medical component of each hospital. The assumption here being that the more different types of personnel, the wider the range of tasks performed, and the higher the complexity.

If the Entrepreneurial Theory is correct, then there will be a more positive and stronger relationship between specification of procedures and efficiency in low complexity non-medical components than in high complexity non-medical components. The cost index as the measure of efficiency was used here[2] and the results of this test are shown in Table 6-V.

Table 6-V supports the hypothesis. In the low complexity non-medical components the higher the specification of procedures the higher the efficiency (as measured by a lower cost index). This is true for both measures of specification of procedures. In the high complexity non-medical components the higher the specification of procedures the lower the efficiency (as measured by a higher cost index), although this relationship is not at all significant. In short, only in the least complex of the non-medical components of the hospital is there a positive relationship between specified procedures and efficiency.

Using the same method to control for complexity there appears to be no modification in the positive relationship between the existence of reports (R), visibility of consequences (C_v), and efficiency.

[2] This was the only measure of efficiency which gave an adequate distribution of the observations to undertake this test.

TABLE 6-V

THE RELATIONSHIP BETWEEN SPECIFICATION OF PROCEDURES AND EFFICIENCY CONTROLLING FOR COMPLEXITY IN THE NON-MEDICAL COMPONENT OF THE HOSPITAL (n = 27)

		Low Complexity Hospitals (C_x)		High Complexity Hospitals (C_x)	
		Cost Index ($)		Cost Index ($)	
		Low	*High*	*Low*	*High*
Perceived Worker P+ (P_p+)	LOW	0	6	3	1
	HIGH	6	3	4	4
Q = −1.00 p < .02			Q = + .40 NS		
Extent of Job Descriptions (P_j+)	LOW	0	8	3	1
	HIGH	6	1	4	4
Q = −1.00 p < .001			Q = +.40 NS		

Q is Yule and Kendall's Q coefficient of correlation. Significance is based on χ^2 test from D. J. Finner, *et al. Tables for Testing Significance in a 2 × 2 Contingency Table*, Cambridge University Press, 1963.

HYPOTHESIS III:

The higher the visibility of consequences (C_v) the more likely that the extent of specification of procedures ($P+$) will be optimal.

Table I showed that the procedures which have the strongest positive relationship with operating efficiency are: (*a*) perceived specification of worker procedures, (*b*) position control, (*c*) job descriptions. The use of budgets, salary control, and procedure manuals were found to have much less impact on efficiency.[3] Table 6-III showed that Perceived Department Head Specification of Procedures is negatively related to efficiency.

[3] Correlations between the use of procedure manuals and efficiency were very close to zero and were not shown in Table I.

The test of this hypothesis is operationalized as follows. If Hypothesis III is correct, then visibility of consequences and the existence of reports will be positively related to: (*a*) perceived specification of worker procedures (P_p+), (*b*) position control, and (*c*) job descriptions (P_j+). The visibility measures will not be strongly related to use of budgets, salary controls, or procedure manuals. Also the visibility and reports measures will be negatively related to perceived department head specification of procedures. The results are shown in Table 6-VI. Of the nine Pearson Product Moment correlations predicted to be positive, eight are positive and three of these are statistically significant at the .05 level. Of the nine correlations predicted to be not significant, none are statistically significant. Of the three product moment correlations predicted to be negative, two are and one of these is significant at the .005 level. These results support Hypothesis III.

TABLE 6-VI

VISIBILITY OF CONSEQUENCES, REPORTS AND SPECIFICATION OF PROCEDURES (Non-Medical Component)

Measures of Specification of Production Procedures (P+)	Predicted Direction of Correlation with Reports and Visibility	Correlation with the Existence of Reports (R) (n = 27)	Correlation with Visibility of Consequences (C_v)	
			Administrator (n = 27)	Board Chairman (n = 17)
Job Descriptions	Positive	+.461*	−.024	+.442*
Position Control	Positive	+.257	+.156	+.228
Perceived Worker P+	Positive	+.157	+.062	+.687†
Budget	Not Significant	−.106	+.111	+.049
Salary Control	Not Significant	+.230	+.026	+.031
Procedure Manual	Not Significant	+.035	+.039	−.077
Perceived Department Head P+	Negative	−.563†	+.291	−.016

* p < .05.
† p < .005.

HYPOTHESIS IV:

The effect on efficiency of specification of procedures ($P+$), reports (R), and visibility of consequences (C_v) is positive and additive.

It was hoped that this hypothesis could be tested using the 2 × 2 tables and by regression techniques. Unfortunately the sample size is too small to allow useful analysis using paired 2 × 2 tables.

This leaves the use of multiple regression techniques to test the hypothesis. In these equations four different measures of efficiency are used: the cost index, the man-hour index, the average expert evaluation, and occupancy.[4] Two measures of specification of procedures are used: perceived worker specification of procedures (P_p+), and the index based on the proportion of employees covered by job descriptions, (P_j+). Two additional control variables have been added: hospital size, and complexity. To avoid the problem of colinearity, only one of the two ($P+$) variables and only one of the control variables are used in each equation.[5] The efficiency variables are the dependent variables and each equation has four independent variables.

TABLE 6-VII

MULTIPLE REGRESSION EQUATIONS PREDICTING EFFICIENCY WITH SPECIFICATION OF PROCEDURES, REPORTS, VISIBILITY OF CONSEQUENCES, ORGANIZATION SIZE, COMPLEXITY

Symbol	Theoretical Name	Operational Measure	Relation Between Operational Measure and Theoretical Concept*
$	Efficiency	Cost Index	(−)
MH	Efficiency	Man-Hour Index	(−)
EE	Efficiency	Mean Expert Evaluation	(+)
Ø	Efficiency	Percent Occupancy	(+)
P_p+	Specification of Procedures	Perceived Worker P+	(+)
P_j+	Specification of Procedures	Percent of Employees Covered by Job Descriptions	(+)
C_v	Visibility of Consequences	Administrator Awareness	(+)
R	Existence of Reports	Reports Index	(+)
S	Organizational Size	Number of Beds	(+)
		Reciprocal of Size (1/S)	(−)
C_x	Organizational Complexity	Index of Number of Different Technical Personnel in Hospital	(+)

The independent variables are shown in order of entrance in stepwise multiple regression ($BM_{34}T$ Computer Program). Directly below each independent variable the t values are shown. If $t > 1.96$, then $p < .05$. For all equations, $n = 27$.

* This is to say as the cost index ($) falls, efficiency rises; as the mean expert evaluation score rises, efficiency rises, etc.

[4] The JCAH Index was not used because it does not approximate a normal distribution.

[5] Size is measured by the number of beds, complexity is measured by an index based on a checklist of the existence of fifteen different types of technical personnel employed full time in the hospital. The correlation between size and complexity here is (+.724).

The economic theory of long-run economies-of-scale states that per unit costs should decline as the size of the firm increases up to a point. This approach suggests that the relationship between efficiency and size is non-linear and may be approximated by the reciprocal of size.[6]

This results in the sixteen different regression equations shown in Table VII. The first two pages of this Table list the variables used, their theoretical definitions, operational measures, means, standard deviations, and theoretical ranges.

TABLE 6-VII—*Continued*

MEANS, AND STANDARD DEVIATIONS, AND MAXIMUM RANGES OF THE VARIABLES (n = 27)

Variable Symbol	Variable Name	Mean	Standard Deviation	Maximum Possible Range*
$	Cost Index	23.25	3.42	$0 > \$$
MH	Man-Hour Index	4.74	0.70	$0 > MH$
EE	Expert Evaluation	3.19	0.73	$1 > EE \leq 5$
Ø	Occupancy	82.04	6.61	$0 \geq Ø$
P_p+	Perceived Worker P+	9.17	0.83	$2 \geq P_p+ \leq 12$
P_j+	Job Descriptions	61.11	43.18	$0 \geq P_j+ \leq 100$
C_v	Visibility of Consequences (Admin.)	00.384	0.50	$-1 \geq C_v \leq +1$
R	Reports Index	22.33	6.78	$0 \geq PC_v+ \leq 44$
S	Size	308.5	123.5	$100 \geq S \leq 530$
C_x	Complexity	10.81	2.45	$1 \geq C_x \leq 15$
1/S	Reciprocal of Size	3.79×10^{-3}	1.55×10^{-3}	

* These indicate the extreme maximum values which these variables can take in theory. For example, for P_j+, no less than 0 and no more than 100% of all employees can be covered by job descriptions.

In every equation, for every dependent variable entered, the results support Hypothesis IV. Both measures of specification of procedures (P_p+, P_j+), visibility of consequences (C_v), and the existence of reports (R) are all negatively related to the costs and man-hour indices

[6] Linear size was also used but the comparable regressions had lower r^2's and there was a problem of heteroskedasticity with respect to size. This second problem was resolved with the use of the reciprocal of size. These regressions were also run, weighted by size, and produced very little change in the results. In all these alternative regressions, the signs for C_v R, and $P+$ were all in the predicated direction. The first order correlations between the reciprocal of size and the four efficiency measures were always larger than for linear size.

Economic theory states that diseconomies-of-scale should set in beyond a certain very large size. Diseconomies-of-scale have only rarely been empirically observed for hospitals and there was no reason to expect to observe diseconomies-of-scale in our sample of medium-sized hospitals. Because our sample was specifically chosen so as to have a limited size range it is inappropriate for the detailed or intensive study of this issue.

TABLE 6-VII—*Continued*

MULTIPLE REGRESSION EQUATIONS PREDICTING THE EFFICIENCY OF THE NON-MEDICAL COMPONENT WHERE EFFICIENCY IS MEASURED BY THE COST INDEX

($)=+36.17	−1.25(P_p+)	− 0.14(R)	+569(1/S)	−1.22(C_v)
t 4.50	1.58	1.57	1.34	1.00
Cumulative r=.59		r^2=.35		
($)=+24.71	− .036(P_j+)	+667.(1/S)	− 1.34(C_v)	− .058(R)
t 10.10	2.42	1.81	1.18	0.63
Cumulative r=.66		r^2=.43		
($)= 28.	− .04(P_j+)	− 1.06(C_v)	− .05(R)	− .05(C_x)
t 8.07	2.43	0.86	0.49	0.20
Cumulative r=.59		r^2=.35		
($)= 42.	−1.70(P_p+)	− .14(R)	− .91(C_v)	−1.5x
t 6.19	2.01	1.47	0.70	0.05
Cumulative r=.55		r^2=.30		

TABLE 6-VII—*Continued*

MULTIPLE REGRESSION EQUATIONS PREDICTING THE EFFICIENCY OF THE NON-MEDICAL COMPONENT WHERE EFFICIENCY IS MEASURED BY THE MAN-HOUR INDEX

MH=+6.05	+249 (1/S)	− .41 (C_v)	−.027 (R)	−0.16 (P_p+)
t 4.42	3.44	1.96	1.82	1.19
Cumulative r=.75		r^2=.56		
MH= 4.58	+259 (1/S)	-4.98×10^{-3} (P_j+)	−.42 (C_v)	− .016 (R)
t 10.83	4.08	1.96	2.15	0.99
Cumulative r=.77		r^2=.60		
MH= 6.7	− 4.7×10^{-3} (P_j+)	− .11 (C_x)	−.41 (C_v)	-1.3×10^{-2} (R)
t 10.0	1.46	2.17	1.72	0.68
Cumulative r=.65		r^2=.42		
MH= 8.6	− .22 (P_p+)	− .10 (C_x)	−.39 (C_v)	-2.3×10^{-2} (R)
t 6.66	1.40	1.89	1.59	1.31
Cumulative r=.64		r^2=.41		

and are positively related to occupancy and the mean expert evaluation. In addition the reciprocal of size is positively related to costs and man-hours showing the existence of economies-of-scale over the size range observed.[7]

Note that the cost index of efficiency appears to be close to complexity-free in that the complexity variable enters last in both equations where it is used as an independent variable. This is not the case for the expert evaluation and occupancy measures of efficiency. The Cost and Man-Hour indices were purposely designed to be minimally influenced by complexity. The complexity measure is always positively related to efficiency. This is probably in part because it is picking up the size effect to which it is so closely related.

These regressions explain from 28 to 60 percent of the variance in the efficiency of the non-medical component. At best these equations explain 43 percent of the variance in the cost index, 60 percent in the man-hour index, 47 percent in occupancy and 52 percent in the mean expert evaluation. This appears to be a noticeable improvement over previous studies of the impact of managerial behavior on organizational perfor-

[7] The extensive empirical literature on economies-of-scale in hospitals has produced a wide range of results. In general there appears to be good evidence for economies-of-scale and little strong evidence for the existence of diseconomies-of-scale. Our results appear to be consistent with this literature. This provides further evidence that our cost and man-hour indices are measuring efficiency. Our sample with its narrow size range was not designed to study this issue. For references see: Neuhauser, Duncan. "Hospital Size: A Selected Annotated Bibliography," in *Proceedings of the Ninth Annual Symposium on Hospital Affairs*, December, 1966, Chicago. Program in Hospital Administration, University of Chicago, 1967; and Thomas R. Hefty, "Returns to Scale in Hospitals: A Critical Review of Recent Research," *Health Services Research*, Winter, 1969, pp. 267–280.

TABLE 6-VII—*Continued*

MULTIPLE REGRESSION EQUATIONS PREDICTING THE EFFICIENCY OF THE NON-MEDICAL COMPONENT WHERE EFFICIENCY IS MEASURED BY THE OCCUPANCY RATE

Ø=52.04 +	3.19 (P_p+)	−1017. (1/S)	+ .17 (R)	+1.96 (C_v)
t 3.40	2.10	1.25	1.01	0.84
Cumulative r=.61		r^2=.37		
Ø=82.09	−1589. (1/S) +	.032 (P_j+)	+2.59 (C_v)	+ .14 (R)
t 15.39	1.98	.99	1.04	0.67
Cumulative r=.53		r^2=.28		
Ø=60.5 +	1.5 (C_x) +	3.44 (C_v)	+ .12 (R)	$+1.0\times10^{-2}$(P_j+)
t 9.57	3.13	1.52	.68	.35
Cumulative r=.64		r^2=.41		
Ø=43.2 +	1.22 (C_x) +	2.36 (P_p+)	+2.82 (C_v)	+ .13 (R)
t 3.77	2.49	1.67	1.30	.81
Cumulative r=.69		r^2=.47		

TABLE 6-VII—*Continued*

MULTIPLE REGRESSION EQUATIONS PREDICTING THE EFFICIENCY OF THE NON-MEDICAL COMPONENT WHERE EFFICIENCY IS MEASURED BY THE MEAN EXPERT EVALUATION

EE=2.43	−241 (1/S)	+ .039 (R)	+ .23 (C_v)	+.078(P_p+)
t 1.54	2.90	2.24	.96	.50
Cumulative r=.68		r^2=.46		
EE=3.10	−233 (1/S)	$+4.9\times10^{-3}$ (P_j+)	+ .026 (R)	+.22 (C_v)
t 6.43	3.21	1.68	1.42	1.00
Cumulative r=.72		r^2=.52		
EE=1.15 +	4.5×10^{-3} (P_j+)	+ .11 (C_x)	$+2.3\times10^{-2}$ (R)	+.22 (C_v)
t 1.62	1.32	1.91	1.15	.86
Cumulative r=.63		r^2=.39		
EE=1.84×10^{-3} +	.11 (C_x)	$+3.4\times10^{-2}$ (R)	+ .22 (C_v)	+.12 (P_p+)
t 1.3×10^{-3}	1.88	1.79	.84	.70
Cumulative r=.60		r^2=.36		

mance. According to Dubin and Homans[8] in their reviews of studies of leadership and productivity, differences in the quality of supervision have accounted for at best 20 percent and an average of 10 percent of the variance in performance.

The evidence presented in this chapter on the non-medical component confirms the hypotheses.

The Potential for Improvement in Hospital Efficiency

So far the regressions in Table 6-VII have been used to verify hypotheses. They can also be used to estimate the cost savings which can potentially be achieved through improved management techniques. The question is: if these hospitals were raised from the current average level of management to a realistically attainable higher level of management practice, what would be the gain in efficiency?

(A) Many previous studies of hospital efficiency have been carried out in a single hospital and the improved results reported in the literature. These studies, taken in aggregate give a misleading picture of the potential improvements in efficiency. The hospitals were probably chosen because they had problems to begin with so that the introduced change would be likely to have a large impact. Secondly, only those studies where some improvement was achieved are likely to be reported in the literature.

Instead one should look at an average group of hospitals. We do not claim to have a representative sample of U.S. hospitals but at least our hospitals were chosen primarily by location so that this study is less subject to the bias described above. In fact, the hospitals in our sample are probably managed better than average. Their participation in HAS, the exclusion of three problem hospitals[9] from these regressions, and the comments by the JCAH surveyors suggest this. Thus our sample may underestimate the potential savings. It can only be claimed that these data are an improvement over the existing literature on this topic.

(B) If one only looks at the worst managed hospitals the potential for improvement is greatly exaggerated. The appropriate question is to ask how much improvement can be expected from an average hospital.

(C) Comments are often made that hospitals are very inefficient compared to some non-existent hypothesized ideal. This kind of speculation, although popular, is of doubtful validity until the ideal is actually

[8] Dubin, Robert, George C. Homans, Floyd C. Mann, and Delbert Miller. *Leadership and Productivity*, San Francisco: Chandler Publishing Co., 1965. However they were concerned with the effect of first line supervisors (foremen) rather than at the organizational level.

[9] These are the three hospitals discussed as case studies in Chapter X.

put into practice and observed in operation. For this reason it seems much more realistic to take practices in a very good existing hospital as the criterion of achievable excellence. This way we know it is possible.

(D) The results are more meaningful for some variables than for others. To show an X percentage change in the expert evaluation measure of efficiency (EE) as a result of improved management has little meaning. For this reason the cost measure is the preferred measure of efficiency. In the same way the job description measure of specification of procedures (P_J+) seems more meaningful than the perceived measure (P_P+); and size more meaningful than complexity.[10] For this reason the equation used in the following analysis will be the second cost index ($) regression in Table 6-VII. Another reason is that this equation has the highest r^2 (.43) of all the cost index ($) regressions.

(E) It should be made explicit that these regression coefficients are estimates with associated standard errors. In addition, these equations assume linear relationships which may or may not hold for extremely high or low values of the variables included.[11]

(F) Observing the regressions on the cost index in Table 6-VII, the large positive constant term is persistent and noteworthy. It suggests that a large proportion of total costs are fixed with respect to management and size; that is to say, they are incurred regardless of the level of managerial competence.

(G) Choosing the potential level of improvement in management is to some degree arbitrary. The major rule followed here is that at least a few hospitals should equal or exceed the standard of high performance. This suggests that this standard of high performance is possible because it exists in the real world. If the reader prefers to use another regression from Table 6-VII or if he does not like the standards of high performance used here, he should feel free to pick his own standards and "plug" them into the equation of his choice.

These hospitals have a mean (P_J+) value of 61.11. That is the average hospital has sixty-one percent of employees covered by job descriptions. Let us say that it is possible to have one hundred percent of employees covered by job descriptions.

The mean reports index (R) is 22.33. Let us say that the use of reports can be increased to 35.

[10] More precisely, these variables more closely approximate ratio scales. They are also meaningful to the extent that they suggest guides to action in improving performance.

[11] Other regressions were obtained using exponential terms for the managerial variables to see if curvilinear relationships existed. No significant curvilinear relationships were found for this sample of hospitals over the observed range of these variables.

Let us assume that visibility of consequences can be improved from a mean of + .384 to + .750. A perfect C_v score of + 1.00 is probably impossible to achieve in reality.

Many of the hospitals in this sample are located a block or two away from other hospitals. This suggests that by merger and combination it is possible to raise the average size of these hospitals by about one hundred beds to four hundred beds without greatly increasing transportation costs. This improvement would not be possible, of course, in isolated communities with only one hospital.

The next step is to "plug" these values ($S = 400$, $PC_v+ = 35$, $C_v = + .750$, $P_j+ = 100$) into the second Cost Index equation in Table 6-VII.

The method and results are shown in Table 6-VIII. The proposed improvement in (P_j+) will save $1.40 per patient day. The proposed

TABLE 6-VIII

ESTIMATING THE EFFECT OF IMPROVED MANAGERIAL PERFORMANCE ON NON-MEDICAL EFFICIENCY

(1) Equation	(2) Using Mean Values	(3) Using Reasonable Standard	(2)–(3) Reasonable Improvement
($)=.....	23.25*	19.76	3.49
+24.71†.....	24.71	24.71	0.0
−.036 (P_j+)	(−.036)(61.11)=2.20	(−.036)(100)=−3.60	−1.40
+667. (1/S).....	(+667)(3.79×10⁻³) =+2.53	(+667)(2.5×10⁻³) =+1.67	−0.86
−1.34 (C_v).....	(−1.34)(+.384) =−0.51	(−1.34)(+.750 =−1.01	−0.50
−.058 (R).....	(−.058)(22.33) =−1.30	(−.058)(35.)=−2.03	−0.73

* There is an .02 rounding error.
† The constant term remains unchanged.

improvement in increased size will save $0.86 a day. The proposed improvement in (C_v) will save $0.50 a day and the proposed improvement in (R) will save $0.73 a day. These improvements total to $3.49 per patient day and reduce the cost index from the present mean of $23.25 to $19.76.[12] This is a saving of 15 percent as a result of improved management and increased size.

A few warnings are in order:

(A) As discussed above, this sample of hospitals may be slightly better managed than average. Therefore this fifteen percent saving is probably slightly conservative.

(B) These variables may stand for a cluster of management activities. Thus the (P_j+) measure reflects not just the use of job descriptions, but a cluster of other specified procedures. Therefore, increasing the percent of job descriptions alone may not bring about the desired improvement in efficiency.

[12] In keeping with our standard of reasonableness, four of the twenty-seven hospitals have cost indices slightly lower than this. This suggests that these changes are possible in the real world.

Applying these same values for the management variables in the same way to the other similar equations in Table 6-VII result in a 28 percent increase in expert evaluation (EE), a 23 percent decrease in the man-hour index (MH) and a 7 percent increase in the occupancy rate. This suggests that management has more impact on controlling man-hours worked than on increasing the occupancy.

As noted in Table 5-III, our cost index accounts for only one-third of total hospital costs per patient day and is not strongly correlated with total hospital costs or total hospital revenue per patient day. This raises the question as to whether the observed 15 percent potential for improvement can be applied to total hospital costs.

The difference between our index and total costs PPD can be accounted for by (*a*) departments excluded such as nursing, which exist in all hospitals; (*b*) differences in scope of services: e.g., some departments like physical therapy exist in some hospitals but not in others; (*c*) differences in volume of ancillary services used: e.g., x-rays and lab tests. With respect to excluded departments such as nursing, similar or greater savings may well be possible.[13] With respect to differences in scope of services, these should not be equated with differences in efficiency. With respect to differences in the volume of ancillary services used, this is largely out of the hands of administration and is dependent on physician decisions.[14]

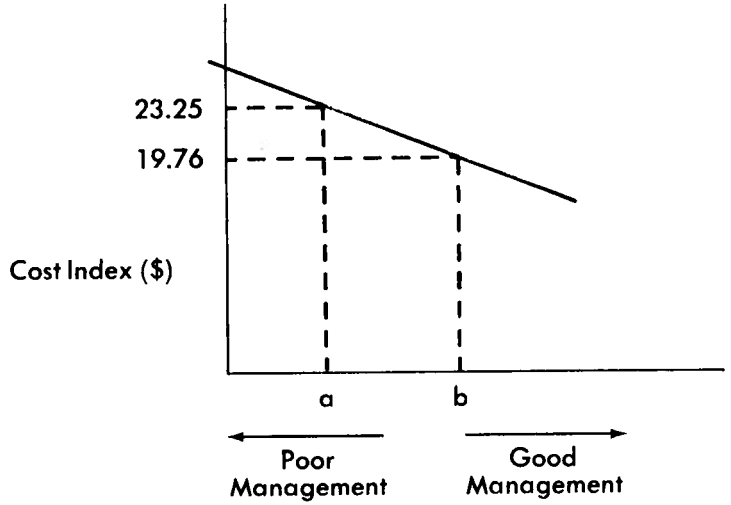
It is thus not clear whether the 15 percent savings can be achieved for total hospital per diem costs. A savings of $3.49 per patient day may seem small, but the average hospital in our sample has approximately 92,000 patient days per year. A $3.49 saving per day would be a $321,000 saving per year per hospital in this sample. If savings are also possible for the costs not covered by our index this would be even

[13] This is suggested by the wide differences in nursing staffing ratios observed in similar hospitals.

[14] This is not completely true, however. If laboratory tests in a hospital have a large error factor due to inefficiency, sloppy work, etc., doctors may start doubting all lab test findings. To remedy this, they may order the same test several times over and average out the results. To the extent that laboratory quality can be changed by good management then management may indirectly effect the volume of lab tests per patient day.

greater.[15] With inflation this may well underestimate savings possible today compared with 1968, when these figures were obtained. With the three "problem" hospitals excluded from the regressions this may also underestimate this potential savings.

The relationship between the cost index measure of efficiency and managerial activities (P+, C_v, R) can be diagramed as follows.



The current average level of management (a) yields a cost index of $23.25. The reasonable standard of improvement (b) yields a cost index of $19.76. This $19.76 represents costs incurred even with very good management. Note that potentially the effect of very bad management can actually be harmful. An example of harmful management would be an administrator with a negative C_v score. His misinterpretation of reality is harmful to the hospital according to these data.

Conclusion

The evidence presented in the first part of this chapter confirms the hypothesis related to the non-medical component of the hospital. Reports, specified procedures and managerial awareness have a positive impact on efficiency. Along with size, these variables account for from 30 to 60 percent of the variance in hospital efficiency.

[15] A 15 percent savings on total costs PPD would be $10.47 for 1968, or $963,000 per hospital per year. A 15 percent savings applied to all U.S. community hospitals in 1968 would amount to 2.12 billion dollars.

In the second part of this chapter, the regression equations were used to estimate the potential savings to an average hospital from a reasonably possible improvement in management. An estimate of 15 percent potential reduction in costs resulted. The problems in making such an estimate were discussed. In spite of the drawbacks, this technique is apparently new enough to warrant describing and has the merit of being an improvement over past discussions of improving average hospital performance. To the extent that it improves past discussion and in spite of the fact that it falls far short of perfection, this estimate is worthy of consideration.

CHAPTER VII

THE OPERATIONAL MEASURES FOR THE MEDICAL COMPONENT OF THE HOSPITAL

In this chapter, the operational measures are described and validated.

Quality of Care

It is beyond the current state of art to obtain a ratio of inputs to outputs as a measure of efficiency for the medical (physician) component of the hospital. Instead, several measures of the quality of medical care provided in each hospital will be used to measure the degree of owner's goal attainment. The four measures of quality of care used here are:

(A) Expert Evaluation (EE)
(B) Joint Commission on the Accreditation of Hospitals (JCAH) Evaluation
(C) Training of the Medical Staff
(D) Severity-Adjusted Death Rate (SADR)

These measures will be described in turn.

(A) Expert Evaluation: Five experts, all physicians, none of whom were connected with the hospitals in this sample, evaluated the quality of medical care in these hospitals on a five-point scale. This technique is similar to that used to obtain the expert evaluation of non-medical efficiency and is taken from Denton, *et al.*[1] A number of other physicians were approached, but declined to complete the questionnaire on the grounds that they lacked sufficient information about the hospitals in the sample. The expert evaluators of non-medical efficiency formed a much more clearly defined set of people who knew about each other. This was not true for the medical experts who did not tend to know each other as well and were, therefore, much harder to track down. This difficulty in finding physician experts is not intimated at by Denton, *et al.* This is probably because Denton's study dealt with the evaluation of teaching hospitals whose reputations are widely known. This is far less the case for this sample of community hospitals which tend to be more hidden in anonymity with respect to the quality of medical care.

It was particularly fortunate that one of the physician evaluators

[1] Denton, *et al.*, *op. cit.*

(Evaluator a) had recently undertaken a formal evaluation of two-thirds of the hospitals in this sample. He spent a day or more in each hospital talking with physicians and administrators and used a formal questionnaire to elicit information on medical staff activities. This was done in order to select four or five community hospitals for affiliation with the evaluator's medical school. His opinion of these hospitals was highly valued by the other experts.

TABLE 7-I

COMMENTS BY THE EVALUATORS OF QUALITY OF MEDICAL CARE AS TO THE CRITERIA THEY USED TO EVALUATE THESE HOSPITALS

Evaluator (a)	Signs of excellence of medical care are (1) the range of specialists on the staff including such non-official specialties as intensive care and coronary care and (2) the number of full time salaried physicians on the staff. These are reflective of an interest in expanding knowledge and keeping up to date. When filling out the questionnaire he said these hospitals were rarely comparable to the larger medical school affiliated hospitals in the city.
Evaluator (b)	The competence of the medical staff is the most important criterion. Next in importance is whether the hospital has the essential range of specialists such as a good pathologist. The smaller hospitals do not have this range of specialists and suffer in the ratings because of this. Sometimes newspaper accounts and comments by patients are taken into account.
Evaluator (c)	The patient work-up in terms of history and physical exam as reflected in the written record. Also taken into account are gross errors in medical judgment.
Evaluator (d)	His major criterion was the existence and extent of internship and residency programs in the hospital, next came the size of the hospital, scope of services provided and the intensity of staffing. He said a small hospital does not fare well because it can not maintain the needed specialists of good quality like radiologists and pathologists.
Evaluator (e)	The extent of adequate emergency services, medical school affiliation, qualifications and perceived competence of the physician, and the extent of night time physician coverage. He said none of these hospitals were really good.

Table 7-II shows the interrater reliability of the five physician evaluators of the quality of medical care. The correlations in Table 7-II are all significant with an average interrater correlation of +.738. This mean correlation is higher than the mean interrater correlation for the expert evaluators of the non-medical component.

In order to obtain an overall mean expert evaluation, each expert's ratings were recalibrated so that they all would have the same mean. Then the evaluations were summed for each hospital and divided by the number of evaluations. Because of the high interrater reliability amongst the expert evaluators here this will be our preferred measure of quality of medical care.

After each expert scored these hospitals, he was asked to verbally describe the criteria he used to evaluate the quality of medical care in these hospitals. Summaries of these criteria are shown in Table 7-I.

(B) The Joint Commission on Accreditation of Hospitals (JCAH) Quality Index: As described in Chapter IV, every three years the JCAH has surveyed each of these hospitals for purposes of accreditation. All these hospitals are accredited so that this could not be the basis of the

TABLE 7-II

INTERRATER RELIABILITY FOR FIVE EXPERT EVALUATIONS OF THE QUALITY OF MEDICAL CARE IN THE HOSPITALS

Correlations—Expert Raters

	2	3	4	5
Expert Raters 1.....	+.806*	+.739*	+.819*	+.938*
2.....		+.591*	+.685*	+.811*
3.....			+.577*	+.743*
4.....				+.673*

The above correlations are based on the following number of hospitals

	2	3	4	5
Expert Raters 1.....	21	21	21	13
2.....		28	29	17
3.....			27	16
4.....				17

* $p < .005$.

index. However, the files of the JCAH provide more detailed information about up to twenty areas of the hospital. Six of these areas were used as the basis of the non-medical efficiency index. These areas were:

(1) Administration
(2) Physical Plant
(3) Medical Records
(4) Nursing
(5) Pharmacy
(6) Dietary

These areas were not used for the quality of medical care index, but the following areas were:

(7) Medical Staff Organization
(8) Pathology

(9) X-ray
(10) Internal Medicine
(11) Psychiatry
(12) Surgery
(13) Obstetrics
(14) Anesthesia
(15) Emergency Department
(16) Outpatient Department
(17) Physical Therapy
(18) Occupational Therapy
(19) Social Service
(20) Dentistry

Each of these areas, if it existed, was evaluated on a pass/fail basis by the JCAH surveyor. The surveyor would also write in comments about any important problems he found.

These data were scored in two different ways. One score (JCAH I) did not count it against the hospital if it did not have one of the departments listed above. The other score (JCAH II) did count it against the hospital for each of the departments that was missing.

The former score (JCAH I) was coded as follows. Each of the fourteen areas of the hospital if it existed would have one of the following scores:

Unacceptable 1
Unacceptable/Acceptable (half-way between) 2
Acceptable, but with Major Problems Noted 3
Acceptable, No Major Problems Noted 4

To obtain the index, the scores for each area were summed and divided by the number of areas in the hospital.[2] In this way if the hospital did not have a psychiatry department or a social service department (for example) it did not count against the hospital.

The second score (JCAH II) was coded as follows. Each of the fourteen areas of the hospital could have one of the following scores:

Unacceptable or Absent 1
Present, Unacceptable/Acceptable (Half-way between) 2
Present, Acceptable, but with Major Problems Noted ... 3
Present, Acceptable, No Major Problems Noted 4

To obtain this index the scores for each area were summed but *not*

[2] This distinction was unnecessary for the JCAH efficiency index for the Non-Medical Component of the Hospital. This is because all hospitals had all the six departments which comprise this scale. Therefore, there will be no difference between these two scoring methods for the Non-Medical Component.

divided by the number of areas in the hospital. The logic here is that an unacceptable department is as bad as no department at all.

One can argue indefinitely whether one score is preferable to the other, on theoretical grounds. For example, one could say that in the absence of a physical therapy department the patient would not go to that hospital if he needed physical therapy and, therefore, the absence of this department should not count against the hospital. Conversely, one could argue that the patient would probably not be referred to the appropriate hospital because his physician may not have admitting privileges there. The latter is possibly the case and therefore the hospital should be docked for the absence of an area. Finally, no end of weighting scales can be developed here and one soon reaches a point of diminishing returns in this effort.

TABLE 7-III

EXAMPLES OF THE JCAH SURVEYOR'S COMMENTS ABOUT THE AREAS OF THE HOSPITAL USED TO MAKE UP THE JCAH INDEX OF QUALITY OF CARE

OBSTETRICS
"Needs more extensive recording of physical exam in record"
"poor records"
"needs more complete records"

EMERGENCY DEPARTMENT
"small, crowded, but well equipped"
"poor records"
"pathetic little room"

PATHOLOGY
"autopsies less than 20%"
"crowded"

RADIOLOGY
"rubber stamp used by MD to sign medical record"*

MEDICINE
"EKG Interpretations have rubber stamped physician signature"
"needs better organization"

SURGERY
"Autoclaves not cultured"
"well organized"
"pre-operative work-up does not always justify surgical treatment"

ANESTHESIA
"cylinders for compressed gasses not properly secured"
"poor records"
"poor storage of gasses"

MEDICAL STAFF ORGANIZATION
"no medical staff bylaws"
"needs better tissue committee minutes"
"no clarification of the position of (moonlighting)) residents who cover the emergency department"†
"needs revised bylaws"
"bylaws need total revision"

DENTISTRY
"dentists do not count the number of teeth extracted"
"poor reports in medical records"
"duties and responsibilities (of dentist) not put in writing"
"inadequate records"
"records not countersigned by MD"

* A rubber-stamped physician signature is used in place of the physician's own handwritten signature. The latter insures that the physician has seen the record.

† A number of these hospitals hire "moonlighting" resident physicians from other hospitals to provide the legally required, round the clock, Emergency Department physician coverage.

Radiology and Pathology were included in the Quality Index here because the JCAH evaluators showed concern primarily for the impact of these departments on medical activities. It was, therefore, felt that the JCAH evaluation of these departments would fall under quality of care rather than under non-medical component efficiency.

A selection of comments by the JCAH surveyors about these departments is shown in Table 7-III to give an idea of their concerns. It would seem that the surveyors emphasize patient records, medical staff bylaws, and physical facilities.

(C) Training of the Medical Staff: A number of possible measures could be used here. For each hospital the total number of physicians on the active (voting) staff was obtained. This number excluded physicians on the courtesy staff, consulting staff, house staff, honorary staff, emeritus staff, and physicians on leave of absence.

Of the active staff, the number of general practitioners and the number of board certified specialists were obtained. The residual category consists of specialists who are not board certified. The assumption here is that the higher the proportion of board certified specialists the higher the quality of care.[3]

Three possible measures here are: (1) the proportion of board certified specialists, (2) the proportion of general practitioners, and (3) the ratio of general practitioners to board certified specialists. The mean values, standard deviations and intercorrelations between these three measures are shown in Table 7-IV. These three measures are fairly strongly correlated one with another in the expected directions. The percent of Board Certified Specialists will be the preferred measure.

This measure of quality will be used only to verify the other measure of quality. Within the context of the Entrepreneurial Theory, this physician qualification measure might better be viewed as an intervening variable between (low) specification of procedures and efficiency.

Given a high level of task-environment complexity and some degree of urgency the owner (Board) and his agent (Administrator) can no

[3] Needless to say, this assumption would be hotly contested by general practitioners.

longer specify procedures and maintain an efficient organization. They must bring into the organization workers with the ability to specify their own procedures (called professionals). These measures of the proportion of board specialists can be considered as reflecting the extent to which the owner has attracted highly skilled professional workers who will specify their own procedures. This is a necessary step in maintaining an efficient organization given a complex task-environment.

TABLE 7-IV

PHYSICIAN QUALIFICATION MEASURES FOR THE ACTIVE (VOTING) MEDICAL STAFF*

	Mean	Standard Deviation
Percent Board Certified Specialists.....	51.7	15.0
Percent General Practitioner.....	31.9	16.3
Ratio of General Practitioners to Board Certified Specialists.....	0.726	0.540

Correlations

	Percent GP's	Ratio GP's/ Board Cert.
% Board Certified.....	−.594†	−.778† +.916†

* I am indebted to Geoffery Gibson of the Center for Health Administration Studies, University of Chicago, for the use of these data. For these data, n = 26.

† $p < .005$

This is not the case for low task-environment complexity where high specification of procedures is predicted to be most conducive to organizational efficiency. In this case, it may be appropriate to use unskilled workers (perhaps paying them lower wages) and specify procedures for them. For this reason, given low complexity, there is no reason to expect a positive correlation between professional qualifications and efficiency.

(D) Death Rate Adjusted for Case Severity as a Measure of Quality of Care: This measure is taken from Roemer, *et al.*[4] The following information is required to derive the index. The data used here was obtained from the files of the JCAH.

[4] Roemer, Milton, *et al.* "A Proposed Hospital Quality Index: Hospital Death Rates Adjusted for Case Severity," *Health Services Research,* Summer, 1968.

$\emptyset$ = Occupancy Rate for the Hospital
$\bar{\emptyset}$ = Mean Occupancy for All Hospitals in the Sample
ALOS = Average Length of Stay for the Hospital
DR = Death Rate in the Hospital

The death rate figure is derived as follows:

$$DR = \frac{\text{Number of Deaths in the Hospital During the Year Excluding Newborn Deaths}}{\text{Number of Admissions Excluding Maternity Admissions}}$$

In another analysis, Roemer, *et al,* found that the best measure of case severity was average length of stay in the hospital. The longer the average length of stay, the greater the average severity of illness. However, they suggest that average length of stay is also affected by the demand for hospital beds. They hypothesized that the higher the demand for beds, the higher the occupancy rate and, therefore, in order to increase patient turnover, the shorter the average length of stay. Following this logic, first they adjusted ALOS to take out differences in "pressure for beds" by use of the following equation.

$$A^* = \text{ALOS } (\emptyset/\bar{\emptyset}) \text{ Occupancy corrected ALOS } (1)$$

where A^* is the average length of stay corrected for differences in pressure for beds. Then the hospital's death rate was adjusted for differences in case severity by use of the following equation.

$$\text{SADR} - 100 \text{ DR} - 0.94 \ (A^* - \bar{A}^*)$$

where SADR is severity adjusted death rate (the final quality of medical care measure); $\bar{A}^*$, the mean average length of stay corrected for occupancy differences for all the hospitals in the sample; and —.94, the regression coefficient obtained by Roemer, when he regressed $(A^*-\bar{A}^*)$ against (100 DR). We do not know, but he probably dropped the constant term obtained in this regression.

The reason for this is that Roemer, *et al,* found that ALOS was the best predictor of his unadjusted death rate (DR). His data are from thirty-two Los Angeles general hospitals and the correlation between ALOS and DR was +.794. The correlation between DR and A^* was +.770. In spite of the lower correlation, Roemer, *et al,* chose A^* as the best control on theoretical grounds. Roemer, *et al,* validated their severity adjusted death rate (SADR) as a measure of quality of care by showing that it was negatively related to other presumed aspects of quality such

as the scope of services provided by the hospital and hospital accreditation. They also found a higher SADR in proprietary hospitals than in non-profit hospitals. Unfortunately, these relationships were not tested for statistical significance, so we have no way of judging the strength of these relationships from their article.

Roemer's technique was replicated as the fifth measure of quality of care, with use of data obtained from the JCAH files. The only difference is that where he used the number of maternity admissions to obtain the death rate (DR) we used the number of deliveries. This modification appears to be trivial. The assumption here is that the higher the severity adjusted death rate (SADR) the lower the quality of care.

The Validity of the Measures of Quality of Care

To test the validity of the five measures of quality of care, they were correlated one with another and the results are shown in Table 7-V.

All the correlations are in the predicted direction and when the JCAH I index is excluded, four out of six of these correlations are statistically significant at the .05 level. Although the JCAH I index correlations are in the right direction they are not very strong. Since the JCAH I index

TABLE 7-V

CORRELATIONS BETWEEN THE MEASURES OF QUALITY OF CARE (MEDICAL EFFICIENCY)*

	% Board Certified Specialists	Evaluation I	Evaluation II	Adjusted Death Rate
Mean Expert Evaluation	+.557‡	+.089	+.528‡	−.456‡
% Board Certified Specialists		+.310	+.214	−.270
JCAH Evaluation I			+.571‡	−.103
JCAH Evaluation II				−.364†

Mean Expert Evaluation: The Mean Expert Evaluation of the Quality of Care (n = 30)
% Board Certified Specialists: (Number of Active Board Certified Specialists) × 100, divided by the Number of Physicians on the Active (Voting) Staff (n = 26)
JCAH Evaluation I: Missing departments are excluded and not counted against the hospital (n = 29)
JCAH Evaluation II: Missing areas are counted against the hospital (n = 29)
Adjusted Death Rate: SADR Severity Adjusted Death Rate (The lower the rate the higher the quality of care) (n = 29)
(For full details, see text)

* Pearson Product Moment Correlations are shown without parentheses. Rank Order Correlations were very much the same and are therefore not shown.
† $p < .05$.
‡ $p < .005$.

does not count missing departments against the hospital while the JCAH II index does, these correlations suggest that the hospital should get a lower score if it is missing departments.[5] Thus, the JCAH II index which does dock the hospital for missing departments is more strongly related to the mean expert evaluation (+.528) and to the adjusted death rate (−.364).

These correlations in Table 7-V and the preceding theoretical discussion about physician qualifications suggest that the three best measures of quality of care are:

(1) Mean Expert Evaluation
(2) JCAH II Index
(3) Severity Adjusted Death Rate

The Existence of Reports (R) in the Medical Component

Four measures have been obtained for the medical component of the hospital. These are:

(1) Whether or not the hospital subscribes to PAS (Physician Activities Services). This is a centralized data analysis program based in Ann Arbor, Michigan. The hospital pays to be a subscriber, turns in abstracts of each patient record, and PAS keypunches, analyzes and prints out data monthly on patient characteristics. The assumption here is that the hospital which subscribes to PAS has a higher volume of reports than a hospital which does not subscribe. This is a dichotomous variable.

There is a good deal of debate about the usefulness of PAS. It is frequently argued that many hospitals subscribe to this service and never look at these data. Their reason for subscribing is that this is one way of keeping the disease and operations files required for accreditation. Informal discussions with the medical record librarians in these thirty hospitals suggests that the PAS reports are sometimes minimally used.

(2) The second measure of Reports is an index based on the extent and frequency of statistical reports on medical staff activities. The types of reports used to make up this index are shown in Table 7-VI. The

[5] Mathematically:

$$\text{JCAH I} = \frac{\sum_{i=7}^{20} w_i}{n} \qquad \text{JCAH II} = \sum_{i=7}^{20} W_i$$

where i stands for the area of the hospital, and areas 7 to 20 constitute the relevant areas of the hospital; w is the weighting index for JCAH I and W the weighting index used for JCAH II; and n is the number of areas which the hospital has. See the preceding discussion for the list of areas and the weights.

higher the index score the more reports are being generated. This measure should be strongly correlated with the use of PAS, but it should be a more important measure with respect to organizational behavior. The reason for this is that the effort required to generate and maintain special organizational reports would appear to be greater than just purchasing the use of an outside computer service.

TABLE 7-VI

THE BASIS FOR THE REPORTS INDEX (R) FOR THE MEDICAL COMPONENT OF THE HOSPITAL

	Used Yes/ No	Frequency of Use
Incomplete Medical Records		
Percent Normal Tissue Removed		
Consultation Rates		
Post Operative Deaths		
Anesthesia Deaths		
Admissions per MD per year		
MD Attendance at Staff Meetings		

To count as a report this statistical information had to be compiled on a routine basis rather than remaining in raw form either in individual committee minutes or in individual medical records.

The scoring system is as follows:

report not used	0
report produced yearly	1
report produced twice yearly	2
report produced quarterly	3
report produced monthly or less	4

Thus, the maximum possible score is 28.

(3) The third reports measure for the medical component is the hospital's autopsy rate. This is the proportion of all patients who died in the hospital who were autopsied. The autopsy is the definitive technique for finding out the reason for a patient's death and, therefore, the way to find out the effects of medical treatment. It is a way for making the effects of procedures visible. The higher the autopsy rate the higher the reports index.

(4) The use of formal periodic reports from the hospital's tissue committee. This committee, consisting of physicians, is supposed to review the medical records of patients who have undergone surgery. They are supposed to review the pathologist's findings on whether the tissue removed from the patient during an operation was diseased or not. This is one way of seeing if too many or too few operations are being performed. All the hospitals have such a committee, because it is

required by the JCAH for accreditation. However, only a few of these committees compile periodic statistical reports on their findings above and beyond the minutes of their meetings. If the tissue committee generates periodic reports, this hospital was given a score of one on this measure; if not, it was given a score of zero. Needless to say, this Reports measure is much more narrow in scope than the Reports Index described above.

The validation of these four reports measures (R) by the use of correlations is shown in Table 7-VII. Of the six correlations shown, five are in the expected positive direction and four of these are significant at the .05 level. Of these four measures the Reports Index and the Autopsy Rate are the preferred measures for the reasons discussed above.

TABLE 7-VII

THE EXISTENCE OF REPORTS (R) AND VISIBILITY OF CONSEQUENCES (C_v) FOR THE MEDICAL COMPONENT

The Existence of Reports (R)

	Reports Index	Autopsy Rate	Tissue Committee Reports
PAS	+.456*	−.054	+.421*
Reports Index		+.389*	+.525†
Autopsy Rate			+.074

* $p < .05$.
† $p < .005$.
n = 26 or 27.

Visibility of Consequences (C_v) (n = 17)

	Board C_v
Admin C_v	+.841†

Visibility of Consequences (C_v) for the Medical Component

The Visibility of Consequences measures for the medical component were obtained in exactly the same way as for the non-medical component and by use of the same questionnaire. The Administrator and the Chairman of the Board were asked to rate their hospital on a five-point scale as to whether their hospital was higher or lower than other similar hospitals in the Chicago area for the following aspects of medical staff performance.

(*a*) Autopsy Rate
(*b*) Average Quality of Education of Physician on the Active Staff

(*c*) Post Operative Infection Rate
(*d*) Overall Quality of Care

The Administrator's and Board Chairman's ratings were then each correlated with his hospital's actual standing (rank order) on these four characteristics. This correlation between the perceived evaluations and the hospital's actual rank order is our measure of visibility of consequences. The higher this correlation the higher the visibility of consequences.

In seventeen non-Catholic hospitals both the Administrator and the Board Chairman filled out this questionnaire. In these hospitals the correlation between the Administrator's C_v score and the Chairman's C_v score is $+.841$. The mean C_v score for the twenty-seven administrators is $+.136$. The mean C_v score for the seventeen board chairmen is $+.160$. That these means are greater than zero suggests that these respondents on the average do have an accurate idea of their hospital's relative performance.

Specification of Procedures (P+) for the Medical Component

The six measures of specification of procedures are described below:

(1) The use of a formulary: This limits the range of drugs which a physician can prescribe in the hospital. This is in contrast with hospitals which allow the physician to prescribe any drug he wishes. This is scored as yes/no. (28 percent of the hospitals use a formulary)

(2) The use of required admission test on all patients including (*a*) chest x-ray, (*b*) urinalysis, (*c*) serologic test for syphilis and (*d*) blood count. The more of these required tests the higher the specification of procedures. This is a 4 point scale. (mean value 3.38)

(3) The extent to which consultations are required before the following procedures can be performed; (*a*) Caesarian section, (*b*) D & C, (*c*) therapeutic abortion and (*d*) sterilization. The more of these required consultations the higher the specification of procedures. This is a 4 point scale. (mean value 3.40)

(4) The extent to which the hospital placed restraints on the range of activities each physician can perform in the hospital, including (*a*) surgeons, (*b*) obstetricians and (*c*) other specialities. This is a three point scale. (mean value 2.00)

(5) If admitting privileges of physicians are suspended for having too many incomplete medical records this indicates the willingness of the hospital to invoke sanctions on individual physicians to enforce hospital rules concerning the completion of these records. This is scored as yes = 1, no = 0, so that this is positively related to specification of procedures. (88 percent of hospitals suspend privileges for incomplete records)

(6) The perceived degree of influence that physicians in the hospital have. The Chief, or President of the Medical Staff, was asked to complete a questionnaire in which he rated the influence of the physicians on a 6 point scale, where the higher the score the higher the perceived influence and the lower the specification of procedures. (mean value 4.38)

The correlations between these six measures of specification of procedures are shown in Table 7-VIII. This table shows that these measures are neither strongly nor systematically related to one another. The use of a formulary and the extent of required consultations are positively and significantly related to each other. However, the perceived measure of

TABLE 7-VIII

CORRELATIONS BETWEEN THE MEASURES OF SPECIFICATION OF PRODUCTION PROCEDURES (P+) FOR THE MEDICAL COMPONENT

	Required Admission Test	Required Consultation	Limits On MD Activities	Suspension of Privileges	Perceived MD Influence
1) Formulary is used.....	+.070	+.330*	+.143	−.287	+.244
2) Use of Required Admission Tests.....		+.162	+.053	−.092	+.068
3) Extent of Required Consultations.....			−.139	−.194	−.180
4) Limits on MD Activities.....				−.217	+.339*
5) Suspension of Admitting Privileges.....					−.105

* $p < .05$.
n = 26 or 27.
See Text for a full description of these variables.

physician influence should be negatively related to the other P+ measures. In fact, the imposition of limits on MD activities is positively related to perceived MD influence.[6] The reasons for this will be discussed in the next chapter.

[6] These findings, or lack of them, are consistent with those of Thomas Whisler, *et al:* "Centralization of Organizational Control," *The Journal of Business,* Vol. 40, No. 1, January, 1967, pp. 10–26. They found that their three measures of centralization of control which are akin to our measures of specification of production procedures were highly interrelated in departments with highly programmed tasks (akin to our non-medical component) and not interrelated for departments with non-programmed tasks (akin to our medical component).

CHAPTER VIII

TESTS OF THE HYPOTHESIS CONCERNING THE MEDICAL COMPONENT OF THE HOSPITAL EMPIRICAL EVIDENCE

HYPOTHESIS V:

The Existence of Reports (R) and Visibility of Consequences (C_v) Are Positively Related to Quality of Care.

The correlations between R, C_v, and Quality of Care which test this hypothesis are shown in Table 8-I. The results are all in the predicted direction and are statistically significant for seven out of twelve correlations. High C_v and high R both are positively correlated with the mean expert evaluation and with the JCAH II evaluation and negatively correlated with the severity adjusted death rate. As with the non-medical component, Board C_v is a better predicator of efficiency than is Administrator C_v.

TABLE 8-I

THE CORRELATION BETWEEN THE EXISTENCE OF REPORTS (R), VISIBILITY OF CONSEQUENCES (C_v) AND QUALITY OF CARE FOR THE MEDICAL COMPONENT OF THE HOSPITAL*

	Quality of Care		
	Mean Expert Evaluation	JCAH II Evaluation	SADR Adjusted Death Rate
R			
Reports Index.	+.541‡	+.308	−.107
Autopsy Rate.	+.495‡	+.502‡	−.443†
C_v			
Administrator.....	+.468†	+.183	−.231
Board (n=17).	+.753‡	+.424†	−.158

* Unless otherwise stated, sample size is from 24 to 27 hospitals due to occasional missing data. This is true for all tables in this chapter.

† $p < .05$.

‡ $p < .005$.

HYPOTHESIS VI:

Given High Complexity, Specification of Procedures Will Be Negatively Related to Quality of Care.

This hypothesis is tested by correlating our three measures of Quality of Care with the six measures of Specification of Procedures for the Medical Component of the Hospital. The results are shown in Table 8-II along with the predicted direction of these relationships based on Hypothesis VI. Of the eighteen relationships shown in this Table, eleven are in the predicted direction and of these, three are statistically significant at the .05 level. This provides only modest support for the hypothesis.

Ex post facto analysis of these results raises the following theoretical question with respect to professional organizations. If we observe the existence of a constraint on behavior (a rule) in a professional organization, we do not know who imposed it. In the context of the Entrepreneurial Theory, if the rule is hierarchically imposed it would be defined as a specified procedure (P+). In the absence of hierarchically imposed procedures two alternatives are possible both of which would fall under the theoretical rubric of low specification of procedures (P—).

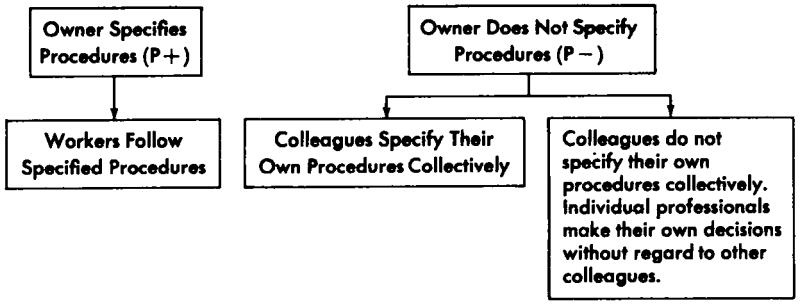
TABLE 8-II

SPECIFICATION OF PROCEDURES (P+) AND QUALITY OF CARE FOR THE MEDICAL COMPONENT OF THE HOSPITAL

	Mean Expert Evaluation	JCAH II Index	Adjusted Death Rate
Predicted Direction of Relationship based on Hypothesis VI			
1) Formulary Used.....	−	−	+
2) Required Admission Tests.....	−	−	+
3) Required Consultations.....	−	−	+
4) Limits on MD Activities.....	−	−	+
5) Suspension of Privileges.....	−	−	+
6) Perceived MD Influence.....	+	+	−
Observed Relationships			
1) Formulary Used.....	−.294	−.325*	+.124
2) Required Admission Tests.....	+.241	+.090	−.220
3) Required Consultations.....	−.159	−.270	+.094
4) Limits on MD Activities.....	+.164	+.198	−.112
5) Suspension of Privileges.....	−.381*	+.016	+.228
6) Perceived MD Influence.....	+.276	+.286	+.326*

* $p < .05$.

Either the colleague group, as a group, may specify its own procedures ($P\bar{a}$) or the colleagues may let each individual professional specify his own procedures without regard to the other professionals ($P\bar{b}$). This may be viewed schematically as follows:



Thus if we observe constraints on behavior, we do not know whether the owner imposed them (P+) or the colleagues collectively specified them ($P\bar{a}$). If we observe no rules then we can assume ($P\bar{b}$).

Note that this problem arises only when specification of procedures is operationally measured by observing the existence of rules (our measures: 1, 2, 3, 4, 5) and not for the perceived influence measure (6) which does not face this problem.[1]

To make sense of our measure of specification of procedures, we must re-examine those measures of the extent of rules 1–5 to see if they were imposed hierarchically (P+) or were collectively agreed upon by the professionals ($P\bar{a}$).

There is some logical grounds for arguing that three of these rules:

2. Required Admission Tests
3. Required Consultations
4. Limits on Physician Activities

are imposed by the colleagues themselves. The reason for this is that physicians will financially benefit from them. Requiring x-rays and lab tests on all patients may well be a way of enhancing the income of radiologists and pathologists respectively, both of whom are usually remunerated in these hospitals on a percent of gross or net departmental

[1] This problem does not arise with respect to the non-medical component, because the workers do not have any say in whether the hospitals in our sample use position controls, budgets, job descriptions, etc. The decision to use these tools is decided by the Board and Administration. Therefore, these procedures can only be imposed hierarchically.

revenue. Required consultations can be seen as enhancing the income of those physicians who consult. Limits on surgical and obstetrical activities reward monopolies to those who are granted these privileges. Thus there is a good case here for saying that the physicians themselves benefit here and that they are therefore the ones who imposed these rules. This would be classified as ($P\bar{a}$) in the preceding schematic diagram.[2]

This reasoning does not hold at all for (1) The Use of a Formulary, and for (5) The Suspension of Admitting Privileges Due to Failure to Complete Medical Records. The formulary is a bureaucratic device which directly benefits the pharmacy by lowering the inventory levels and allowing bulk purchasing. The suspension of admitting priveleges benefits the medical records department by providing sanctions to be invoked for physician non-compliance in filling out patient records. Presumably, physicians prefer not to be constrained by a formulary and undoubtedly would prefer not to have their privileges to admit patients suspended for failure to keep up with their paper work.

Thus there is some logic behind arguing that (1) the use of a formulary and (5) the suspension of privileges are imposed from outside the colleague group and would therefore be classified under (P+) in the preceding schematic diagram.

Given this, let us return to Table 8-II and look only at the three appropriate measures of (P+):

1. The Use of a Formulary
5. The Suspension of Privileges
6. Perceived Physician Influence

Of the nine correlations between these (P+) measures and efficiency, eight are in the predicted direction and three of these are significant at the .05 level. This provides stronger evidence in support of Hypothesis VI.

Admittedly these findings were unexpected and this theoretical refinement was made on observing the data in Table 8-II. Further evidence is called for. To this end we undertook to develop a new index which would allow us to say whether or not the physicians participated in specifying their own procedures. This (P+) scale is constructed as follows:

If there are a proportionately large number of physicians on the Board

[2] This is not to argue that these rules are detrimental to the quality of care in the hospital. It is believed that required tests screen for undetected illnesses, that consultations promote the verification of diagnosis and that limits on physician activities restrain the untrained. The weak positive correlations between (2) Required Tests, (3) Limits on Physician Activities and Quality support this contention. The economic rationale of these rules has been stressed here to show why the physicians are more likely to impose these rules upon themselves.

of the hospital, or if the physicians are able to meet with the Board frequently through a joint conference committee, then it is assumed that the Board is less likely to impose rules upon the professionals without their participation and consent. Heavy worker participation on the Corporate Board of the organization is perhaps the ultimate in worker participation. Compared to this, the other studies of participatory management are measuring trivial differences in participation. If there is not representation on the Governing Board, then the next best thing is to have the professionals meet frequently in regular conferences with the Board. In hospitals the usual vehicle for this is called the Joint Conference Committee (JCC) in which chiefs of the medical staff meet with the executive officers of the Board. Although decisions of the JCC are usually not binding on the Board, they tend to carry great weight. Using this reasoning the following scale was developed.

(P−)	> 10% of Board are MD's and JCC meets frequently	1
	≤ 10% of Board are MD's and JCC meets frequently > 10% of Board are MD's and JCC meets infrequently	2
	≤ 10% of Board are MD's and JCC meets infrequently	3
	No MD's on Board and JCC meets frequently	4
(P+)	No MD's on Board and JCC meets infrequently	5

If the Joint Conference Committee meets six or more times a year, this is defined as "frequently"; if it meets less than six times a year, this is defined as "infrequently." The higher the number here, the higher the specification of procedures.

Hypothesis VI would predict that this P+ index would be negatively correlated with the Expert Evaluation of Quality of Care, negatively correlated with the JCAH II rating of Quality and positively correlated with the adjusted death rate. The results are shown below:

The results shown in Table 8-III are in the predicted direction and two of the relationships are significant at the .05 level. This provides support for Hypothesis VI.

This hypothesis can be further tested by subdividing these medical

TABLE 8-III

QUALITY OF CARE MEASURES

	Expert Evaluation	JCAH II	Adjusted Death Rate
(7) P+ Index...	−.092	−.449*	+.435*

* $p < .05$.

components into high and low complexity. To do this we used a complexity index based on whether or not eleven different surgical operations were performed in the last year, the use of cardiac monitors, and the availability of a premature nursery. This list is shown in Table 8-IV. The complexity index can range from zero to thirteen; the higher the score the more complex the medical component. Hypothesis VI would

TABLE 8-IV

COMPLEXITY INDEX (MEDICAL COMPONENT)

Operations	SNDO* Number	ICDA† Number
1) Uncomplicated Obstetric Delivery	790-89	...
2) Cesarean Section	7x2-04	77.9
3) Spinal Fusion	200-57	84.4
4) Skin Graft	510, 512, 514, 516	93.4, 93.5
5) Radical Mastectomy	190-14	65.5
6) Cornea	x12-00 thro. x12-71	14.0 thro. 14.9
7) Open Skull	21Δ-00 thro. 21Δ-08	01.0
8) Amputation above knee	235-20	85.8
9) Implantation of Radioactive Substance	782, 783, 310-32	R1.4, R1.5
10) Cardiac Catheterization	410-38	30.2
11) Dental Extraction	613-12	99.3, 99.4
Other		
12) Electronic Cardiac Monitors are used		
13) There is a premature nursery service		

* American Medical Association, *Standard Nomenclature of Diseases and Operations*, 5th Edition, New York: McGraw-Hill, 1961.

† U.S. Department of Health, Education, and Welfare, *Eighth Revision International Classification of Diseases*, Vol. 2, PHS Publication, 1963, Washington, D.C.: Government Printing Office, December, 1968.

predict that the negative relationship between P+ and quality of care would be greater in the high complexity medical components. The results are shown in Table 8-V.

Because of the very small sample sizes involved, these results are not statistically significant, and must be viewed cautiously. For both high and low complexity groups the higher the specification of procedures, the lower the expert's evaluation of the quality of care and the higher the death rate index. In the high complexity groups these associations (as measured by the larger Q's) are slightly stronger. This is consistent with the hypothesis that higher complexity calls for less specified procedures.

TABLE 8-V

COMPLEXITY, QUALITY OF CARE AND (P+) FOR THE MEDICAL COMPONENT*

LOW COMPLEXITY

P+ Index (7)	Expert Evaluation		SADR	
	Low	High	Low	High
Low	3	2	3	2
High	3	1	1	3
	Q=−.333		Q=+.636	

HIGH COMPLEXITY

P+ Index (7)	Expert Evaluation		SADR	
	Low	High	Low	High
Low	3	6	7	2
High	5	2	2	4
	Q=−.667		Q=+.750	

* The JCAH II Index did not split evenly between high and low complexity to allow for this type of analysis. Q's are Yule and Kendall's Q: a measure of association. None of these 2 × 2 tables are statistically significant by themselves using χ^2 as the test of significance. The variables shown here have been dichotomized at the mean.

HYPOTHESIS VII:

The Higher the Visibility of Consequences (C_v) the More Likely the Extent of Specification of Procedures (P+) Will Be Optimal.

We have already shown that our measures of the existence of reports (R) for the medical component are positively related to quality of care. Therefore, Visibility of Consequences should be positively related to the Reports Index (R). The correlations between these measures are shown on the following page.

The results shown in Table 8-VI support the hypothesis. Note that Board C_v is more strongly correlated with (R) than is Administrator C_v.

As the data in Table 8-II show, limits on physician activities (P+ measure 4) and the use of required admission tests (measure 2) are positively, but not significantly related to quality. The use of required consultations (3) are negatively but not significantly related to quality. The use of a formulary (1), the suspension of privileges (5), and the P+ Index (7) shown in Table 8-III are negatively related to quality.

TABLE 8-VI

CORRELATIONS BETWEEN VISIBILITY OF CONSEQUENCES (C_v) AND REPORTS (R)

	Administrator C_v (n=27)	Board C_v (n=17)
Reports Measures (R)		
Reports Index.....	+.335*	+.584*
Autopsy Rate.....	+.138	+.298

* $p < .05$.

Finally, (6) perceived physician influence, is positively related to quality. Hypothesis VII would predict that Visibility of Consequences and Reports would be correlated with these seven (P+) measures in the same way. The test of this prediction is shown in Table 8-VII.

Visibility was expected to be positively but not significantly correlated with required admission tests (2). In fact they are positively and significantly related. Limits on Physician Activities (4) and Required Consultations (3) were not expected to be related to Visibility and they were not. For the remaining four (P+) measures (1, 5, 7, 6) of the sixteen correlations shown, twelve are in the predicted direction and of these,

TABLE 8-VII

SPECIFICATION OF PRODUCTION PROCEDURES (P+), VISIBILITY OF CONSEQUENCES (C_v) AND REPORTS (R)

(P+) Measure	Predicted Direction* of Relationship	(R) Reports Index	(R) Autopsy Rate	Administrator C_v	Board C_v (n=17)
2) Required Admission Tests.....	+ Not Significant	+.414†	+.295	+.477†	+.484†
4) Limits on MD Activities..	+ Not Significant	−.048	−.011	+.189	−.045
3) Required Consultations..	− Not Significant	+.127	−.206	+.171	+.380
1) Formulary is Used.....	−	+.082	−.174	+.210	+.116
5) Privileges Suspended....	−	−.186	−.043	−.361	−.163
7) P+ Index....	−	−.434†	−.355†	+.012	−.212
6) Perceived MD Influence...	+	+.021	+.190	+.345†	+.258

* For explanation, see text.
† $p < .05$.

four are significant at the .05 level. The data in Table 8-V appear to support Hypothesis VII.

HYPOTHESIS VIII:

The Effects of Specification of Procedures (P+), Reports (R), and Visibility of Consequences (C_v) on Quality of Care Are Additive.

This hypothesis will be tested by the use of multiple regression equations to predict quality of care in exactly the same way as was done with the non-medical component in Chapter VI.

Three measures of quality of care are used: (1) the Mean Expert Evaluation; (2) the Joint Commission on the Accreditation of Hospitals Evaluation Score II, which docks the hospital for having missing departments; and (3) the Severity Adjusted Death Rate which is negatively related to quality of care.

Two measures of reports are used: the Reports Index and the Autopsy Rate. These two measures will not be used in the same regression equation, because they both measure the same theoretical concept.

The specification of procedures index used here is the one developed retrospectively in this chapter (#7).

TABLE 8-VIII

MULTIPLE REGRESSION EQUATIONS PREDICTING QUALITY OF MEDICAL CARE

Symbol	Theoretical Name	Operational Measure	Relation Between Operational Measure and Theoretical Concept
EE	Quality of Care	Mean Expert Evaluation	(+)
JCAH II	Quality of Care	Joint Commission on the Accreditation of Hospitals Index II	(+)
SADR	Quality of Care	Severity Adjusted Death Rate	(−)
C_x	Complexity	Index of Operations Performed	(+)
log S	Size	Log of the Number of Hospital Beds	(+)
R	Reports	Reports Index	(+)
A	Reports	Autopsy Rate	(+)
P+	Specification of Procedures	Index of Physician Participation in Decision Making (#7)	(+)
C_v	Visibility of Consequences	Administrator Awareness	(+)

The independent variables are shown in order of entrance in the stepwise multiple regressions. Directly below each independent variable the t values are shown. If $t > 1.96$ then $p < .05$. For all equations, $n = 23$.

TABLE 8-VIII—*Continued*

MEANS, STANDARD DEVIATIONS, AND MAXIMUM RANGES OF THE VARIABLES

Variable Symbol	Variable Name	Mean	Standard Deviation	Maximum Possible Range
EE	Expert Evaluation	3.04	0.85	$1 \leq EE \geq 5$
JCAH II	JCAH Index	43.87	5.73	$0 \leq JCAH\ II \geq 56$
SADR	Death Rate	3.87	1.57	
C_x	Complexity	11.00	2.02	$0 \leq C_x \geq 13$
log S	log Size	5.62	0.40	
R	Reports Index	16.91	6.12	$0 \leq PC_v \geq 28$
A	Autopsy Rate	40.74	12.43	$0 \leq A \geq 100$
P+	Specification of Procedures	3.09	1.41	$1 \leq P+ \geq 5$
C_v	Administrator Awareness	+.047	0.65	$-1.00 \leq C_v \geq +1.00$

TABLE 8-VIII—*Continued*

MULTIPLE REGRESSION EQUATIONS PREDICTING QUALITY OF CARE FOR THE MEDICAL COMPONENT WHERE QUALITY IS MEASURED BY MEAN EXPERT EVALUATION

EE = −4.56	+1.28 (log S)	+ .040 (R)	−0.10 (P+)	+0.31 (C_v)
t 2.42	4.17	1.71	1.08	1.02
cumulative r = .81		$r^2 = .66$		
EE = −3.38	+1.12 (log S)	−0.14 (P+)	+0.35 (C_v)	+0.013 (A)
t 1.88	3.42	1.55	1.75	1.24
cumulative r = .80		$r^2 = .64$		
EE = +1.32	+0.48 (C_v)	+0.15 (C_x)	−0.12 (P+)	+0.25 (R)
t 1.22	1.92	2.02	.99	.86
cumulative r = .67		$r^2 = .45$		
EE = +0.91	+0.51 (C_v)	+0.021 (A)	+0.14 (C_x)	− .11 (P+)
t .92	2.33	1.76	2.08	1.05
cumulative r = .72		$r^2 = .52$		

TABLE 8-VIII—*Continued*

MULTIPLE REGRESSION EQUATIONS PREDICTING THE QUALITY OF CARE FOR THE MEDICAL COMPONENT WHERE QUALITY IS MEASURED BY THE JCAH II INDEX

JCAH II = −8.22	+9.94 (log S)	−1.62 (P+)	+ .069 (R)	+ .40 (C_v)
t .69	5.12	2.73	.47	.30
cumulative r = .84		$r^2 = .70$		
JCAH II = −6.69	+8.88 (log S)	−1.41 (P+)	+0.12 (A)	+0.52 (C_v)
t .68	4.91	2.82	2.06	.48
cumulative r = .87		$r^2 = .76$		
JCAH II = 37.45	+1.13 (C_x)	−1.75 (P+)	+2.46 (C_v)	− .045 (R)
t 5.01	2.23	2.13	1.42	.22
cumulative r = .65		$r^2 = .43$		
JCAH II = 28.25	+0.18 (A)	+1.06 (C_x)	−1.16 (P+)	+1.84 (C_v)
t 4.46	2.41	2.38	1.75	1.32
cumulative r = .75		$r^2 = .57$		

TABLE 8-VIII—*Continued*

MULTIPLE REGRESSION EQUATIONS PREDICTING QUALITY OF CARE FOR THE MEDICAL COMPONENT WHERE QUALITY IS MEASURED BY THE SEVERITY ADJUSTED DEATH RATE INDEX

SADR = +5.99	+ .059 (P+)	−0.88 (log S)	−0.65 (C_v)	+0.061 (R)
t 1.24	2.43	1.11	1.21	1.01
cumulative r = .58		r^2 = .34		
SADR = +8.14	−0.049 (A)	+0.34 (P+)	−0.38 (C_v)	−0.58 log S)
t 1.96	1.98	1.60	.82	.77
cumulative r = .65		r^2 = .43		
SADR = +1.91	+0.60 (P+)	−0.83 (C_v)	+0.071 (R)	−0.096 (C_x)
t .85	2.43	1.61	1.16	.63
cumulative r = .56		r^2 = .31		
SADR = +5.79	−0.053 (A)	+0.32 (P+)	−0.46 (C_v)	−0.065 (C_x)
t 2.88	2.19	1.51	1.05	.46
cumulative r = .64		r^2 = .42		

TABLE 8-IX

MULTIPLE REGRESSION EQUATIONS PREDICTING QUALITY OF CARE USING THE PERCEIVED MEASURE OF SPECIFICATION OF PROCEDURES (P_p+)

EE = −5.21	+1.29 (log S)	+ .052 (R)	+ .157 (C_v)	+ .027 (P_p^+)
t (3.03)	(4.24)	(2.60)	(0.78)	(0.23)
cumulative r = .804		r^2 = .646		
JCAH II = −18.69	×9.35 (log S)	+ .344 (R)	−1.72 (C_v)	+0.91 (P_p^+)
t (1.19)	(3.38)	(1.89)	(0.94)	(0.87)
cumulative r = .688		r^2 = .473		
SADR = 6.42	− .049 (A)	−0.34 (P_p^+)	+ .093 (C_x)	−0.27 (C_v)
t (3.21)	(1.94)	(1.11)	(0.65)	(0.54)
cumulative r = .514		r^2 = .264		

The higher the P_p+ score, the lower the specification of procedures.
The mean value of P_p+ is 4.38 and the maximum possible range is $1 \geq P_p+ \leq 6$.

TABLE 8-X

ESTIMATING THE EFFECT OF IMPROVED MANAGERIAL PERFORMANCE ON QUALITY OF CARE

(a) Equation	(b) Using Mean Values*	(c) Using Reasonable Standard	(d)=(b)−(c) Reasonable Improvement
SADR = ...	3.87	1.91	1.96
+8.14.....	+8.14	+8.14	0.00
−0.049 (A)...	(−0.049)(40.74) = −2.00	(−0.049)(60.0) = −2.94	+0.94
+0.34 (P+)..	(+0.34)(3.09) = +1.05	(+0.34)(1.0) = +0.34	+0.71
−0.38 (C_v)...	(−0.38)(.047) = −0.02	(−0.38)(.40) = −0.15	+0.13
−0.58 (log S).	(−0.58)(5.62) = −3.26	(−0.58)(6.00) = −3.48	+0.22

* There is an 0.04 rounding error so that the lower part of the equations in columns (b) and (d) sum to 3.91 and 2.00 respectively.

Two additional control variables have been entered: the Natural Log of Hospital Size, and, Medical Component Complexity. The log of size is used because the first order correlations between log of size and the quality of care measures are stronger than for linear size. Unlike the cost indices of non-medical efficiency, there is no compelling theoretical reason for choosing one particular form of the size measure over any other. The complexity measure has already been described (see Table 8-IV). Complexity and log size were not used in the same regression equations to avoid the problem of colinearity between these two independent variables.

This resulted in the twelve separate equations shown in Table 8-VIII. The results here support the hypothesis with the partial exception of one of the two reports measures.

As predicted, the (P+) measure is negatively related to the Expert Evaluation and JCAH II indices and positively related to the SADR index. That is to say, the more specified the procedures, the lower the quality of care.

As predicted, visibility of consequences is positively related to the quality of care.

Size and complexity are positively related to the quality of care. This is consistent with the findings of Denton, *et al.*[3]

With respect to the relationship between Quality of Care and performance reports, the Autopsy Rate measure is consistently in the predicted direction. The Reports Index measure is in the predicted direction in three out of the six equations where it is used. It fails to be in the predicted direction in the three equations with the lowest r^2's. In three out of four matched comparisons the r^2's are higher where the autopsy rate rather than the reports index is used.

The r^2's for these equations tend to be higher than for the non-medical component. At best we can explain 66 percent of the variance in the mean expert evaluation, 76 percent of the JCAH II evaluation, and 43 percent of the death rate index.

To further test the hypothesis that specification of production procedures should be negatively related to quality of care, the perceived measure of specification of procedures (6) was used in place of the P+ Index (7) in the regression equations. This measures the degree of perceived physician influence in the hospital. The higher the score the more physician influence and the lower the specification of procedures. Therefore it is predicted that this perceived P+ measure ($P+_p$) should be

[3] Denton, *et al.*, *op cit.* They found that the strongest prediction of Expert Evaluation of Quality of Care was hospital size. Roemer, *et al.* also found that larger hospitals had a lower death rate index.

positively correlated with the Expert Evaluation Index (EE) and the JCAH II Index, and negatively correlated with the SADR Index. The results are shown in Table 8-IX. Instead of showing all possible regression equations only three are shown. One for each different measure of quality of care. The equations chosen are those with the highest r^2 and F values obtained. The results shown in Table 8-IX are consistent with the hypothesis. The more physician influence the higher the expert evaluation and JCAH II Index and the lower the severity adjusted death rate. The visibility variables enter with the expected signs with the single exception of C_v in the JCAH II equations. As with the previous regressions the t values are not always significant.

The results of these regression equations support the hypothesis that C_v, P+, and R have an additive effect on the quality of care provided in the hospital.

The Potential for Improvement in Quality of Care

So far the regressions in Tables 8-VIII and 8-IX have been used to verify the hypothesis. They can also be used to estimate the improvement in quality of care which can potentially be achieved through improved management techniques. The approach used here will be exactly the same as that used in Chapter VI for the non-medical component of the hospital. As before the question is: if these hospitals were raised from their current average level of management to a realistically attainable improved level of managerial practice what would be the gain in quality of care?

To undertake this estimate only the Severity Adjusted Death Rate Index (SADR) of Quality of Care is appropriate. This is because an x percent difference in a death rate is meaningful while an x percent change in mean expert evaluation is not particularly meaningful. For this reason only the SADR equations will be considered here. The next step is assigning the realistically attainable improved standards. As before, the rule followed here is that at least one or two hospitals must exceed the improved standard in order to show that it is practically attainable. For example, no hospital had a 100 percent autopsy rate and this appears to be a practically unattainable achievement. The following improved levels were chosen.[4]

For the autopsy rate the reported current mean for these hospitals is 40.7 percent and the improved standard is 60 percent.

The current mean administrative awareness (C_v) score is + .047 and the improved awareness score is + .40.

[4] As in Chapter VI, the reader may prefer to choose different improved levels.

The current mean log size is 5.62 and the larger mean size is 400 beds (log size ≈ 6.00).

The P+ Index (7) has been chosen over the perceived P+ measure (6) because it appears to have more meaning with respect to behavior and because the equation in which it appears has a higher r^2 value. The current mean value of the P+ Index is 3.87 and the expected level of improvement is 1.00. This is to say that all hospitals will have more participation in decision making at the Board level by the medical staff.

The equation chosen for this analysis is the second SADR equation in Table 8-VIII because it contains the preferred independent variables and because it has the highest r^2 of any SADR equations. As stated before, the JCAH II and EE equations are not used because percentage changes in these measures have little meaning.

The results shown in Table 8-X show that increasing the autopsy rate lowers the SADR by 0.94 deaths per 100 admissions. Increasing participation by the medical staff in decision making lowers the SADR by 0.71 deaths per 100 admissions. Increasing visibility of consequences on the part of the administrator decreases the SADR only slightly. The same is true for increasing the mean size of the hospital. Thus a reasonably possible level of improvement in management will lower the Severity Adjusted Death Rate from 3.87 to 1.96 deaths per 100 admissions. This is a reduction of 51 percent. This appears to be possible because two of these hospitals met or did better than an SADR of 1.91.

This equation suggests that major decisions in a good medical component management must involve the professionals themselves. Thus, high autopsy rate and participation by the physicians have the most impact of SADR while size and administrator awareness have a small impact on SADR.

This potential lowering of hospital death rates by 51 percent is a remarkable finding. Because it is remarkable, it calls for replication on another group of hospitals. If this finding occurs in other studies it suggests that large improvements in the quality of medical care may well be possible.

Conclusion

For the professional component of the hospital, procedures can be specified hierarchically (P+) or by the professionals collectively ($P\bar{a}$) or by the professionals individually ($P\bar{b}$). The data in this chapter suggest that participation in decision making by professionals is related to higher quality of care. In general, the evidence here supports the hypotheses. Using the Severity Adjusted Death Rate (SADR) regression equa-

tions to "model" the impact of management on hospitals shows a large potential lowering of SADR primarily through increased participation and an increased autopsy rate. In addition visibility of consequences and the use of reports have a positive impact on quality of care.

This completes the presentation of the basic evidence concerning the impact of "good" management on hospital performance. The next chapter copes with a number of possible problems relating to these data.

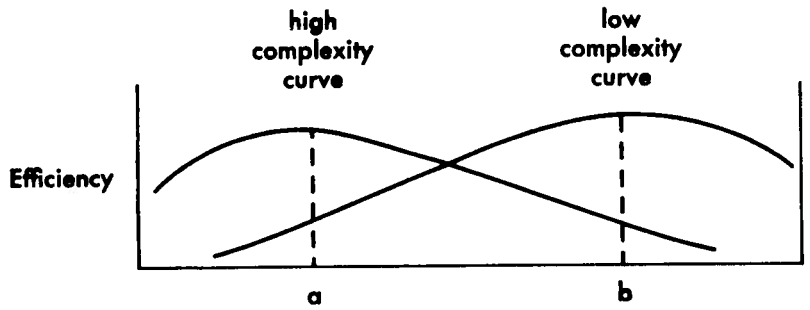
CHAPTER IX

FURTHER ANALYSIS

Although the previous chapters completed the basic test of the Theory, some further analysis is presented here in order to deal with a number of alternative theories.

Curvilinearity

There is compelling logic behind the idea that the hypothesized relationships concerning specification of procedures (P+) and efficiency are curvilinear. A too low proportion of specified procedures will be inappropriate as will a too high proportion. The optimal level will vary with the complexity of the task-environment. This relationship can be portrayed diagramatically as follows:



In plotting the data for specification of production procedures there appeared to be no evidence to suggest a curvilinear relationship. The plotted data approximated linear relationships. This does not destroy the curvilinear hypothesis but rather suggests that the range of our observations was insufficient to observe curvilinearity. This suggests that the observed relationships fall into the range between "a" and "b" in the preceding diagram.

Depreciation and the Cost Index of Efficiency

It has been argued that one can substitute capital for labor in the provision of hospital care. It is not clear that this increased capital will

markedly increase hospital performance which has traditionally been and remains highly labor intensive. If there is substitution between capital and labor, one would expect to observe a negative relationship between the use of plant and equipment as measured by depreciation cost and our cost index which is composed of salaries and supply costs.[1] In this sample of hospitals depreciation is predominantly twenty-year straight line depreciation based on original purchase costs and including equipment valued at over $100. If there is a strong negative relationship between our cost index and depreciation costs per patient day, then our cost index will be a biased measure of efficiency. For our twenty-seven hospitals the mean depreciation per patient day is $3.03. The correlation between depreciation per patient day and our cost index per patient day is + .011 suggesting no substitution effect and suggesting that our cost index as a measure of efficiency is not biased by differences in depreciation. An alternative to our cost index would be to add on a cost figure for depreciation. This has some problems. First, we do not know what proportion of the total depreciation to assign to our cost index. Preferably only the depreciation relevant to the departments whose costs comprise the index should be included. This information is not available. Secondly, the depreciation figures do not accurately reflect the current values of the plant and equipment, but rather the original cost. For these reasons and for simplicity, we have left depreciation out of our cost index. However, to see if it would make a difference, we took one-third of total depreciation costs (because our cost index is one-third of total costs) added it to the cost index and correlated the cost index with the cost index plus one-third depreciation. The correlation was +.981 suggesting a negligible difference betwen the two measures. With this analysis we felt we could safely exclude depreciation from our cost index.

Quality of Care and Costs and Man-Hours

It has frequently been argued that hospital costs are positively related to the quality of care provided. If our cost and man-hour indices are positively related to quality of care they are exposed to this criticism. To test this, the correlations between the cost index, the man-hour index and the three major measures of quality of care are shown on page 91.

These correlations show that the cost and man-hour indices are not positively related to quality of care. In fact, Table 9-I suggests that the more efficient hospitals (lower costs and man-hours) have higher quality of care for five out of six correlations shown. This suggests that the cost and man-hour indices reflect operating efficiency rather than quality of

[1] Called Direct Costs.

TABLE 9-I

MEASURE OF QUALITY OF CARE

	Mean Expert Evaluation	JCAH II	Adjusted Death Rate
Cost Index...	−.129	−.204	−.166
Man-Hour Index.....	−.345*	−.284	+.156

* $p < .05$.

care. This information further enhances the validity of these indices as measures of operating efficiency.

The Efficiency Indices and Intensity of Care

There is evidence to suggest that hospital costs vary with average length of stay (ALOS).[2] Controlling for the type of patient in the hospital, the longer the ALOS the lower the cost and man-hours per patient day. This difference reflects difference in intensity of treatment. If our cost and man-hour indices are negatively related to ALOS, it could be argued that our index is just picking up differences in intensity of care. The correlations between cost and man-hour indices and average length of stay are shown below:

TABLE 9-II

	ALOS
Cost Index.....	+.324*
Man-Hour Index.....	−.037

* $p < .05$.

These correlations indicate that these two efficiency indices are not picking up differences in intensity. In fact, the high cost index hospitals have a longer ALOS. Therefore, we can exclude the intensity of care effect as an explainer of our cost and man-hour indices.

By standardizing for the volume of departmental output we attempted to avoid picking up differences due to intensity of care and due to differences in physician practice which would result particularly in different use of lab tests and x-rays per patient day. Our cost index has attempted to pick up those costs which are particularly under the control of administration.

[2] Neuhauser, Duncan. "Average Length of Stay and Hospital Staffing Ratios," Unpublished paper, available through *Abstracts of Hospital Management Studies*, Vol. 4, No. 1, September, 1969 (Number NU1166).

An alternative index would be a case mix index like the one used by M. Feldstein.[3] The case mix index is unsatisfactory for our purpose. First, data on the types of patients in these hospitals are not available. Secondly, data on costs by case type are unavailable. Thirdly, the case mix index does not distinguish between costs that are controlled by administration and costs which are controlled by physicians.

The next step in refining our cost and man-hour indices is to control for differences in type of departmental services offered. For example, most of the dietary departments in these hospitals provide a selective menu while three do not. It is widely believed that it costs more to provide a selective menu. The next step would be to develop an adjustment to control for this difference. This would require both a detailed time and motion study combined with an accounting study to develop a standardized cost and man-hour adjustment. Regression techniques are inappropriate here, given the current state of the art. This is because correlations between differences in services and departmental costs may pick up the effect of differences in efficiency. This would defeat the purpose of these indices as measures of efficiency.

For example, although selective menus are presumably more expensive than a set menu, in this sample of hospitals those three hospitals with set menus have higher per meal costs. This suggests that in these three hospitals, the loss due to inefficiency was greater than the gain from a set menu.

To undertake these accounting adjustments is far beyond the scope of this study. Someday it will have to be done in order to develop more comparable units of departmental output. This would greatly enhance the usefulness of the HAS figures.

Participation in HAS

As had previously been discussed, our sample consists primarily of hospitals participating in the HAS data collection service. It seems appropriate to ask whether participation in HAS makes a difference. On the one hand the HAS reports can be viewed as a type of performance report (R) and, therefore, should be positively related to efficiency. On the other hand, this relationship is not expected to be very strong, because it is purchased rather than internally generated, as is the case for PAS in the medical component. The data show that participation in HAS is not very strongly related to the cost index (—.134) and to the man-hour index (—.125). These negative correlations are consistent with

[3] Feldstein, Martin. *Economics Analysis for Health Services Efficiency*, Amsterdam: North Holland Publishing Co., 1967, Chapter 2.

the hypothesis predicting a positive relationship between efficiency and the existence of reports.

The Managerial Component and the Cost and Man-Hour Indices

Another argument concerning the cost and man-hour indices of efficiency would be to say that lower costs and man-hours in the departments which constitute this index are achieved by increasing the number of managerial personnel. If this criticism is correct, then we would observe a negative correlation between the ratio of all managerial personnel to total hospital personnel (the managerial component) and the cost and man-hour indices. These two correlations are shown below:

TABLE 9-III

	The Size of the Managerial Component
Cost Index.....	+.212
Man-Hour Index.....	+.200

These positive correlations suggest that low costs and man-hours are not being achieved by increasing the managerial component. These positive correlations imply that the inefficient hospitals have a higher proportion of managers.

The further analysis in this section supports the validity of the cost and man-hour indices developed here. They do not appear to be picking up differences in quality of care and intensity of care. They do not appear to be picking up a substitution phenomenon between labor costs and capital costs as reflected in per diem depreciation, nor is it picking up a substitution between departmental costs and the size of the managerial component.

Generalizing these Conclusions to Small Hospitals and Teaching Hospitals

It is probably necessary to be very careful in generalizing these specific results to small hospitals. Although the relationships between C_v, R, P+, and Efficiency are predicted to be the same, they may manifest themselves somewhat differently. The administrator of a small hospital may rely more on personal inspection than on written reports to maintain high visibility. He may rely less on written rules to specify procedures than on face to face verbal requests.

In teaching hospitals, low specification of procedures for the medical staff may be achieved through tenured academic positions for the chiefs of service. These chiefs of service may have considerable leeway in specifying their own procedures, but they may specify procedures in turn for the relatively unskilled medical students and interns. In these large hospitals, the administrator may rely entirely on financial and other written reports to maintain visibility.

Thus it is proposed that the same relationships will occur, but different organizational devices may be used to achieve these ends.

Cause and Effect

The design of this study has only shown that a set of variables are systematically related to each other. It has not shown cause and effect relationships. This is clearly the next step. If one were to go into a hospital with low managerial awareness and increase it, would there be resultant changes in efficiency? If one introduced a position control system into a hospital previously without one, would personnel costs be lowered? Some issues are relevant here:

1. What is the direction of cause and effect?
2. To what extent does having a position control stand as a symbol for a whole cluster of "good" management practices?
   If this is the case, then if the only change that is made is to introduce a position control, it will have very little effect on efficiency.
3. It may not be sufficient to change the variables described here. There may be other important variables such as motivation, which we have not dealt with.
4. Finally, it may be that uncontrollable factors force organizations into certain patterns of performance and it is exceedingly difficult to change them.[4]

[4] An example of this perpetuation of excellence is that the most outstanding medical schools of 1910 (Johns Hopkins, Harvard, Columbia) remain among the top of the list today; over a half a century later. (Flexner, Abraham. "Medical Education in the United States and Canada, A Report to the Carnegie Foundation for the Advancement of Teaching," New York, 1910. "Full Time Physician Faculty by School of Graduation," *Journal of Medical Education,* Vol. 36, No. 2, February, 1961, pp. 178–179.) To some extent good performance perpetuates good performance and perhaps poor performance also persists over time. In our sample of hospitals, the experts felt that only one or two of these thirty hospitals were making a noticeable change in their relative level of efficiency at that time. The others were perceived as stable. This long-term stability is also proposed as important by Aaron Lowin, *op. cit.*

CHAPTER X

THE MISSING OBSERVATIONS

Three hospitals out of the thirty in the sample were unable or unwilling to provide much information. These hospitals are sufficiently unique to warrant some discussion of their characteristics. These hospitals may be viewed as case studies to further test the Entrepreneurial Theory. In describing these hospitals we have attempted to do so in such a way so as not to make their identity obvious. Needless to say, these "case studies" provide primarily anecdotal evidence.

One of the characteristics of a well-run hospital appears to be the willingness of administration to provide any and all information to qualified people. As the empirical evidence of the preceding chapters shows, the well-run hospital also accumulates more data about their operating characteristics. The poorly run hospitals generate less information and are reluctant to talk about it. This may be due to embarrassment about how badly they are doing, but that's only part of the answer, because they probably have no idea that they don't compare well with other hospitals (low C_v). In addition, information is power and perhaps some administrators hoard information as a device for perpetuating their influence. In two of these three hospitals there was no financial information being produced during the last six months. Their only financial information was their bank balance and in one case this was not reconciled with cancelled checks, so that they had no check on its accuracy. Thus this hospital had almost no idea of its financial position. Needless to say, these two hospitals had not turned in financial data to HAS for over a year in spite of the fact that they were paying for this service. Conversely, a sign of a business office that is functioning well is one where the twelve-month running average cost figures produced by HAS are accurate. This shows they are able to routinely turn in monthly cost figures on deadline. Those administrators who specify that these reports (R) be routinely and promptly completed appear to run efficient hospitals.

Not only do these three hospitals have, on the average, lower (R) they also appear to have lower Visibility of Consequences (C_v).

One of these administrators has a management style which includes purposely not answering his telephone and eating all his meals alone in his office. These are hardly techniques for maximizing visibility. One

example of his lack of awareness is that he had no feeling for the community surrounding the hospital. He was amazed to hear that I took the bus to get to his hospital. He thought it unsafe because it went through a poor neighborhood. This was a remarkable comment since many of his patients and employees must routinely use this bus to get to this hospital. The panel of administrative experts felt that this hospital had very little concern for its community.

Two of these three administrators were not at all involved in professional activities such as attending seminars, serving on external committees, writing for hospital journals, etc. They appeared only to be concerned with their own hospital and made little effort to find out what other hospitals were doing. This suggests a tendency toward low visibility of consequences.

These hospitals did not have high specification of procedures for the non-medical component. They did not use budgets and two did not have position controls. They did not have job descriptions.

In Chapter VI we showed that in more efficient hospitals department heads were given more leeway in carrying out their job. This was far from true in one of these three hospitals, as the following incident suggests.

In one of these hospitals the new head dietician had just spent eighty hours developing a two-week menu cycle. This task is difficult because calories must be balanced, variety insured, and leftovers used. She had just been told by the administrator that the price of lamb chops was too high this week and none of these and certain other raw foods could be purchased. This invalidated the dietician's entire menu cycle and she was very upset. In no other hospital in my sample did the administrator specify such detailed procedures for his department heads. This was reflected by the fact that this hospital had the second highest score for perceived department head P+ of all the hospitals in this sample.

In short, the non-medical component of these three hospitals tended to have low P+ for workers, low C_v, low R, and high P+ for the department heads. The empirical evidence of Chapter VI shows that these are all the wrong conditions for promoting efficiency and we would expect these hospitals to be inefficient. According to the expert evaluators of the non-medical component, this is the case. Out of the thirty hospitals ranked by these experts these three hospitals ranged last, third-to-last, and seventh-to-last in terms of operating efficiency.

Now let us turn to the medical component. With respect to the use of reports on medical staff activities (R) these hospitals were below average. Two of them did not maintain the disease index and operations index required by the Joint Commission on Accreditation of Hospitals.

At the turn of the century, it was very common for hospitals to evaluate the care they provided by indicating whether the patient left the hospital improved, the same, or worse than when he was admitted; or whether he died in the hospital. One of these hospitals still does this. Looking at their figures nearly every patient either left "improved" or died. The logic behind this is that if a patient had not improved then why was he discharged? If he is unimproved or worse then he would not be discharged, obviously. The usefulness of this approach is rather doubtful. This is an example of a report (R) which does not measure much of anything. Even though the hospital collected this information they never used it. The medical record librarian said that this information had been handwritten into a large ledger as long as she could remember and they just kept doing it. In addition, these hospitals had lower-than-average autopsy rates.

Visibility of consequences on the part of the adminstrator was not particularly high. For example, one of these administrators had no idea whether the chiefs of his medical staff were elected by the doctors or appointed by the Board.

A unique and distinguishing feature of these hospitals is their apparent use of nepotism to fill the key medical staff positions. Given low visibility of consequences, the Entrepreneurial Theory would predict that such important decisions would more likely be made on grounds not relevant to achieving the organization's goals. In two of these hospitals the senior officer on the medical staff was a close kin to an influential board member. It appeared that these two key people specified procedures for the rest of the medical staff. This appears to be the opposite of collegial decision making and suggests comparatively high specification of procedures for the medical staff as a whole.

In one of these hospitals, due to unusual historical circumstances and perpetuated by the existing management, a number of the most active doctors who account for about half of all admissions to the hospital were permanently barred from becoming active (voting) members of the medical staff. These doctors were as well-qualified professionally as the rest of the staff, but were classified as temporary (non-voting) members of the medical staff even though some had been admitting patients there for a decade. Thus these doctors had no formal collegial rights to participate in medical staff decisions. This may well be symbolic of high specification of procedures (P+) for this medical staff.

In short, the medical components of these hospitals tended to be characterized by low R, low C_v, and high P+. The empirical evidence of Chapter VIII demonstrates that these conditions are related to low quality of medical care. The expert evaluators of the medical com-

ponents of these hospitals thought this to be the case. These hospitals ranked last, fourth-from-last, and fifth-from-last out of thirty in terms of quality of medical care provided.

Since this study was undertaken, one of these three hospitals has recognized the very acute nature of its problems, has changed administration, brought in new doctors, and changed the composition of its Board of Trustees to make the hospital more responsive to community needs. This reorganization appears to give it a better chance for survival and improvement. This suggests that although visibility may be low, if the problems are severe enough, the organization's owners will be forced to adapt and improve or face the death of the organization. Management can hide from reality for only so long and only within limits. When the employees go on strike, when the community leaders sit-in in the administrator's office and the bank will not honor the hospital's checks, it is very hard to ignore reality. But, by the time these things have happened, it may be too late.

By this description of some relatively inefficient hospitals I do not mean to shed a bad light on all hospitals. The data presented here tell us absolutely nothing as to whether hospitals are on the average better or worse managed than other organizations. There are also some very badly managed businesses. To use these data as the basis for a blanket criticism of hospital administration would be an error.

In any area of endeavor, be it medicine, law, education, or research, there are always a few who by their very poor performance do a disservice to the rest. Hospitals are no exception to this.

The extreme characteristics of these organizations which could or would not participate in this research has implications for empirical research on organizations. The missing observations may be very atypical.

In summary, these three hospitals are poorly managed and are relatively inefficient. Visibility is low and procedures are specified in an inappropriate manner. These "case studies" provide further support for the hypothesis derived from the Entrepreneurial Theory.

CHAPTER XI

IMPLICATIONS FOR THE HOSPITAL FIELD

This chapter, by the nature of its topic, consists of a number of opinions drawn from this research experience. They are presented in the spirit of proposing some potentially interesting ideas for the reader's consideration.

Are Hospitals Badly Managed Compared to Other Organizations?

The data presented here suggest that there is some room for improvement in hospital management, but this is unquestionably true for all organizations. There is nothing in the data presented here to suggest that hospitals are better or worse managed than other organizations.

One way in which people have attempted to answer this question is to compare one aspect of performance which is similar across different organizations. For example, meals in hospitals are frequently compared to meals in restaurants. Another comparison of performance is to look at the average percent of plant capacity in use across organizations.[1] This is called the occupancy rate in hospitals. The average occupancy rate for our hospitals was 82 percent. The average occupancy rate for United Air Lines airplanes is about 52 percent; for Chicago convention hotels, about 60 percent; for steel mills, sometimes 30 percent. Thus, using occupancy rate hospitals appear to be comparatively efficient in the use of their physical plant. However, these comparisons are misleading because firms in different industries face different problems which are to some extent out of their control. Perhaps in the last analysis, this question is impossible to answer.

It may well be that it is intrinsically more difficult to manage a hospital than other less complex organizations. For example the difficulty in measuring performance (low visibility of consequences) may make hospitals by their very nature more difficult to manage. But if this difficulty is inherent in the tasks and technology, then it should not be a cause for criticism until and unless the technology can be changed.

The Double Standard for Research in Health Care

It appears from the results of this research that good hospital management practices have an impact on patient care as well as on costs.

[1] This technique is suggested by Gerald Hage, *op cit.*

Compared with the research required before a new drug is approved, the research on the relation between hospital organization and performance is non-existent. Of course this total lack of rigorous scientific effort has not stopped all sorts of committees, experts, and agencies from decreeing what should and should not be done. For example, there have been several recommendations that hospitals carry out more budgeting[2] without one iota of empirical evidence to support the contention that imposed budgets improve performance on the average. This is what is meant by the double standard in health care research.

Hospital Size

For these hospitals, size has been an important positive relationship with both efficiency and quality of care. In this research we have assumed that size is an independent variable. This may not be the case. The hospital that performed well yesterday may have grown as a result because patients and doctors prefer to use it. If good performance perpetuates itself, then size and today's performance will be positively related. This research design does not allow us to separate this effect out.

The Joint Commission on the Accreditation of Hospitals

The JCAH is clearly evolving into a more extensive and sophisticated instrument for evaluating and monitoring hospital performance. The data that we used here from the JCAH files may already be viewed as being from the "old" JCAH. One might have wished to observe higher correlations between the JCAH indices of performance and the other performance measures used here. Most likely the future will bring these improvements. Just as the JCAH has come a long way from the day when one of its former executive directors publicly stated that "there is only one level of quality of care in America: the very best."

This is the only empirical study that I know of which attempts to validate the JCAH ratings. The JCAH has just started its own research effort and hopefully more of this type of validation studies will be carried out in the future.

The JCAH has in the past primarily influenced hospital performance by urging compliance to various performance standards. This research suggests that the JCAH might also expand its role of increasing visibility of consequences by providing the medical staff and hospital management with basic information on their comparative performance.

[2] For example: "Report of the Secretary's Advisory Committee on Hospital effectiveness" (The Barr Committee Report), U.S. Department of Health, Education, and Welfare, Washington, D.C.

The Measures of Performance

If the measurement of hospital performance is to be useful it must not be exhorbitantly expensive to obtain. Ideally one would like "low cost" measures of efficiency and quality of care. This research fulfills this criterion by being comparatively inexpensive and easily repeated.

The most striking finding with respect to the performance measures is the high degree of consensus among the expert evaluators of efficiency and quality of care. The experts agree as to which hospitals are good and which are not so good. Their agreement is striking because of the widespread belief that hospital performance is so difficult to measure.

Their agreement is all the more remarkable when one considers that they were evaluating very similar hospitals. If teaching hospitals and very small hospitals were included, their agreement (interrater reliability) would probably be even higher. In turn, the expert evaluations were related to the other performance measures albeit not perfectly. In short, this study points out that it is possible to obtain "low cost" measures of hospital performance.

The Poorly Managed Hospital

By most any criterion about one hospital in fifteen in this sample is poorly managed. Of the three hospitals described in Chapter X, one has recently changed management and is undertaking an extensive reorganization which has much promise for the future. This leaves two hospitals out of thirty which are poorly managed and show a negligible short-term hope for improvement.[3]

To say that X percent of hospitals are poorly managed is not to say that this is unique to hospitals. One could say much the same about government agencies, businesses, universities, doctors, lawyers, etc.

One implication of this is that the hospital field in its public relations programs should not try and say that hospitals are all well managed (given the circumstances). They only lose credibility this way.

Of interest is that the experts in Chicago know about these hospitals, but are not in a position to do anything about it for a variety of reasons.

In a sense, the existence of these one or two badly managed hospitals does the entire field a disservice.

[3] This one in fifteen figure is really arbitrary. Our research implies management excellence is a continuum rather than a dichotomy. Being a continuum the dividing point between good and bad management is arbitrary. Because these two poorly managed hospitals are smaller than the average for this sample, they account for less than 1/15 of the beds.

Knowledge About Community Hospital Performance

It is striking that there are so few people in the city of Chicago who are currently aware of the comparative performance characteristics of community hospitals. This is particularly true for the quality of medical care. One might think that there would be extensive effort to observe and monitor performance in these hospitals. This invisibility is not the case for the major teaching hospitals in Chicago whose reputation both for good and for bad are more widely known. This problem is compounded by the apparent phenomenon that the poor performance hospitals are social isolates. Others have little knowledge of them and they don't make much effort to seek out information. There are more knowledgeable people with respect to administrative efficiency than with respect to quality of care. If the medical profession aspires to self-regulation with respect to the quality of care provided by doctors in hospitals, more effort might be spent in this direction.

The Mangement Basics

There is much discussion of exciting new management techniques like systems analysis, computer simulation, T groups, critical path method, etc. Perhaps it is natural in America to be excited about new techniques and technologies, but this enthusiasm may be misdirected when the basic management techniques are not always known and used. Perhaps it is exciting for an administrator to tell his colleagues that he is using a computer to solve this or that problem while it is an embarrassment to say he is just getting started on monthly cost reports for the first time. In short, there is an under-emphasis on having and using the standard management tools of cost reports, patient attitude surveys, budgets, salary controls, position controls, and so forth.

The Medical Staff and the Trustees

This study provides the first empirical evidence that participation of the medical staff in hospital decision making is related to high quality of care. This supports the recent JCAH and Barr Committee recommendations both of which were made without recourse to any empirical evidence. Perhaps because no evidence was available one way or another, the debate on this issue appeared to have overtones of a power struggle between physicians and administrators.

This board brush study raises the question of how the Board and the medical staff relate in detail. How can the medical staff be heard without taking over the hospital? How can the Board guide the medical staff toward improved performance without dominating these professionals?

In essence, the question is how can the public as non-experts guide the professions toward fulfilling public demand? How can the experts lead the public toward what they need without becoming elitist? In a world increasingly filled with experts of all sorts this is a fundamental social issue.

The Trustees and Hospital Performance

This research suggests the important and often overlooked role of the trustees in promoting hospital performance. If the trustees are indifferent or unaware of their hospital's real performance then they provide no incentive for the administrator and the medical staff to improve performance. This raises the question: How does one increase the performance orientation of the trustees? There does not seem to be much thought given to this question currently.

The Trustees: Chauvinism Versus Reality

Part of good hospital management appears to involve convincing the patients, the public, and employees that the hospital is doing an outstanding job. A symptom of this effort is that most every hospital believes it has a "famous" or even "world famous" doctor on its staff and the people of any city worth its salt are firmly convinced that they have the "best medical care in the world." This chauvinism is functional to the hospital because it enhances patient confidence, employee enthusiasm, and community pride. The hospital can use this chauvinism to maintain support and gather the resources necessary for improvements. In these ways promoting "a good image" appears to be part of good hospital management.

At the same time, however, hospital management and the trustees must be clearly aware of their actual level of performance. They must know that all standards are not met, errors are made, and in some areas they compare unfavorably with other hospitals in the area. This knowledge is a necessary precondition for systematically introducing improvements. Because no hospital is perfect, the conflict between chauvinism and reality is one of the paradoxes of hospital management.

In some hospitals, particularly with respect to quality of care the trustees seem to have taken on the chauvinistic viewpoint entirely and ignored reality. They were quite convinced that their hospital provided the very best quality of care, even though the experts thought otherwise, and the signs of high quality did not suggest it. It is this subtle and complex balance between simultaneous commitment to chauvinism and reality that was missing in some hospital boards.

The Administrator: Hierarchy versus Participation

This research suggests that there is no "one best way" to manage all organizations. Depending on the complexity of the task-environment more or less participation is called for. This means the hospital administrator must be at ease with both management styles and he must be able to reconcile them within himself and between subordinates who are committed to different management styles.

What Is to Be Done

Improved management is not the only source of improved hospital performance and it may not be the most fruitful one. Perhaps a greater payoff to the public as a whole would be in the reduction of admission rates per 1000 population.[4]

Perhaps the simplest public policy would be to pass a law saying that all hospitals must have a budget, job descriptions, and an autopsy rate higher than 60 percent. This might make the legislative body look good to its constituents in the short run, but our data hint that externally generated managerial techniques (HAS, PAS) do not have the impact on performance that internally generated management techniques do. If management has taken the effort to devise a policy or report, it implies some organizational commitment to that effort. It also suggests that one can have job descriptions and ignore them. The existence of job descriptions in our hospitals (being a voluntary management activity) probably implies or stands as a symbol for an appropriate style of management. Thus this type of legislation may look good in the short run but have negligible impact in the long run.

The second easiest solution is to urge greater education for hospital administrators. This would appear to be necessary but not sufficient. In order to use a budget or salary control system you must know what they are, but you must also have the incentive to use them. Several of the administrators in this sample were knowledgeable about budgets but did not have them saying that next year they would, but that other urgent business, "putting out fires," did not give them a chance to do so now. Perhaps there is more to be gained by educating the Trustees.

The third solution would be to stop Medicare and Blue Cross payments to the low performance hospitals. Why should you or I as Blue Cross members and participants in Social Security pay for hospital care in these two poorly managed institutions when there are better hospitals a block or two away? Two objections to this approach are frequently heard. First, this would provide a hardship in rural areas if payments to

[4] The adjustment of demand for beds to the supply of beds, and the lower admission rates of prepaid group practice plans do not exclude this as a possibility.

an isolated hospital were stopped. True, but it is a question of relative performance rather than absolute performance. The issue is where there is a poor performance hospital adjacent to a high performance hospital with available beds and in this case this objection does not hold.

The second objection is that it would cause a hardship to patients of doctors on the staff of this hospital.

The benefit of this approach is that it is a strong, economic sanction on both doctors and hospitals. In fact it is so strong that the agencies which have such power are very reluctant to use it.[5]

There is a fourth solution which is intriguing because it seems never to have been tried. This is simply to make information about hospital performance available to the public through newspapers, public libraries and other popular media and let the public pick the hospital and associated doctor of their choice. Now their choice is comparatively blind. This way it would be more informed. For this approach to be at all appealing one must be willing to assume a certain level of rationality on the part of the public. That this information has not been provided by the American Medical Association or the American Hospital Association should not reflect any criticism on them because their function as associations is to represent the interests of all their constituents equally and fairly. For this reason, they should not be expected to make this kind of public comparative performance evaluation of their membership.[6]

Conclusion

It is all too easy and simple to pick out villains for blame. We have tried to avoid this. The basic points that result from this are the obvious conclusions that some hospitals are better managed than others, and that therefore there is some room for improvement. How these improvements can be achieved is the real issue. The other basic point is that good management practices are significantly related to performance. These conclusions will undoubtedly surprise few. What should be surprising is the lack of empirical research to test these widely held beliefs in a field that is dedicated to the scientific method.

No research work is perfect and this is no exception. One can only justify a piece of research by saying that it is an advance over previous

[5] The same argument can be made concerning licensure.

[6] As a researcher I feel this issue personally. Should I disclose the names and evaluations of these hospitals to the Chicago newspapers, for example? In some ways perhaps I have an obligation to do so. On the other hand, to gain access to this information I promised anonymity to all my respondents. To do future research in hospitals I must keep this promise. Some of my students have told me that by making this decision I am "selling out to the establishment."

work. The value of research over opinion is that it should provide a mechanism for disproving a hypothesis. This is not always possible with respect to opinions or beliefs. All too frequently beliefs are clouded by our hopes and fervent expectations. Empirical research, at its best, is a device for comparing those beliefs with reality.

This research has been done with broad brush strokes. It should be viewed as complementary to other more detailed case studies or industrial engineering studies.

CHAPTER XII

CONCLUSION

The cumulative weight of the evidence presented here provides strong support for the Entrepreneurial Theory as stated in Chapter II. Visibility of consequences and the use of reports are positively related to efficiency for both the medical and non-medical components of hospitals. Specification of procedures is positively related to efficiency only in those areas with the lowest level of complexity. In the high complexity areas specification of procedures is negatively related to efficiency and participatory management techniques are more appropriate.

The validity of these findings are supported in that they are consistent with a number of other previous studies.

The studies of quality of care by Denton, *et al.* (expert evaluation) and Roemer, *et al.* (severity adjusted death rate) have been repeated with very similar results. Like Whisler, *et al.*, we found that the (P+) measures were positively and significantly related to each other given low complexity, but not for the high complexity components.

By and large, previous studies of economics of scale in hospitals have shown that standardized costs decline with size in the observed range. Our data support this. We have shown that quality of care also increases with size. This positive relationship between quality of care and size is consistent with the literature on quality of care reviewed in Chapter III.

To the extent that they overlap our findings are consistent with those of Georgopoulos and Mann. They found that hierarchically imposed rules were positively related to efficiency in their hospitals. Because they were looking at non-medical component of the hospital these findings are consistent with ours. We feel that we have gone beyond their study by showing that specified procedures (P+) are negatively related to quality of care in the highly complex medical component. Georgopoulos and Mann sum up their findings by saying:

> Advance planning and formal organizational rules and regulations are essential to organizational functioning and coordination, but they are not enough, in and of themselves. Effective day to day communication between superiors and subordinates about the work process and work problems provides an additional key mechanism for coordination.[1]

[1] Georgopoulos and Mann, *op cit.*, p. 497.

This conclusion is very similar to our findings for the non-medical component. That is, rules, reports, and awareness have an additive, positive effect on efficiency. Their concept of communication is akin to visibility of consequences and the use of reports.

These findings are also consistent with the contingency theory of management proposed by Lawrence and Lorsch.[2]

The Entrepreneurial Theory suggests that the present division of hospitals between the medical and non-medical components may be fundamentally the appropriate way to organize a hospital given the current state of technology. Given that new technologies are constantly being introduced and old technologies routinized it suggests that the organization of the hospital should be fluid enough to adapt to these changes. It suggests that the administrator must understand two rather different styles of management: the hierarchical, and the collegial, and that he be skilled in both.

These findings suggest the importance of maintaining a meaningful, coherent and systematically planned set of reports on hospital performance which include both costs and quality of care.

It suggests that the administrator and his board should spend a certain amount of time observing the performance of other similar hospitals so that they are aware of their own hospital's relative standing.

In conclusion let us restate the Entrepreneurial Theory as supported and elaborated by the data presented here.

If he can, the owner of an organization will prefer to specify procedures for his employees to the extent that this maximizes the benefits of coordination. That is, he wishes to retain control over his organization consistent with goal achievement. However, given a complex task-environment and some degree of urgency the owner will find it difficult to specify procedures and he will be forced to bring into the organization personnel who are able to specify their own procedures. These personnel are professionals and managers. Professionals perform production tasks while the managers are skilled in specifying procedures for the non-professional employees under their supervision.

Given the use of professional workers in the organization, they may specify their procedures collectively thus coordinating their own activities or they may perform their tasks individually and independently. In the former case, one will observe standardized rules of behavior, and in the latter case one will not.

If an organization faces different levels of complexity in its task-environment as does a hospital, then it will be more efficient to divide the

[2] Lawrence and Lorsch, *op. cit.*

organization into components where the appropriate authority pattern can be matched with the level of complexity.

Specifying the appropriate level of procedures is necessary but not sufficient to achieve an efficient organization because rules may be inappropriate or have unintended consequences. In addition, the owner must be aware of the effects of his actions. This is called visibility of consequences. Given high visibility of consequences the rational owner will specify the appropriate level of procedures or bring into the organization professionals who can. One way to increase visibility is through the use of performance reports. The use of reports and visibility of consequences enhance performance regardless of the level of complexity.

BIBLIOGRAPHY

A Study of the Quality of Hospital Care, Secured by a Sample of Teamster Family Members in New York City, School of Public Health and Administrative Medicine, Columbia University, 1964.

Aiken, Michael and J. Hage. "Organizational Alienation: A Comparative Analysis," *American Sociological Review,* Vol. 31, No. 4, August, 1966, p. 497.

Aiken, Michael. "Organizational Interdependence and Intra-Organizational Structure," mimeographed paper, 1967.

American Hospital Association: *Uniform Chart of Accounts and Definitions for Hospitals* (Chicago: American Hospital Association, 1965).

Anderson, T. R. and S. Warkov. "Organizational Size and Functional Complexity," *American Sociological Review,* Vol. 26, 1961, pp. 23–28.

Argyris, Chris. "The Individual and Organizational Structure" in *Readings in Human Relations* (New York: McGraw-Hill Book Co., 1959, Davis, Keith, and Scott Eds.).

Argyris, Chris. *Integrating the Individual and the Organization* (London: Tavistock, 1964).

Argyris, Chris. *Understanding Organizational Behavior* (London: Tavistock, and Homewood, Illinois: The Dorsey Press, Inc., 1960).

Barnes, T. "Industry in a New Age," *New Society,* Vol. 18, January, 1963, pp. 17–20.

Becker, Selwyn W. and G. Gordon. "An Entrepreneurial Theory of Formal Organizations, Part I," *Administrative Science Quarterly,* Vol. 11, No. 3, December, 1966, pp. 315–344.

Bennis, Warren G. "Leadership Theory and Administrative Behavior: The Problem of Authority," *Administrative Science Quarterly,* Vol. 4, December, 1959, pp. 259–301.

Blau, Peter and W. R. Scott. *Formal Organizations* (San Francisco: Chandler Publishing Co., 1962).

Brech, E. F. L. *Organization: The Framework of Management* (London: Longmans, Green, 1957).

Brown, W. *Exploration in Management* (London: Heinemann, 1960).

Burns, T. and G. M. Stalker. *The Management of Innovation* (London: Tavistock, 1961).

Bynder, Herbert. "Doctors as Patients: A Study of the Medical Care of Physicians and their Families," *Medical Care,* Vol. 6, No. 2, March-April, 1968, pp. 157–167.

Carroll, Jean. "The Structure of Teaching Hospitals," unpublished Ph.D. dissertation, Department of Sociology, University of Chicago, 1969.

Commission on Hospital Care. *Hospital Care in the United States* (Cambridge: Harvard University Press, 1957).

Commission on Professional and Hospital Activities. *Length of Stay in Short-Term General Hospitals (1963–1964),* (New York: McGraw-Hill, 1966.

DeGeyndt, Willy. "Five Approaches for Assessing the Quality of Care," *Hospital Administration,* Vol. 15, No. 1, Winter, 1970, pp. 21–42.

DeGeyndt, Willy and K. Ross. *Evaluation of Health Programs: An Annotated Bibliography,* Minneapolis: Systems Development Project, September, 1968.

Denton, John C., *et al.* "Predicting Judged Quality of Patient Care in General Hospitals," *Health Services Research,* Spring, 1967, pp. 26–33.

Dubin, Robert, *et al. Leadership and Productivity* (San Francisco: Chandler Publishing Co., 1965).

Ellwood, Paul. "Quantitative Measurement of Patient Care Quality," *HOSPITALS,* J.A.H.A., Vol. 40, December 1, 1966, p. 42, December 16, 1966, p. 59.

Emich, Arnold F. "Control Means Action," *Harvard Business Review,* Vol. 32, No. 4, 1954, pp. 92–98.

Fayol, Henri. *General and Industrial Management* (London: Pitman, 1949).

Fayol, Henri. "General Principles of Management," in *Classics in Management* (New York: American Management Association, H. F. Merrill ed., 1960).

Feldstein, Martin. *Economic Analysis for Health Services Efficiency* (Amsterdam: North Holland Publishing Co., 1967).

Flexner, Abraham. *Medical Education in the United States and Canada.* A Report to the Carnegie Foundation for the Advancement of Teaching (New York: The Carnegie Foundation, 1910).

Frank, A. Gunder. "Administrative Role Definition and Social Changes," *Human Organizations,* Vol. 22, Winter, 1963–1964, pp. 238–242.

"Full Time Physician Faculty By School of Graduation," *Journal of Medical Education,* Vol. 36, No. 2, February, 1961, pp. 178–179.

Georgopoulos, Basil S. and F. C. Mann. *The Community General Hospital* (New York: The Macmillan Co., 1967).

Gordon, Gerald and S. S. Becker. "Changes in Medical Practice Bring Shifts in the Patterns of Power," *The Modern Hospital,* February, 1964, pp. 89–91.

Gouldner, Alvin W. *Patterns of Industrial Bureaucracy* (Glencoe, Illinois: Free Press, 1954).

Graicunas, V. A. "Relationship in Organization," in *Papers on the Science of Administration* (New York: Institute of Public Administration, Columbia University, 1937, pp. 183–187).

Grozier. *The Bureaucratic Phenomenon* (London: Tavistock, 1964).

Hage, Jerald. "An Axiomatic Theory of Organizations," *Administrative Science Quarterly*, Vol. 10, 1965, pp. 289–320.

Hage, Jerald and M. Aiken. "Routine Work, Social Structure, and Organizational Goals," unpublished paper, 1968.

Hefty, Thomas R. "Returns to Scale in Hospitals: A Critical Review of Recent Research," *Health Services Research*, Winter, 1969, pp. 267–280.

Heydebrand, Wolf. "Bureaucracy in Hospitals," unpublished Ph.D. dissertation, Department of Sociology, University of Chicago, 1965.

Hickson, D. J. "A Convergence in Organization Theory," *Administrative Science Quarterly*, Vol. 11, 1966, pp. 224–237.

Jaques, Elliott. *Equitable Payment* (London: Heinemann, 1961).

Jaques, Elliott. *Time-Span Handbook* (London: Heinemann, 1964).

Janowitz, Morris. "Changing Patterns of Organizational Authority: The Military Establishment," *Administrative Science Quarterly*, Vol. 3, March, 1959, pp. 473–493.

Joint Commission on Accreditation of Hospitals. *Five Basic Publications of Joint Commission on Accreditation of Hospitals* (Chicago: Joint Commission on Accreditation of Hospitals, December, 1965).

Joint Commission on Accreditation of Hospitals. *Proposed Standards for Accreditation of Hospitals* (Chicago: Joint Commission on Accreditation of Hospitals, July, 1969).

Katz, Daniel and R. Kahn. *The Social Psychology of Organizations* (New York: John Wiley & Sons, Inc., 1966).

Kerr, Markay and D. Trantow. *Defining, Measuring and Assessing the Quality of Health Service: An Annotated Bibliography*, Minneapolis: Institute for Interdisciplinary Studies, American Rehabilitation Foundation, no date, mimeographed).

Kurtz, Norman and T. Zwerdling. *Explorations on Quality of Medical Care*, Michigan Health and Social Security Research Institute and Brandeis University, February 27, 1969.

Lawrence, Paul R. and J. Lorsch. *Organization and Environment*, Division of Research, Graduate School of Business Administration, Harvard University, Cambridge, 1967, Chapter 8 especially.

Leavitt, Harold J. *Managerial Psychology* (Chicago: University of Chicago Press, Revised Edition, 1964).

Leftwich, Richard. *The Price System and Resource Allocation* (New York: Holt, Rinehart, & Winston, Revised Edition, 1962).

Likert, Rensis. "A Motivational Approach to a Modified Theory of Organizations and Management," Chapter 7 in *Modern Organization Theory* (New York: John Wiley & Sons, Hare, & Mason Ed., 1959).

Likert, Rensis. *The Human Organization* (New York: McGraw-Hill, 1967).

Likert, Rensis. *New Patterns of Management* (New York: McGraw-Hill, 1961).

Lipworth, L., J. Lee, and J. Morse. "Case-fatality in Teaching and Non-Teaching Hospitals," *Medical Care*, Vol. 1, April–June, 1963, p. 71.

Litwak, R. "Models of Bureaucracy Which Permit Conflict," *American Journal of Sociology*, Vol. 67, 1961, pp. 177–184.

Lowin, Aaron. "Participative Decision Making: A Model, Literature Critique, and Prescriptions for Research," *Organizational Behavior and Human Performance*, Vol. 3, 1968, pp. 68–106.

Lyden, Fremont, *et al. The Training of Good Physicians* (Cambridge: Harvard University Press, 1968).

Maloney, M. C., *et al.* "Physicians Choose Medical Care: A Sociometric Approach to Quality Appraisal," *American Journal of Public Health*, Vol. 50, 1960, p. 1678.

March, James and H. Simon. *Organizations* (New York: John Wiley & Sons, Inc., 1966).

McGregor, Douglas M. *The Human Side of Enterprise* (New York: McGraw-Hill, 1960).

McGregor, Douglas M. "The Human Side of Enterprise" in *Readings in Management Psychology* (Chicago: University of Chicago Press, Harold Leavitt and L. Pondy, Eds., 1964).

McNerney, Walter, *et al. Hospital and Medical Economics* (Chicago: Hospital Research and Education Trust, 1962).

Merton, Robert K. *Social Theory and Social Structure*, Revised Enlarged Edition (Glencoe, Illinois: The Free Press, 1957).

Morrill, Richard. "A Principle Components Analysis and Classification of Chicago Area Hospitals," Regional Hospital Study Paper #19, Chicago: Hospital Planning Council of Chicago, May, 1967 (mimeographed).

Neuhauser, Duncan. "Average Length of Stay and Hospital Staffing Ratios," (unpublished paper), available through *Abstracts of Hospital Management Studies*, Vol. 4, No. 1, September, 1969, (Number NU 1166).

Neuhauser, Duncan. "Hospital Size: A Selected Annotated Bibliography" in *Proceedings of the Ninth Annual Symposium on Hospital Affairs, December, 1966* (Chicago: Program in Hospital Administration, University of Chicago, 1967).

Neuhauser, Duncan. "Hospital Size and Structure," *Proceedings of the Ninth*

Annual Symposium on Hospital Affairs, December, 1966 (Chicago: Graduate Program in Hospital Administration, University of Chicago, 1967).

Perrow, Charles. "Hospitals: Technology, Structure, and Goals," in *Handbook of Organizations* (Chicago: Rand McNally, James March Ed., 1965).

Peterson, Osler. "Medical Care in the U.S.," *Scientific American,* Vol. 209, No. 2, August, 1963, pp. 19–27.

Peterson, Osler. "Medical Care: Its Social and Organizational Aspects: Evaluation of the Quality of Medical Care," *New England Journal of Medicine,* Vol. 269, December 5, 1963, pp. 1238–1245.

Peterson, Osler, *et al.* "An Analytical Study of North Carolina General Practice 1953–1954," *Journal of Medical Education,* Vol. 31, Part 2, December, 1956.

Peterson, Osler, *et al.* "Appraisal of Medical Student's Abilities as Related to Training and Careers after Graduation," *New England Journal of Medicine,* Vol. 269, No. 28, 1963, pp. 1174–1182.

Pfiffner, John M. "The Effective Superior," *Personnel,* May, 1955, pp. 530–540.

Pfiffner, John M. "The Effective Supervisor: An Organization Research Study," in *Readings in Human Relations* (New York: McGraw-Hill, Keith Davis and William G. Scott, Eds., 1959, pp. 286–298.

Pfiffner, John M. and W. High. "A Survey of District Rangers," *Personnel Psychology,* Vol. 7, Winter, 1954, pp. 533–547.

Pfiffner, John M. and F. P. Sherwood. *Administrative Organization* (Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1960).

Presthus, R. V. "Toward a Theory of Organizational Behavior," *Administrative Science Quarterly,* Vol. 3, June, 1958, pp. 48–72.

Price, Philip, *et al.* "Performance Measures of Physicians," (Utah: University of Utah, August, 1963, mimeographed paper).

Robinson, Webster. *Fundamentals of Business Organization* (New York: McGraw-Hill, 1925).

Roemer, Milton I. "Is Surgery Safer in Larger Hospitals?" *Hospital Management,* Vol. 87, January, 1959, p. 35.

Roemer, Milton I., *et al.* "Hospital Death Rates as a Quality Index," *HOSPITALS,* Journal of the American Hospital Association.

Roemer, Milton I. "A Proposed Hospital Quality Index: Hospital Death Rates Adjusted for Case Severity," *Health Services Research,* Vol. 3, No. 2, Summer, 1968.

Rosenfeld, Leonard S. "Quality of Medical Care In Hospitals," *American Journal of Public Health,* Vol. 47, July, 1957, pp. 856–865.

Shapiro, Sam. "End Result Measurements of Quality of Care," *Milbank Memorial Fund Quarterly,* Vol. 45, No. 7, 1967.

Sheps, M. C. "Approaches to Measuring Hospital Care Quality," *Public Health Reports,* Vol. 70, February, 1955, September 1955.

Sidel, Victor W. "Techniques for Assessment: Validity and Limitations," Unpublished paper presented at the First National Congress on the Socioeconomics of Health Care, Chicago: American Medical Association, January, 1967.

Simon, Herbert A. *The New Science of Management Decisions* (New York: Harper, 1960).

Spencer, J. A. *Management in Hospitals* (London: Faber and Faber, 1967).

Strachey, Lytton. *Eminent Victorians* (New York: Capricorn Books, 1963).

Taylor, Frederick W. "The Principles of Scientific Management," in *Classics in Management* (New York: American Management Association, H. F. Merrill Ed., 1960, p. 217).

Thompson, Victor A. "Bureaucracy and Innovation," *Administrative Science Quarterly,* Vol. 10, June, 1965, pp. 1–20.

Thompson, Victor A. *Modern Organization* (New York: Alfred A. Knopf, 1965).

Udy, Stanley H. Jr. "Technical and Institutional Factors in Productive Organizations: A Preliminary Model," *American Journal of Sociology,* Vol. 67, 1961, pp. 247–254.

Urwick, Luther F. *A Dictionary of Industrial Administration* (London: Isaac Putnam & Sons, John Lee Ed., 1928).

Urwick, Luther F. *The Elements of Administration* (London: Pitman, 1947).

U.S. Department of Health, Education, and Welfare. "Report of the Secretary's Advisory Committee on Hospital Effectiveness" (The Barr Committee Report).

Walker, H. and J. Lev. *Statistical Inference* (New York: Holt, Rinehart, and Winston, 1953).

Weber, Max. *The Theory of Social and Economic Organizations* (Glencoe, Illinois: The Free Press, 1947, translated by T. Parsons and A. Henderson).

Weiland, George F. "Complexity and Coordination in Organizations," Unpublished Ph.D. dissertation, University of Michigan, 1965.

Whisler, Thomas, *et al.* "Centralization of Organizational Control," *The Journal of Business,* Vol. 40, No. 1, January, 1967, pp. 10–26.

White, Ralph and R. Lippitt. "Leader Behavior and Member Reaction in Three 'Social Climates.' " Chapter 28 in *Group Dynamics* (Evanston, Illinois: Row, Peterson & Co., 2nd edition, Cartwright, Dorwin, Zander, and Alvin Eds., 1962).

Whyte, W. Foote. "Incentives for Productivity: The Bundy Tubing Company Case," *Applied Anthropology,* Vol. 7, 1948, pp. 1–16.

Whyte, W. Foote. *Money and Motivation* (New York: Harper & Bros., 1955).

THE CENTER FOR HEALTH ADMINISTRATION STUDIES conducts a program of research and education in the social and economic aspects of the health care system.

The Center, a part of the Graduate School of Business of the University of Chicago, has as its purposes to expand basic research in health and medical care, to communicate this basic research to public and private agencies, to train practitioners in health administration at the Master's level and to prepare selected individuals at the doctoral level for research and teaching in health services.