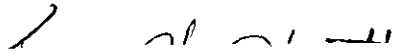


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7/25/68

FISCAL CONTROLS FOR HOSPITAL DEPARTMENTS

A THESIS

Presented to

The Faculty of the Division of Graduate

Studies and Research

By

Tee H. Hiett

In Partial Fulfillment

of the Requirements for the Degree

Doctor of Philosophy

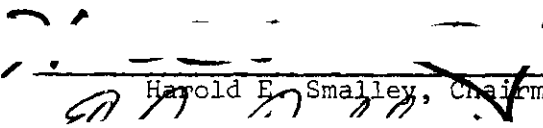
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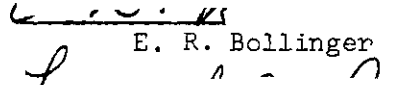
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FISCAL CONTROLS FOR HOSPITAL DEPARTMENTS

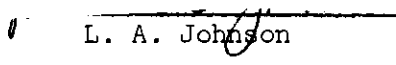
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Harold E. Smalley, Chairman



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SUMMARY

This is an investigation of the coordination of the goods and services of hospital departments. Its general purpose is to contribute to the body of knowledge in hospital management systems. Its general objective is the development of practical procedures through which managers can effectively coordinate the goods and services of hospital departments. As used in this investigation, the term "coordination" refers to the identification, availability, and the use, in the proper amounts, of departmental goods and services which blend into a harmonious effort to achieve the goals of the hospital. The term "management system" refers to the management team and the mechanisms and procedures which the members of the team develop and use in planning for, organizing, staffing, directing, and controlling the departmental "production systems," the combinations of facilities and personnel that actually produce the goods and services of departments.

Hospitals are complex organizations with many quasi-autonomous departments organized around complex technologies. Not all of these departments produce goods and services which directly provide patient care; many produce goods and services which benefit patients only indirectly by benefiting other departments. One of the current and major problems of hospital administrators is to cause department heads, first, to coordinate the goods and services of the departments and, then, to manage the departments in the efficient production of the goods and services.

As a medium through which to analyze hospital organization and management, procedures for coordinating departmental goods and services are derived from the general procedures of public utility economics and implemented in a hospital management system. These procedures focus on the "business transactions" between producer and consumers. These transactions are taken to be a fundamental component of coordination.

From the analysis of hospital organization and management, 23 characteristics of hospital organization and management which contribute to the need for, and influence the design of, procedures through which hospital managers formally coordinate departmental goods and services are identified. These characteristics pertain to the following general elements of hospital organization and management:

1. Organization.
2. Relations Among Departments.
3. Technological Theme.
4. Organizational Positions.
5. Fiscal Procedures.

These characteristics of hospital organization and management are used in the development of a program of coordination which includes practical procedures for coordinating departmental goods and services which conform to the characteristics. The program of coordination consists of the following sequential steps or projects, each of which produces a specific result:

1. Establish a hospital services commission.
2. Identify departmental goods and services.

3. Establish the authority and responsibility for each good and service.
4. Value goods and services.
5. Modify budgets.
6. Account for transactions.

CHAPTER I

COORDINATION AND COST CONTAINMENT IN HOSPITALS

This is an investigation of the coordination of the goods and services of hospital departments. Its general purpose is to contribute to the body of knowledge in hospital management systems. Its general objective is the development of practical procedures through which managers can effectively coordinate the goods and services of hospital departments. As used in this investigation, the term "coordination" refers to the identification, availability, and the use, in the proper amounts, of those departmental goods and services which blend into a harmonious effort to achieve the goals and objectives of the hospital. The term "management system" refers to the management team and the mechanisms and procedures which the members of the team develop and use in planning for, organizing, staffing, directing, and controlling the departmental "production systems," the combinations of facilities and personnel that actually produce the goods and services of the departments.

Hospitals have a clear mandate to contain costs; however, there is not a corresponding clarity as to which costs can be contained without sacrifices in the quality of patient care. While patient care results from the production of departmental goods and services and the preponderance of hospital costs is incurred by the departments in the production of these goods and services, the relationships between patient

care, departmental goods and services, and departmental costs are not readily apparent. Hospitals are complex organizations with many quasi-autonomous, technical departments. Many of the department heads, citing justifications based upon their expert knowledge of the complex technology of their departments, often unilaterally specify the goods and services of their department. And in this complex setting, not all of the departments produce goods and services which directly provide patient care; many hospital departments produce goods and services which benefit patients only indirectly by benefiting other departments which, in turn, produce goods and services which benefit other departments and patients. One of the current and major problems of a hospital administrator is to cause the department heads, first, to coordinate the goods and services of the departments and, then, to manage the departments in the efficient production of the goods and services. The present investigation is concerned with the development of practical procedures for effectively coordinating these goods and services.

Cost Containment in Hospitals

The United States is experiencing a significant increase in the demand for health care services, and this increase is expected to continue into the foreseeable future. The number of people in the United States is increasing, and, of course, additional citizens create additional demands for health care services. But of even more significance, more citizens are beginning to demand that health care services be made available to all citizens. Increasingly, health care is being viewed as a right to be available to all, not merely to the more affluent. Such

government programs as Medicare and Medicaid, and such new concepts as health maintenance organizations are the beginnings of major efforts to make health care services available to all citizens, and programs which place more people in the role of consumers of health care services further increase the demand for these services.

A significant portion of this increase in demand is supply generated. Rapid strides in medical technology are producing major changes and improving the more traditional health care services. In addition, many new services which were being introduced in research-oriented institutions a few years ago are now widely available as standard practices and procedures, and additional services are being developed. As these new services and improvements in services become available, additional demand is generated.

The increase in the demand for services and the increase in the number of services available in combination with such factors as the inflationary increases in the prices of all the goods and services used in the health system have produced dramatic increase in the total costs of the health care system--from \$17,900,000 in 1955 to \$67,200,000,000 in 1970.¹

This rapid rate of increase in the costs of health care services is now receiving attention from many groups in the United States. Over the past few years, articles about the expanding health care system and its costs have been appearing with increasing frequency in such widely

¹*The Size and Shape of the Medical Care Dollar: Chart Book/1970*, Department of Health, Education, and Welfare, U.S. Government Printing Office, Washington, D.C., 1971, p. 5.

read and influential journals as *Business Week*, *Newsweek*, *Harvard Business Review*, *Forbes*, and *Fortune*. It is obvious to many thoughtful Americans that, with the present health care system and national priorities, an accelerating increase in the cost of providing health care services seriously restricts the expansion of the system and reduces the availability of health services to many needy persons.

As a result of the attention to and the effect of the increasing costs, efforts are now being devoted to innovative approaches to modify or redesign all or portions of the current health care system. But no matter what changes are introduced, hospitals with essentially their present facilities and organization will continue to be one of the major focal points in the delivery of health care services for many years into the future. The American Hospital Association reported that in 1970 the United States had \$36,159,198,000 invested in 7,123 hospitals with 2,537,112 employees.² The United States simply cannot afford to fail to give proper attention to these assets. Nor is it reasonable to expect major changes in hospital facilities and organization or a major retraining of hospital employees in the short run.

As a major component of the health care system, hospitals have experienced increases in the demand for services and the costs of providing the services comparable to those of the entire health care system. The demand for hospital services, as indicated by the number of admissions, increased by approximately 50 per cent from 1955 through 1970,

²"Guide Issue," *Hospitals*, Vol. 45, No. 15, Part 2, August 1, 1971, p. 463.

from 21,073,000 admissions to 31,759,000 admissions. As indicated by the number of outpatient visits, the demand for services from these same hospitals increased by approximately 54 per cent in only five years, from 125,793,000 visits in 1965 to 181,370,000 visits in 1970. The costs of providing the inpatient and outpatient services of these hospitals increased approximately 360 per cent from 1955 through 1970, from \$5,594,000,000 to \$25,556,000,000.³

Whatever the causes, influencing factors, or extenuating circumstances, the rapid increases in the cost of operating hospitals reduce the availability of hospital services to a considerable number of people. These increases also consume much of the funds which could be used to expand the health system and make more health care services available to more people.

Concern about these increases in costs has led a number of people both within and outside of the hospital field to demand cost containment. Even though approaches to cost containment may differ in scope and complexity, the spirit of cost containment is quite clear: realistic control of the cost of operating hospitals.

Major Approaches to Cost Containment

The growing demand for the containment of the costs of operating hospitals has precipitated many positive responses. One of the most promising responses has been an acceleration of a movement previously initiated in the hospital field by far-sighted individuals who recognized

³*Ibid.*, p. 460.

and responded to the need for cost containment prior to the demand by the public. In this movement, hospitals have been adopting the successful cost containment approaches which had been developed, accepted, and implemented in the major U.S. manufacturing industries. Although there are many variations, the approaches being adopted can be grouped into the following classes:

1. Using qualified managers who improve the efficiency of the production systems.
2. Developing and applying techniques to improve the efficiency of the production systems.

It should be noted that both of these approaches deal with improving the efficiency of production systems. In hospitals, as in most organizations, the preponderance of costs is incurred in the production systems. Here, people are employed in the production of the goods and services of the hospital. These people use the space, supplies, and equipment of the hospital in the performance of physical and mental activities as directed by the procedures of the hospital. Improving the efficiency of these production systems can contribute to cost containment.

The first of these approaches, the use of qualified managers who, through experience, training, or education, are skilled in many of the varied, complex functions of management, is now accepted in all U.S. industries. Originally businesses were operated by the owners. As the corporate structure became the organization through which large amounts of necessary capital were accumulated, resources were organized, and goods and services were produced, management became more complex and ownership

became dispersed among a large number of people. To more successfully achieve their objectives, these owners employed managers to plan, organize, staff, direct, and control the organizations. Although these managers did not necessarily have cost containment as a primary objective, to be successful, they certainly had to maintain costs which were below the prices received for their goods and services, such prices being determined at least partially by competition.

Although lagging behind the manufacturing industry by several decades, the growth in size and complexity of hospitals closely parallels the growth of manufacturing organizations. From small organizations in which the principal service was compassionate attention, hospitals have grown into large organizations with extremely complex medical services, employing several thousand persons. With significant advances in such areas as anesthesia, surgical techniques, bacteriology, pathology, and diagnostic and treatment equipment, the health professions provided more and more services. As the demand for these services grew, hospitals grew.

For many years during this growth, it was accepted that the administrator of a hospital should be a doctor of medicine.⁴ As the hospitals became larger and more complex, the "owners" recognized that qualified managers could help organize the resources to more effectively and efficiently achieve the objectives of the hospital. In many large hospitals, managers have been employed as hospital administrators, bringing to the hospital advanced techniques for planning, organizing,

⁴Letourneau, Charles U., "Hospital Administration; A True Profession," *Hospital Administration*, Vol. 13, No. 1, Winter, 1968, p. 57.

staffing, directing, and controlling the production systems and, thereby, improving the efficiency of these systems.

The second approach to cost containment in manufacturing organizations, the development and application of techniques to improve the efficiency of the production systems, uses the assistance of such groups as the manufacturers of equipment and supplies and the educators, researchers, and practitioners concerned with the technology in each of the production systems. Another, and major, contributor is industrial engineering.⁵ Evolving from the pioneer works of Taylor and the Gilbreths in the manufacturing industry, industrial engineering has become accepted and implemented in all major industries in the United States. Although developed about the same time as the concept of qualified, non-owner managers, the acceptance and implementation of industrial engineering has tended to lag behind the acceptance and implementation of this type of management. As these managers have become established, they have made industrial engineering a permanent part of the organization in a staff position providing technical assistance to management.

The acceptance and implementation of industrial engineering in hospitals is quite similar to its acceptance and implementation in other industries.⁶ Larger hospitals with qualified managers led to an

⁵ As used here, the term "industrial engineer" is synonymous with the terms management engineer, systems engineer, systems and industrial engineer, and operations researcher.

⁶ For additional information about hospital industrial engineering, see Smalley, Harold E., and John R. Freeman, *Hospital Industrial Engineering*, Reinhold Publishing Corporation, New York, 1966, 460 pp.; and *Management Engineering for Hospitals*, American Hospital Association, Chicago, 1970, 26 pp.

increasing acceptance and implementation of industrial engineering. As in other industries, industrial engineers in hospitals have tended to focus their attention and efforts on improving the efficiency of the production systems. They have assisted management by developing and applying techniques for planning and organizing the people, supplies, equipment, and space and preparing the policies and procedures through which these resources are directed.

Although the use of industrial engineers as full-time staff specialists in hospital management is growing steadily, most hospitals with such resources acquire the services from management consulting companies, the students and faculties of colleges and universities, or from one of the latest innovations in the field of hospital management--shared management engineering services.⁷

That the costs of hospital production systems can be contained can be inferred from the cost savings studies which have been reported in the literature. In his review of cost containment studies during 1969, John Freeman included references to studies reporting annual savings of \$16,000, \$100,000, and \$160,000 in three hospitals.⁸ The American Hospital Association reports cost containment studies which reduced the average inpatient receivables in one hospital by more than \$400,000, which reduced the average length of stay of Blue Cross surgical patients

⁷For additional information about shared services, see *Cooperative, Multihospital Management Engineering Programs*, Hospital Management Systems Society, Chicago, October, 1968, 17 pp.

⁸Freeman, John R., "Systems Engineering," *Hospitals*, Vol. 44, No. 7. April 1, 1970, pp. 151-4.

by one day, which decreased the average nursing staff level in a group of hospitals with over 90,000 patient days per month by 0.2 staff hour per patient day, and which achieved cost savings in excess of \$18 million annually in 140 California hospitals.⁹

In summary, the widespread acceptance and implementation of these approaches in most U.S. industries can be taken as an indication of their value in controlling costs. When utilized in hospitals, these approaches contribute to the design and implementation of more efficient production systems and, thereby, to the containment of costs. With the increasing demand for the containment of hospital costs, these two approaches will become even more widely accepted and implemented in hospitals.

However, one of the prerequisites to the design of an efficient production system is information about the types and amounts of goods and services to be produced by the system. In many industries, much of this type of information is supplied by a dominant, central technology. In hospitals this information typically must be generated through special studies. Yet this essential information could be routinely generated through a hospital management system which formally coordinates the goods and services of the hospital departments.

The Problem of Coordination

Whether special or general, long-term or short-term, proprietary or not-for-profit, hospitals are organized to produce goods and services. To maintain control over the actions of the employees and the use of the

⁹*Management Engineering for Hospitals, op. cit.*, pp. 22-4.

resources in the production of the goods and services, to gain economies in the production of the goods and services, and to set clear policy in regard to each of the many technologies, hospitals have, to a certain extent, decentralized management. That is quasi-autonomous departments have been formed within hospitals. For example, a dietary department is formed by bringing under one control all the activities associated with technologies used in the preparation and distribution of food. A dietician, given authority over these activities, is expected to obtain economies in the preparation and distribution of food and to establish and maintain uniform hospital policy with regard to the types and quality of food services.

Through extensive application of this concept of departmentation, hospitals have become complex organizations with many departments. Joseph Owen, in the book *Modern Concepts of Hospital Administration*, illustrated this complexity by having 25 of the 52 chapters correspond to functions around which hospital departments are traditionally organized, with each of these chapters written by an expert in the technology of the department.¹⁰ Ray Brown and Richard Johnson, in the book *Hospitals Visualized*, identified 32 hospital departments.¹¹ The American Hospital Association, in its booklet describing the design of the chart of accounts for hospitals, presented illustrative hospital organization charts for large hospitals, medium hospitals, and smaller hospitals. From these

¹⁰ *Modern Concepts of Hospital Administration*, ed. Joseph K. Owen, W. B. Saunders Company, Philadelphia, 1962, 823 pp.

¹¹ Brown, Ray E., and Richard L. Johnson, *Hospitals Visualized*, American College of Hospital Administrators, Chicago, 1961, 134 pp.

charts, it is possible to identify 66 departments in large hospitals, 37 departments in medium hospitals, and 17 departments in smaller hospitals.¹²

A primary objective of each of these departments is the production of goods and services which are of benefit to other departments and to patients. For example, a hospital laundry produces goods and services either for a linen department or directly to those departments using linens. The hospital laundry, in turn, is provided goods and services from such hospital departments as maintenance, personnel, the business office, and purchasing. As in the case of the laundry, most hospital departments are both "producer" departments, providing goods and services to other departments and patients, and "consumer" departments, utilizing goods and services from other departments.

The many quasi-autonomous, technical departments which produce and consume goods and services leads to the problem of coordinating the goods and services of the departments. The existence of this basic problem is illustrated by the contrasting views of experts which are presented as "modern concepts of hospital management" in the book by the same name. Jane Rohrback wrote that the personnel department should provide training for all hospital employees, since the other department heads do not have the time nor the necessary skill to conduct this training.¹³ The author of the chapter on the pharmacy agreed that the

¹²*Chart of Accounts for Hospitals*, American Hospital Association, Chicago, 1966, pp. 37-42, 127, and 130.

¹³Rohrback, Jane C., "Hospital Personnel Administration," *Modern Concepts of Hospital Administration*, ed. Joseph K. Owen, W. B. Saunders Company, Philadelphia, 1962, pp. 132-3.

pharmacist should not be involved in training the employees in the pharmacy. Authors of the chapters on laundry, engineering, housekeeping, radiology, and nursing preferred that the training be conducted by the department head in each of these departments. E. C. Wolf, in his chapter on hospital procurement, would have the procurement department "purchase for all departments of the hospital, thus permitting the professionally trained people in the hospital to devote their time and effort to the better administration of their department."¹⁴ This point was debated by authors of chapters devoted to the functions of laundry, engineering, housekeeping, pharmacy, radiology, and nursing service. Similar differences in professional opinion about the availability and use of departmental goods and services can be found among most of the department heads in a hospital.

From his incisive observations of hospital management and organization, Stanley Young inferred that hospital department heads do not aim to coordinate the goods and services of their departments; rather, they maintain a state of non-interference in the affairs of each other. He dramatically portrayed the picture thusly:

. . . Each [hospital] department more or less went its own way. A kind of feudal system existed in which the hospital represented a series of principalities, loosely organized under the aegis of the hospital administrator. Each department was possessive about its own jurisdictional rights and privileges. Occasionally, two or more would informally reach some accommodation over certain types of changes. This represented a treaty of sorts between respective dukedoms. An implicit struggle between departments

¹⁴Wolf, E. C., "Hospital Procurement," *Modern Concepts of Hospital Administration*, ed. Joseph K. Owen, W. B. Saunders Company, Philadelphia, 1962, p. 118.

continued over budget allocations, with each attempting to maximize its own departmental development.¹⁵

One of the major challenges facing hospital administrators is to cause the department heads, first, to coordinate the goods and services of the departments so as to effectively achieve the objectives of the hospital, and, then, to manage the departments in the efficient production of the goods and services of the departments. Effective coordination can assist in assuring that all the goods and services necessary to the objectives of the hospital are being produced. Effective coordination can contribute directly to cost containment through a reduction in any duplication of effort in the production of goods and services and the elimination of any goods and services which are not essential to the objectives of the hospital. And, effective coordination can contribute directly to cost containment by providing a practical basis for the identification of the demand for the goods and services of each department, information essential to the design of efficient production systems.

Objectives

The general objective of this investigation is the development of practical procedures through which managers can effectively coordinate the goods and services of hospital departments. To this end, the two specific objectives of this investigation are:

1. To identify characteristics of hospital organization and management which contribute to the need for, and

¹⁵Young, Stanley, *Management: A Systems Analysis*, Scott, Foresman & Company, Glenview, Illinois, 1966, p. 299.

influence the design of, procedures with which hospital management coordinates the goods and services of the departments.

2. To develop practical procedures for coordinating goods and services which conform to the characteristics of hospital organization and management.

Scope and Limitations

Procedures for coordination developed in this investigation are applicable to a wide range of hospitals. Basically this investigation is concerned with the identification and the specifications of the goods and services produced in each hospital department and the mechanisms and procedures through which these goods and services are exchanged among the departments and delivered to patients. The production, exchange, and delivery of departmental goods and services occur in all hospitals.

Although efficient production of these goods and services of hospital departments contributes to cost containment, this investigation is not directed at those management functions dealing directly with the hospital production systems. Such functions as planning, organizing, staffing, directing, and controlling the production systems in the departments are currently receiving considerable attention. Effective techniques for performing these functions are being developed and implemented by hospital administrators, hospital industrial engineers, hospital department heads, and other groups.

Nor are the motivational aspects of hospital management directly included. This investigation focuses on coordination rather than cooperation and on services rather than people. Although the employees, each with his own hopes, desires, capabilities, and interests, produce

health care goods and services, it is the goods and services which benefit the patient. And although the employees must cooperate if the objectives of a hospital are to be achieved, coordinating the goods and services produced by their efforts will direct the attention of the employees to those areas in which they should cooperate. Coordinating the goods and services of the departments does not eliminate the need for a people-oriented management system, but it does formally direct management attention to those goods and services which are to be produced.

Overview

The approach used in this investigation is manifested in the following steps:

1. Chapter II: A survey of the dominant procedures and techniques for formally coordinating goods and services and the general characteristics of the organizations and management in the industries in which they were developed.
2. Chapter III: A study of the coordination of goods and services in a small, general hospital during the implementation and operation of procedures derived from the fundamental principles of public utility economics.
3. Chapter IV: The identification of a set of relevant characteristics of hospital organization and management which contribute to the need for and influence the design of procedures through which hospital managers formally coordinate departmental goods and services.
4. Chapter V: The development of procedures which conform to the characteristics of hospital organization and management and through which hospital managers formally coordinate departmental goods and services.

CHAPTER II

TECHNIQUES FOR COORDINATING GOODS AND SERVICES

The coordination of goods and services is not a problem unique to hospitals. It exists to some degree in the organizations in all industries. And, to the practicing managers in these organizations, the coordination of goods and service is only one of a large array of complex management functions to be performed.

Among those disciplines which develop, and assist in the implementation of, techniques through which the managers can more effectively and efficiently perform these complex functions are management, industrial engineering, and economics. Typically, the techniques from each of these disciplines are developed from the body of knowledge underlying the discipline. Many of the techniques are developed to conform to the characteristics of the organizations and management within a specific industry. And, although coordination is not emphasized, many of the techniques do include procedures through which managers formally coordinate goods and services.

In this chapter is presented a survey of the basic approaches of the more prominent techniques from the disciplines of management, industrial engineering, and economics which include procedures for coordinating goods and services. The discussion of each technique includes a brief examination of some of the dominant characteristics of the organizations and management which influenced the design of the procedures for

formally coordinating goods and services. This survey illustrates the basic approach of, and the current body of knowledge incorporated into, this investigation.

Management

Several writers in the field of management have been concerned with the use of goals and objectives as a means of informal coordination. Among these, Chester Barnard, in examining the formal organization as a cooperative system, identified the formulation of purposes and objectives as one of the principal functions of management, indicating that the cooperation and coordination so necessary to the successful operation of an organization could be more readily achieved with the development of specific goals for each of the departments or divisions of the organization.¹ And Peter Drucker specifically related goals and objectives to the coordination of the goods and services of departments when he said that:

. . . Objectives should lay out what performance the man's own managerial unit is supposed to produce. They should lay out what contribution he and his unit are expected to make to help other units obtain their objectives. Finally, they should spell out what contribution the manager can expect from other units toward the attainment of his own objectives.²

In addition to this informal approach to coordination, management has recently contributed to the design and implementation of two

¹Barnard, Chester I, *The Functions of the Executive*, Harvard University Press, Cambridge, 1938, p. 231.

²Drucker, Peter F., *The Practice of Management*, Harper & Row, Publishers, New York, 1954, p. 126.

techniques for formally coordinating goods and services, techniques which conform to the characteristics of the organization and management of government. The procedures of Program, Planning, and Budgeting Systems (PPBS) are being implemented in the management systems of government agencies. Within these agencies in the field of education, procedures for accountability are being explored, developed, and implemented in the management systems.

There are several characteristics of government which influence the design of procedures for coordinating goods and services. For example, government agencies generally produce services, not products, so there is little flow of material or products among the divisions in government organizations. In addition, governments have multiple service objectives and goals. There are many services which could be provided by governments in such fields as security, sanitation, training, and transportation, and there are many such fields. In organizing for the delivery of these services, governments usually develop a set of parallel, relatively independent agencies, each responsible for the services within a specific field. Also, in government, funding is independent of production, that is, income is not produced through the sale of services.

Program, Planning, and Budgeting Systems

One of the major problems of management in government is the allocation of its limited funds among a large and growing number of services and demands for services. Traditionally, government management has dealt with this problem through the use of budgets, and the procedures for the

preparation and evaluation of budgets have become quite elaborate. Budgeting is a valuable management tool for fiscal planning and control, but when budgets are developed and sustained independently of production, their value has some limitations.³

Management in government has need for procedures which direct attention to the production of services and to the coordination of these services as well as the expenditure of funds. To meet this need, the United States Air Force and other government agencies, working with the Rand Corporation, developed and implemented the concepts and procedures of PPBS in 1965. By 1970, PPBS was being used throughout the federal government, and a large number of state governments, city governments, and county governments had either adopted or were exploring the use of PPBS in their management systems.⁴

Basically, PPBS "is an approach that starts with planning about objectives, then develops programs through analysis on the basis of these objectives, and finally translates the programs into budgetary requirements."⁵ The procedures of PPBS lead management to focus first on the objectives of the agency. For each of these objectives, PPBS leads to

³For a cogent discussion of the limitations of the budget as a means of allocating resources, see Smithies, Arthur, "A Conceptual Framework for the Program Budget," *Systems, Organizations, Analysis, Management: A Book of Readings*, eds. David I. Cleland and William R. King, McGraw-Hill Book Company, New York, 1969, pp. 163-7.

⁴*Program Budgeting: Program Analysis and the Federal Budget*, 2nd ed., ed. David Novick, Holt, Rinehart and Winston, Inc., New York, 1969, p. v.

⁵*Analysis for Planning, Programming, Budgeting*, ed. Mark Alfandary-Alexander, Washington Operations Research Council, Potomac, Maryland, 1968, p. v.

the identification of "programs" (services) through which the agency can achieve the objectives. In the procedures of PPBS, management also identifies alternative services and the effect on the achievement of the objectives of incremental changes in these services. Budget requirements are then developed for each service and for all the realistic alternative services which have been identified. These budgets are extended beyond the traditional budget period of one year for a more rational interval of up to ten years, depending upon the circumstances.

With the objectives, the programs and alternatives, and the budgetary requirements for these programs, top management can more objectively coordinate the services of its agencies and the use of its limited resources in the achievement of the desired results. The identification and publication of the specific services to be produced by each agency provide an opportunity to identify and, hopefully, eliminate any duplication of services and any services which are not directly aimed at the objectives of the government. This approach to coordination also assists in the assignment of services to those agencies in which they can be performed most effectively. This approach also assists in the identification of any lapses (or erosions) in services; services which should be, but are not being, produced.

Accountability in Education

One of the major responsibilities of government in the United States is education. Government agencies are formed and given the responsibility for developing and operating educational processes. These agencies of education exhibit many of the characteristics of

government agencies described earlier. But they also differ from most other government agencies, having some of the characteristics of the organizations in the manufacturing industry. Somewhat similar to products in a manufacturing process, students pass through a sequence of grades which are somewhat similar to departments in the manufacturing process. Through the process of teaching (the application of the technology of the production systems in each grade), modifications are introduced in each student. After a sufficient amount of this processing, the student is ready for transfer or promotion to the next grade in the sequence for additional processing. As in the manufacturing process, the services in each grade are usually requisite to the services in the subsequent grades.

But dissimilar to the manufacturing process, the products in education are not homogeneous when either entering or leaving a grade; relevant characteristics among students differ considerably. Nor is the teaching process in each grade susceptible to the same precise controls and the degree of repeatability found in the departments in most manufacturing processes. Nor is there precise knowledge as to the specifications required for the transfer of a student from one grade to the next. Thus, coordinating the services of the grades is a significant problem in the management of an educational organization.

Although this problem of coordination was not explicitly identified as a major target, the "performance contracting" project introduced into the Texarkana school system in 1969 did include basic procedures which could be used to formally coordinate the services of the grades in

a school.⁶ In this project, which was sponsored by the U. S. Office of Education, firms in the education business were invited to bid on a program to train a group of children who were below average in the basic skills of reading and mathematics. The desired results of the program would be specified by school officials. The firm would select the production system and train the students. Payments to the firm would be made in relation to the degree to which it achieved the desired results, as determined by an independent, outside auditor. At the completion of the project, the teaching procedures and equipment would become the property of the school system.

The publicity given to this project caught the attention of many people in the field of education and precipitated a large number of articles in a wide variety of periodicals.⁷ From this interest, it appears that all three of the major aspects of performance contracting--the use of private firms, incentive payments, and accountability--will have considerable effect upon the management system in education. This interest will be further stimulated through the grants from the Office of Economic Opportunity to 18 school districts which, in turn, have contracted with six firms to teach underachieving students reading and mathematics.⁸

⁶For an excellent discussion of this project and the concept of accountability in education, see Lessinger, Leon M., *Every Kid a Winner: Accountability in Education*, Simon and Schuster, New York, 1970, 239 pp.

⁷For example, the entire issue of *Educational Technology*, Vol. 11, No. 1, January, 1971, was devoted to accountability in education.

⁸Schiller, Jerry, "Performance Contracting; Some Questions and Answers," *American Education*, Vol. 7, No. 3, May, 1971, p. 4.

One prominent aspect of performance contracting is accountability--the identification of the specific results desired and a measure of the degree to which the results are achieved. John Morris, in describing accountability as the watchword of the 70's in education, reported that 200 school districts throughout the nation are trying accountability in some form.⁹ Although identification of the desired results is extremely complex and still experimental, it appears that this approach will lead to new procedures in the management of education--procedures which will have an impact comparable to that of PPBS in the management systems in other governmental agencies.

Basic to this accountability is a study to determine and identify the specific results desired in each grade. Properly performed, such a study is the quintessence of formal coordination. It can lead to the elimination of any duplication of services and the elimination of those services which do not complement the objectives of the entire organization. It can lead to the addition of service which is not being provided but which would significantly complement the achievement of the objectives of the organization. It can lead to the assignment of services to those grades in which they can be most effectively performed. And, finally, the services of each grade along with information about the volume can be used to establish the specific demands on each grade, information which is very valuable in the design of effective and efficient production systems in each grade.

⁹ Morris, John E., "Accountability; Watchword for the 70's," *The Clearing House*, Vol. 45, No. 6, February, 1971, p. 328.

Industrial Engineering

The practice of industrial engineering was developed to conform to the characteristics of management and organization in the manufacturing industry. Although his specific reasoning and logic are not available, Frederick Winslow Taylor apparently observed that the planning function of management as directed toward the production systems was not being adequately performed. He must have decided that this planning function was easily postponed by managers who also perform the other functions of management, such as organizing, staffing, directing, and controlling. He decided that the planning function could be more effectively performed if separated from the other functions of management and given to a special department with the specific responsibility for the development of plans for all management. Taylor envisioned a lofty role for this department when he said that ". . . the shop, and indeed the whole works, should be managed, not by the manager, superintendent, or foreman, but by the planning department."¹⁰ From this concept evolved industrial engineering. Although not appropriating the authority nor assuming the responsibility of the management of "the whole works," industrial engineering has become accepted as a major planning department in all major American industries.

Through this planning function, industrial engineering has developed and assisted in the implementation of management techniques which include procedures for coordinating goods and services. Over the

¹⁰Taylor, Frederick W., "Shop Management," p. 110, reprinted in a collection of Taylor's most important papers in *Scientific Management*, Harper & Brothers, Publishers, New York, 1947.

years, many such techniques have been developed; however, two significantly different approaches which are inherent in many of these techniques can be related to:

1. Production management systems in which coordination is achieved through the design of the production systems.
2. Project management systems in which coordination is achieved through such techniques as network analysis.

Production Management Systems

Several characteristics of the organization and management of production influenced the development of the production systems design approach of industrial engineering. One of these is the arrangement of the production systems and the flow of materials and products within a firm. In the manufacturing industry, the usual arrangement of the production systems can be classified into one of two basic types: product or line organization, and process or functional organization. The fundamental organizational unit in each of these organizations is the work station, usually consisting of one or two operators, one machine or piece of equipment, and the necessary supplies. As the product is moved through a series of these work stations, the worker uses the resources of the station in a set of activities so as to modify (and add value to) the product.

Another characteristic underlying this production system design approach is volume production. Although the total time for a production run might extend over several months, with volume production, the cycles of activity at the work stations are repeated many times. Thus, there is an opportunity for savings from increased efficiency in some of the

cycles to more than pay for the cost of the study to increase the efficiency.

Coordination in production systems design typically begins with or builds upon extensive studies of the activities of each of the work stations. Studies are made of such factors as the motions of the operators; the activities of the machines; the relations among the operators, the machines, the supplies, and the product; and the characteristics of the machine, the operators, the supplies, and the product. From an analysis of the data and the application of certain techniques, practices, and principles, standards are established for the motions of the operator, the sequence of the activities, the layout of the work area, and the quality of the product. This information can be used in the design of work stations in the production systems.

Since, in production processes, the product output of one work station is the input to another work station, the design of the work stations provides a means of coordinating the flow of the product between work stations and among the production systems in the process. In the production line organization, coordination can be achieved through such techniques as balancing the amount of work at the work stations. In a functionally organized production process, coordination of the flow of the product among the production systems can be achieved through such techniques as scheduling the production so as to accommodate the differences in the time required for the operations at each work station and to keep idle time at the work stations to a minimum.

This approach of industrial engineering has been successfully

expanded beyond the manufacturing industry, and the traditional techniques have been expanded and many new techniques have been developed. Advanced mathematical theories and techniques have been incorporated to provide more powerful methods for extracting information from data and for modeling systems. Statistical theories and techniques have been introduced to more effectively accommodate the many variations which cannot be eliminated or controlled. Electronic computers have been introduced to process the large amounts of data, to take advantage of the more powerful and complex mathematical and statistical techniques, and to provide real-time control over work stations and production systems. With these innovations industrial engineering has produced more powerful techniques with which management can plan for, design, or organize the production systems and coordinate the flow of products among these systems.

In this approach to production management systems, coordination is an integral component of the design of efficient production systems. Through the detail design of this approach, only those goods and services which are necessary to the achievement of the objectives are included. Through design, duplication of goods and services is eliminated. And, finally, through design, the production of goods and services are assigned to those work stations in which they can be produced most effectively.

Project Management Systems

Industrial engineering has also participated in the development of a different approach to the coordination of goods and services where the

characteristics of management and organization are significantly different from those typically found in the manufacturing industry. In the construction of a high-rise office building, for example, there is only one building to be constructed, the production systems of several independent companies will be used during the construction process, and, although the time required to complete the building may extend over several years, this type of project typically has a time constraint: either the project has a specific completion date or management wants to minimize the duration of the project within the constraints of certain key resources. Similar characteristics are found in the management and organization of many other construction projects and many research and development projects.

In developing procedures for coordination which conform to these characteristics, industrial engineering shifted from the approach of designing production systems to the approach of network analysis. Although there are many intermediate variations which include procedures from both, these two approaches can be contrasted in terms of how they deal with the production systems. The approach of production management systems begins with detail studies of the activities at the work stations in the production systems and, then, through the design of efficient and effective work stations, coordinates the goods and services of the production systems. The approach of project management systems, on the other hand, begins with only estimates about a few of the characteristics of the goods and services of the production systems and, then, with little attempt to improve the efficiency of the production systems,

schedules the goods and services of the production systems.

Two techniques quite widely used in project management systems are the Critical Path Method (CPM) and the Project Evaluation and Review Technique (PERT).

Typically the estimates and other information which form the data base for these techniques are provided by the experienced managers who have authority over and responsibility for the production systems which produce the goods and services to be coordinated. Although the more elaborate the procedures, the more elaborate the information, the basic information required for these techniques include (1) the identification of the activities (the goods and services of the production systems) which are necessary for the completion of the project, (2) an estimate of the time required to complete each activity, and (3) the precedent relations among the activities.¹¹

This information is organized in a network diagram. From an analysis of this network, an earliest possible start date and a latest possible start date are established for each activity with particular emphasis given to that sequence of activities whose start and completion dates are most crucial to the timely completion of the project.

Periodically, as the activities are completed, the network diagram is updated. Through an analysis of this current network, a revised set of start dates for the remaining activities is identified, again with emphasis on those activities whose start and completion dates are most crucial to the project.

¹¹For additional information about these procedures, see Moder, Joseph J. and Cecil R. Phillips, *Project Management with CPM and PERT*, Reinhold Publishing Corporation, New York, 1964, 283 pp.

Coordination as typically provided through the techniques used in project management systems is in two phases: the formal identification of the activities of the project and the scheduling of these activities. Formal identification of the activities provides an opportunity to identify and eliminate any duplication of activities. It also assists in the identification of any omissions in activities, activities which should be, but are not being, planned. These necessary and, in total, sufficient activities are then scheduled so as to complete the project with the constraints.

Economics

Economics has been defined by George Stigler as "the study of the operation of economic organizations, and economic organizations are social (and rarely, individual) arrangements to deal with the production and distribution of economic goods and services."¹² Stigler identified the following four functions of an economic system:

1. To determine the goods that should be made and to determine the quantity of each good.
2. To allocate the resources among products and production units in such a way, given the state of technological information, so as to obtain as much as possible of the desired outputs.
3. To divide the aggregate output of the economic system.
4. To maintain the capability of change and growth.¹³

The first and third functions identified by Stigler correspond to

¹²Stigler, George J., *The Theory of Price*, rev. ed., The MacMillan Company, New York, 1952, p. 1.

¹³*Ibid.*, pp.3-4.

the task facing hospital management in the coordination of the services of the departments. The second function identified by Stigler corresponds to the task facing hospital management in the efficient production of these services. And the fourth function identified by Stigler is a desirable characteristic of a hospital management system.

Two basic approaches of economics to the development of procedures for coordination are found in the branches of microeconomics and public utility economics.

Microeconomics

Microeconomics, also known as price theory and the theory of the firm, deals with the firm as an economic unit, an entity which is considered to act as an entrepreneur. One of the major concerns of microeconomics is the coordination of goods and services among firms, since the goals of microeconomics are to determine what goods and services are produced, how they are produced, and who gets them. In microeconomics, prices are the primary means through which coordination is achieved.¹⁴

As firms became large, it was only natural that economists would be interested in the application of prices as a mechanism for coordinating goods and services among divisions within a firm. In 1955, an article by Joel Dean generated a great deal of interest in and precipitated a large number of articles devoted to transfer pricing--the pricing of goods and services exchanged among divisions of a firm--as a technique for coordinating goods and services.¹⁵ This article is representative of the many subsequent articles devoted to the same subject.

¹⁴For an excellent development of the theory of prices, see Stigler, *op. cit.*, and Watson, Donald S., *Price Theory and Its Uses*, Houghton Mifflin Company, Boston, 1963, 431 pp.

¹⁵Dean, Joel, "Decentralization and Intracompany Pricing," *Harvard Business Review*, Vol. 33, No. 4, July-August, 1955, pp. 65-74.

In his article in the *Harvard Business Review*, Dean claimed a new management system based on profit centers and transfer prices. Under his management system, each profit center would seek to maximize its own profit and, thereby, maximize the profits of the entire firm. He identified and examined the following six bases for determining transfer prices: published market prices, marginal cost price, full cost-plus price, sales-minus price, traditional price, and negotiated competitive price. He concluded that a negotiated competitive price system, a miniature free-enterprise system, would best serve the interest of the firm. Because of the strain placed on management in the transition from traditional cost allocation to transfer pricing, Dean recommended that a price mediator be used. He anticipated that as the managers gained experience and came to appreciate the value of the transfer pricing system, the effective mediator would work himself out of a job.

Dean referred to the characteristics of the organizations in which this technique might be applied by citing three characteristics of organizations where it was not applicable: where profit centers cannot be identified, where a small, closely knit group of men can confidently exercise all managerial functions, and where mathematical models and computers can be used in solving the problems of coordinating goods and services. He identified four characteristics which distinguish profit centers from service centers: operational independence, access to sources and markets, separable costs and revenues, and profit goals. As an illustration of a service center, Dean described a "captive" steel mill which delivers all its output to a large equipment manufacturing

plant within the same firm. He said that the steel mill should not be considered a profit center because none of the requirements of a profit center were met. For example, the management of the mill is expected to meet the requirements and specifications of the manufacturing plant, not to produce profits.

Other writers in this field recommend other methods for determining prices, but all the proponents of this approach focus on developing prices for goods and services and presume consumer or division sovereignty over the purchase of these goods and services.¹⁶ Thus, in this approach, a major phase of coordination--the identification of those goods and services which are necessary to the operation of a division--is dependent, to a considerable degree, upon the pressures of supply and demand. Suppliers, both internal and external to the company of which the division is a part, are supposed to recognize the necessity for additional goods and services and react to the economic opportunity to provide these goods and services. Given sets of services and corresponding prices from a number of suppliers, the consuming division completes another major phase of coordination by selecting those goods and services in the amounts which best meet the needs of the division.

¹⁶For illustrations of and references to other methods of transfer pricing, see Gordon, Myron J., "The Use of Administered Price Systems to Control Large Organizations," *Management Controls: New Directions in Basic Research*, eds. Charles P. Bonini and others, McGraw-Hill Book Company, New York, 1964, pp. 1-26; and Hirschleifer, Jack, "Internal Pricing and Decentralized Decisions," *Management Controls: New Directions in Basic Research*, eds. Charles P. Bonini and others, McGraw-Hill Book Company, New York, 1964, pp. 27-37.

Public Utility Economics

Public utilities are private firms which are organized to provide to the public indispensable services under monopoly conditions with government regulation substituting for the regulation of the competition of the market.¹⁷ The services provided by the firms are essential to the wellbeing of the public, services which are "affected with a public interest." The privately-owned public utility firms have an obligation to their owners to provide an adequate return on the investment. They also have an obligation to the public to provide the approved services to anyone who is willing and able to pay for them.

In public utility economics, coordination of services between producer and public is achieved in two phases. The first phase is the regulation of the services and the corresponding prices; the second phase is customer sovereignty.

In the utility industry, government regulation is usually accomplished through regulatory commissions operated independently of the government and of the firms being regulated. The power of these commissions is centered in their authority to eliminate or control competition and to control the prices of the services offered by the firms. Protecting these firms from competition aggregates a large demand for the services. Having one large organization meet this total demand permits significant economies of scale in terms of long-run decreasing costs, as compared to having several smaller organizations, each meeting a segment of the demand. In addition, making these services available from one

¹⁷For an excellent discussion of the public utility concept, see Bonbright, James C., *Principles of Public Utility Rates*, Columbia University Press, New York, 1961, Chapter I, pp. 3-25.

firm eliminates many expenses and inconveniences which would be incurred by the customer if parallel, competing systems were in operation.

Although the actual procedures are quite involved and very complex, in simplified form, the general steps followed by a regulated firm in requesting approval for a set of services and prices are:

1. Prepare the specifications of the proposed services.
2. Estimate the annual demand for each service.
3. Estimate the annual operating cost of supplying the demand.
4. Propose a price for each service.
5. Petition the commission for approval of the proposed services and prices.¹⁸

These steps are not necessarily sequential nor are all these steps necessary when a firm merely requests modifications of existing prices.

Although procedures differ among commissions, the official business of the commissions is conducted through formal hearings. In preparing for a formal hearing, a firm petitions the commission, and a pre-hearing conference is held to identify the issues, limit the scope of the hearing, specify the data which will be required, and schedule the hearing. Official notice of the hearing is made available to all interested firms and citizens. At the hearing, arguments are presented by representatives of the firm submitting the petition. Additional information and arguments are presented by members of the commission staff, representatives of other firms, and interested citizens. After hearing the

¹⁸These basic procedures are discussed in detail in Phillips, Charles F., Jr., *The Economics of Regulation*, Richard D. Irwin, Inc., rev. ed., Homewood, Illinois, 1969, pp. 134-42.

arguments, the commission either rejects the petition, approves the petition as submitted, modifies the petition and approves it, or sets the petition aside for additional study.

One of the basic tenets of public utility economics is that the beneficiary should bear the burden. Under this concept, each customer is free to use as much of each of the approved services as meet his needs, and he is obligated to pay only for the services he uses. In addition, most public utility firms subscribe to the concept of differential rates. Under this concept, the firm will obtain the approval to offer reduced prices for those services which are delivered at off-peak periods and for other special services which increase the utilization of the facilities and, thereby, lower the average price of the services. Thus, the customer has some opportunity through differential rates to select a comparable service at a lower price.

Thus, public utility economics, in developing procedures for coordinating services, not only incorporated the concepts of service prices and consumer sovereignty as used in the transfer pricing techniques of microeconomics, but also provided procedures for accomplishing other aspects of coordination. Through these procedures, the producer and consumers formally participate in (1) the identification of the services necessary to the operation of the organizations in the community, (2) the identification of alternative levels of services, and (3) in establishing the prices for the services. These procedures also assign to a public utility firm the responsibility to make these services and levels of services available. And, then, under these procedures, the

consumer has sovereignty over the selection of those services in the amounts which best meet his needs.

Conclusion

In summary, this survey indicates that:

1. Although the coordination aspects of the techniques may not be identified, industrial engineering and other disciplines develop and assist in the implementation of management techniques, and many of these techniques include procedures through which managers formally coordinate goods and services.
2. Although the characteristics may not have been explicitly identified, many of these techniques have been developed to conform to the characteristics of the organizations and managements in a specific industry.
3. Management techniques which include procedures for formally coordinating departmental goods and services and which conform to the characteristics of hospital organization and management have not been reported.

This investigation aims to extend the bounds of present knowledge to include practical procedures through which hospital managers formally coordinate departmental goods and services. In achieving its goal, this investigation makes a contribution to the body of knowledge in hospital management systems.

In pursuing its goal, this investigation uses the approach of analysis and design which was implied in the development of the techniques identified in the survey. Such an approach includes an analysis of an organization and its management in order to identify those characteristics influencing the design of procedures through which the management coordinates the goods and services. The design of practical procedures conforming to these characteristics completes this approach.

In addition, this investigation uses the fundamental principles of public utility economics in the derivation of an initial set of procedures for coordinating goods and services. A principal reason for using this technique is that certain similarities between the characteristics of organization and management in a hospital and in the public utility industry can be drawn.

The relation between each hospital department and the hospital as a whole may be likened to the relation between a public utility and the community which it serves. A public utility provides to the community indispensable services under monopoly conditions with the community regulating, through a commission, the charges for these services. That a hospital, with its wide range of services, may be likened to a community was implied in the American Hospital Association's slogan, "Your Hospital--City of Care" for National Hospital Week in 1967. Hospital departments provide to this "city" indispensable services under monopoly conditions with the hospital administrator regulating, to some extent, these services. The hospital administrator, in effect, grants a monopoly to a laundry manager to produce indispensable laundry services for basically the same reasons that a community grants a monopoly to a utility, that is, to eliminate costly duplication of facilities and to achieve decreasing average unit cost as output increases. The business office, the emergency room, and other hospital departments can also be considered to be monopolistic entities providing goods and services which are indispensable to the objectives of the hospital. In the community, each public utility is a business which utilizes the goods and services of and

provides services for other businesses. Correspondingly, each hospital department can be considered to be a "business" which utilizes goods and services of other departments and provides its goods and services for hospital departments and for patients.

In contrast to these similarities are some significant differences between the characteristics of the organization and management in a hospital and in the other industries identified in this survey. For example, hospital departments do not normally exhibit the operational independence of the divisions in the organizations for which the techniques of PPBS and transfer pricing were developed. Nor do hospitals employ sequential processing through an extended series of production systems as found in those organizations for which the techniques of production management systems and accountability in education were developed. Nor are the main efforts of a hospital directed toward projects which are performed once, such as the construction projects for which the techniques of project management systems were developed.

Thus, the basic approach of, and the current body of knowledge incorporated into, this investigation are established. The next task, an analysis of the characteristics of hospital organization and management, is presented in the following chapter.

CHAPTER III

A STUDY OF COORDINATION

In several industries, effective procedures through which managers coordinate goods and services have been developed to conform to the characteristics of the organization and management peculiar to the industry. Similarly, knowledge about the characteristics of hospital organization and management can be used most effectively in the design of procedures for formally coordinating departmental goods and services of hospitals. Relevant characteristics of hospital organization and management can be identified and described through analysis. In this investigation, such an analysis is conducted during a study of coordination in a hospital.

In this study, procedures for coordinating departmental goods and services are derived from general procedures of public utility economics and implemented in a hospital management system. The implementation of these procedures provides a practical medium through which to analyze hospital organization, management, and coordination. Through the procedures of public utility economics, this study focuses on the "business transactions" between producing departments and consuming departments, since public utility economics deals with the coordination of goods and services between a producer and a set of consumers, not with methods of producing goods and services nor with the use of goods and services. These business transactions are taken to be a fundamental component of

coordination in hospitals.

In this chapter is presented a description of the study of coordination. Beginning with an examination of the general procedures of public utility economics from which procedures for coordinating departmental goods and services are derived, the description includes an overview of the organization of the hospital in which the study was conducted. The major segment of the description is devoted to the implementation and operation of procedures. The description concludes with a discussion of the general results of the study.

Procedures

The general procedures of public utility economics provide a practical means for coordinating the goods and services between a monopolistic entity and the users of its goods and services. Basically, this coordination is achieved by regulating the prices of the goods and services and permitting a consumer to buy as much of these goods and services as he needs. Procedures for coordinating departmental goods and services were derived from general procedures of the following aspects of public utility economics:

1. The Regulatory Commission.
2. Price Regulation.
3. Differential Pricing.
4. Consumer Sovereignty.

1. The Regulatory Commission. In public utility economics, government regulation, which substitutes for the regulation of competition, is accomplished through an official body, such as a public service

commission. Even though this commission obtains its authority from the government, it operates independently of the government and of the firms being regulated. A principal power of the commission is in its authority to control the prices charged for the services offered by the utility.

A "review commission" composed of the administrator and two members of the board of directors can provide to a hospital administrator and his hospital department heads the principal regulatory functions of a public utility commission. Essentially, the administrator can substitute the authority of the review commission and its "public" hearings for the regulation of his authority and the private negotiations between himself and the heads of producing departments. Although such a commission would not be independent of the source of its authority or the entities being regulated, it should be concerned with achieving the overall goals and objectives of the hospital.

2. Price Regulation. In the general procedures of public utility price regulation, each public utility prepares a proposed price or "rate" schedule, based upon the estimated annual cost of providing the services and the estimated annual demand for services. This estimated annual cost of providing services, also called the annual revenue requirement, is the sum of the annual operating expenses, the annual depreciation expenses, the annual taxes, and a reasonable return on the net valuation of the property. A price for each service is proposed such that the expected total annual income from all services will equal the estimated annual cost of providing the services. The proposed price

schedule is submitted to the public service commission for review at a public hearing with the consumers being invited to participate. After the hearing, the commission reviews the material, makes whatever adjustment it deems necessary, and approves the prices. These, then, become the prices of the services of the public utility.

These procedures can be incorporated into a hospital management system. Each hospital department head can review his annual cost and production records, estimate future demands for the services of his department, estimate the costs of providing these services, estimate a price for each service which will return the full costs of providing the services, and prepare a report justifying these prices. At a "public" hearing the hospital review commission can review the proposed prices. As in the hearings of the public service commission, the heads of the departments consuming these services can be invited to participate in these hearings. After reviewing the material and making whatever adjustments it deems necessary, the commission can publish a schedule of the approved prices of the goods and services of each hospital department.

3. Differential Rates. In public utility economics, differential rates is the concept of relating the prices for services to those demand characteristics affecting the cost of providing the services. Through differential rates, those customers who create peak demands pay more for services than do those customers who can shift the timing of their demand to an off-peak period. One of the primary purposes of differential rates is to promote the use of services in such a way as to increase the utilization of the facilities, and thereby, lower the average unit cost.

Two readily recognizable differential rates designed to increase utilization during off-peak periods are the less expensive night rates offered by the commercial airlines and by the telephone companies. The procedures for regulating these differential rates are the same as those for regulating other prices, that is, proposed sets of differential rates with supporting arguments are submitted to the commission for review, adjustment, and approval.

In hospital management systems, differential rates can be applied to many departmental services when alternative levels of service are desirable either by the producer or the consumer. For example, three differential levels of service which might be established for many of the services of the laboratory are:

1. Stat.--at once.
2. Routine--within four hours.
3. Dilatory--within two days.

These levels of service can be priced so as to penalize the departments using those levels of service with the higher production costs. As in public utility economics, the purpose of differential rates is to cause the hospital consumer department to select the lowest cost level of service, consistent with the required level of patient care. As in price regulation, these rates can be submitted to the hospital review commission for review, adjustment, and approval.

4. Consumer Sovereignty. The final general procedures of public utility economics included in this study relate to consumer sovereignty. A public utility might have a few broad groups of customers, such as

industrial customers and private customers, and offer a unique set of services at specific prices to each group of customers; however, the utility cannot discriminate among any of the customers within a group. Any potential customer who can pay is entitled to the services. Each customer can select from among the approved services those services in the amounts which help him meet his objectives.

In the application of the concept of consumer sovereignty in a hospital management system every department head has the opportunity to use as much of any of the services of other departments as he can justify economically. Each department head should manage all the resources available to his department so that the cost of operating the department does not exceed the value of the goods and services produced. If a department head can efficiently use the goods and services of other departments, he should use those goods and services.

The Hospital Site

This study was conducted in Holy Family Hospital in Atlanta, which was owned and operated by the Medical Mission Sisters. From their headquarters in Philadelphia, Pennsylvania, these Sisters operated a religious society which had as a primary aim the caring for the sick as a work of Christian love and charity. Although most of their work was conducted through hospitals in Africa, Asia, and Latin America, the Sisters opened this hospital in Atlanta in 1964 as a result of their efforts to expand the services of the medical clinic they had operated for a number of years.

Similar in size and services to a large number of American

hospitals, this 128-bed short-term general medical and surgical hospital participated in both the Blue Cross and Medicare Programs. The facilities and the services of the hospital included pathology, clinical laboratory, pharmacy, premature nursery, emergency room service, radiology service, intensive care service, and a post-operative recovery room.

The administrative organization of the hospital is shown in the chart in Appendix A-1. Through this organization, 274 employees participated in a progressive care plan for approximately 5,000 admissions each year at a total annual expense of approximately \$1,700,000.

The Sisters were interested in learning about, developing, and utilizing modern hospital management techniques. Several of the Sisters were participating in the Program in Hospital Administration at Georgia State University in Atlanta. One of the Sisters attended and successfully completed the Hospital Management Systems Analyst Training Program, an experimental program conducted in 1965-1966 by the Hospital Systems Research Group of the Georgia Institute of Technology.

In addition, the Sister serving as the Administrator of Holy Family Hospital was actively interested in having the hospital participate in research related to hospital management. She assisted in the development of a proposal to the U.S. Public Health Service to conduct this study in Holy Family Hospital. Even though the study was not funded, she still offered the hospital as a resource to the study.

Implementation and Operation

The study officially began with a presentation of the basic concepts and the general plan to the Board of Directors of the Hospital during the winter quarter of 1967. Even though most of the department heads had been exposed to these basic concepts during meetings and discussions associated with other projects, these concepts and the general plan of the study were also presented at a staff meeting of the hospital department heads.

The general plan for the study was as follows:

1. Identify the goods and services of all the service departments and two revenue producing departments, Central Service and Pharmacy, through interviews with department heads.
2. Develop a proposed price for each good and each service, using the basic pricing procedures of public utility economics.
3. Establish a review commission to review the proposed prices at a "public hearing," make any adjustments it deems necessary, and publish the approved prices for all goods and services.
4. Apply the concept of consumer sovereignty and permit department heads to select those goods and services which best meet their needs in the amount which meets their needs.
5. Record the transfer of goods and services among departments through simplified accounting procedures.
6. Prepare financial reports of the transfer of goods and services and present the reports to hospital managers.
7. Have the review commission re-evaluate prices of goods and services as requested by department heads.

Service Identification

Implementation began with interviews with the department heads of Pharmacy, Radiology, Central Service, and a nursing unit. The primary objectives of these interviews were the identification of and the collection of information about the goods and services which were available as "inputs" to these departments, the "outputs" of the service departments. The initial definitions, presented in Appendix B-1, were discussed with the department heads during these interviews, and the guide in Appendix B-2 was used in the collection of information about the goods and services.

Even though it provided valuable insights into the interrelations among hospital departments, this approach was not a productive means of identifying goods and services. The department heads had little perception of services being provided as a benefit to their departments. Although recognizing that other departments produced goods and services, in general the department heads implied that such goods and services were produced for the "hospital," or for the patients, not for their departments. From this viewpoint, housekeeping services are not provided as services to Laboratory, they are provided by Housekeeping for the hospital; the services of the Laundry are services for patients, not services for Nursing Service; and the preparation of paychecks and maintenance of personnel records are not services for departments, but rather services for the hospital.

Following this experience, efforts to identify the goods and services of the service departments were directed to those departments-- Business Office, Dietary, Housekeeping, Medical Records, Maintenance and

Engineering, Personnel, and Purchasing. The identification of the goods and services of two revenue-producing departments, Central Service and Pharmacy, was also included in this phase of the study. It was assumed that the charges by the other departments to the patients would reflect a value of the goods and services of these departments. Using the service identification form shown in Appendix B-3, the goods and services of the nine departments were identified through a series of interviews with the department heads.

Although the actual procedure depended upon such factors as the work schedule, interest, and ability of the department heads, the basic procedure was to have three interviews with the head of each of the departments for which the services were to be identified. During the first interview and after the basic concepts and the general plan of the study had been reviewed, the department head was encouraged to talk about his department. Typically, the department head would identify two or three specific services and discuss the general goals and objectives of the department. Following this interview, these goals were translated into statements identifying specific services. At the second interview, as these statements were reviewed with the department head, the concept of differential levels of services was introduced. As he helped edit the statements and identify the levels of service, the department head could usually identify additional services. Following this interview the statements were edited and organized into a standard format. At the third interview, these statements were reviewed and edited.

Hospital Personnel Changes

During the initial phases of the study in the spring quarter of 1967, the Administrator resigned, an event which had a profound effect upon the study. Her intense interest in the study as demonstrated by her frequent discussions about the plans of the study with the department heads generated considerable interest in the study. During the summer quarter until the next Administrator arrived, the hospital was under the direction of one of the Sisters who served as Acting Administrator. Although she had considerable interest in the study, the many other pressures of her new position appeared to prohibit her active participation. The next Administrator who arrived during the fall quarter of 1967 did not actively participate in the identification and pricing of the departmental goods and services nor did he exhibit much interest in collecting data about departmental transactions and using the information in the hospital management system. As might be predicted, a lack of interest and participation by top management was reflected in a lack of interest and participation by the department heads. The change in viewpoint seriously inhibited the implementation and operation of the procedures; however, it did not inhibit the study of hospital organization and management.

The change in the administrative viewpoint was made even more pronounced by several other personnel changes at the hospital during the study. In any project dealing with the hospital management system in a small hospital, two influential positions are the Business Office Manager and Director of Nursing. During the study, the hospital had four

different men occupying the position of Business Office Manager and three different nurses occupying the position of Director of Nursing. Other personnel changes which affected the study were the heads of the departments of Medical Records, Pharmacy, Central Service, Delivery Room, Emergency Room, and Recovery Room.

Service Prices

Even though these many personnel changes impeded the rate of progress of the study, the identification of the departmental goods and services was continued and the pricing of these goods and services was begun. Originally, the general procedures of public utility economics were to be used in pricing these services; however, the dearth of production and cost records, and the absence of departmental budgets prohibited the use of this approach. Instead, prices were developed from estimates of direct labor costs, supplies costs, and indirect labor costs or burden. It was recognized that such a procedure would, in all probability, underestimate the price which should be charged for each service in order that the income from all services equal the cost of operating the departments and providing the services. However, since there were insufficient data available to use the public utility economic procedures, since the department heads appeared to understand the concept of direct costs, and since the procedures of the Review Commission would permit the department heads to adjust the process of their services, these revised procedures were implemented to provide a simplified approach to the initial prices with which to implement the accounting procedures.

As with the identification of goods and services, the initial

prices were established through a series of meetings with each department head. With the general guidelines in the letter in Appendix B-4 and the worksheet for computing the prices in Appendix B-5, the price per unit for the regular level of services were estimated. The basic price was then adjusted to reflect the department head's opinion as to the costs of the differential levels of each service.

Implementation

In the original plan of the study, the goods and services would be identified and priced, a Review Commission would be established to adjust and approve these prices, and simplified procedures with which to account for the transfer of these goods and services would be put into effect for a four-month operational period. However, the change in the administrative viewpoint, the many changes in personnel, and the false starts in the identification and pricing of the goods and services had greatly lengthened the time required to complete the initial phases of the study. It appeared that these events were adversely affecting the interest of the department heads. Therefore, rather than to delay any further, the operational period of the study was implemented on December 1, 1967, even though identification, pricing, and review of the goods and services were not completed by that date.

During the operational period of the study, several of the department heads maintained accurate records of the delivery of the goods and services of their departments, but many of the department heads made only a token effort to collect these data. Where adequate records were not maintained, basic accounting and census data were used to estimate the

delivery of the goods and services of the departments.

Reviewing Prices

After the operational period had been in effect for more than a month, but before the first "contributed value statements" (basically a profit and loss statement as shown in Appendix B-9) were prepared, a Review Commission was formed, and the first hearing was conducted. Just before the hearing, the proposed prices of the goods and services of three service departments and Pharmacy were submitted to the Commission. At the hearing, which was attended by the members of the Review Commission and the hospital department heads, a review of the original plans and the current status of the study was presented. Also included in this presentation was a review of the contributed value statements which were being prepared. Then the Commission heard the arguments of the department heads in support of their proposed prices. Although a few of the arguments precipitated some discussion, the proposed prices were routinely approved.

In an attempt to stimulate interest in the use of the managerial information generated by the study, the second hearing was scheduled to follow the preparation and the distribution of the contributed value statements for December, the first month of the operational period of the study. Since these statements would present, for each department, the difference, if any, between the cost of operating the department and the "revenue" produced through the delivery of the goods and services of the department, it was expected that a significant difference between cost and revenue might cause the Administrator and the department heads to

bring additional requests to the Review Commission.

For a department in which the cost exceeded the revenues, the Administrator and the department head might study the prices of the goods and services of the department, review the goods and services actually produced by the department, inspect the methods of recording the production of goods and services of the department, and examine the efficiency of the production processes. If, after such a study, the price of the goods and services should be increased, the department head should prepare and submit the justification to the Review Commission. If, after review, additional goods and services produced by the department were identified, these services could be priced and the prices could be submitted to the Review Commission. Of course, methods for obtaining more accurate production records and more efficient production could be implemented without the approval of the Review Commission.

As shown in the input-output transactions for December in Appendix D-1, only two of the seven service departments, Housekeeping and Maintenance, and the four income-producing departments had total revenues which exceeded cost. Although this fiscal information generated some discussion about the prices for the goods and services of the departments, the additional prices to be approved were presented as originally proposed, and the Commission received no request to modify prices or approve additional goods and services from any of the department heads. The proposed prices discussed at the second hearing of the Review Commission were routinely approved. The approved services and prices are presented in Appendix C.

Operation

With these services and prices, the operational period of the study continued through March, 1968. As soon as the production and cost data for each hospital department could be collected after the end of each of the four months of the study, the data were organized into input-output transaction tables as presented in Appendix D and distributed to the Administrator and the department heads.

Results

The major results produced by this study were the identification of the services of the seven service departments and Central Service and Pharmacy, a set of input-output transaction tables displaying the fiscal results of the exchange of services among the hospital departments, two component sub-studies, and the identification of a set of characteristics of hospital organization and management which contribute to the need for coordination and influence the design of procedures for formally coordinating departmental goods and services.

Services

All the interactions, the goods and services, to be coordinated formally among departments are classified in this study as services. A service is defined as the work in one department for the benefit of another department or for a patient. Even though a department produces goods for other departments or patients, such as clean linens and sterile water, these goods are classified as services of the work of producing, processing, or delivering the goods. For example, although dietary plans, prepares, and delivers patient meals to the floor, and

the business office prepares payroll checks, these activities are identified as services with the emphasis on the action rather than the goods.

Each of the services identified in this study is designated by a brief description which begins with the infinitive form, without the *to*, of the transitive verb denoting the primary action of the service. The verb is followed by a direct object, the recipient of the action of the service. Many of these services require a number of adverbial modifiers in regard to such factors as manner, time, place, and degree to complete the description. Examples of these services are "process and file patient chart," "pick up and deliver items outside the hospital," and "prepare and dispense drugs and chemicals for use on floor and for floor stock."

For many services, differential levels of service are included in the description of the service. In some services, the differential levels of service require significantly different procedures, such as the discharge of patients with cash or insurance and the discharge of patients with term payments. In some services, the differential levels require additional work on the part of the department providing the service, such as the delivery of the goods supplied by Purchasing to the user. In other services, differential levels of service were available in regard to the timing of the service, such as the emergency drug dispensing service of Pharmacy.

Several of the departments identified and received approval of services of an informational or consulting nature which were based upon

the technical knowledge of the production systems of the department and frequently provided by the department head. For example, the Purchasing Department provides purchasing counsel, the Dietary Department provides special diet instructions to patients and serves on various administrative committees, the Pharmacy provides pharmaceutical information and also provides training services to Nursing Service, and the Chief Engineer provides engineering and maintenance consulting services and serves on the Fire and Safety Committee.

The services, the levels of each service, and the charge per service identified in this study are presented in Appendix C. For each department the services are organized in a format which could serve as a monthly statement of services rendered to a consumer department. The number of each of the services delivered could be entered on the form and multiplied by the charge per service to produce the total charges for each of the services. The sum of these charges would be the total charges from the producing department to the consuming department.

Input-Output Transaction Tables

The fiscal results of the interaction of these services among hospital departments are presented in the input-output transaction table in Appendix D, one table for each of the months of the operational period of the study and one table in which the results for the four months are summarized. These transaction tables have a basic organizational format similar to the input-output analysis table of microeconomics.¹

¹ For an excellent introduction to input-output analysis, see Miernyk, William H., *The Elements of Input-Output Analysis*, Random House, New York, 1965, 156 pp.; and for a theoretical discussion of the use of

The first 18 rows and 18 columns of the tables represent the departments of the hospital identified in this study. In each cell of this portion of the table is recorded the dollar value of the services provided during the period by the department whose name appears on the row to the department whose name appears at the top of the column. This flow of services is an "output" from the department named on the row and is an "input" to the department named in the column.

In the cells in column 19 are recorded the outside income during the period from sources other than patients to the department whose name appears on the row. In column 20 is the sum of the charges of all the hospital departments during the period. In the cells in column 21 are recorded the sum of the charges to patients during the period for services by the department whose name appears on the row. In the cells in column 22 are the sum of the data across the row. In rows 20 through 25 are recorded the expenses named on the row as incurred by the department whose name appears at the top of the column. In the last row, 26, each cell contains the sum of all of the costs of operating the department listed at the head of the column.

In these tables, the income from patients usually credited to Pharmacy and Central Service has been credited to Administration. The charges for the services of Central Supply and Pharmacy were made to the consuming departments on the basis of the cost of the service excluding the cost of the goods supplied with the service. The costs of

an input-output transaction table in hospital management system, see Nasta, Manohar D., and Robert A. Shapiro, *Mathematical Models to Facilitate Management Developmental Planning of a Hospital System*, School of Industrial Engineering, University of Oklahoma, April 1970, 263 pp.

the goods of these two departments were charged to Administration, and the income from these goods was credited to Administration. Other income credited to Administration includes the income from patients for oxygen, anesthesia, television, and miscellaneous charges, such as telephone calls.

One of the apparent managerial uses of the transactions tables is a comparison between the costs of operating a department and the value of the services produced by that department. In the transactions tables, the value of the services is recorded at the intersection of column 22 and the row for the department, and the cost of operating the department is recorded at the intersection of row 22 and the column for the department. If there are significant differences between the value of the output and the cost, managerial action by the administrator and the department head could lead to the identification of the cause of the difference and to the initiation of corrective action.

During this study, only three of the nine departments for which services were identified and priced--Housekeeping, Personnel, and Maintenance--produced revenues from services which equaled or exceeded the cost of providing the services.

Component Sub-Studies

During both the implementation and operation periods of this study, several graduate student assistants from the Hospital Systems Research Group (later the Health Systems Research Center) of the Georgia Institute of Technology assisted with the collection and organization of the data and with the design and implementation of the procedures. Two

of these students developed their master's theses in association with the study.

One student simulated, through the use of DYNAMO, a hospital management system which included the concepts of consumer sovereignty over the goods and services of other departments and over the use of overtime within the departments, regulated prices for the goods and services available to the departments, and differential pricing for these goods and services.² The three basic hospital departments included in this simulation were: A doctor-nurse-patient complex, such as intermediate care ward or a pediatric ward in which nurses care for patients; a medical supportive department, such as radiology or laboratory which provides goods and services to the doctor-nurse-patient complex; and a general service department such as housekeeping or maintenance which provides service for both the medical supportive department and the doctor-nurse-patient complex. Based on the assumptions underlying the decision model, the simulation indicated that a hospital management system incorporating the fundamental principles of public utility economics would cause the department heads to effectively use the goods and services of other departments and overtime by its own employees to adjust to the varying demand for services generated throughout the hospital as a result of variations in the patient load at the doctor-nurse-patient complex.

The second student recognized that the available time of a

²Hardison, Jasper H., Jr., "A Simulation Model of a Hospital System Under 'Management by Fiscal Control,'" unpublished M.S. thesis, Georgia Institute of Technology, Atlanta, June 1968, 77 pp.

hospital department head is normally limited to 40 hours a week, assumed that the total time which could be invested by a department head exceeds 40 hours a week, and concluded that the department head could use an objective guide to the efficient allocation of his time.³ Furthermore, since the objective of a department is the production of goods and services, such a guide should deal with the relative values of these goods and services. Using information generated during the study about the services of the pharmacy and the price and the frequency of these services, and Pareto's concept of the "vital few, and the trivial many," he demonstrated that only 21 per cent of the services of pharmacy accounted for 96 per cent of the contributed value of the pharmacy.⁴ From this, he concluded that the information generated through procedures for coordination such as those implemented in this study, could be used by a department head as a guide in the efficient allocation of his time.

Characteristics of Hospital Organization and Management

In addition to specific results, the study of coordination provided an opportunity to intimately observe and analyze a hospital management system. For three years following the completion of the study at Holy Family Hospital, the analysis of hospital management systems was continued in other hospitals. Opportunities to analyze management systems were provided through management consulting projects in large,

³Alonso, Felipe, "An Application of Managerial Accounting to Cost Data in a Hospital Service Department," unpublished M.S. thesis, Georgia Institute of Technology, Atlanta, August 1968, 45 pp.

⁴*Ibid.*, p. 30.

medium, and small hospitals; in specialty and general hospitals; and in hospitals operated by state government, by hospital authorities, and by private parties. Also during this period, contemplative discussions with leading hospital administrators, department heads, and industrial engineers in Alabama and Georgia provided valuable input to the analysis of hospital management systems.

This analysis produced a set of characteristics of hospital organization and management which contributes to the need for, and influence the design of, procedures through which hospital managers formally coordinate the goods and services of hospital departments. The importance of these characteristics to this investigation and the amount of space required for their descriptions demand a separate chapter. Thus, the major result of the study of coordination is presented in the following chapter.

CHAPTER IV

RELEVANT CHARACTERISTICS OF HOSPITAL ORGANIZATION AND MANAGEMENT

The characteristics of hospital organization and management in this chapter were developed through an inductive process of observation, generalization, and summation. Hospital organization and activities were closely observed and analyzed in one hospital during the study of coordination described in the preceding chapter and were studied in a number of other hospitals. During and following the study, many details observed in the organization and management of these hospitals were generalized, i.e., transformed into properties shared by a large number of hospitals. Several properties contributing to a distinguishing feature were summarized in a single sentence, termed a *characteristic* of hospital organization and management.

Such an inductive process generates a plethora of characteristics. However, a necessary attribute for a characteristic to be included in this chapter is that it contribute to the need for, or influence the design of, procedures through which hospital managers formally coordinate departmental goods and services. Selecting and arranging characteristics such that their descriptions based on the general properties clearly portray the nature of the problem of coordination and demonstrate a need for formal coordination assures relevance to coordination. Selecting characteristics which are used as a basis for the design of a set of

procedures through which hospital managers can formally coordinate departmental goods and services demonstrates relevance to design.

The arrangement of the characteristics included in the three major sections of this chapter is such that their descriptions demonstrate relevance to coordination and the design of procedures through which managers coordinate goods and services. In the first section, the descriptions identify the basic elements of coordination and portray the nature of the problem of coordination. In addition, these descriptions introduce some terminology used throughout the chapter. In the second section, the descriptions present a review of the principal functions of existing potential agents of coordination in hospitals. The discussion of these functions augments the descriptions of the nature of coordination and of the need for formal coordination. The additional characteristics identified and described in the third section also influence the design of procedures to be implemented and used by hospital managers. Throughout these three sections, the characteristics are numbered sequentially as one list. Several auxiliary or corollary characteristics, identified with a lower case letter, are also included in the list.

Coordination

Coordination, as the term is used in this investigation, implies first that there is a group of entities, secondly that there are relations among these entities, and thirdly that these relations can be modified so as to achieve a harmonious and complementary effort from the group. The initial characteristics of hospital organization and management in this chapter pertain to entities or segments of hospital

organization and to the relations among these segments.

Organization

When the traditional organization chart, as shown in Appendix A-1, is used to illustrate the formal lines of authority from the top administrative position down through the organization of a hospital, a rectangle identified by the name of a department, such as dietary, represents the head of the department, a person who has some managerial responsibility for, and authority over, the resources used in the production of the goods and services of the department. This organization chart is also used to identify the segments of the organization to which employees, resources, and facilities are assigned, in which case a rectangle identified by the name of a department represents the authorized resources used in the production of the goods and services of the department. Thus, this traditional organization chart does not clearly differentiate between the organizational segments in which employees produce the goods and services to be coordinated and those segments in which employees manage the production of goods and services.

A distinction between these segments is developed and illustrated on a modified hospital organization chart in the description of the following characteristic of hospital organization and management.

Characteristic 1. The typical hospital organization consists of a set of hospital production systems and a hospital management system.

The terms "hospital production system" and "hospital management system" have been used in this investigation with only implied definitions. As these systems directly relate to coordination and to several

characteristics presented later in this chapter, their descriptions include formal definitions.

A *hospital production system* is defined to be a subset of the resources and facilities of a hospital department. The interrelated members or components of this set are policies and procedures and authorized resources and facilities, such as space, supplies, equipment, and organizational positions. In this set, the employees assigned to the organizational positions use the space, supplies, and equipment in performing physical and mental activities as directed by the policies and procedures. These activities contribute to the production of goods and services of the department and, thereby, to the production of goods and services of the hospital.

Within a department, there may be several production systems organized around such factors as a set of related activities or a work area. Laboratories, for example, are usually organized into several production systems, such as the blood bank and the hematology section. Although many such production systems are recognized as entities in the financial accounting procedures and assigned unique account numbers, such recognition is not necessary to the organization of production systems. Engineering and maintenance departments typically include one production system organized around the technical activities required to maintain the electrical equipment and another organized around the activities required to operate the boiler. And many housekeeping departments have a production system for each nursing unit. But whether there is one production system or several production systems in a department,

the activities in these systems produce the goods and services of the department.

Somewhat as a production system is a subset of a department, the *hospital management system* is defined to be a subset of the hospital organization, resources, and facilities. The interrelated components of this set are equipment, supplies, space, and organizational positions. In this set, the employees assigned to the organizational positions--the managers--use their space, supplies, and equipment in performing physical and mental activities associated with managing the production systems. For example, many of these managers participate in the development of the goals, philosophies, and policies of the hospital. And many of these managers are department heads who have been delegated some authority over, and assigned some responsibility for, the resources of hospital departments. These department heads--guided by the goals, philosophies, and policies, and operating within their authority and responsibility--perform the activities of such management functions as organizing each production system and developing the policies and procedures which direct the activities in these production systems.

To extend these definitions, the hospital management system includes all organizational positions, equipment, space, and supplies not assigned to a hospital production system. Thus, in regard to these resources and facilities, the hospital management system and the hospital production systems are mutually exclusive and all-inclusive.

The organizational positions and the hierarchical strata in these systems can be illustrated through an extension of the traditional

organization chart. To extend the line of authority into, and to illustrate the hierarchy within, the departments, the portion of the organization chart in Figure IV-1 has been extended to identify three strata within each department with the organizational positions of department head, supervisor, and practitioner. Although each organizational position below the level of the board of directors represents no more than one employee, generally, the department heads and the supervisors also perform in the organizational position of practitioner.¹

The only novel term in Figure IV-1 is "practitioner," the organizational positions in the stratum below the hierarchical level of supervisor. As used in this investigation, the term practitioner refers to employees who perform the procedures which produce the goods and services of the production systems. Included among the practitioners are physicians and technicians, nurses and ward clerks, maids and orderlies, systems analysts and typists.²

¹The primary functions performed by the employees in the organizational positions are identified in the examination of potential agents of coordination on pp. 89-107.

²Although the term *practitioner* identifies a stratum of hospital employees with diverse backgrounds, its use is not intended to imply any social, economic, technical, or professional equality or inequality among the employees in this stratum. The term is used merely as a convenience to simplify the discussion of hospital organization in regard to the definition of hospital production systems. Nor does the identification of this stratum eliminate the possibility of additional hierarchical strata within a department. However, it will become evident that even if there are additional strata within a department, the employees in these strata are members of a production system participating in the production of goods and services. Therefore, the identification of additional strata within a department would make little contribution to the description of hospital production systems, at least in terms of the coordination of goods and services among departments.

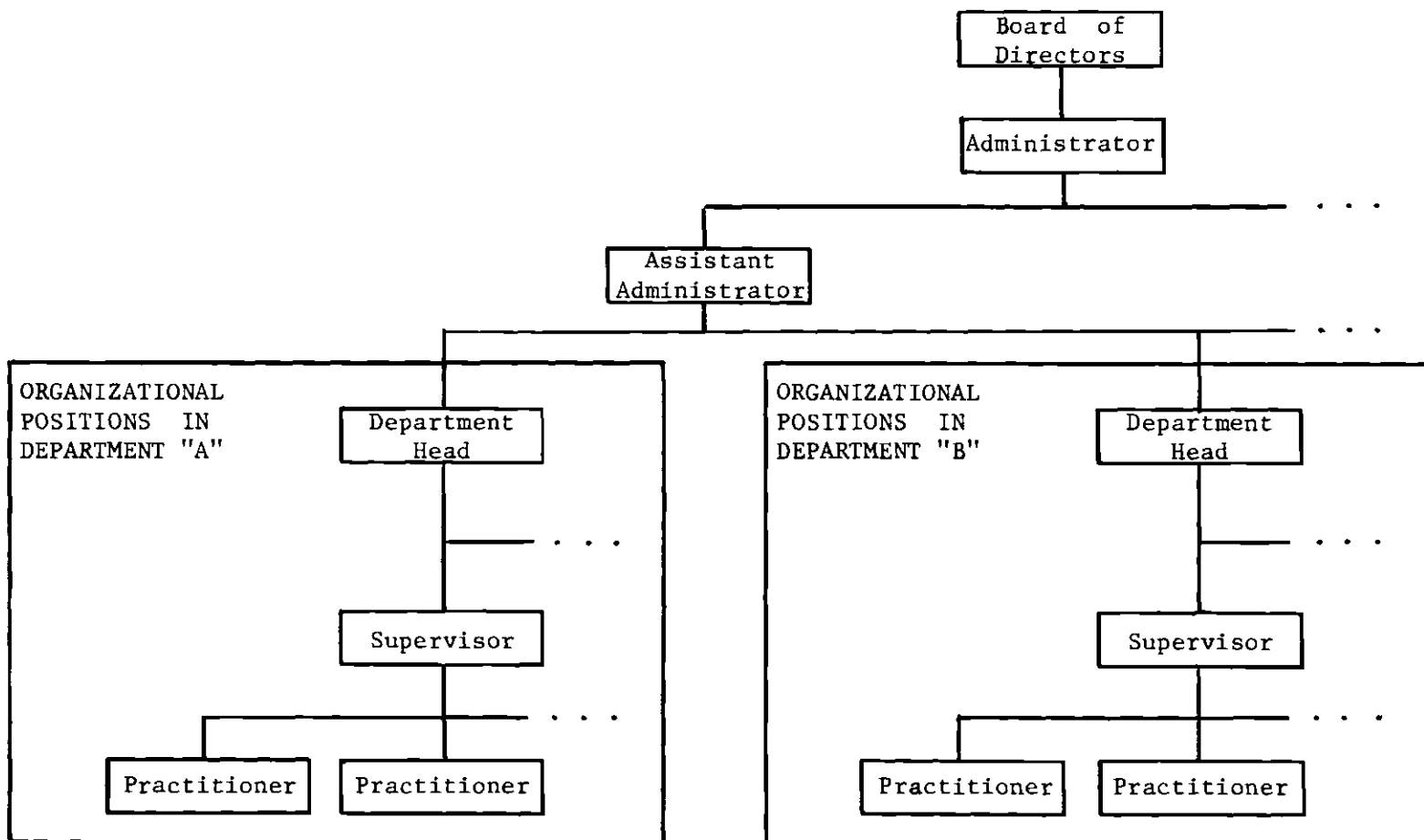


Figure IV-1. Extended Hospital Organization Chart with Organizational Positions Identified within Departments

The organizational positions on the extended chart can be partitioned into the management system and the production systems. The management system, by definition, includes the positions from the top administrative position down through the organization and including the department head positions. A production system, by definition, includes a subset of the positions in a department and not in the management system. Partitioning these positions, as shown in Figure IV-2, clearly distinguishes between those organizational positions in which the employees produce goods and services and those in which employees manage production.

The complex chart in Figure IV-2 can be simplified by eliminating the rectangles representing organizational positions and the lines connecting them, leaving only rectangles identified as management system, departments, and production systems. Such a modified chart, in effect, aggregates the organizational positions into three groups:

1. Administrative positions which are in the management system but not in a department.
2. Department head positions which are in the management system and in a department.
3. Practitioner positions which are in the departments but not in the management system.

In addition to groups of organizational positions, the modified hospital organization chart can represent all the components of the management and production systems, as illustrated with the identification of the components of a production system on the modified chart in Figure IV-3. Such a modified organization chart which clearly distinguishes between the management system and the production systems will be used in the

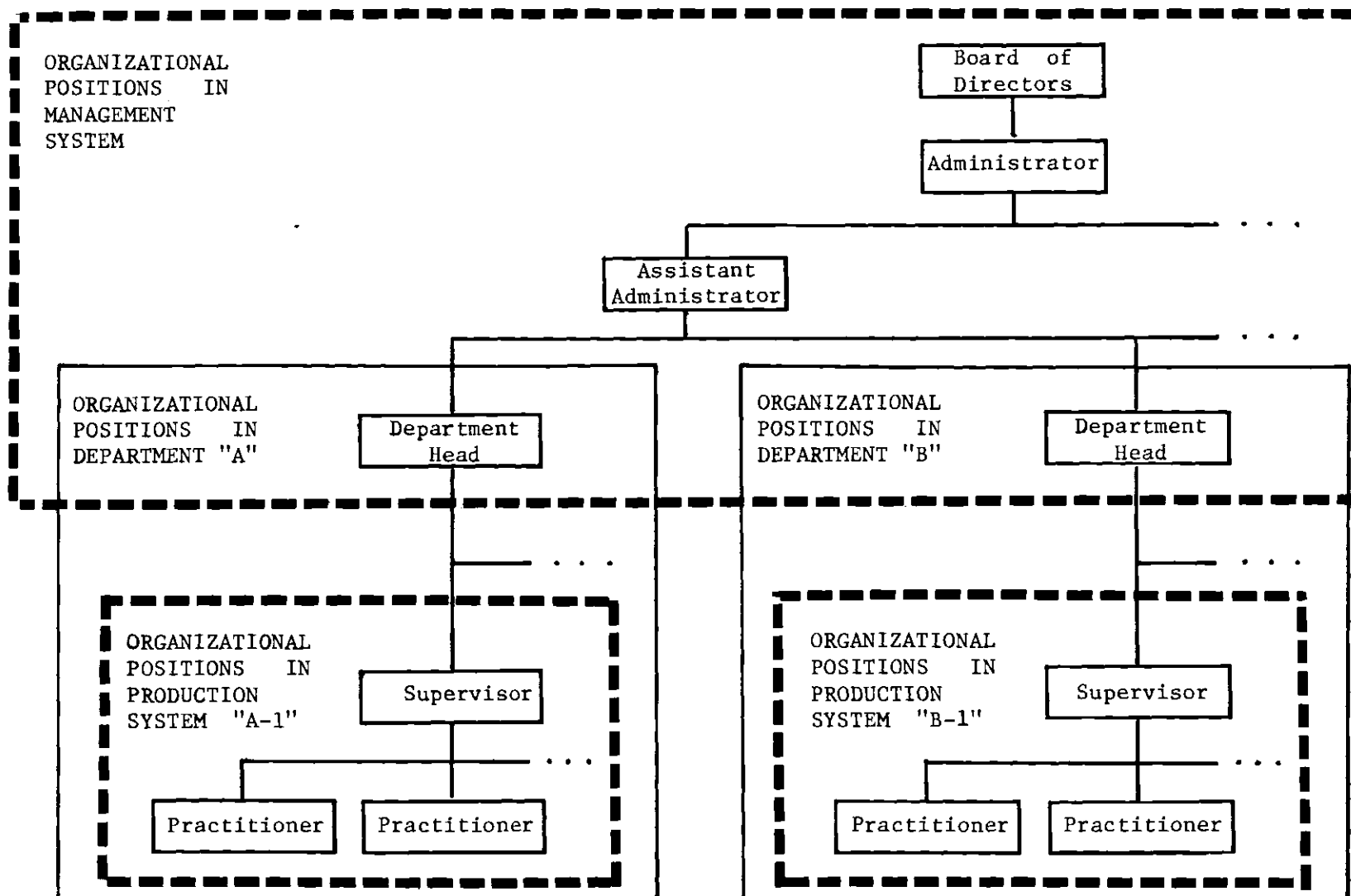


Figure IV-2. Extended Hospital Organization Chart with the Organizational Positions Partitioned into Hospital Management System and Hospital Production Systems

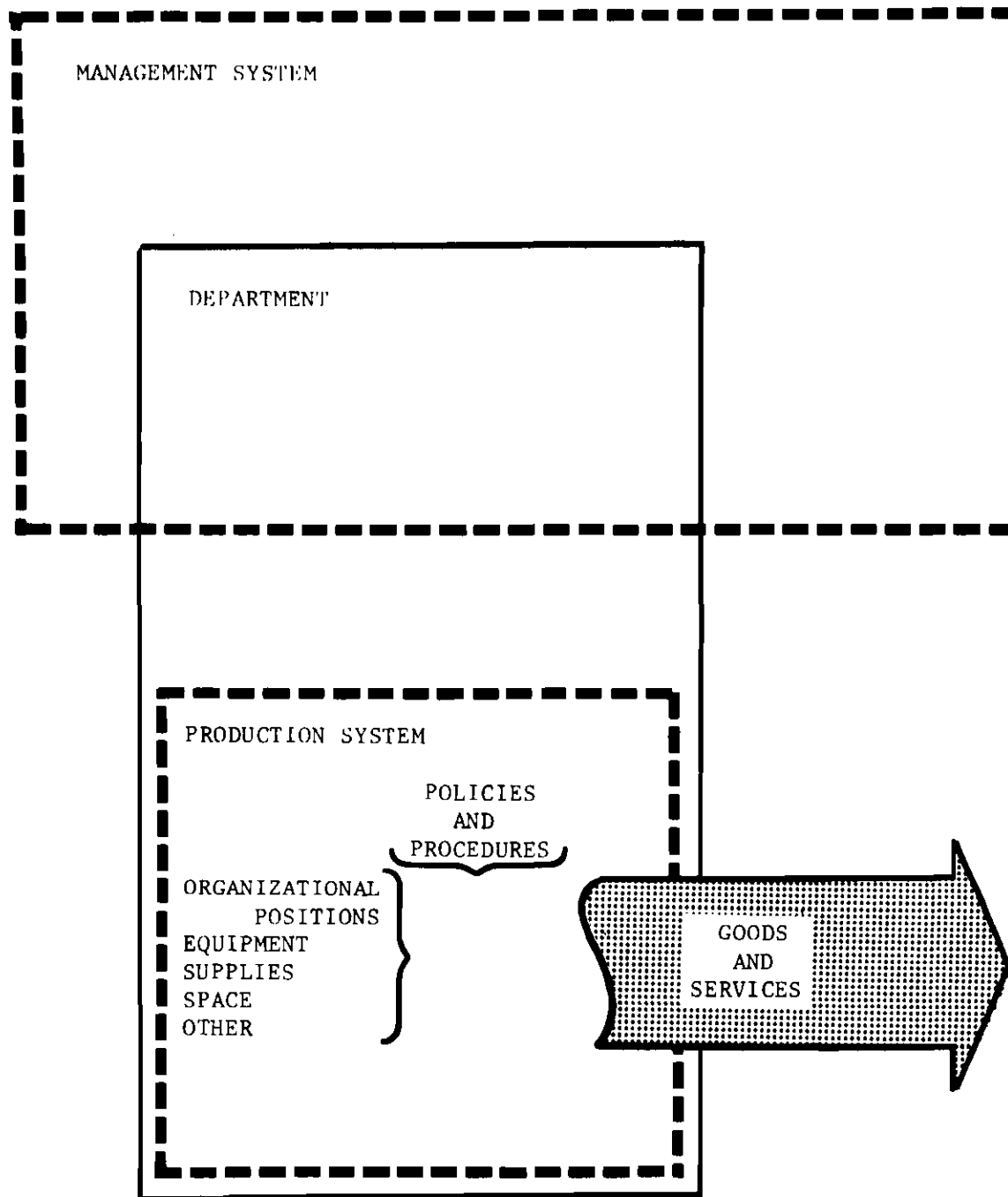


Figure IV-3. Modified Hospital Organization Chart with the Components of a Hospital Production System

descriptions of several characteristics of hospital organization and management in this chapter.

Further description of hospital production systems is provided by the description of the following auxiliary characteristic related to organization:

Characteristic 1a. Hospital production systems are organized around complex and changing technologies.

Most hospital production systems are organized around the related activities of a set of procedures. These procedures are developed from, or are provided by, a body of knowledge or a set of general methods evolving from the application of science and other organized knowledge to the accomplishment of practical tasks.

In many production systems, complexity is implied in the amount of education and training required for a practitioner to achieve an acceptable level of competency. Several technologies, such as those of nursing, laboratory, and radiology, have been organized into professional education and training programs and technical education and training programs, implying a high degree of complexity. In other technologies, as as those of housekeeping and laundry, practitioners are generally subjected to short training programs in procedures which have been reduced to routines requiring little professional or technical judgement. However, many of these procedures are based upon complex technology. In the laundry, for example, the relationships and interactions among such factors as the class of materials to be washed, the types of stains to be removed, the operations in the wash cycle including the length of each

operation and the temperature of the water during each operation, and the actions of such chemicals as soaps, bleaches, sours, and starches are a part of a complex technology. Thus, even though many procedures may be reduced to simple routines, the major procedures of hospital production systems are based upon complex technology.

And these complex technologies are changing. Changes are being introduced through such agents as advances in the organized knowledge underlying the technologies, the application of mechanization, and the introduction of new materials. And these agents interact to introduce additional changes. Many changes in technology which are subsequently introduced in the procedures of production systems affect the goods and services of the systems. Some of the changes improve the quality of current goods and services. Other changes lower costs and permit an increase in the output of current goods and services. Some changes modify current goods and services, and still other changes introduce new goods and services. Examples of changes which have recently been introduced into hospital production systems are electronic computers for both accounting and clinical procedures, disposable linens, convenience foods, and procedures for open heart surgery. As national political attention allocates more resources to health care services, the rate at which changes are introduced into the technologies and into hospital production systems will increase.

Additional description of hospital production systems and hospital management systems is provided as these systems and their components are cited in the descriptions of other characteristics of hospital

organization and management in this chapter. For example, the descriptions of the characteristics identified in the discussion of the relations among hospital departments, in taking production systems as the source of departmental goods and services, augment and complement the description of production systems which has been presented in this section. And the descriptions of characteristics related to the principal functions of the organizational positions contrast activities in the management system and those in production systems. Thus, further description of these systems defers to other characteristics of hospital organization and management.

In summary, hospitals are organized into departments; however, in regard to the coordination of goods and services among departments, the hospital organization consists of a management system and a set of production systems. The management system intersects departments with department heads being members of both a department and the management system. The production systems are subsets of departments which are organized around complex and changing technologies. These production systems are the segments of the organization in which all the goods and services of hospitals are produced.

Relations Among Departments³

Although all the goods and services of hospitals are created in

³ Although there are relations among production systems within departments, the organization of production systems and the development of procedures which direct the activities within these systems are a responsibility of the department head. Coordination of the relations among production systems within a department is considered, in this investigation, to be included in the procedures which direct and, thereby, coordinate the activities within production systems.

the production systems of the departments, not all these goods and services are provided directly to patients; many are transferred to production systems in other departments to complement or facilitate the production of other goods and services. In the example illustrated in Figure IV-4, engineering maintains the equipment of housekeeping which provides cleaning services to the business office which prepares paychecks for nursing service which administers medication to patients. This transfer of goods and services leads to the following characteristic of hospital organization and management.

Characteristic 2. The principal formal relations among hospital departments are the goods and services created in the production systems and transferred among departments.⁴

The transfer of goods and services can be traced not only through a sequence of departments, such as engineering to housekeeping to

⁴ Another set of important relations among departments includes those relations generated among people. For example, employees develop social relations that transcend departmental boundaries; but these relations are primarily personal and informal. Employees also add a human dimension to the production, delivery, and receipt of goods and services and, thereby, contribute to relations among departments. For example, a service delivered by an employee with a positive, enthusiastic attitude may produce a different effect than would the same service delivered by an employee with a reserved, indifferent attitude. In addition to differences in attitude, employees differ in motivation and ability, and these differences affect goods and services. However, there are minimal acceptable levels of such human characteristics as attitude and ability which are essential to the effective production, delivery, and receipt of goods and services; and a major responsibility of department heads is the acquisition of employees who meet or exceed these minima. Even though relations among employees should be of major and continuing concern to members of the hospital management system, a primary objective of every hospital is the production of goods and services. In achieving this objective, the goods and services which are produced and transferred among the production systems of departments can be considered to be the principal formal relations among these departments.

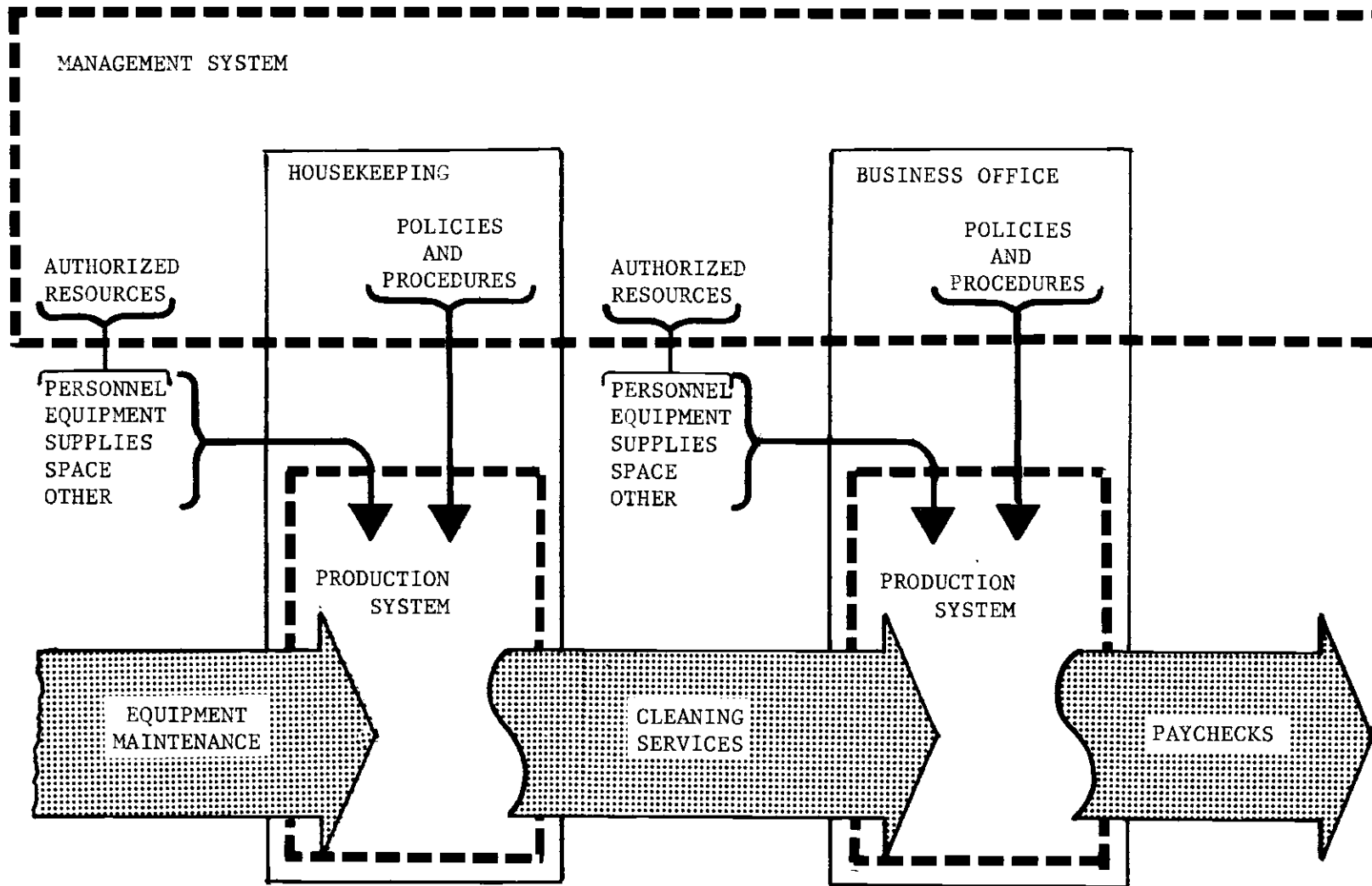


Figure IV-4. Modified Hospital Organization Chart Illustrating Formal Relations among Departments

nursing service to the patients, but also through a network of interactions among departments.⁵ Thus, an auxiliary characteristic of the relations among hospital departments is:

Characteristic 2a. The transfer of goods and services produces interactions among hospital departments.

A simple illustration of these interactions is shown in the modified hospital organization chart in Figure IV-5 in which purchasing provides goods and services to housekeeping, the business office, and the nursing services. Purchasing receives goods and services provided by the business office and housekeeping. Similar interactions can be traced through the other departments in Figure IV-5. Although this type of chart vividly portrays interactions among a few departments, it tends to become a maze as additional departments are included.

A more succinct illustration of interaction among hospital departments is portrayed in the input-output transactions tables produced during the study of coordination. In these tables, in Appendices D-1 through D-5, the numbers in the cells at the intersections of the rows and columns through row 18 and column 18 represent an estimate of the value of the goods and services produced in the department named on the row and transferred to the department named in the column during the time period represented by the table. For example, as shown in Appendix D-5, Administration (row 1) provided goods and services valued at \$1,536 to Central Service (column 3). Additional sources and evaluations of

⁵To simplify the discussion in this section, the transfer of goods and services among production systems of departments is referred to merely as the transfer of goods and services among departments.

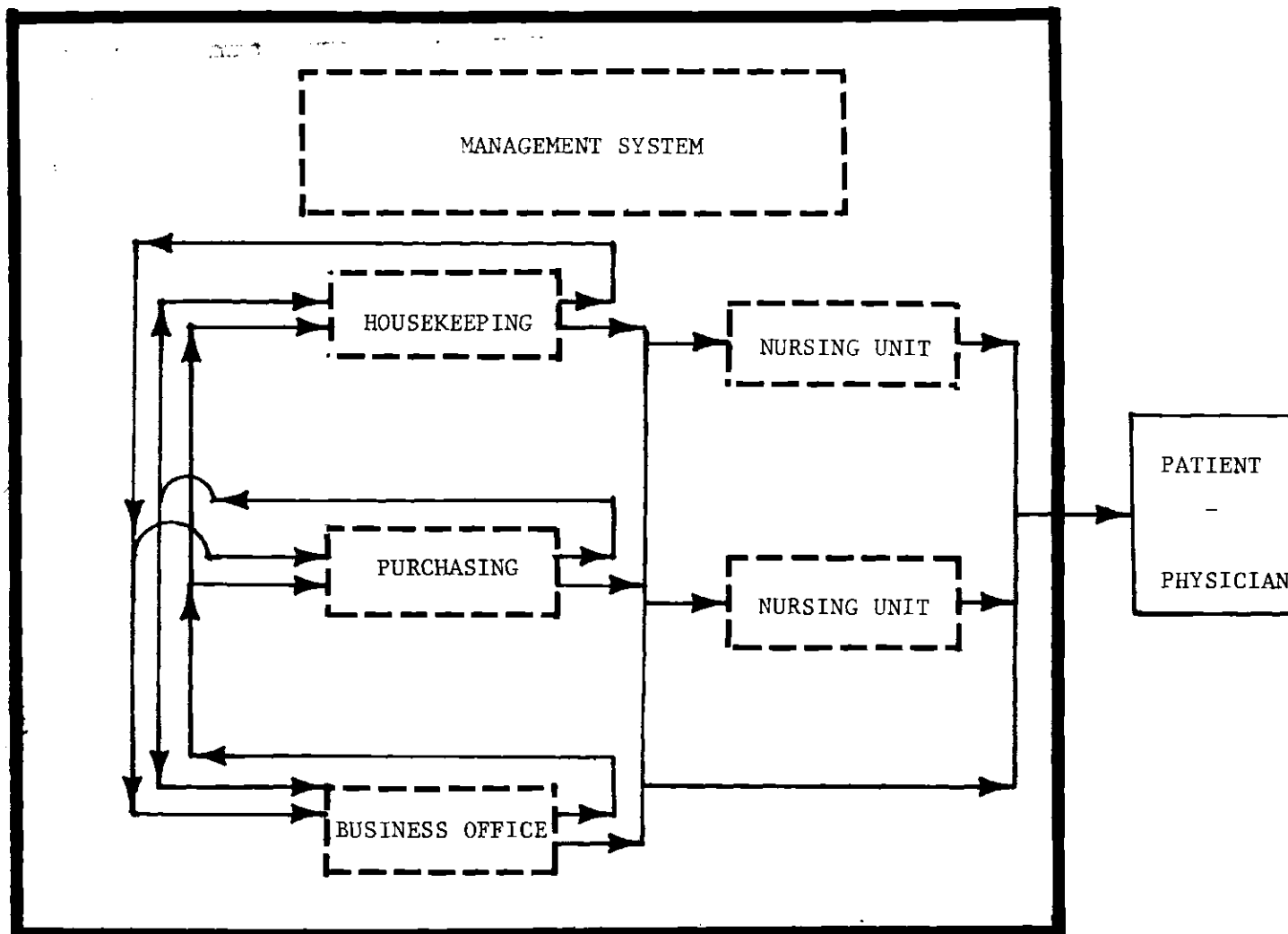


Figure IV-5. Modified Hospital Organization Chart Illustrating Interaction among Production Systems of Hospital Departments

goods and services to Central Service were Business Office, \$41; House-keeping, \$2,436; Maintenance and Engineering, \$405; Personnel, \$347; Pharmacy, \$23; and Purchasing, \$229. As shown in the same table, Central Service produced goods and services for Emergency Room, Nursing Service, Operating Room, and Recovery Room valued at \$100, \$4,268, \$30, and \$142, respectively. Similar transactions can be traced through the remaining 123 cells in Appendix D-5 with entries representing interactions among departments.

The complexity of interactions among departments is compounded by changes in several factors external to the hospital. A corollary characteristic of relations among departments is:

Characteristic 2b. Changes in demand for patient services and changes in the technologies of production systems generate surges of change through the intricate interactions among the production systems of hospital departments.

A surge of change can be illustrated by tracing through a few departments a hypothetical set of changes resulting from a sustained increase in census at a nursing station. In the example diagrammed on the modified hospital organization chart in Figure IV-6, arrows identified by numbers represent needs for additional goods and services. These needs result from primary, secondary, and tertiary effects of the increase in demand at the nursing unit. The primary effects are identified by numbers in circles, the secondary effects by numbers in triangles, and the tertiary effects by numbers in squares.

As shown in Figure IV-6, response to the increase in demand at the nursing unit generates needs for additional cleaning services from

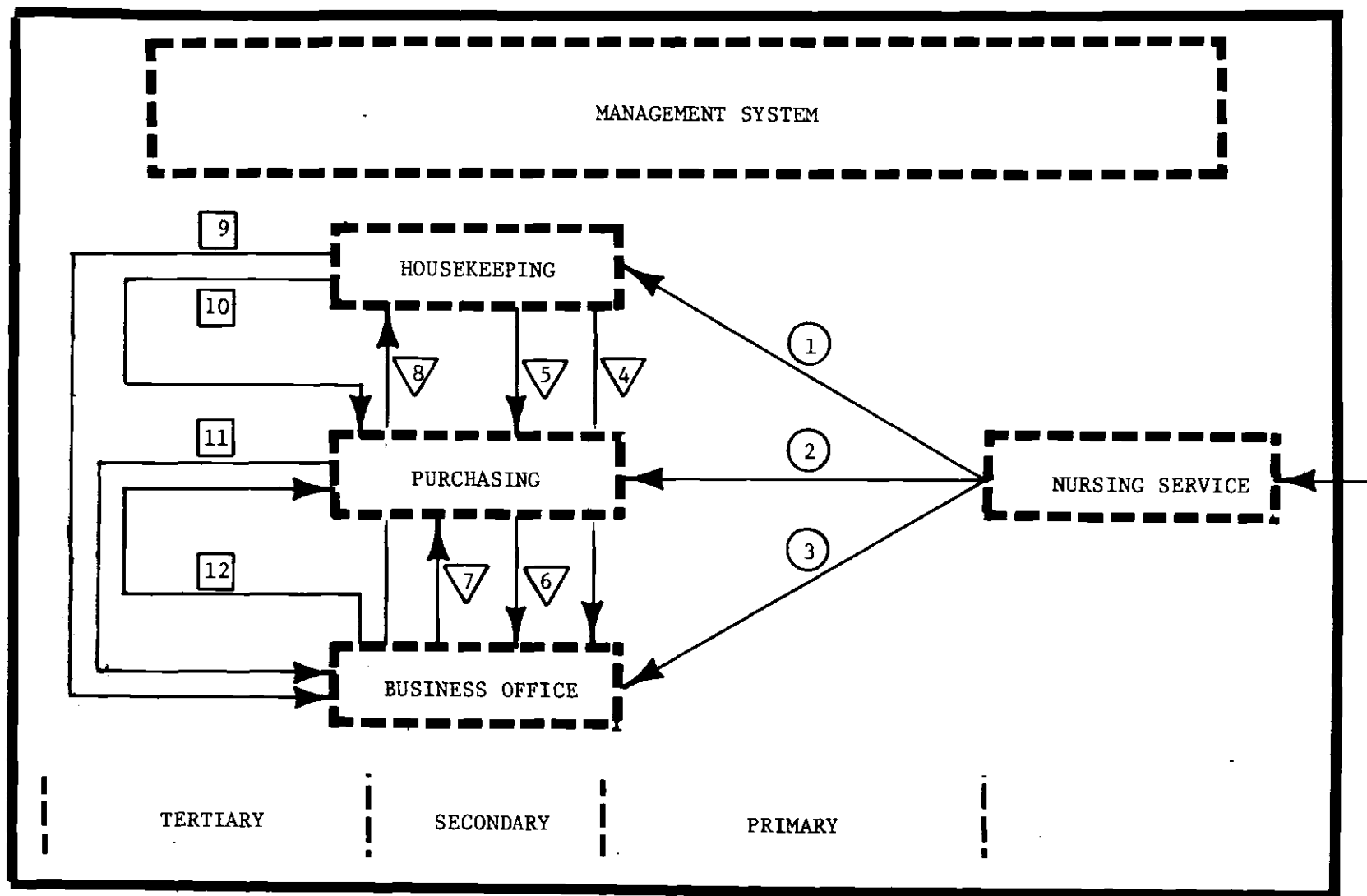


Figure IV-6. Modified Hospital Organization Chart Illustrating the Primary and Higher-Order Interaction among Departments

housekeeping (1) , additional medical and surgical supplies from purchasing (2) , and additional accounting by the business office (3) .

In responding to these needs, housekeeping, purchasing, and the business office generate needs for additional goods and services. Housekeeping generates needs for additional accounting by the business office (4) and for additional cleaning supplies from purchasing (5) . Purchasing generates needs for additional accounting by the business office (6) . And the business office generates needs for additional office supplies from purchasing (7) and for additional cleaning services from housekeeping (8) .

The response to needs generated by the secondary effect of the demand at the nursing unit generates needs for additional goods and services from several departments. Housekeeping generates needs for additional accounting from the business office (9) and for additional cleaning supplies from purchasing (10) . Purchasing generates needs for additional accounting by the business office (11) . And the business office generates needs for additional office supplies from purchasing (12) .

If appropriate data were available, the final results of the surge of primary, secondary, and higher-order effects of changes could be estimated through the techniques of input-output analysis.⁶ For example, if the data in Appendix D-5 were accurate, i.e., all the goods and services transferred among departments were accounted for and

⁶Several hypothetical examples of the application of input-output analysis to hospitals are presented in Nasta and Shapiro, *op. cit.*

the charges for the goods and services reflected the cost of their production, these data could be manipulated to provide measures of the results of all interactions among all departments. Such measures would provide an indication of the effects on each department as changes in the demand for patient services trigger a surge that flows through the interactions among departments.

Surges in the interactions among departments are introduced not only by changes in the demand for patient services, but also by changes in the production systems. That the technologies around which production systems are organized are evolutionary and changing has been established in the description of *Characteristic 1a*. As many of the changes in technology are introduced into hospitals, they inject a surge of changes which flows through several departments.

The impact of changes in technology on interaction among departments can be illustrated by the introduction of disposable needles and syringes. The adoption of disposable needles and syringes did not significantly alter medical procedures, but it did affect the goods and services of several departments, such as purchasing, engineering, central service, and the business office.

Adopting disposable needles and syringes produced several primary effects on goods and services among departments. Purchasing developed specifications for and added these items to the storeroom stock. Engineering experienced increases in requests to dispose of needles and syringes. Central service experienced a reduction in its services; no longer were its employees required to sharpen needles and wash, rinse,

sterilize, and store needles and syringes. In many hospitals, it was possible for nursing units to order these pre-sterilized needles and syringes directly from the purchasing storeroom; thereby, further reducing the need for services from central service and changing the need for services from purchasing.

Adopting disposable needles and syringes also produced some higher-order effects. Purchasing, by increasing the number of requisitions, increased the need for the services of the accounts payable section of the business office. The increase in the need for the goods and services of purchasing and engineering along with the decrease in the need for the goods and services of central service had some effect upon the need for the goods and services of the personnel and payroll section of the business office.

Many other changes in technology, when introduced into hospital production systems, inject similar surges of changes in goods and services.

Conclusion

The organization and operation of hospitals exhibit conditions which are necessary for formal coordination. There are identifiable organizational entities. Formal relations among the entities can be identified. And these relations are susceptible to modification.

In addition, sufficient justification for formal coordination is implied in the major goal of hospitals, the efficient production of those goods and services which benefit patients. These goods and services are created in the production systems. Although many of the goods and

services are delivered directly to patients, many are transferred among departments to complement or facilitate the production of other goods and services. Effective coordination of the goods and services among departments and to patients can contribute to the achievement of the major goal of hospitals.

Having illustrated that conditions which are necessary for formal coordination exist in hospitals and that the major goal of hospitals implies sufficient justification for formal coordination, a next logical step is an examination of characteristics of hospital organization and management pertaining to existing agents which coordinate goods and services among departments.

Agents of Coordination

As goods and services are transferred among the production systems of hospital departments and as these goods and services are frequently subject to changes, due to changes in both demand and supply, then there must exist an agent, or agents, which limit the extent of the changes and provide some degree of coordination. The characteristics of hospital organization and management in this section are organized around three such potential agents: a theme of technology, the principal functions of the organizational positions, and fiscal procedures.

Technological Theme

In organizations in the manufacturing industry, functions are traditionally classified as being either line or staff. Although the distinction between these two classes is not well drawn, generally line functions are those dealing directly with the accomplishment of the

objectives of the organization, and staff functions help line functions effectively accomplish the objectives. Functions of both classes are accomplished through departments which are subdivisions of the organization. Thus, departments in manufacturing organizations can be classified as line departments or staff departments.

Generally, each staff department has one or more production system organized around a complex technology, and the department head is an expert in that technology. Examples of the technologies are: public relations, research and development, personnel, and purchasing. Although the authority and responsibility for the services of these departments differ among organizations, traditionally staff departments provide services to administrative positions in the line of authority and to line departments.

Line departments, on the other hand, are typically segments of the dominant, central technological theme, and, although the department head may be an expert in the segment of the technology in his department, generally the heads of line departments are considered to be managers. In such a line department, technology is used to process materials and products moved through the department.

In many manufacturing organizations, a considerable amount of coordination is provided among line departments as the products and the materials are moved through an extended sequence of departments. Thus, the products and materials become a primary formal relation among these departments. Although subject to some minor variations, many of the characteristics of these relations, such as specifications, quality, and

timeliness of delivery, can be established through the technology in the departments. Thus, among such line departments, the identification of the relations among the departments and the authority and responsibility for the relations are established, in major degree, by the technological theme.

Although there are inter-relations among staff departments, there is not a flow of materials through an extended sequence of these departments. Other distinctions between line and staff departments can be drawn. Typically, in manufacturing organizations, there are relatively few staff departments as compared to a large number of line departments. And the preponderance of the equipment, supplies, space and employees are in the line departments. And, finally, line departments apply technology to goods in the departments; staff departments apply their technology in services to line departments.

Hospitals are similar to manufacturing organizations in that they have staff departments with production systems organized around different and complex technologies and with department heads who are expert in the technology of the department. Examples of these departments are radiology, housekeeping, dietary, and central service.

Hospitals are different from manufacturing organizations in that they do not have an extended sequence of line departments which are merely segments of the same technology and through which patients are moved. It may appear that the nursing service departments provide a "line" function in hospitals. Certainly most of the resources of hospitals are consumed in nursing service departments and nursing

departments apply technology in caring for patients who are assigned to the departments. But even though these departments do serve as focal points for the delivery of the services of the hospital, patients are not normally moved through an extended sequence of nursing service departments. In fact, although goods and services are transferred among hospital departments, neither patient nor goods are processed through an extended sequence of departments.

• In the terms of classical line and staff departments, most hospital departments may be classified as staff departments, and the coordination provided by a central technology for an extended sequence of line departments is not available. Thus, the first characteristic of hospital organization and management is as follows:

Characteristic 3. Hospitals do not have a dominant technological theme which coordinates the flow of goods through an extended sequence of departments.

Organizational Positions

In many organizations, people are a major agent of coordination. In hospitals, the absence of the coordination provided by a central technological theme, heightens the influence employees exert over coordination. Even though such influence depends to some degree upon the characteristics of the employee assigned to a position, each organizational position has functions which pertain to coordination and which can be identified independently of the characteristics of the incumbent. And although functions may vary among positions within groups, discussion of these functions can be simplified by aggregating organizational positions into the following groups identified in the discussion of *Characteristic 1*.

1. Administrative positions.
2. Department head positions.
3. Practitioner positions.

Although the functions to be described in this section are associated with organizational positions, in many instances it is more natural to refer to an employee who performs the function rather than the position from which the function is performed. In order to have this natural referent, employees in practitioner positions will be identified as *practitioners*, employees in department head positions will be identified as *department heads*, and employees in administrative positions will be identified as *administrants*, since the term administrator has a unique connotation in traditional hospital organization.

It should be recognized that the set of primary functions in this section is not exhaustive. There are many other functions of major importance which are essential to the management of hospitals. For example, although the coordination of goods and services does have some implication for morale, there are many other functions associated with morale and human relations within hospitals. But the functions to be identified and described in this section do pertain to the coordination of goods and services.

1. Administrative Positions

Characteristic 4. *The primary functions of hospital administrative positions can be grouped into two major classes: observing the environment outside hospitals, and organizing and adapting components within hospitals.*

Hospitals are but one segment of a society, and a primary

responsibility of administrators is to continually observe other segments of society. The functions associated with such observations form one major class of primary functions of hospital organizational positions. Having observed those segments and detected needs and changes and trends, administrators have a corresponding obligation to cause the internal organization and operations of hospitals to respond in such a way as to adapt to the needs and changes and trends. The group of functions associated with response form a second major class of primary functions of hospital administrative positions. The functions of these two classes and the relation of these functions to the formal coordination of departmental goods and services will be examined in the discussion of three auxiliary characteristics of hospital organization and management.

Characteristic 4a. Observing external sources of demand and external sources of supply are primary functions of administrative positions.

Administrators observe sources which generate or influence the demand for goods and services of hospitals and sources supplying the resources through which hospitals meet demand. Such sources are observed in order to discern existing demand and supply and to detect trends which have implication for future demand and supply.

A major portion of the demand for the goods and services of hospitals is generated outside hospitals. Among those sources which generate or influence demand are such groups as insurance companies, government agencies, and the people in the area served. For example, insurance companies influence demand through such actions as the types and amounts of coverage provided and the methods of paying hospitals for

services. Government agencies influence demand as official bodies which exercise some control over hospital organization and operation and as third party payers who purchase hospital goods and services for citizens. And the number of people in a community and their social and economic condition significantly influence demand. And these groups are changing. For example, many insurance companies now provide outpatient coverage as well as the traditional inpatient coverage. Increasingly, government agencies are becoming involved in health care services, including the goods and services of hospitals. And in most communities, the number of citizens and their socio-economic conditions are changing. By observing groups such as these, administrators can discern demand and changes in demand outside the hospital.

The demand generated by such groups is to be met with the goods and services of hospital production systems. As discussed in the description of *Characteristic 1a*, hospital production systems are organized around complex technologies. Although administrators are not necessarily practitioners in all these technologies, they should be familiar with all available technologies and the goods and services of each technology, in order to identify the resources with which to meet the demand. Such familiarity can be developed and sustained by observing those groups which contribute to and influence the technologies.

Research institutions, educational institutions, and manufacturing companies are among those groups which generate or influence the technologies available for use by hospitals. Research institutions contribute to the body of knowledge underlying the technologies.

Educational institutions prepare people who produce goods and services through the application of technology. And manufacturing companies produce equipment and supplies through which practitioners produce the goods and services of the production systems. That such groups introduce changes in the technologies and, thereby, in the goods and services of hospital production systems was discussed briefly in the description of *Characteristic 1a*.

Although the functions of observing external sources of supply and external sources of demand have significant implications for the goods and services of the hospital and, thereby, the goods and services of hospital departments, these functions do not normally include procedures for formally coordinating goods and services.

The information generated by observing external sources of demand and external sources of supply is used in the primary function through which administrators cause the internal operations and organization of hospitals to respond so as to adapt to the demand and changes in demand. These primary functions are discussed in the following auxiliary characteristics of hospital organization and management.

Characteristic 4b. Identifying goals, identifying departments, selecting department heads, resolving disagreements between department heads, and allocating income among departments are primarily functions of administrative positions.

The functions identified in this characteristic are discussed in sequence.

Identifying Goals. Whether hospital goals are stated explicitly or merely implied in the actions and decisions of administrators, the

identification of that segment or portion of the total demand to be met by the hospital and the identification of the technologies to be used in meeting the selected demand are included in the goals. Although the identification of goals has significant implication for the goods and services to be coordinated among departments, this function does not typically include procedures for formally coordinating such goods and services.

Identifying Departments. Although basic sets of departments have become generally accepted in hospitals by size and by types of services, administrators have some latitude in organizing the technologies identified in the goals into departments. Traditionally, the identification of a department has considerable implication for goods and services. For example, the identification of a printing and duplication department implies that certain goods and services will be available to other departments in the hospital. However, the omission of a department does not mean that the goods and services of that department will not be available; it may mean that the production systems of that technology are in another department. For example, the omission of a printing and duplicating department does not mean that these services are not available; the technologies associated with printing and duplication may be in another department, such as purchasing.

Although the identification of hospital departments has considerable implication for the goods and services to be coordinated among the departments, this function does not include formal identification of the goods and services to be produced by the department.

Selecting Department Heads. The selection of a department head has considerable implication for the production of goods and services. Each department head brings to his job certain personal and professional goals, and many of these goals relate to the operation of the production systems of the departments and to the goods and services of these production systems. For example, one department head may be willing to "do the best he can" with whatever resources are made available to his department. Another department head may want the production systems in his department to reflect the latest development in the technology. Still another department head may want to use the production systems not only to produce goods and services, but also to advance the technology around which the production systems are organized. In many hospitals, such techniques as personal interviews and diagnostic testing are used in an attempt to identify those potential department heads whose goals synchronize with the goals of the hospital. Although a potential department head may be willing to modify and synchronize his goals with those of the hospital, selecting an individual as a department head carries with it some obligation to make available to the department those resources necessary to the production of the goods and services as implied in the employment agreement.

Although the selection of a department head has considerable implication for the goods and services to be coordinated among the departments, this function does not include formal identification of the goods and services to be produced by, or made available to, the department.

Resolving Disagreements. As discussed in the description of *Characteristic 2*, the principal formal relations among hospital departments are goods and services. Although department heads may have differing opinions on many subjects, the essential nature of the transfer of goods and services among departments to the achievement of the goals demand that agreements be developed between department heads in regard to the transfer. In the event department heads are unable to agree, administrators adjudicate the disagreement and identify the goods or services to be produced in one department and to be made available to other departments. This adjudication process deals both with non-recurring services, such as having engineering and maintenance cut a doorway through a wall, and with continuing services, such as establishing a delivery service in central service.

This function deals directly with coordination. In this process, the goods to be produced and the authority and responsibilities of the producing department and consumer department are explicitly identified. However, this function normally occurs only when two department heads are unable to agree.

Allocating Income. In order that department heads can acquire the resources to be used in the production systems of departments, hospital income is allocated among the departments, typically through the use of budgets. The magnitude of budgets has some effect on the goods and services produced by the department and, thus, on the coordination of goods and services among departments. This function will be examined in detail in a characteristic pertaining to fiscal procedures as an agent of coordination.

Characteristic 4c. The primary functions of administrative positions draw upon the procedures, practices, and principles of management.

Administrants may be trained, skilled, and experienced in one or more of the technologies of departments. For example, a physician may be an administrator, a registered nurse may be an assistant administrator, and an accountant may be an assistant administrator. Although the primary functions of administrative positions require some knowledge about *all* the technologies of production systems, they do not require that an administrant be a practitioner in a technology. The functions of the administrative positions draw upon the procedures, practices, and principles of management.

The body of knowledge underlying the procedures, practices, and principles of management is being developed at a rapid pace, independently of the development of the bodies of knowledge in the technologies of the production systems. The increasing complexity of management functions has attracted the attention of professionals from such disciplines as management, engineering, mathematics, and computer technology. In directing their attention to the management functions, professionals from these groups draw upon the body of knowledge underlying their discipline to develop procedures, practices and principles through which the complex management functions can be more effectively and efficiently performed. These procedures, practices, and principles contribute to the effective accomplishment of the primary functions of the administrative positions of hospital organization. Thus, it would be logical to expect that procedures for formally coordinating departmental goods and services

would come from the field of management.

However, most of the procedures, practices, and principles of management have evolved from, or been developed in, extractive and manufacturing industries. As discussed briefly in *Characteristic 3*, in these industries the flow of products and materials through the line departments provides some coordination. And since the dominant interest of management in these organizations is in the line departments, as opposed to the staff departments, the procedures, practices, and principles of management tend to deal with activities within departments and, thereby, coordinate goods and services among departments. One notable exception is in the construction industry, as discussed in Chapter II. In this industry, procedures have been developed to coordinate activities of different segments or organizations without detailed knowledge of the procedures within these segments. Although these procedures are used in hospitals, they are most applicable to one-time projects, not the continuous operations of production systems.

2. Department Head Positions

Characteristic 5. The primary functions of hospital department head positions can be grouped into one minor class, observing factors outside hospitals, and one major class, organizing and adapting production systems within hospitals.

Somewhat as administrators continually observe segments of the environment in order to detect changes and trends which affect hospitals, hospital department heads observe factors outside hospitals. And, somewhat as administrators organize and adapt internal components to the observed changes and trends, hospital department heads organize and adapt

production systems within departments to the observed changes and trends. The functions of these two classes and the relation of the functions to formal coordination will be examined in the discussion of three auxiliary characteristics of hospital organization and management.

Characteristic 5a. Observing external sources of supply is a primary function of hospital department heads.

Whereas observing the environment outside hospitals is a major class of functions for administrators, it is a minor class for department heads because it does not include observations of demand and because it includes observations of only a few technologies, in which the department is an expert.

Although the preponderance of the demand for hospital goods and services is generated outside hospitals, the demands for the goods and services of many departments are generated within hospitals, as illustrated in the discussion of *Characteristic 2*. Department heads focus their attention on technologies with which to meet demand, on the implied assumption that sufficient demand exists. (The demand for departmental goods and services will be examined in detail in the discussion of *Characteristic 7c*.)

Department heads continually observe the many changes being introduced into the technologies, as discussed in *Characteristic 1a*. Information about changes and trends are utilized by department heads in the functions described in the following characteristic.

Characteristic 5b. Serving as a staff advisor, assisting in the preparation of departmental budgets, acquiring authorized resources, and developing (or selecting) and implementing policies and procedures, are primary functions of hospital department head positions.

The functions identified in this characteristic are discussed in sequence.

Serving as a Staff Advisor. Department heads, as experts in the technologies of their department, serve as staff advisors to administrators and to other department heads. The function may be purely advisory, or a department head may have "functional" authority over some of the procedures in other departments. For example, the head of a purchasing department may advise administrators and department heads as to a supplier, without authority to implement his recommendations. The head of a clinical laboratory might not only report and interpret the results of culture tests taken from housekeeping equipment, but also have some authority in developing the procedures and selecting the supplies used by the housekeeping department in order to combat microorganisms.

As mentioned in the description of *Characteristic 4b*, administrators need information about technologies in order to identify hospital goals and to select the technologies with which to meet goals. As mentioned in the description of *Characteristic 1*, the increasing number of technologies, the increasing complexity of technology, and the increasing rate at which changes are introduced make it difficult for administrators to gather the required information. The expert knowledge of department heads is a valuable source of information about technology.

Although the staff advisory function has considerable potential impact on coordination, it does not provide procedures for formally coordinating goods and services.

Assisting in the Preparation of Departmental Budgets. Although the final authority for the approval of departmental budgets is a primary function of administrative positions, department heads prepare budget requests which are reviewed, edited, and approved. As budgets are fiscal procedures, they will be discussed with the characteristics pertaining to fiscal procedure as agents of coordination.

Acquiring Authorized Resources. The approval of a departmental budget identifies the amount of money that can be spent in the acquisition of resources, such as people, supplies, space, and equipment. Since the acquisition of such resources involves the expenditure of funds, this function will be examined in the description of the characteristics pertaining to fiscal procedures as an agent of coordination.

Developing and Implementing Policies and Procedures. The acquisition of resources is a first step in the production of goods and services. As discussed in *Characteristic 1*, department heads develop and implement procedures which direct the employees in the organizational positions in the use of the space, equipment, and supplies.

Although not achieving the monotonous repetition found in many manufacturing processes, most of the activities in production systems are performed with sufficient frequency to justify formal, detailed procedures which identify a set of activities and the sequence in which the activities are to be performed. Many procedures are explicitly

identified and established either by the technologies of the production system or by the acquisition of mechanized processes. For example, many of the activities of the procedures of operating and maintaining a blood bank are established by the technology associated with maintaining blood. And the specific procedures for operating such complex equipment as an automatic analyzer as used in laboratories may permit only few variations. In such case, the selection of the technology or the selection of the process provides the procedures. But, more typically, technology establishes some general procedures and guidelines, and department heads are allowed some latitude in developing and implementing procedures. For example, the head of a housekeeping department may have considerable latitude in developing the activities and the sequence of activities in the procedures for cleaning patient rooms. And, although there may be some technical constraints in a dish-washing process, dieticians are permitted some latitude in such factors as the location of the dish-washing process, the methods used in the process, the equipment used, the location, the scheduling, and the assignment of people.

Although the development of procedures implies the identification of goods and services, such development does not provide for formal identification and coordination of goods and services. Even though procedures specify such factors of coordination as quality, timeliness, and conditions under which goods and services are provided, these factors are developed through informal, personal relations among department heads. These personal relations provide a primary coordinating force among hospital departments.

Thus, department heads require information about coordination such as the identification of the services and the characteristics of the services to be produced by the department and to be made available to the department in order to develop efficient procedures. Such information is not generated through formal procedures, it is supplied through personal relations. Thus, in generating information from which to develop procedures, department heads perform a major act of coordination in hospitals.

Characteristic 5c. The primary functions of hospital department head positions draw upon the procedures, practices, and principles of management and of the technology around which production systems are organized.

In contrast to the primary functions of administrators, which draw primarily upon the procedures, practices, and principles of management, the primary functions of department heads draw from both the fields of management and of technology. For example, even though the development of procedures requires knowledge about the technology, many of the activities are left to the discretion of department heads. In developing the methods for these activities and the sequence of the activities in the procedure, department heads can utilize the procedures, practices and principles from the field of management.

Of these two fields, technology dominates. That department heads have extensive training, experience, or education in technology is typically a prerequisite for assignment. Training, experience, and education in the procedures, practices, and principles of management is desirable but not necessary.

The dominance of technology tends to inhibit coordination. For example, most department heads belong to professional or technical societies organized by researchers, educators, and practitioners. Many of these organizations are managed or led by individuals who have achieved an unusually high ability in the technology, and these leaders exert considerable pressures to upgrade the profession through the organization. These pressures lead to the publication and presentation, at regional and national meetings, of papers dealing with new, sophisticated, and, frequently, spectacular services which the members can produce within their departments. Department heads may be motivated to implement such services in their departments in order to maintain or establish positions within societies. Department heads may be able to develop the procedures and implement the service without due regard to the coordination of the services among the departments of the hospital.

This characteristic interacts with *Characteristic 6a* and *Characteristic 7c* to be discussed later.

Characteristic 6. Based on the technology of production systems, the singular function of hospital practitioner positions is the production of goods and services.

As discussed in *Characteristic 4b*, the primary goals of hospitals include goods and services for patients. As described in *Characteristic 1*, the goods and services through which hospital goals are achieved are produced in production systems by practitioners as directed by procedures. Thus, practitioners have a singular function, the production of goods and services. This function might be more dramatically illustrated with a

negative statement, the primary function of practitioners is not "to not produce services." To a practitioner, it may appear that to not produce certain services would make his work more convenient and pleasant and lower the cost of operating the department. Although administrators and department heads would like to have the work convenient and pleasant for all hospital employees and to have low departmental operating costs, these are not primary goals of hospitals. And, with the intricate interactions described in *Characteristic 2b*, achieving these goals in one department might increase overall costs and hinder the achievement of hospital goals.

Thus, in their primary function, practitioners are not agents for coordinating goods and services among departments. Practitioners do influence the development or selection of procedures by making suggestions and recommendations to department heads. And, if department heads have not properly performed their primary functions, practitioners develop or select procedures, thereby coordinating goods and services, but then practitioners are performing a primary function of department head positions, not practitioner positions.

Characteristic 6a. Many hospital department heads also perform in practitioner positions.

Many hospital departments, particularly in small hospitals, have only a few employees, and department heads produce some of the goods and services of the production systems. For example, a chief pharmacist may not only perform functions as the head of the pharmacy, but also serve in the production system as a pharmacist, filling the order for narcotics

and providing the services of the clinical pharmacy program. And the head of a personnel department might also conduct diagnostic employment interviews, personnel tests, and exit interviews.

And even in large hospitals, department heads may have difficulty in relinquishing the opportunity to practice. Part of the difficulty may be due to a professional pride, or a reluctance to delegate work, or a desire to provide services to meet demand.

A department head with more of an inclination toward technology than toward management and with constraints on the resources of his department (to be discussed in *Characteristic 7c*) may react to any apparent increase in demand by producing goods and services himself. Since the goods and services of production systems are necessary to the goals and the objectives of hospitals, their omission, and frequently, even their postponement can have adverse effects on the achievements of those goals. However, the functions related to department head positions may be postponed, sometimes indefinitely, frequently with little apparent negative results, at least in the short run. This difference between the functions of department heads and practitioners is striking. It is one thing to delay or postpone the study of the coordination of goods and services; it is quite another thing to postpone medication rounds. It is one thing to postpone the development of formal, detailed procedures; it is quite another thing to postpone washing sheets.

Extended neglect of the primary functions of department heads can contribute to a decrease in efficiency, however, and if a department head responds to a decrease in efficiency by producing more of the goods and

services himself, it may be increasingly difficult for him to perform the primary functions of department heads and eliminate the causes of inefficiency. And, although a department head may coordinate the goods and services he produces, while he is producing them, he is not coordinating the other goods and services produced in his department.

In summary, the primary functions of organizational positions are presented in Figure IV-7. In conclusion, the function which deals most formally with coordination is that of administrators in the resolution of disagreements among department heads. The position which deals most effectively with coordination is that of department heads as they develop personal relations in order to generate information with which to design procedures.

Fiscal Procedures

Although primarily concerned with goods and services for patients, hospitals are economic entities, that is, hospitals acquire funds with which to acquire resources with which to produce goods and services. The major source of hospital funds is the income from the charges for goods and services to patients. Hospital fiscal procedures are a valuable source of information to administrators who identify charges for each of the goods and services, estimate the volume of demand for each of the goods and services for a specific time period, and, with these data, estimate the total income to the hospital during the time period. Hospital fiscal procedures also provide a valuable source of information to administrators who develop budgets which allocate hospital income among the departments. And hospital fiscal procedures account for the business

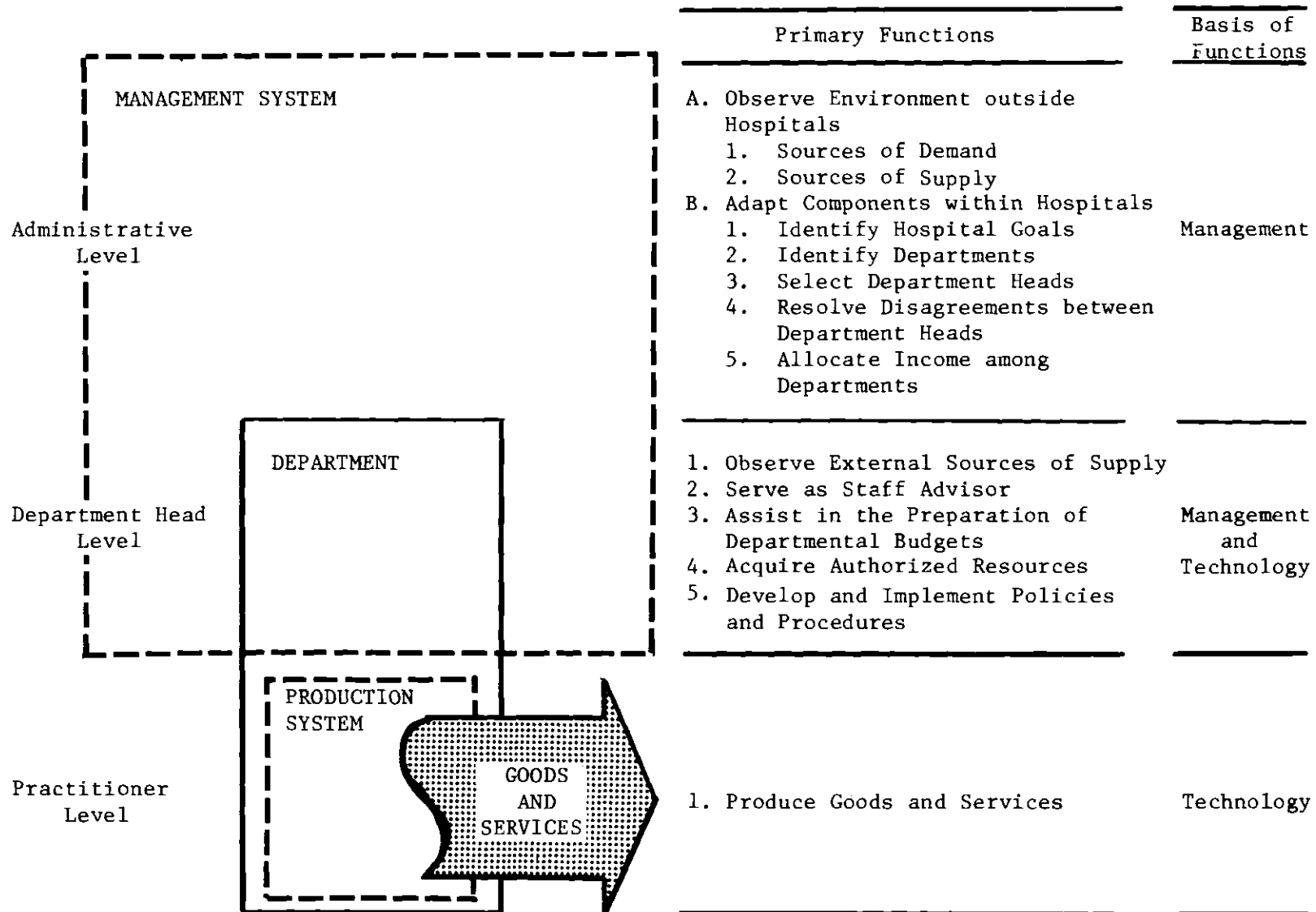


Figure IV-7. Summary of the Primary Functions of Organizational Positions

transactions associated with receiving money and spending money.

The influence of fiscal procedures on the coordination of goods and services is described in the characteristics of hospital organization and management.

Characteristic 7. The primary functions of hospital fiscal procedures include identifying charges for goods and services, accounting for income, establishing departmental budgets, and accounting for spending.

Hospital charge for the goods and services of only a few departments, the "revenue producing departments." Among these departments are nursing department, operating room, anesthesia, radiology, and laboratory. "Nonrevenue producing departments" include such departments as dietary, housekeeping, business office, personnel, and engineering and maintenance. Thus, if charges for goods and services are to reflect the "full cost" of providing the services, then the cost of the goods and services of the nonrevenue producing departments must be assigned to the revenue producing departments and incorporated into the charges for services of these departments. Thus, one important aspect of identifying charges for services rendered to patients is cost finding. In addition, cost finding directly identifies the charges for the major cost reimbursement programs, such as Medicare.

In cost finding, the direct costs for labor and supplies are accumulated for each department, and the overhead costs, including depreciation for space and equipment, are distributed among all departments. These costs for nonrevenue producing departments are to be

distributed to revenue producing departments. The dominant services are the generally accepted basis for distribution identified by the authors of the booklet *Cost Finding and Rate Setting for Hospitals*. For example, if laundry has provided 10 per cent of its clean linens to a department, that department should incur 10 per cent of the costs of operating laundry. And, if 25 per cent of the priced requisitions of pharmacy are sent to one department, that department should be allocated 25 per cent of the costs of operating pharmacy.

The first auxiliary characteristic of hospital organization and management related to fiscal procedures pertains to the identification of the charges for goods and services.

Characteristic 7a. In identifying charges for goods and services, the major source of income in most hospitals, hospital fiscal procedures identify the full cost of each department and the coordination among departments.

The three methods of cost finding in hospitals, known as Method Number 1, Method Number 2, and Method Number 3, will be reviewed briefly.⁷

In Method Number 1, the costs of the nonrevenue producing departments are allocated directly to the revenue producing departments. This method is not recommended because it does not develop the full cost of operating the nonrevenue producing department.⁸ In this method, the

⁷For more information on these three methods, see *Cost Finding and Rate Setting for Hospitals*, American Hospital Association, Chicago, 1968, pp. 21-67.

⁸*Ibid.*, p. 67.

costs of the nonrevenue producing departments include depreciation for equipment and space, but not the costs of the goods and services transferred to these departments.

Method Number 2, also called the step-down method, accounts for some of the interaction among departments and all of the costs for depreciation. In this method, the nonrevenue producing departments are taken in sequence, beginning with that department which provides services to the largest number of other nonrevenue producing departments. The costs of the first department in this sequence are distributed among all departments in relation to the services provided. The costs of the second department in the sequence are increased by its share of the costs of the first department, and these costs are distributed among the remaining nonrevenue producing departments and all the revenue producing departments in relation to the services provided. Thus, each nonrevenue producing department is taken in sequence. Its costs are increased by its portion of the costs of the nonrevenue producing departments whose costs have been distributed, and these costs are distributed among the remaining nonrevenue producing departments and all the revenue producing departments. The authors of the booklet on cost finding and rate setting by the American Hospital Association identify this method as being acceptable; however, they caution that it does not provide for the determination of the full costs of the nonrevenue producing departments, that is, does not account for all the coordination among the departments.⁹

Method Number 3, also known as the double-distribution method,

⁹*Ibid.*, p. 67.

accounts for more of the coordination among departments. In this method, the costs of the nonrevenue producing departments are distributed among all other departments in relation to the services rendered. Then, for each of the nonrevenue producing departments, the added costs which have been assigned to the department are distributed either by one of the methods discussed above or by repeating Method Number 3. If Method Number 3 is selected for the second round of distribution, then the additional costs to each of the nonrevenue producing departments are distributed. Eventually Method Number 1 or 2 is used to terminate the process. Method Number 3 is the most highly recommended method because even though Method Number 2 produces the same basic end result, Method Number 3 "has the distinct advantage of producing the full costs of operating the nonrevenue producing departments, as well as the full costs of the revenue producing department."¹⁰

Thus, the cost finding techniques of fiscal procedures include the costs of depreciation for space and equipment and measures of the coordination which did occur among departments. Even though such procedures direct attention to identifying and measuring interaction among departments, the procedures do not serve as agents for coordinating goods and services among departments.

But cost finding procedures do permit the identification of the full costs of operating the revenue producing departments and the identification of charges for services. After services of the revenue producing departments have been delivered to patients, other fiscal procedures are

¹⁰*Ibid.*, p. 67.

used to account for the revenue produced by the charges.

Although several hospital departments are classified as revenue producing, that is, patients are charged for services delivered by or through these departments, the revenues are not income to the departments, but income to the hospital. Through fiscal procedures, hospitals decompose this income into departmental budgets which may be taken as "income" to the departments. The money authorized by the budget is the only money available to department heads with which to acquire resources to be used in the production of goods and services.

In traditional hospital fiscal procedures, the expense budget is the formally recognized source of income to departments. The categories for which department heads can spend money and the maximum amounts which can be spent are included in expense budgets.

The following auxiliary characteristic of hospital organization and management pertains to the establishment of departmental budgets.

Characteristic 7b. In establishing departmental budgets, which can be taken as income to departments, hospital fiscal procedures do not identify charges for services, full costs, nor the degree of coordination among departments.

The income to hospital departments as determined by traditional fiscal procedures is not directly related to the production of goods and services. Although statistical budgets and other methods are used to estimate the required job positions, salaries and wages, supplies, and purchased services for each department, once established, expense budgets are available, relatively independent of production. Even though administrators periodically review costs per unit of principal services, and

may adjust budgets, the income to a department from a budget is only indirectly related to the production of goods and services.¹¹

Even flexible budgets, in limited use in hospitals, do not directly relate income to production. In such budgets, the income to a department would be related to some readily available statistic which is related to departmental services, such as inpatient days.

Nor do departmental expense budgets include full costs. Two major classes of items frequently omitted are depreciation of space and equipment and the costs of the goods and services of other departments. That these costs are significant is shown in Figure IV-8, which summarizes the data in Appendix D-5. The cost data in Appendix D-5 have been aggregated into five categories, equipment, supplies, space, goods and services from other departments, and personnel. The value of each category as a percentage of total cost was computed. As illustrated in Figure IV-8, all departments utilize goods and services of other departments and the value of these goods and services constitute between 7 per cent and 37 per cent of the cost of operating the departments. The costs for equipment and space constitute between 3 per cent and 39 per cent of the cost of operating the departments. The costs of goods and services, equipment, and space constitute between 11 per cent and 66 per cent of the cost of operating departments.

Thus, fiscal procedures which identify the expense budgets for departments are not agents through which the goods and the services of

¹¹For a discussion of hospital budgeting, see *Budgeting Procedures for Hospitals*, American Hospital Association, Chicago, 1971, 88 pp.

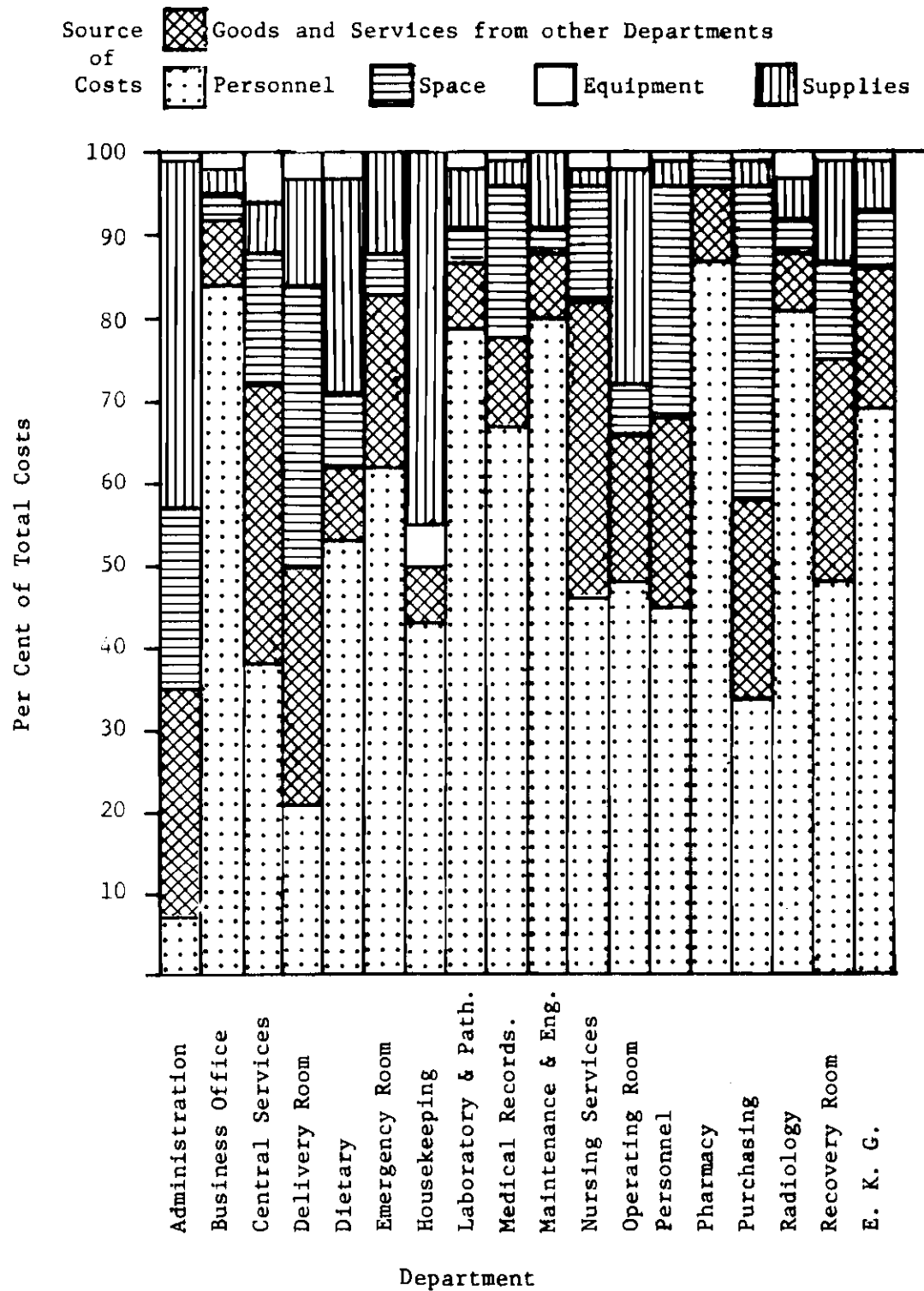


Figure IV-8. Sources of Hospital Department Operating Costs
(From Appendix D-5)

the departments are formally coordinated. In fact, such budgeting procedures provide a means of constraining the income to departments and, thereby, the resources of departments as described in the next auxiliary characteristic of hospital organization and management.

Characteristic 7c. For many hospital departments, the total "demand" for goods and services exceeds the capacity of the production systems, as constrained by the budget and available goods and services.

In the most common definition, demand exists outside the unit which supplies the goods or services which satisfy the demand. There is a demand for the goods and services of hospitals. And, within hospitals, there are demands for departmental goods and services by other departments as illustrated in *Characteristics 2a* and *2b*.

One factor contributing to the demand for goods and services of hospital departments is that there are no economic costs assigned to the goods and services transferred among departments. If a department head can increase the amount of goods and services that he receives from another department, he will, in effect, increase his budget, although such a change would not be reflected in the fiscal procedures. If nursing service cleans up the spillage occurring in patient rooms and delivers patients' meals, getting the housekeeping department to clean up the spillage and dietary to deliver the meals would, in effect, increase the budget of nursing service.

Some demand is supply generated. As identified in *Characteristics 1* and *5b*, department heads have received extensive experience, training, or education in technology, and they usually participate in a professional

or technical society devoted to advancing this technology, as discussed in *Characteristic 5b*. With the rapid rate at which changes are being introduced in the technologies, as discussed in *Characteristic 2*, and pressures from societies, department heads perceive of even greater contributions to be made by their departments. For example, the head of an industrial engineering department may want to apply queuing theory. The director of a library may want to enlarge the reference section and subscribe to more digest services. Such professional goals augment the demand for services of departments. Moss recognized this when he said,

The disparity between a nursing director's view of funds needed for optimum quality patient care and the funds available is apparent in two instances where the initial budgets were sizeable departures from expectations; in one hospital nursing was \$60,000 of the \$200,000 excess over-anticipated income, and another \$68,000 to \$170,000.¹²

But, no matter the source of demand, the supply with which to meet demand is constrained by budgets. Frequently, budgets are rational extensions of historical costs. Typically, such historical data reflects what did occur, not necessarily what should have occurred. In an exceptional, but highly illustrative example, an industrial engineering department in a large mental health hospital studied the randomly generated demand for linens by incontinent patients. A chart was prepared showing the amount of linens needed as a function of hospital policy in regards to the frequency of changing linens for both continent and incontinent patients. The administrative and the medical staffs were asked for a policy in regards to frequency of changes. The resultant policy

¹²Moss, Arthur B. and others, *Hospital Policy Decisions: Process and Action*, G. P. Putnam's Sons, New York, 1966, p. 266.

dictated that the laundry have the capacity to process 600,000 pounds of linen a week. The capacity of the existing laundry was 240,000 pounds of linen a week. Not only did the demand exceed the capacity of the laundry, but the hospital did not have enough linens nor enough staff to change linens to meet the demand.

And when demand exceeds supply, rationing must occur. By modifying the procedures directing the production system as described in *Characteristic 5b*, heads of producing departments eliminate services, change the quality of the service, or delay the timing of the service in such a way as to operate within budget. Since there are no charges for the goods and services of the department, the heads of the departments using the goods and the services may be willing to accept whatever services will be made available by the producing department.

Using budgets to constrain the capacity of a department is certainly an effective procedure for controlling costs. However, this traditional method of controlling costs through budgets, where such budgets deal directly with only one segment of the supply and are not related to output, does not serve as an agent for formally coordinating goods and services among departments so as to effectively achieve the goals of the hospital. Where hospital department heads arbitrarily ration the production of goods and services in order to stay within budget, effective coordination must be a chance occurrence.

Conclusion

Generally, the primary functions of the potential agents examined here do not provide for routinely and formally coordinating goods and

services among departments. The dominant role of coordination for each of the potential agents can be summarized as follows:

1. Technological Theme. Not only is there an absence of a dominant technological theme which coordinates the flow of goods through an extended sequence of departments, but the quasi-independence of the complex technologies of each of the departments complicates coordination.
2. Functions of Organizational Positions. The coordination achieved among departments is primarily the result of personal relations developed among employees in the organizational positions. However, except for administrators resolving disagreements between department heads, the principal functions of the organizational positions do not include the formal coordination of goods and services among departments.
3. Fiscal Procedures. Although fiscal procedures include a measure of coordination which did occur, they do not provide for formally coordinating goods and services among departments. Fiscal procedures do constrain the capacity of production systems of departments and inhibit, to some degree, the coordination of goods and services.

Additional Relevant Characteristics

In addition to the characteristics identified and described in the discussion of the basic elements and the nature of the problem of coordination and the review of principal functions of existing potential agents of coordination, there are a few additional characteristics of hospital organization and management which are relevant to the design of procedures through which hospital managers formally coordinate departmental goods and services. These characteristics relate to the goals of hospitals, the rate at which management techniques can be introduced in hospitals, and the role of hospital medical staffs.

Characteristic 8. Although differing among hospitals and over time, goals of hospitals can be related to goods and services of production systems.

The goals of hospitals are functions of such factors as discussed in *Characteristic 4b*. Since these factors differ among hospitals, goals among hospitals differ.

And as the factors which affect goals are changing over time, hospital goals change over time. New employees bring new interests and interaction with current employees so as to produce different goals. Changing technologies, as discussed in *Characteristic 1*, introduce different goals.

Even though different and changing, the primary goals of hospitals pertain to goods and services for patients. As described in *Characteristic 1*, all goods and services for patients are produced in production systems. And even though not all the goods and services of production systems are provided directly to patients, the final objective of all goods and services of all production systems are goods and services to patients.

Characteristic 9. The rate at which hospital managers can assimilate advanced management techniques differs among hospitals.

Some hospitals currently have elaborate and sophisticated budgeting procedures, while other hospitals have only the essential, rudimentary elements of budgeting. Many hospitals have detailed, formal procedures manuals for the activities in almost all production systems; other hospitals have only a sufficient number of procedures

manuals to satisfy the requirements of JCAH. These differences in the current status of development of management systems and the differences in the interests and the capabilities of the managers affect the rate at which hospital managers can assimilate additional management techniques.

Characteristic 10. In terms of interactions, hospital medical staffs may be viewed as hospital departments using goods and services of other departments.

Although all members of medical staffs may not be paid employees of hospitals, they are members of hospitals. And medical staffs have many of the characteristics of departments as described in *Characteristic 1*. They have administrators, service chiefs, chiefs of staff, and an executive committee which relates to the board of directors. And medical staffs have production systems. In these systems, physicians use the space, supplies, and equipment in performing physical and mental activities as directed by policies and the procedures. And even though physicians, as professionals, have considerable latitude in selecting the procedures, their actions are governed, to some extent, by administrators, particularly through such peer review groups as Utilization Review Committees. And, finally, services produced by physicians contribute to hospital goals.

As a practitioner in a hospital production system, physicians have available to them certain goods and services from other hospital departments. And although the physician is legally responsible for decisions related to diagnosis and treatment, he can be restricted to ordering those goods and services as authorized by the management system.

For example, a physician cannot order procedures for open heart surgery, no matter how badly needed, if the management system has not made facilities available with which departments can produce goods and services required for open heart surgery.

Conclusion

The characteristics of hospital organization and management identified and described in this chapter indicate that hospitals are complicated sets of complex and changing technologies with intricate and variable interactions of goods and services and that these interactions are essential to the achievement of the organizational goals. Thus, these characteristics illustrate an environment suitable for, and a need for, procedures through which managers formally coordinate departmental goods and services.

Subsequent characteristics pertaining to the primary functions of potential agents of coordination failed to reveal functions dealing directly, routinely, and formally with the coordination of goods and services. Many functions relate indirectly to or have implications for coordination. Perhaps the most significant of these is the function of department head positions related to the development of procedures, *Characteristic 5b*. Such procedures require some knowledge about goods and services which are to be made available and goods and services which are to be produced. If formal procedures are not available to provide the information, department heads must develop informal, personal relations so as to achieve some degree of coordination in the production of their goods and services.

The descriptions provided by the characteristics identified and discussed here do not directly provide procedures for formally coordinating goods and services; description alone seldom resolves problems. However, if descriptions have been properly developed, they can be used in developing solutions; this is the remaining task to be completed in the following chapter.

CHAPTER V

PROCEDURES FOR FORMAL COORDINATION

Even though the initial procedures developed for the study of coordination as described in Chapter III were derived from the fundamental principles of public utility economics, and even though considerable argument could be advanced that, in terms of the total hospital, a department could be likened to a public utility serving a community, it does not necessarily follow that the initial procedures conform to the characteristics of hospital organization and management. With the identification of the characteristics of hospital organization and management in Chapter IV, it is now possible to examine the procedures in order to identify those procedures or portions of procedures which do not conform to the characteristics.

Such an examination is presented in the first section of this chapter. As points of disparity are discovered, modification are suggested. In the second section of this chapter, the initial procedures are revised, by incorporating the suggestions, and organized into a program of coordination.

Initial Procedures

The seven initial procedural steps derived from public utility economics are discussed in sequence.

1. Identify the goods and services of all the service departments and two revenue producing departments, Central Service and Pharmacy.

This step includes two functions worthy of separate consideration. These are identifying goods and services and limiting the number of departments included.

Identifying Goods and Services. Goods and services are the principal formal relations among departments (2),¹ and specific knowledge about which goods and services are to be produced in which departments can be of value to administrators and department heads. Goods and services are related to hospital goals (8), and since administrators identify hospital goals (4b), formally identifying the authorized goods and services can assist administrators in establishing goals. Knowing what goods and services to produce and what goods and services are to be available can assist department heads in developing and implementing procedure within their departments (5b).

However, departmental goods and services are currently being identified in only the revenue producing department and only for those goods and services delivered to patients (7a). Department heads informally, through personal relations, identify the departmental goods and services transferred among departments (5b). Therefore, introducing this procedure can precipitate a resistance to the change. However, since all hospital goods and services are produced in departments, and

¹In the first section of this chapter, numerous references will be made to the characteristics of hospital organization and management identified and described in the preceding chapter. To simplify these references, the point being drawn from the description of a characteristic will be included in a sentence and the referential characteristic will be identified by number, marked off by parentheses.

since the primary goals of hospitals are met through these goods and services, the identification of department goods and services seems to be a function too important to be left to the informal personal relations which develop among department heads.

So, even though changes in the management system are required, identifying goods and services is an essential component of coordination which is generally compatible with the characteristics of hospital organization and management. Therefore, it seems reasonable to retain this procedure.

Limiting the Number of Departments. In the exploratory study of coordination described in Chapter III, it was assumed that the income produced by the services of the revenue producing departments was income to the departments, and, except for Pharmacy and Central Service, the goods and services of these departments were not included in the study. Actually, hospitals charge patients for the goods and services of only a few departments, and the revenue is the primary source of income to the hospital (7a) and all departments (7b). Since administrators identify departments, select department heads, and allocate income among departments (4b), the view could be taken that administrators pay departments for services rendered to patients.

There does not seem to be a compelling reason for not including all departments in a program of coordination. For one thing, the dominant services of the revenue producing departments which have been priced serve as a basis for charging patients (7a). In addition, many of these departments also produce services for other departments. For example,

many radiology departments provide chest x-rays for hospital employees in other departments. Including the revenue departments in a program of coordination would permit the identification of all possible interactions among departments.

2. Develop a proposed price for each good and each service, using the basic pricing procedures of public utility economics.

Prices for departmental goods and services provided to patients are now being used in hospitals (7a), therefore, this concept is not totally new to hospitals. However, prices are not being developed for all goods and services. Department heads informally develop a system of values for goods and services transferred among departments (4b, 7b). Therefore, to price all goods and services introduces changes in the management system and can precipitate resistance to change.

But overcoming such resistance and developing prices can encourage the practice of management. Department heads are experts in, and tend to devote their attention to, the technology of the production systems in their department (5b, 6a). Department heads are also expected to use procedures, practices and principles of management (5c). Causing department heads to develop prices will direct some of their attention to the use of resources and the cost of output.

Another reason for pricing goods and services is that prices indicate value. In those departments in which demand exceeds supply (7c), information about the value of goods and services can assist department heads more objectively ration goods and services. The heads of producing departments know that stat services cost their departments

more than routine services, and they admonish the heads of consuming departments to utilize routine services whenever possible. Pricing departmental goods and services can provide these department heads with more information with which to make their case, and also information to be used as they acquire goods and services from other departments (4b).

Although pricing all goods and services does introduce some changes in the management system, prices provide information essential to the primary functions of department heads. Therefore, since pricing goods and services contributes to the program of coordination and, in general, is compatible with the characteristics of hospital organization and management, these general procedures are retained.

3. Establish a review commission to review the proposed prices at a "public hearing," make any adjustments it deems necessary, and publish the approved prices for all goods and services.

This step includes two functions worthy of separate consideration. These are the review commission and the reviewing of prices.

Review Commission. Currently, hospital departments are identified by administrators (4b), and the goods and services of these departments are developed by agreement among department heads (5b). If two department heads are unable to agree on goods and services, an administrator will resolve the disagreement (4b). However, it is difficult for one or two persons to have specific, detailed knowledge about the complex and different technologies in the many departments (1a), of the surges of interactions among departments (2b), and of external sources of demand and supply (4a, 5a). Committees can bring together a group of people

with knowledge from many areas to apply to the complex problems of coordination. And the use of committees is well established in hospitals, with committees in the management system, such as the budget committee, and in the medical staff, such as the utilization review committee and the executive committee.

However, a few changes are needed to make this procedure conform to the characteristics of hospital organization and management, changes in regard to the name, the authority, and the composition.

The name of the commission should be changed. The adjective *review* emphasizes a major function of the commission, not the subject with which the commission deals. And the utilization review committees of medical staffs have established a role for the term review (10). Departmental goods and services occupy the attention of the commission and using a name such as services commission will emphasize that fact. The noun *commission* is retained merely as a distinctive title.

In the initial procedures, it was assumed that the commission would be given the authority of the administrator in pricing the goods and services transferred among departments. The administrator has sufficient threats to his authority without the introduction of new ones. Among these are the several administrative committees within the management system, the medical staff and associate committees with their authoritative roles, and the many complex technologies in which staff advisors employ expertness as a means of gaining authority over portions of operations (1a). The commission should serve as an advisor to the administrator. In effect, the commission consolidates staff advice from

a large number of experts and organizes this information into recommendations to the administrator.

Also in the initial procedures, the review commission was composed of the administrator and two members of the board of directors. As hospitals are composed of many complex technologies (1a), including the medical staff (10), the commission should be composed of experts from these technologies. For example, a commission could have representatives from the board of directors, the medical staff, physician departments, nursing departments, and service departments. The administrator should be a member of the commission and may serve as chairman.

Reviewing Prices. The complexity of determining prices is amply demonstrated in the fiscal procedures for pricing goods and services provided to patients (7a). There are several costs to be allocated to departments, such as depreciation of the building, maintenance of the building and grounds, and administrative costs. The allocation of these costs is arbitrary and significantly affects the costs of the departments. After such costs are allocated, departmental costs are distributed among other departments, and the most generally accepted basis of distribution is the dominant services.

Since cost allocation is arbitrarily established and since the prices for the goods of a department are affected by the costs of services of other departments in the intricate interactions among production systems (2b), it seems reasonable that the expert knowledge of the services commission be used to review, adjust, and approve departmental goods and services and their prices.

4. Apply the concept of consumer sovereignty and permit department heads to select those goods and services which best meet their needs in the amount which meets their needs.

There are several characteristics of hospital organization and management which negate the acceptance of consumer sovereignty. Such characteristics will be discussed under the headings of technology, demand, and budget.

Technology. Hospital departments have production systems organized around complex technologies (1a). The heads of these departments are experts in the technology of their department (5c). Many of the goods and services of the departments require expert knowledge of the technology in such aspects as initiating the order and specifying the timeliness of delivery, the method of delivery, and quality. Since every hospital department is organized around complex technology, it should be expected that every department head jealously guard the authority over the goods and services produced by the technology of his department.

Another aspect of technology is that there are goods and services from some technologies which do not require expert knowledge to initiate the order, but which are so essential to the successful operation of the hospital that a consumer should not have the authority to reject such services. For example, it may not be reasonable for nursing service to have the authority to *not* have a room thoroughly cleaned by housekeeping after a patient has vacated the room. And it may not be advisable for housekeeping to have the authority to *not* order the culture checks of laboratory.

One way to resolve this complex problem of authority would be to

have the department heads propose a set of authorities and responsibilities for each good and each service for both the producing department and the consuming department. These proposed authorities and responsibilities could be submitted to the services commission for review, adjustment, and approval.

Demand. The heads of many hospital departments perceive a total "demand" for goods and services which exceeds the capacity of the productions systems of their departments (7c). It is not reasonable to expect these department heads to forego the rationing of goods and services which permits them to allocate the limited capacity in such a way as it meets their professional goals.

One of the primary objectives of a program of coordination is to cause the use of the goods and services in the proper amounts. The identification of the official authorities and responsibilities produced through the process described above will specify those services over which the producer has authority and those over which consumer has authority. Through such a process, each department head will have authority over the goods and services which require technical knowledge for order initiation, and, perhaps, other characteristics. For the other goods and services of the departments, demand as generated by the needs of consumer departments and supported by the budgets will establish the level of operation.

Budgets. Traditional departmental budgets do not include full costs (7b). Omitted are the depreciation on equipment and supplies and the cost of the goods and services provided by other departments. Thus,

with traditional budgets, department heads have funds to employ people and purchase supplies, but do not have funds with which to purchase goods and services of other departments. Even though these department heads may be told that they will obtain additional income from the production of goods and services, such income is not available at the beginning of an accounting period. They also know that if they do not have budget with which to purchase goods and services, it is likely that limited budgets in other departments do not include goods and services from their departments.

One method of changing the budgets would be to estimate the amount of interactions among departments and to increase the budget of each department to reflect the cost of the goods and services used in the interaction. In fact, it would be well to include in this budget the costs for depreciation on space and equipment, in order that the department heads can identify the full costs of operating departments and better estimate the prices to be charged for the services of the department.

With the above modifications, the concept of consumer authority is reduced to two steps: (1) establishing the availability of goods and services through authorities and responsibilities, and (2) modifying the budgets. These procedures conform to the characteristics of hospital organization and management and contribute to the program of coordination.

5. Record the transfer of goods and services among departments through rudimentary accounting procedures.

Although hospital fiscal procedures may identify the full cost of each department in identifying charges for goods and services to patients (7a), the transfer of goods and services among departments is not routinely accounted for. The information about the interaction, which is required for appraising services, is determined periodically through cost-finding techniques. Thus, even though hospitals have adequate procedures to account for the delivery of goods and services to the patients, they have only limited experience with accounting for the goods and services among departments. Therefore, accounting for these goods and services through rudimentary procedures provides a means of acquiring experience with the methods of collecting data and the levels of detail in the data collected. After hospitals have had sufficient experience, formal procedures to account for the transfer of goods and services could be developed and incorporated into the fiscal procedures of the hospitals.

Although this procedure introduces changes in hospital operations, it is an essential step in the program of coordination and is retained.

6. Prepare financial reports of the transfer of goods and services and present the reports to hospital managers.

In many hospitals, department heads currently receive periodic financial reports about the rate of which they are using their budgeted resources. Such information is of value to administrators in allocating income among departments (4b) and to department heads in acquiring authorized resources (5b). The financial report to be presented here contains the same information as current budget reports, and also includes

additional information in regard to the income to the department from the production of goods and services and the cost to the department for the goods and services consumed. This procedure requires no changes to conform to the characteristics of hospital organization and management.

7. Have the review commission re-evaluate the prices of goods and services as requested by department heads.

The technology of hospital production systems is changing (1a), the external sources of demand and supply are changing (4a, 5a). In order to adjust to these demands, the internal organization and procedures of the hospital are modified (4b, 5b). Changes are introduced not only in the prices of goods and services, but also in the goods and services to be made available and the authorities and responsibility over these goods and services. The services commission should consider additions, deletions, and modifications as recommended by department heads.

This procedure is compatible with the characteristics of hospital organization and management and is retained.

Sequence and Focus

In addition to the above examination of each of the procedural steps, the overall sequence of the steps and the focus of the project can be examined in view of the characteristics of hospital organization and management. The initial procedures focus on two primary factors as agents of coordination, prices and consumer sovereignty. That consumer sovereignty is in conflict with several of the characteristics of hospital organization and management has been noted above and changes in the procedures have been suggested.

The rate at which hospital managers can assimilate such management techniques as a program of coordination differs among hospitals, and a major portion of this difference is time availability (9). With the focus on prices as a means of coordination, it appears that all of the initial procedures through procedure number 6 must be implemented before a hospital achieves meaningful results. Implementing all procedures can require several years in some hospitals. To wait for several years for the achievement of meaningful results would inhibit the implementation of this program in many hospitals.

One way to alleviate this difficulty is to reduce the emphasis on prices and to emphasize goods and services. The sequence of the steps can be rearranged so that each step is a separate project which, except for sequence, is conducted independently of the other steps in the project. Each of these steps, or small projects, should have specific end results with value to hospital managers.

One way to do this would be to arrange the steps such that they form steps in the act of coordination. In general terms, coordination can be defined as the act of arranging relations among unlike things in order to produce a common action or effort. In hospital organization, the unlike things are departments with different technologies (1a). The principal formal relations among these departments are goods and services (2). In specific terms, coordinating goods and services among hospital departments consists of three basic steps:

1. Identifying the goods and services to be used.
2. Making the goods and services available.

3. Causing the use of goods and services in the proper amounts so as to effectively and efficiently achieve the goals of the hospital.

Procedures through which hospital managers can formally and systematically accomplish these steps as independent, but sequential, projects with meaningful end results are presented in the next section of this chapter. These procedures also incorporate the other modifications suggested in this section.

Program of Coordination

Although the procedures for formal coordination presented in this section incorporate the suggestions developed in the preceding section, it should be noted that these are not the only procedures which could be developed from the suggestions. However, the procedures developed in this program of coordination do conform to the characteristics of hospital organization and management identified and described in Chapter IV.

These procedures are general, corresponding to the general characteristics of hospital organization and management. For implementation in a specific hospital, more specific procedures would be developed to correspond to the characteristics of the hospital.

Beginning with the establishment of a hospital services commission, the program of coordination proceeds according to the three steps of coordination identified in the preceding section, identifying goods and services, making goods and services available, and causing the use

of the goods and services in the proper amounts.

Establish Hospital Services Commission

The hospital administrator forms and formally incorporates into the hospital management system a hospital services commission, composed of representatives from the hospital board, medical staff, physician departments, nursing departments, and service departments. This commission is charged with the responsibility for developing and implementing the program of coordination in the hospital.

The administrator should consider consolidating the services commission with some existing committee of the management system. For example, the services commission and the budget committee might well be the same group, since the work of the services commission deals with several of the preparatory and fundamental activities typically assigned to budget committees.

Such organizational procedures as electing or appointing representatives, the length of term in office, and the frequency of meetings can be devised to conform to the characteristic of a specific hospital. Although the commission might meet frequently during the initial steps of a program of coordination, once the goods and services have been identified, the authority and responsibilities have been established, and the prices have been approved, the commission will only have to meet periodically to consider changes as recommended by department heads.

If the commission elects to implement the next step in the program of coordination, a portion of its functions and procedures will be as described in that step. However, even if the commission elects not to

implement the remaining steps, it can serve as a valuable tool of management, serving administrators in resolving disagreements between department heads and relating departmental goods and services to hospital goals.

If a hospital elects to move into the program of coordination after the hospital services commission becomes operational, the first of three steps of coordination, identifying departmental goods and services, can be initiated.

Identify Departmental Goods and Services

Department heads formally identify the goods and services of the production systems of their departments. The exact format and the level of detail to be included can be decided by the commission and department heads as they gain experience in describing goods and services. Examples of one format and several different levels of detail are illustrated in Appendix C. In general, the identification of a service should focus on what the service does for the consumer, not the procedures used in providing the service.

As department heads identify goods and services, they also identify differential levels, or variations in such factors as quality and timeliness, which are permissible for a good or service. Each of these levels will be considered a separate service.

The list of recommended goods and services is submitted to the services commission for review, adjustment, and approval. The general procedures through which the services commission identifies goods and services are to be used in the two subsequent steps of the program of

coordination, should a hospital elect to continue the program through those steps. The following procedures of the services commission will be referred to in the sections of this chapter describing those two steps.

Services Commission Procedures. The list of recommended goods and services submitted to the services commission is duplicated and distributed to all hospital managers. After the members of the commission and the managers have had sufficient time to review the goods and services of a few departments, the commission holds a quasi-public hearing and encourages interested department heads to attend. At this hearing, the head of a producing department and the heads of the departments consuming the goods and services of the producing department are invited to discuss those goods and services. During and after the hearing, the commission reviews the goods and services, makes whatever adjustment it deems necessary, and approves the goods and services. The list is then submitted to the administrator for formal approval and adoption. These procedures become an iterative process through which the goods and services of a hospital are continually modified to reflect changes in demand, technology, and the needs and organization of the hospital.

The completion of these procedures provides hospital managers with a detailed listing of all goods and services of all production systems.

The formal identification of goods and services can be used by both administrators and department heads. Since goods and services are related to hospital goals, and since administrators identify hospital goals, they can use the above procedure to relate goods and services to hospital goals. Administrants, through the services commission, can

eliminate those goods and services which do not complement goals, rearrange or combine goods and services among departments, so as to better achieve goals, and add those services which are necessary in order to assure that the goods and services of the departments, in total, are sufficient to achieve the goals.

And identification of departmental goods and services can be used to assist department heads. Knowing what goods and services are to be produced and what goods and services are to be made available will be of value to department heads in developing and implementing procedures within their departments.

In addition to the above uses, the completion of the identification of departmental goods and services prepares the way for the implementation of the second step in the program of coordination, identifying the authority and responsibility of both the producing department and the consuming department for each of these goods and services.

Although identifying departmental goods and services is a necessary step of coordination, it does not provide a mechanism for transferring goods and services among departments. There must be some authority and responsibility in regards to the availability of goods and services. If a hospital elects to continue this program of coordination, the next step deals with authority and responsibility.

Establish Authority and Responsibility

Although authority over the operations of the production systems in each department has a clear and unmistakable line up through the supervisor to the department head and up through a series of administrators

to the board of directors, there is not a corresponding precise line of authority and responsibility in regard to the goods and services transferred among production systems in the different departments. These authorities and responsibilities are developed in this step.

The heads of the departments propose, for each of the goods and services of their departments, the authorities and responsibilities of the producing department and the authorities and responsibilities of the consumer department. Although the exact format and the amount of detail required in these proposals will be established after hospitals have acquired experience in defining them, generally the authority and responsibility will be identified for relevant factors, such as ordering the service, delivering the service, accepting the service, and specifying the time of delivery, method of delivery, and quality. These proposed authorities and responsibilities are submitted to the services commission for processing through the general procedures used in identifying the goods and services as described in the preceding section.

This step produces a list of authorized responsibilities and authorities for each of the goods and services of the hospital. For example, a nursing service department may have the authority to order a special cleaning service from housekeeping. However, housekeeping may have the authority to deliver, without orders from nursing service, the service to clean rooms after patients vacate them, and nursing service may have the responsibility to see that such services are delivered.

Thus, with the completion of this second step in the program of coordination, a hospital would have a complete list of all the

departmental goods and services and the official authority and responsibility for both the producer and consumer for each of these goods and services. The next step in this program of coordination is to cause the use of the goods and services in the proper amounts so as to effectively and efficiently achieve hospital goals.

Cause Effective and Efficient Use

Identifying the goods and services of departments assists in clarifying relations among departments. Establishing the authorities and responsibilities for each of these goods and services will further clarify relations among departments. But neither of these two steps provide information which will cause department heads to use the goods and services of the department in the proper amounts. One approach to this task is to value each of the goods and services and account for the transactions. (With accounting, this value becomes price.) Valuing the goods and services gives the department head information with which to consider alternatives. Accounting for the transaction causes the fiscal results of his decisions to be reported.

The general procedures introduced to accomplish evaluation and accounting are discussed in three sections: valuing goods and services, simulating transactions in order to learn more about interaction and to acquaint department heads with charges for interaction, and accounting for transactions. Each of these is a separate, but sequential, project with a valuable end result.

Valuing Goods and Services. Each department head utilizes whatever resources are available to help him estimate a value for each good

and each service such that the sum over all goods and services of the value multiplied by the estimated annual demand equals the estimated annual cost of operating his department. Since the differential levels of service which are available are considered as separate services, they are also valued.

These values are actually estimates of the full costs of the goods and services, and since the determination of full cost is a highly subjective process, for example, depends to a considerable degree upon the allocation of administrative costs, these costs must be reviewed and approved. Again, the procedures of the services commission are available. As described in the identification of the goods and services, the services commission reviews, adjusts, and approves charges and submits the list of values to the administrator.

After approval and adoption by the administrator, the published list provides hospital managers with the official value for each good and service of each department.

Official values of departmental goods and services can be used by administrators in relating goods and services to goals, identifying charges for goods and services provided to patients, and identifying the full costs of each department. And department heads can use the information in selecting goods and services from other departments and developing departmental budgets.

With the identification of the goods and services, the establishment of the authority and the responsibility, and the valuing of goods and services, it is possible to begin accounting for goods and services.

However, one intermediate step is modifying budgets.

Modifying Budgets. Traditional departmental budgets do not include the costs of depreciation and the costs of the goods and services from other departments. Each departmental budget should be modified so as to include these costs. One source of the cost of depreciation and the cost of departmental goods and services are the fiscal procedures dealing with the establishment of the full cost of operating departments, as discussed in *Characteristic 7a*.

If a large-scale electronic computer is available, an effective method for involving department heads in the generation of these data is to use the computer as a means of simulating the interactions and computing the resultant income and expenses to all the departments. As input to the simulation, each department head estimates the annual costs of employees, supplies, and depreciation. In addition, each department head estimates, for each of the consuming departments, the annual volume of the goods and services of his department over which he has authority. And, finally, each department head estimates the volume of goods and services that he orders from other departments.

The simulation program manipulates the data and provides output to each department showing the income from each department as the result of the producers' decisions to provide services to the consumer and as a result of the consumers' decisions to acquire goods and services of his department. The output also presents the expenses for each department including personnel, supplies, depreciation, and the costs of the goods and services which the producer had the authority to supply, and the costs

of the goods and services which the consumer had the authority to order. After the department heads have had time to review the output and discuss the interactions among the departments, the simulation process can be repeated with the department varying their input. After several such simulations, the department heads will acquire some experience with interactions and accounting for interactions and the resulting cost and income produced by the simulation will reflect this experience. Thus, simulation provides a means by which to acquaint department heads with interactions and to develop information with which to modify the budget to include the full costs of departmental operation.

Accounting for Transactions. Before actually accounting for transactions through the fiscal procedures of the hospital, it is recommended that a *design phase* be implemented in order to acquire experience in accounting for, and information about, the transactions among departments. During this phase, various methods of accounting for transactions are studied and tested. Relationships between transactions and other statistical data currently being acquired by the fiscal procedures are examined. The design phase produces procedures for incorporating the transaction among departments into the fiscal procedures.

With the design work completed, the fiscal procedures of the hospital are modified so as to include the transactions among departments. The chart of accounts of the hospital is expanded to include accounts for departmental income from services and departmental expenses for services from other departments. Procedures for routinely recording the transfer of goods and services between departments and to accommodate the authority

and responsibility of both the head of the producer departments and the head of the consumer departments is implemented. Monthly departmental financial statements are prepared and distributed which include the income from and the expenses for the services exchanged among the departments, as well as the other costs associated with operating the department.

The value of the transactions among departments and other costs is organized into a master input-output table and a coefficient table, and an inverse coefficient table is computed. The results of these computations will be distributed to hospital managers for use in such programs as evaluation of departmental efficiency, expansion plans, budget preparation, and the pricing of hospital services.

CHAPTER VI

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

The three general conclusions drawn from this investigation are:

1. Characteristics of hospital organization and management can be identified.

Including the auxiliary characteristics, 23 characteristics of hospital organization and management which contribute to the need for, and influence the design of, procedures through which hospital managers formally coordinate departmental goods and services are identified in this investigation. These characteristics pertain to the following general elements of hospital organization and management:

1. Organization.
 2. Relations among departments.
 3. Technological theme.
 4. Organizational positions.
 5. Fiscal procedures.
2. The characteristics of hospital organization and management indicate that there is a need for formal coordination of departmental goods and services and that this need is not being met.

The characteristics of hospital organization and management pertaining to organization and relations among departments indicate that hospitals are complicated sets of complex and changing technologies with

intricate and variable interactions of goods and services and that these interactions are essential to the achievement of the major goal of hospitals. Thus, these characteristics illustrate an environment suitable for, and a need for, procedures through which managers formally coordinate departmental goods and services.

The descriptions of characteristics pertaining to the primary functions of potential agents of coordination, technological theme, organizational positions, and fiscal procedures, do not reveal functions dealing directly, routinely, and formally with the coordination of goods and services among departments.

3. Characteristics of hospital organization and management can be used in the development of a conformable program of coordination.

The characteristics of hospital organization and management were used in this investigation in the development of a program of coordination which includes practical procedures for coordinating departmental goods and services and which conforms to the characteristics. The program of coordination consists of the following sequential steps or projects, each of which produces a specific result:

1. Establish a hospital services commission.
2. Identify departmental goods and services.
3. Establish the authority and responsibility for each good and for each service.
4. Value goods and services.
5. Modify budgets.
6. Account for transactions.

Recommendations

The principal formal relations among hospital departments are goods and services. The major goal of hospitals is achieved through departmental goods and services. Yet, very little information has been published about these goods and services.

It is recommended that a research organization conduct a project to identify, describe, and catalogue the goods and services of hospital departments. Although design is not the intent of this recommendation, the nature of such a project is indicated in the following steps:

1. Conduct a study in a few hospitals to expand the identification of goods and services of this investigation. The specifications of each of the goods and services would include relevant factors, such as the authority and responsibility of the producer, authority and responsibility of the consumer, quality, and timeliness.
2. Using the above information, prepare a questionnaire soliciting information about department goods and services, and distribute the questionnaire to selected department heads.
3. Organize the results, publish a series of articles, perhaps one per month per department, in a national publication, and solicit additional information from the readers.
4. Catalogue the results, perhaps by hospital size.

One use of such a catalogue can be illustrated in one additional recommended project. Although hospital goals are related to departmental goods and services, and departmental goods and services are related to departmental budgets, not much information has been published about these relationships. Moss indicated this lack of information when he wrote that "A budget can serve to stimulate all parties [managers] to redefine

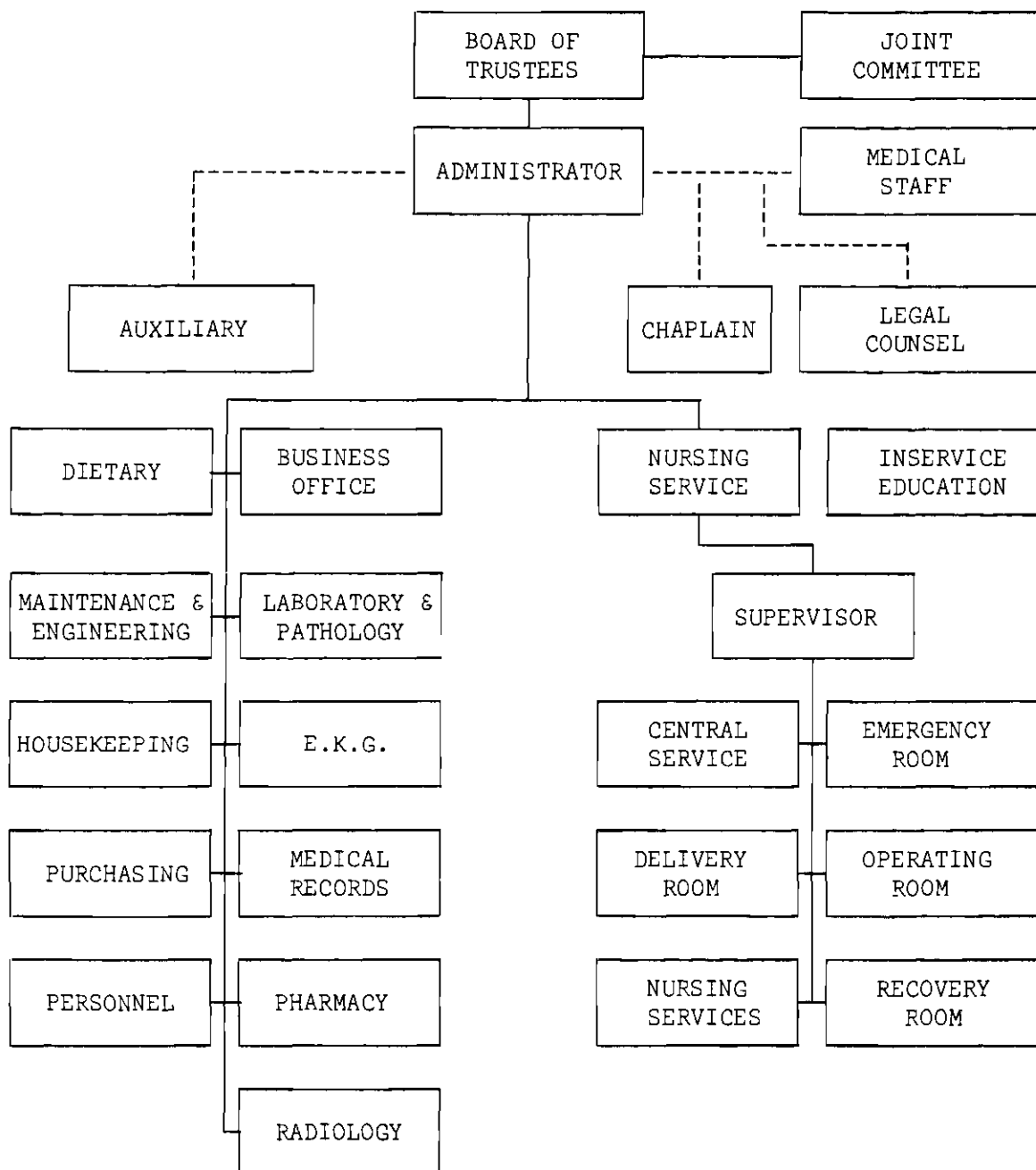
the goals of the institution [hospital] . . ." ¹ But between goals and budgets are departmental goods and services. If such goods and services have been catalogued, then an additional project can be undertaken to determine the nature of the relationships among goals and departmental goods and services, and among departmental goods and services and departmental budgets. If these relations can be determined, then hospital goals can be decomposed into departmental goods and services, which can be decomposed into departmental budgets, including the interactions among departments.

¹Moss, *op. cit.*, p. 321.

APPENDICES

APPENDIX A

A-1. ORGANIZATION CHART, HOLY FAMILY HOSPITAL, 1967



APPENDIX B

B-1. INITIAL DEFINITIONS

Identification of the Input Services of a Department

The department head should carefully consider the work of every other hospital department in view of the question: What services does this department provide for my department? If this department did not exist, what additional work would be added to the present workload in his department? For example, if the business office did not write pay checks and maintain pay records, this office work could be performed in each department. If housekeeping did not clean patient rooms, each nursing unit could add this cleaning work to the work of the nursing staff.

Identification of the Output Services of a Department

The department head should carefully consider the work of each employee in the department and identify the services which are provided by the work and the consumer department for which the service is provided.

Hospital Departments: A hospital department is a functional division of hospital administration in which the people and the facilities required to perform certain related activities are placed under the direction of one person, called the department head, who is responsible for the achievement of hospital policy in regard to the activities of the department and who is given certain authority in developing the tactics through which hospital policy is achieved. A department may be formed for such reasons as: to achieve economics of operations, to achieve control of the activities, to be "like" other hospitals, and to adjust the organization to the personalities of persons in hospital management.

The departments in Holy Family Hospital are:

- | | | |
|--------------------|----------------------|--------------------|
| 1. Administration | 9. 4th Floor | 17. Operating Room |
| 2. Business Office | 10. Housekeeping | 18. Pediatrics |
| 3. Central Service | 11. Intensive Care | 19. Personnel |
| 4. Delivery Room | 12. Clinical Lab. | 20. Pharmacy |
| 5. Dietary | 13. Maintenance-Eng. | 21. Purchasing |
| 6. Emergency Room | 14. Medical Records | 22. Radiology |
| 7. 2nd Floor | 15. Nursing Service | 23. Recovery Room |
| 8. 3rd Floor | 16. Obstetrics | 24. E.K.G. |

Producer Department: A producer department is a department which provides a service for another department. For example, the housekeeping

department in cleaning a patient's room provides a service for the nursing unit.

Consumer Department: A consumer department is a department which utilizes the service of another department. For example, the housekeeping department utilized the services of the maintenance department to maintain housekeeping equipment.

Service: A service is work done for a patient in one department for another department.

Input Services: Input services are those services which are provided for a consumer department.

Output Services: Output services are those services which are provided by a producer department.

B-2. GUIDE FOR THE COLLECTION OF SERVICE DATA

FOR EACH SERVICE
(Input and Output)

February 1967

1. Who decides that this service is to be provided by (for) another department? (Name and Title)
 - a. Consumer department head _____
 - b. Consumer department employee _____
 - c. Producer department head _____
 - d. Producer department employee _____
 - e. Hospital administration _____
 - f. Negotiation between _____ and _____
 - g. Other Name _____
2. How is the service request initiated? (Brief description, copy of forms, etc.)
 - a. Telephone call _____
 - b. Formal written notice _____
 - c. Informal written note _____
 - d. Personal visit _____
 - e. Casual conversation _____
 - f. Pre-established frequency of _____
 - g. Other Name _____
3. Who initiates request for the service? (Name and Title)
 - a. Consumer department head
 - b. Consumer department employee
 - c. Producer department head
 - d. Producer department employee
 - e. Hospital administration
 - f. Negotiation between _____ and _____
 - g. Other Name _____
4. Who authorizes the service? (Name and Title, see number 3 above.)
5. Who decides how soon the service is to be performed after request? (Name and Title, see number 3 above.)
6. Who determines the quality level of the service? (Name and Title, see number 3 above.)
7. Who evaluates the level of quality of the service? (Name and Title, see number 3 above.)
8. Who evaluates the timing aspects of the service? (Name and Title, see number 3 above.)

9. How is the quality level of the service evaluated? (Give a brief description.)
10. How is the timing aspects of the service evaluated? (Give a brief description.)
11. Does the department head have any suggestions related to changes in this service? (Description of suggestions; for example, should this be done in another department, in a different way, at a different quality, with a different timing.)

B-4. REQUEST FOR SERVICE PRICES

September 10, 1967

Dear

As you know I am studying your hospital organization as though each department were operated as a separate "business"--producing and selling services to other departments and buying services from other departments. You might think of your hospital as a "City of Care": a "city" in which the businesses produce services which directly or indirectly provide care for the patients.

To determine the "income" of your business, you need (1) the identification of all services you produce and the classes or variations available for each service, (2) records of the amount of each service purchased (used) by each hospital department, and (3) the prices to be charged for the services.

Attached is a list of services which have been identified as being available from your department. Included is a statement of the regular or basic service and the identification of the emergency or special services which may be ordered. The emergency or special services usually are requested in addition to the regular service thereby, cause additional costs.

Please review the attached list of your services, correct any errors you may find, add any additional services which are available but not identified, identify those services for which production records do not exist, and develop prices for all the services.

Existing hospital accounting procedures may account for the production of services and identify the consumer, but there may be some production which is not accounted for. In these few cases, we may need to develop some additional simplified accounting procedures to capture this information. Mr. Jack Hardison or I will be available to help you in developing these procedures.

If there is a known commercial price for the service provided, you might want to estimate a charge for the service as 85% of the commercial price, thereby, eliminate the concept of profit from your charge.

You might want to base your charge on an estimated cost of providing the service. One way to do this would be to estimate the direct labor time spent and the supplies consumed in providing the service. Sample calculations follow:

Direct Labor cost

Estimated labor time _____ hrs × average wage \$ _____/hr. = \$ _____

Supplies cost

Estimated value of supplies consumed = \$ _____

Indirect costs

Direct labor cost \$ _____ × estimated burden rate 0.25 = \$ _____

Charge per occurrence of service = \$ _____

Mr. Jack Hardison and I will be working with you in order that we might complete the identification of services, the procedures to account for the services, and the charges for the services by October 27, 1967.

Your cooperation is greatly appreciated.

Sincerely,

Tee H. Hiett

B-5. SERVICE PRICE WORKSHEET

(Name of Service)

(Producing Department)

(Date)

Person(s) preparing this worksheet

ESTIMATED LABOR COST

	Estimated	Average Wage		
Name of Activity	Time (Min)	× \$ per min.	=	

rel

ESTIMATED BURDEN COST

Calculated _____

or Direct Labor Cost \$ × 0.25 =

3

ESTIMATED SUPPLIES COST

Supply Item	Amount	Cost
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PRICE PER UNIT OF REGULAR SERVICE

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SPECIAL OR EMERGENCY ASPECTS OF SERVICE

B-6. PROPOSED PROJECT SCHEDULE

Atlanta
23 October 1967

Mr. Lee F. Nichols
Administrator
Holy Family Hospital
Fairburn and Sewell Roads, SW
Atlanta, Georgia

Dear Mr. Nichols:

The attached letter and the form for the schedule of services have been sent to the following departments:

Administration	Housekeeping	Personnel
Business Office	Maintenance	Pharmacy
Central Service	Medical Records	Purchasing
Dietary	Nursing Service	

For all other departments, the value of the output is assumed to be reflected in the charges to the patients.

I would like to propose the following schedule for conducting the fiscal controls project:

November 1, 1967--Each department head will have completed the identification of the services produced by his department.

Each department head will begin keeping records of the services produced by his department.

November 10, 1967--Each department head will have completed the pricing of the services produced by his department.

November 20, 1967--You will name and convene a three-member "review commission" which will review and adjust the service prices and publish a schedule of prices. You might consider the following as potential members: Mr. Nichols, Sr. Geraldine, Mr. Majis, and Dr. Smalley.

November 30, 1967--The department heads will develop their first "profit and loss statements" based on the prices of the services and the data collected during the month.

December 1, 1967 to March 1, 1968--Operational period for the project.

Although Mr. Hardison and I will assist in collecting and organizing the data, the department heads will have to devote some time to the

projects. I would like to suggest that you become familiar with the attached list of services so that you, through personal conversation with the department heads, can discuss the project and stress the value to Holy Family Hospital of collecting, organizing, and analyzing the data to be generated during the project. Expressed interest on your part will certainly encourage the department heads to take an active part in the project.

Your cooperation is deeply appreciated.

Sincerely,

Tee Hiett

B-7. NOTICE OF REVIEW COMMISSION MEETING

January 24, 1968

Dear

As you know Holy Family Hospital can be considered to be a "City of Care" in which each department "buys" services from its employees, outside firms, and other departments and "sells" services to patients and to other departments.

The services which are exchanged among the departments and a charge for each service have been identified, and copies of the service schedules from the departments are attached.

A department's "contributed value" can be estimated by subtracting the "cost" of operating the department from the "income" resulting from the production of services. A sample copy of the contributed value statement is attached.

This fiscal control system has been in trial operation during the months of December and January, and the schedules of service have been submitted to a "review commission." This commission will evaluate each service schedule, hold a "hearing" at the regular staff meeting at Holy Family Hospital on January 30, 1968, and either approve or modify and approve each of the service schedules.

Please come to the staff meeting on January 30, and be prepared to:

1. Discuss the services offered by each department.
2. Justify the charges for the services of your department.
3. Request the addition of services as needed.

Your cooperation is greatly appreciated.

Sincerely,

Tee Hiett

B-8. NOTICE OF SECOND "REVIEW COMMISSION" MEETING

February 7, 1968

TO: HOLY FAMILY HOSPITAL STAFF AND "REVIEW COMMISSION:"

Our first meeting with the "Review Commission" was most encouraging. Your interest and enthusiasm was very evident, and I wish to express my appreciation in this regard.

On February 13 at 2:30 p.m., we will hold our second meeting with the "Review Commission" in the Intensive Care Unit classroom.

The purpose of this meeting will be to allow the "Review Commission" to determine if your department is in agreement with the present defined list of services, and their charges. Please review all services and charges including those discussed in our last meeting. It is important that you evaluate each service and its charge in terms of its "value" to your department; i.e., does the price of the service reflect the value gain by your department.

By February 13 you should have completed your "Contributed Value" statement for December, and the January "Contributed Value" statement should be completed by February 29. I would like to review these statements with you.

Sincerely,

Lee Nichols

B-9. CONTRIBUTED VALUE STATEMENT

STATEMENT OF THE "CONTRIBUTED VALUE" OF DEPARTMENT _____
 OF THE HOLY FAMILY HOSPITAL FOR THE MONTH OF _____

	DEBIT (Outgo) Charges for Supplies and Services Used	CREDIT (Income) Charges for Services Produced
1. Administration	\$ _____	\$ _____
2. Business Office	_____	_____
3. Central Service	_____	_____
4. Delivery Room	_____	_____
5. Dietary	_____	_____
6. Emergency Room	_____	_____
7. Housekeeping	_____	_____
8. Laboratory & Pathology	_____	_____
9. Medical Records	_____	_____
10. Maintenance-Engineering	_____	_____
11. Nursing Service	_____	_____
12. Operating Room	_____	_____
13. Personnel	_____	_____
14. Pharmacy	_____	_____
15. Purchasing	_____	_____
16. Radiology	_____	_____
17. Recovery Room	_____	_____
18. E.K.G.	_____	_____
19. Depreciation (Equipment)	_____	_____
20. Depreciation (Plant)	_____	_____
21. Utilities	_____	_____
22. Salaries and Wages	_____	_____
23. Taxes	_____	_____
24. Supplies and Expenses	_____	_____
25. _____	_____	_____
26. _____	_____	_____
TOTALS	(-) \$ _____	(+) \$ _____
DIFFERENCE	_____	_____
	(-) \$ _____	(+) \$ _____

APPENDIX C

C-1. BUSINESS OFFICE

SERVICES BY BUSINESS OFFICE FOR _____, 19__

<u>Service</u>	<u>Charge Per Service</u>	<u>Number of Services</u>	<u>Total Charges</u>
1. Make reservation for patient.	<u>\$1.00</u> per patient	_____	_____
2. Admit patient.	<u>\$1.00</u> per patient	_____	_____
Escort patient, add	<u>\$0.50</u> per patient	_____	_____
For emergency, add	<u>\$0.50</u> per patient	_____	_____
3. Discharge patient.			
Insurance or cash	<u>\$0.75</u> per patient	_____	_____
Term payment	<u>\$1.75</u> per patient	_____	_____
4. Issue petty cash.	<u>\$0.40</u> per issue	_____	_____
5. Process voucher.	<u>\$0.11</u> per voucher	_____	_____
For emergency voucher, add	<u>\$0.05</u> per voucher	_____	_____
6. Prepare payroll check.	<u>\$0.45</u> per check	_____	_____
For advance, add	<u>\$0.05</u> per check	_____	_____
For overtime, add	<u>\$0.10</u> per check	_____	_____
For special checks, add	<u>\$0.60</u> per check	_____	_____
7. Admit patient to emergency room.			
Cash	<u>\$0.90</u> per patient	_____	_____
Insurance or terms, add	<u>\$0.10</u> per patient	_____	_____
8. Copy service.	<u>\$0.045</u> per copy	_____	_____
9. Store valuables.	<u>\$0.40</u> per storage	_____	_____
10. Write check.	<u>\$0.50</u> per check	_____	_____

C-2. CENTRAL SERVICE

SERVICES BY CENTRAL SERVICE FOR _____, 19__

<u>Service</u>	<u>Charge Per Service</u>	<u>Number of Services</u>	<u>Total Charges</u>
1. Provide sterilization service.	\$0.50 per batch	_____	_____
For emergency service, add	\$0.75 per batch	_____	_____
2. Maintain floor stock of medical and surgical supply items through one delivery each week. Cost of the stock not included. Items and stock level determined by consumer.			
For 2nd, 3rd, 4th floors	\$1.00 per trip	_____	_____
For special service	\$1.50 per trip	_____	_____
For emergency room	\$0.60 per trip	_____	_____
For special service	\$0.90 per trip	_____	_____
For intensive care	\$0.40 per trip	_____	_____
For special service	\$0.60 per trip	_____	_____
3. Wash, clean, package, and issue reprocessed medical and surgical supplies.			
For: Glass bottles Catheter, tubing			
Brushes Treatment trays			
Dressings Basins			
Glassware Utensils			
Instruments	\$0.20 per item	_____	_____
For needles, syringes	\$0.40 per item	_____	_____
For special service, add	\$0.20 per item	_____	_____
4. Pack and issue medical and surgical pack.			
Minor Pack	\$1.00 per pack	_____	_____
Major Pack	\$1.50 per pack	_____	_____
For special pack, add	\$0.50 per pack	_____	_____
For delivery, add	\$0.20 per pack	_____	_____
5. Manufacture and issue sterile water.	\$0.60 per 500 ml	_____	_____
For special service, add	\$0.30 per service	_____	_____
For delivery, add	\$0.20 per service	_____	_____

<u>Service</u>	<u>Charge Per Service</u>	<u>Number of Services</u>	<u>Total Charges</u>
6. Assemble and issue medical and surgical tray.			
Regular tray	<u>\$1.00</u> per tray	_____	_____
Special tray	<u>\$1.75</u> per tray	_____	_____
For delivery, add	<u>\$0.20</u> per tray	_____	_____
7. Provide traction equipment.	<u>\$0.50</u> per service	_____	_____
For delivery, add	<u>\$0.30</u> per service	_____	_____

C-3. DIETARY

SERVICE BY DIETARY FOR _____, 19__

<u>Service</u>	<u>Charge Per Service</u>	<u>Number of Services</u>	<u>Total Charges</u>
1. Plan, prepare, and deliver patient meal to the floor.			
Breakfast, regular diet	\$ 0.90 per person	_____	_____
special diet	\$ 1.05 per person	_____	_____
Dinner, regular diet	\$ 0.90 per person	_____	_____
special diet	\$ 1.05 per person	_____	_____
Supper, regular diet	\$ 0.90 per person	_____	_____
special diet	\$ 1.05 per person	_____	_____
2. Plan, prepare, and deliver guest tray to the floor.			
Breakfast	\$ 0.95 per person	_____	_____
Dinner	\$ 0.95 per person	_____	_____
Supper	\$ 0.95 per person	_____	_____
3. Provide food catering service.			
Complete meal for 1 to 20	\$30.25 per service	_____	_____
For more than 20, add	\$ 1.00 per person	_____	_____
Coffee and cakes for 1 to 20	\$ 7.00 per service	_____	_____
For 11 to 25	\$11.25 per service	_____	_____
For more than 25, add	\$ 0.40 per service	_____	_____
For request for service with less than 8 hours notice, add	\$ 3.00 per service	_____	_____
4. Prepare emulsion	\$ 0.92 per service	_____	_____
5. Issue food and drink to the floors--includes notifying the Business Office. Cost of food and drink not included.	\$ 5.25 per service	_____	_____
For emergency service, add	\$ 1.55 per service	_____	_____
For delivery by Dietary, add	\$ 0.40 per service	_____	_____
6. Provide special diet instruction.	\$ 5.00 per patient	_____	_____
7. Serve on committee.	\$15.00 per month per committee	_____	_____

C-4. HOUSEKEEPING

SERVICES BY HOUSEKEEPING FOR _____, 19__

<u>Service</u>	<u>Charge per Service</u>	<u>Number of Services</u>	<u>Total Charges</u>
1. Clean occupied patient room daily on scheduled 7-day week--dust tables, and blinds, dust mop floor, completely wash down bathroom, restock bath supplies, inspect room and bath facilities and report malfunctions to maintenance, empty waste baskets, wash down shower stalls every other day.			
Private room	\$ 2.20 per room	_____	_____
Semi-private room	\$ 2.45 per room	_____	_____
ICU and Nursery	\$ 3.20 per room	_____	_____
For special clean-up of spillage or drainage	\$ 0.15 per request	_____	_____
2. Clean room within one hour after patient has been dismissed. Completely wash down room and bath, inspect facilities and report malfunctions, and restock supplies.			
Private room	\$ 4.45 per room	_____	_____
Semi-private room	\$ 4.90 per room	_____	_____
Other sizes	\$ 0.65 per bed	_____	_____
3. Clean nursing station, lobby and waiting room, and bathroom each weekday--dust mop floor, dust tables and desks, pick up trash, and empty waste baskets.			
Emergency room	\$ 0.55 per service	_____	_____
2nd Floor and Pediatrics	\$ 0.85 per service	_____	_____
3rd Floor and 4th Floor	\$ 1.10 per service	_____	_____
For weekend service, add	\$ 0.50 per service	_____	_____
For special clean-up	\$ 0.25 per service	_____	_____
4. Provide full time (8 hours per day, 7 days per week) maid service to clinical unit. Instructions as to cleaning procedures and sequence of activities to be provided by the head of the unit. Cost of supplies consumed to be added to the cost of the service.	\$87.50 per week	_____	_____

<u>Service</u>	<u>Charge per Service</u>	<u>Number of Services</u>	<u>Total Charges</u>
5. Wash and dry service	\$ 0.75 per load		
For emergency service, add	\$ 0.40 per load		
6. Issue cleaning products, cost of products to be added	\$ 0.40 per issue		
7. Clean office and bathrooms--dust mop floor, dust tables and desks, wash down bathrooms and fountains, restock bath supplies, inspect baths and all fixtures, and report malfunctions to maintenance.			
Administration	\$ 4.60 per service		
Business Office	\$ 1.82 per service		
Clinical Lab	\$ 1.40 per service		
Medical Records	\$ 1.05 per service		
Maintenance and Purchasing	\$ 1.50 per service		
Nursing Service Administration	\$ 1.75 per service		
Personnel and Pharmacy	\$ 0.85 per service		
Radiology	\$ 2.80 per service		
For emergency service, add	\$ 0.25 per service		
For special clean-up	\$ 0.50 per service		
8. Provide linen supplies as needed--cost of linens and linen processing to be added to the charge for the service.			
Operating Room	\$13.00 per week		
X-Ray and ER	\$ 3.30 per week		
Central Services	\$12.00 per week		
Intensive Care Unit	\$ 4.40 per week		
OB, Delivery & Recovery Rooms	\$ 5.50 per week		
2nd Floor and Pediatrics	\$ 9.00 per week		
3rd Floor and 4th Floor	\$18.00 per week		
9. Provide the services of a seamstress. Charges ne- gotiated in advance of service.	\$ 2.50 per hour		
A minimum charge of	\$ 1.50 per service		
and	\$ 2.50 per hour		
10. Provide services for upholstery. Charges negoti- ated in advance of service.	\$ 3.50 per hour		
A minimum charge of	\$ 2.00 per service		
and	\$ 3.50 per man hr		

C-5. MEDICAL RECORDS

SERVICES BY MEDICAL RECORDS FOR _____, 19__

<u>Service</u>	<u>Charge per Service</u>	<u>Number of Services</u>	<u>Total Charges</u>
1. Process and file patient charts.	\$ 0.47 per chart	_____	_____
For Medicare and Blue Cross patients, add	\$ 0.05 per chart	_____	_____
For pick-up by Medical Records add	\$ 0.05 per chart	_____	_____
For incomplete information, add	\$ 0.75 per chart	_____	_____
2. Verify completed work (phone).	\$ 0.70 per chart	_____	_____
3. Send patient chart and the chart information.	\$ 1.02 per chart	_____	_____
4. Provide abstract of patient's chart, 1-5 pages	\$ 5.00 per request	_____	_____
Additional pages	\$ 0.50 per page	_____	_____
5. Pull patient charts for committees.	\$ 0.45 per chart	_____	_____
6. File emergency room reports.	\$ 4.70 per month	_____	_____
7. Maintain the library.	\$25.00 per month	_____	_____
8. Serve on committees.	\$ 6.00 per month per com.	_____	_____
9. Prepare letters and reports. Hospital service analysis.			
Daily	\$ 2.25 per report	_____	_____
Monthly	\$10.00 per report	_____	_____
Bed utilization report	\$ 1.00 per report	_____	_____
Laboratory test report	\$ 0.75 per report	_____	_____
Doctor discharge report	\$ 5.00 per report	_____	_____

C-6. ENGINEERING AND MAINTENANCE

SERVICES BY ENGINEERING AND MAINTENANCE FOR _____, 19__

<u>Service</u>	<u>Charge per Service</u>	<u>Number of Services</u>	<u>Total Charges</u>
1. Provide technical service for equipment and facilities other than plant facilities.			
Charge negotiated in advance			
of service at	\$ 3.00 per man-hour		
A minimum charge of	\$ 2.00 per man		
and	\$ 3.00 per man-hour		
2. Provide engineering and maintenance consulting service.			
Charge negotiated in advance			
of service at	\$ 5.00 per man-hour		
A minimum charge of	\$ 2.00 per service		
and	\$ 5.00 per man-hour		
3. Provide labor.			
Charge negotiated in advance			
of service at	\$ 2.90 per man-hour		
A minimum charge of	\$ 2.00 per man		
and	\$ 2.90 per man-hour		
4. Make trips to the Bank and Post Office	\$ 3.00 per trip		
For emergency service, add	\$ 2.00 per trip		
5. Pick-up and deliver items outside hospital.			
Charge negotiated in advance			
of service at	\$ 7.00 per man-hour		
A minimum charge of	\$ 4.00 per request		
and	\$ 4.00 per man-hour		
and	\$ 0.10 per mile		
6. Replace light bulbs--cost of bulbs to be added to the charge for the service	\$ 0.50 per request		
For emergency, add	\$ 0.50 per request		
Total material cost			
7. Develop and maintain service contracts	\$10.00 per contract per month		

<u>Service</u>	<u>Charge per Service</u>	<u>Services</u>	<u>Charges</u>
8. Install and remove Bed-a-Chair.			
For pediatrics	\$ 0.50 per request	_____	_____
For all other departments	\$ 1.50 per request	_____	_____
9. Install or remove side rails.	\$ 0.75 per request	_____	_____
For emergency, add	\$ 0.75 per request	_____	_____
10. Develop and direct engineering contracts with outside firms.			
Charge to be negotiated in advance of service at	\$ 5.00 per hour	_____	_____
11. Cut and issue keys or unlock doors for authorized personnel	\$ 1.00 per request	_____	_____
For 3 or more keys	\$ 1.00 plus	_____	_____
The cost of the blanks	\$ 0.40 per key	_____	_____
12. Conduct conductivity test on floors and equipment.	\$40.00 per month	_____	_____
	50% OR	_____	_____
	20% ER	_____	_____
	30% DEL	_____	_____
13. Develop and maintain preventive maintenance programs--includes maintenance of the necessary records.	\$ 2.00 per inspec- tion	_____	_____

C-6. ENGINEERING AND MAINTENANCE

SERVICES BY ENGINEERING AND MAINTENANCE FOR ADMINISTRATION _____, 19____

<u>Service</u>	<u>Charge per Service</u>	<u>Number of Services</u>	<u>Total Charges</u>
1. Operate the plant.	<u>\$1,350.00</u> per month	_____	_____
2. Paint and clean the outside of the building.	<u>\$ 85.00</u> per month	_____	_____
3. Maintain security.	<u>\$1,250.00</u> per month	_____	_____
4. Maintain the grounds.	<u>\$ 450.00</u> per month	_____	_____
5. Administer keys and maintain records.	<u>\$ 10.00</u> per month	_____	_____
6. Fire Marshall and Safety Committee.	<u>\$ 15.00</u> per month	_____	_____

C-6. ENGINEERING AND MAINTENANCE

SERVICES BY ENGINEERING AND MAINTENANCE FOR _____, 19__

<u>Service</u>	<u>Charge per Service</u>	<u>Number of Services</u>	<u>Total Charges</u>
1. Strip and wax floors.	<u>\$40.00</u> per 1,000 square feet	_____	_____
2. Mop and rewax floors.	<u>\$12.00</u> per 1,000 square feet	_____	_____
3. Mop and buff floors and stairways.	<u>\$ 4.00</u> per 1,000 square feet	_____	_____
4. Clean windows and blinds.	<u>\$ 2.35</u> per bay of windows	_____	_____
5. Remove burnable trash.			
For 2nd, 3rd, 4th floors & OB	<u>\$ 2.00</u> per service	_____	_____
For all other departments	<u>\$ 1.00</u> per service	_____	_____
6. Remove non-burnable trash.			
For 2nd, 3rd, 4th floors & OB	<u>\$ 2.00</u> per service	_____	_____
For all other departments	<u>\$ 1.00</u> per service	_____	_____
7. Remove soiled linen.			
For 2nd, 3rd, 4th floors & OB	<u>\$ 2.00</u> per service	_____	_____
For all other departments	<u>\$ 1.00</u> per service	_____	_____
8. Provide labor.	<u>\$ 2.50</u> per man-hour	_____	_____

C-7. PERSONNEL

SERVICES BY PERSONNEL FOR _____, 19__

<u>Service</u>	<u>Charge per Service</u>	<u>Number of Services</u>	<u>Total Charges</u>
1. Locate and screen prospective employees.	<u>\$50.00</u> per employee hired	_____	_____
2. Complete records of discharged employee.	<u>\$10.00</u> per employee discharged	_____	_____
3. Maintain personnel records.	<u>\$ 3.00</u> per employee per month	_____	_____

C-8. PHARMACY

SERVICES BY PHARMACY FOR _____, 19__

<u>Service</u>	<u>Charge per Service</u>	<u>Number of Services</u>	<u>Total Charges</u>
1. Provide pharmaceutical information.	\$ 0.31 per request	_____	_____
2. Prepare and dispense drugs for patients-- includes notifying Business Office. Cost of drugs not included in the charge for this service.	\$ 0.25 per order	_____	_____
For drugs to be packaged, add	\$ 0.13 per order	_____	_____
For drugs to be compounded, add	\$ 0.30 per order	_____	_____
For emergency service, add	\$ 0.43 per order	_____	_____
For delivery by Pharmacy, add	\$ 0.36 per trip	_____	_____
For regular night and weekend service, add	\$ 6.25 per order	_____	_____
3. Prepare and dispense drugs and chemicals for use on floor and for floor stock--includes notifying Business Office; cost of drugs not included in charge for this service.	\$ 0.31 per order	_____	_____
For drugs to be packaged, add	\$ 0.11 per order	_____	_____
For drugs to be compounded, add	\$ 0.25 per order	_____	_____
For emergency service, add	\$ 0.38 per order	_____	_____
For delivery service, add	\$ 0.36 per trip	_____	_____
Check stock	\$ 0.31 per day	_____	_____
4. Prepare and dispense drugs to hospital employees-- includes notifying the Business Office. Cost of drugs not included in the charge for this service.	\$ 0.16 per order	_____	_____
For drugs to be packaged, add	\$ 0.27 per order	_____	_____
For drugs to be compounded, add	\$ 0.16 per order	_____	_____
5. Prepare and add drugs to solutions. Cost of drugs not included in the charge for this service.	\$ 0.31 per order	_____	_____
For emergency, add	\$ 0.31 per order	_____	_____
6. Provide training--cost of supplies not included in the charge for this service.	\$11.50 per teaching hour	_____	_____

<u>Service</u>	<u>Charge per Service</u>	<u>Number of Services</u>	<u>Total Charges</u>
7. Issue contrast media.	\$ 1.66 per order	_____	_____
For emergency service, add	<u>\$ 1.60</u> per order	_____	_____
8. Prepare monthly reports for administration.	<u>\$ 6.60</u> per report	_____	_____

C-9. PURCHASING

SERVICES BY PURCHASING FOR _____, 19__

<u>Service</u>	<u>Charge per Service</u>	<u>Number of Services</u>	<u>Total Charges</u>
1. Provide purchasing counsel--advice about such matters as prices, catalog number, descriptions, vendors, and stock items. \$ 1.69 per request			
For oral request, add \$ 0.56 per request			
For consulting with salesmen, add \$ 2.25 per request			
2. Process stock requisition--includes issuing stock supply items and stock business forms and notifying Business Office. Cost of items not included.			
\$ 1.24 per page of requisition			
For delivery service, add \$ 0.83 per requisition			
For emergency service, add \$ 0.85 per requisition			
For service on non-scheduled days, add \$ 0.50 per requisition			
3. Process purchase requisition--includes notifying the Business Office. If the purchase requisition is incomplete, purchasing counsel will also be required. Cost of items not included.			
\$ 0.30 per requisition			
For emergency service, add \$ 1.13			
4. Process special reproduction request--does not include cost of form. \$ 0.80 per mat			
For emergency service, add \$ 1.13 per request			
For delivery service, add \$ 0.83 per request			
5. Receive returned stock items and notify Business Office. \$ 0.45 per item			
6. Receive returned purchased items and notify Business Office. \$ 1.51 per order			
7. Special request. \$ 3.40 per hour			

APPENDIX D

D-1. DECEMBER TRANSACTIONS

DECEMBER 1967	Adm. (1)	B.O. (2)	C.S. (3)	D.R. (4)	D. (5)	E.R. (6)	H.K. (7)	TOTAL (22)
Administration (1)	\$ --	\$ 300	\$ 384	\$ 672	\$ 612	\$ 264	\$ 360	\$ 39,755
Business Office (2)	641	92	11	5	43	639	25	3,423
Central Services (3)	--	--	--	--	--	--	--	1,097
Delivery Room (4)	--	--	--	--	--	--	--	1,765
Dietary (5)	362	5	--	--	--	--	--	8,573
Emergency Room (6)	--	--	--	--	--	--	--	4,751
Housekeeping (7)	132	62	716	707	--	178	45	11,772
Laboratory & Pathology (8)	--	--	--	--	--	--	--	23,011
Medical Records (9)	165	214	--	32	--	5	--	998
Maintenance & Eng. (10)	3,839	122	37	246	304	142	61	8,904
Nursing Services (11)	--	--	--	--	--	--	--	69,640
Operating Room (12)	--	--	--	--	--	--	--	9,804
Personnel (13)	6	244	90	--	--	--	--	1,919
Pharmacy (14)	56	--	2	18	--	18	--	1,514
Purchasing (15)	69	45	74	10	23	12	28	594
Radiology (16)	--	--	--	--	--	--	--	18,398
Recovery Room (17)	--	--	--	--	--	--	--	1,920
E.K.G. (18)	--	--	--	--	--	--	--	2,158
Total Income (19)								209,996
Depreciation (Equip) (20)	136	213	219	106	337	30	29	3,610
Depreciation (Plant) (21)	4,026	334	489	1,300	912	267	400	21,255
Utilities (22)	908	75	110	231	206	60	100	5,015
Salaries & Wages (23)	1,491	10,342	1,139	901	5,372	4,378	4,129	104,457
Taxes (24)	61	464	52	42	244	197	188	4,693
Supplies & Expenses (25)	9,547	281	188	482	2,218	701	3,971	25,168
TOTAL (26)	21,439	12,793	3,511	4,812	10,414	6,945	9,453	

DECEMBER TRANSACTIONS (CONTINUED)

DECEMBER 1967		Purch. (15)	Rad. (16)	R.R. (17)	E.K.G. (18)	Outside (19)	Total Charge (20)	Pat. Inc. (21)	TOTAL (22)
Administration	(1)	\$ 708	\$ 396	\$ 228	\$ 168	\$ --	\$	\$27,755	\$ 39,755
Business Office	(2)	34	74	18	46	--		--	3,423
Central Services	(3)	--	--	34	--	--		--	1,097
Delivery Room	(4)	--	--	--	--	--		1,765	1,765
Dietary	(5)	--	68	--	--	--		--	8,573
Emergency Room	(6)	--	--	--	--	--		4,751	4,751
Housekeeping	(7)	42	153	149	--	--		--	11,772
Laboratory & Pathology	(8)	--	--	--	--	--		23,011	23,011
Medical Records	(9)	--	--	--	--	120		--	998
Maintenance & Eng.	(10)	78	64	--	9	50		--	8,904
Nursing Services	(11)	--	--	--	--	--		69,640	69,640
Operating Room	(12)	--	--	--	--	--		9,804	9,804
Personnel	(13)	15	33	12	3	--		--	1,919
Pharmacy	(14)	--	--	6	--	--		--	1,514
Purchasing	(15)	--	6	--	4	--		--	594
Radiology	(16)	--	--	--	--	--		18,398	18,398
Recovery Room	(17)	--	--	--	--	--		1,920	1,920
E.K.G.	(18)	--	--	--	--	--		2,158	2,158
Total Income	(19)								209,996
Depreciation (Equip.)	(20)	26	515	23	16	--		--	3,610
Depreciation (Plant)	(21)	1,090	512	222	89	--		--	21,255
Utilities	(22)	246	115	45	20	--		--	5,015
Salaries & Wages	(23)	1,168	9,932	714	899	--		--	104,457
Taxes	(24)	52	446	33	42	--		--	4,693
Supplies & Expenses	(25)	80	681	199	102	--		--	25,168
TOTAL	(26)	3,539	12,995	1,683	1,398	--	214,817	--	

DECEMBER TRANSACTIONS (CONTINUED)

DECEMBER 1967	Lab. (8)	M.R. (9)	M&E (10)	N.S. (11)	O.R. (12)	Pers. (13)	Phar. (14)	TOTAL (22)
Administration (1)	\$ 420	\$ 216	\$ 288	\$ 5,448	\$ 960	\$ 384	\$ 192	\$ 39,755
Business Office (2)	237	39	31	1,358	93	--	35	3,423
Central Services (3)	--	--	--	1,031	7	--	--	1,097
Delivery Room (4)	--	--	--	--	--	--	--	1,765
Dietary (5)	--	--	--	8,126	11	--	--	8,573
Emergency Room (6)	--	--	--	--	--	--	--	4,751
Housekeeping (7)	48	22	32	8,371	937	148	31	11,772
Laboratory & Pathology (8)	--	--	--	--	--	--	--	23,011
Medical Records (9)	96	--	--	366	--	--	--	998
Maintenance & Eng. (10)	326	3	71	3,182	302	68	--	8,904
Nursing Services (11)	--	--	--	--	--	--	--	69,640
Operating Room (12)	--	--	--	--	--	--	--	9,804
Personnel (13)	101	18	130	862	102	6	27	1,919
Pharmacy (14)	1	--	--	1,316	18	77	--	1,514
Purchasing (15)	22	7	16	180	83	9	7	594
Radiology (16)	--	--	--	--	--	--	--	18,398
Recovery Room (17)	--	--	--	--	--	--	--	1,920
E.K.G. (18)	--	--	--	--	--	--	--	2,158
Total Income (19)								209,996
Depreciation (Equip.) (20)	267	48	33	1,315	274	11	12	3,610
Depreciation (Plant) (21)	512	566	178	9,222	535	489	111	21,255
Utilities (22)	125	40	70	2,177	346	110	30	5,015
Salaries & Wages (23)	11,501	2,110	5,392	35,189	6,100	850	2,771	104,457
Taxes (24)	516	94	244	1,582	277	38	122	4,693
Supplies & Expenses (25)	1,616	101	421	998	3,541	40	--	25,168
TOTAL (26)	15,788	3,264	6,906	80,723	13,586	2,230	3,338	

D-2. JANUARY TRANSACTIONS

JANUARY 1968	Adm. (1)	B.O. (2)	C.S. (3)	D.R. (4)	D. (5)	E.R. (6)	H.K. (7)	TOTAL (22)
Administration (1)	\$ ---	\$ 300	\$ 384	\$ 672	\$ 612	\$ 264	\$ 360	\$ 42,978
Business Office (2)	692	92	10	6	44	654	30	3,759
Central Services (3)	--	--	--	--	--	26	--	1,187
Delivery Room (4)	--	--	--	--	--	--	--	1,534
Dietary (5)	135	--	--	--	--	--	--	4,370
Emergency Room (6)	--	--	--	--	--	--	--	6,010
Housekeeping (7)	347	101	513	507	134	371	--	14,377
Laboratory & Pathology (8)	--	--	--	--	--	--	--	25,074
Medical Records (9)	321	324	--	--	--	12	--	1,260
Maintenance & Eng. (10)	4,397	124	80	369	332	173	130	10,291
Nursing Services (11)	--	--	--	--	--	--	--	81,194
Operating Room (12)	--	--	--	--	--	--	--	14,127
Personnel (13)	6	188	77	--	116	77	108	2,129
Pharmacy (14)	47	--	7	--	2	60	--	2,015
Purchasing (15)	26	30	71	--	30	41	70	721
Radiology (16)	--	--	--	--	--	--	--	25,162
Recovery Room (17)	--	--	--	--	--	--	--	3,430
E.K.G. (18)	--	--	--	--	--	--	--	2,450
Total Income (19)								242,068
Depreciation (Equip) (20)	136	213	219	106	337	30	29	3,610
Depreciation (Plant) (21)	4,026	334	489	1,300	912	267	400	21,255
Utilities (22)	1,016	84	124	258	230	67	112	5,617
Salaries & Wages (23)	1,491	10,483	1,194	899	5,428	4,044	4,113	109,282
Taxes (24)	61	453	52	42	236	175	175	4,718
Supplies & Expenses (25)	8,528	538	201	643	3,295	999	5,105	27,453
TOTAL (26)	21,229	13,264	3,421	4,802	11,708	7,260	10,632	

JANUARY TRANSACTIONS (CONTINUED)

JANUARY 1968	Lab. (8)	M.R. (9)	M&E (10)	N.S. (11)	O.R. (12)	Pers. (13)	Phar. (14)	TOTAL (22)
Administration (1)	\$ 420	\$ 216	\$ 288	\$ 5,448	\$ 960	\$ 384	\$ 192	\$ 42,978
Business Office (2)	250	37	26	1,610	95	--	22	3,759
Central Services (3)	--	--	--	1,115	8	--	--	1,187
Delivery Room (4)	--	--	--	--	--	--	--	1,534
Dietary (5)	--	24	--	4,212	--	--	--	4,370
Emergency Room (6)	--	--	--	--	--	--	--	6,010
Housekeeping (7)	52	25	30	11,222	576	21	26	14,377
Laboratory & Pathology (8)	--	--	--	--	--	--	--	25,074
Medical Records (9)	63	--	--	399	--	1	--	1,260
Maintenance & Eng. (10)	168	6	153	3,147	899	3	--	10,291
Nursing Services (11)	--	--	--	--	--	--	--	81,194
Operating Room (12)	--	--	--	--	--	--	--	14,127
Personnel (13)	55	15	130	1,030	196	6	18	2,129
Pharmacy (14)	3	--	--	1,869	20	--	--	2,015
Purchasing (15)	31	21	33	205	122	8	9	721
Radiology (16)	--	--	--	--	--	--	--	25,162
Recovery Room (17)	--	--	--	--	--	--	--	3,430
E.K.G. (18)	--	--	--	--	--	--	--	2,450
Total Income (19)								242,068
Depreciation (Equip.) (20)	267	48	33	1,315	274	11	12	3,610
Depreciation (Plant) (21)	512	566	178	9,222	535	489	111	21,255
Utilities (22)	140	45	79	2,438	388	124	34	5,617
Salaries & Wages (23)	11,672	2,149	5,413	37,066	6,599	850	2,886	109,282
Taxes (24)	505	94	236	1,598	283	38	123	4,718
Supplies & Expenses (25)	878	145	555	1,324	3,826	77	--	27,453
TOTAL (26)	15,016	3,391	7,154	83,220	14,781	2,012	3,433	

JANUARY TRANSACTIONS (CONTINUED)

JANUARY 1968	Purch. (15)	Rad. (16)	R.R. (17)	E.K.G. (18)	Outside (19)	Total Charge (20)	Pat. Inc. (21)	TOTAL (22)
Administration (1)	\$ 708	\$ 396	\$ 228	\$ 168	\$ --	\$ --	\$30,978	\$ 42,978
Business Office (2)	42	81	19	49	--	--	--	3,759
Central Services (3)	--	--	37	--	--	--	--	1,187
Delivery Room (4)	--	--	--	--	--	--	1,534	1,534
Dietary (5)	--	--	--	--	--	--	--	4,370
Emergency Room (6)	--	--	--	--	--	--	6,010	6,010
Housekeeping (7)	30	202	200	21	--	--	--	14,377
Laboratory & Pathology (8)	--	--	--	--	--	--	25,074	25,074
Medical Records (9)	--	8	--	--	130	--	--	1,260
Maintenance & Eng. (10)	44	150	94	20	--	--	--	10,291
Nursing Services (11)	--	--	--	--	--	--	81,194	81,194
Operating Room (12)	--	--	--	--	--	--	14,127	14,127
Personnel (13)	15	90	12	3	--	--	--	2,129
Pharmacy (14)	--	2	4	--	--	--	--	2,015
Purchasing (15)	--	10	--	13	--	--	--	721
Radiology (16)	--	--	--	--	--	--	25,162	25,162
Recovery Room (17)	--	--	--	--	--	--	3,430	3,430
E.K.G. (18)	--	--	--	--	--	--	2,450	2,450
Total Income (19)								242,068
Depreciation (Equip.) (20)	26	515	23	16	--	--	--	3,610
Depreciation (Plant) (21)	1,090	512	222	89	--	--	--	21,255
Utilities (22)	275	129	50	22	--	--	--	5,617
Salaries & Wages (23)	1,168	12,068	729	1,031	--	--	--	109,282
Taxes (24)	52	519	33	42	--	--	--	4,718
Supplies & Expenses (25)	154	812	286	85	--	--	--	27,453
TOTAL (26)	3,604	15,494	1,937	1,559	--	223,917	--	

D-3. FEBRUARY TRANSACTIONS

FEBRUARY 1968	Adm. (1)	B.O. (2)	C.S. (3)	D.R. (4)	D. (5)	E.R. (6)	H.K. (7)	TOTAL (22)
Administration (1)	\$ --	\$ 300	\$ 384	\$ 672	\$ 612	\$ 264	\$ 360	\$ 40,372
Business Office (2)	671	92	9	6	50	570	24	3,535
Central Services (3)	--	--	--	--	--	23	--	1,043
Delivery Room (4)	--	--	--	--	--	--	--	1,530
Dietary (5)	188	24	--	--	--	--	--	4,954
Emergency Room (6)	--	--	--	--	--	--	--	4,309
Housekeeping (7)	347	101	601	162	110	260	--	14,120
Laboratory & Pathology (8)	--	--	--	--	--	--	--	29,202
Medical Records (9)	397	56	--	--	--	5	--	1,082
Maintenance & Eng. (10)	4,128	200	238	270	201	416	166	9,760
Nursing Services (11)	--	--	--	--	--	--	--	83,297
Operating Room (12)	--	--	--	--	--	--	--	15,482
Personnel (13)	6	88	90	--	73	90	167	2,084
Pharmacy (14)	55	--	4	--	1	68	--	2,865
Purchasing (15)	99	13	68	--	24	36	48	724
Radiology (16)	--	--	--	--	--	--	--	25,894
Recovery Room (17)	--	--	--	--	--	--	--	2,690
E.K.G. (18)	--	--	--	--	--	--	--	2,534
Total Income (19)								245,477
Depreciation (Equip.) (20)	136	213	219	106	337	30	29	3,610
Depreciation (Plant) (21)	4,026	334	489	1,300	912	267	400	21,255
Utilities (22)	926	77	112	235	210	61	102	5,117
Salaries & Wages (23)	1,491	9,932	1,329	864	6,009	4,360	4,183	110,536
Taxes (24)	63	435	58	39	261	188	184	4,829
Supplies & Expenses (25)	10,090	453	257	666	3,274	914	5,079	29,089
TOTAL (26)	22,623	12,318	3,858	4,320	12,074	7,552	10,742	

FEBRUARY TRANSACTIONS (CONTINUED)

FEBRUARY 1968	Lab. (8)	M.R. (9)	M&E (10)	N.S. (11)	O.R. (12)	Pers. (13)	Phar. (14)	TOTAL (22)
Administration (1)	\$ 420	\$ 216	\$ 288	\$ 5,448	\$ 960	\$ 384	\$ 192	\$ 40,372
Business Office (2)	227	39	33	1,572	91	--	40	3,535
Central Services (3)	--	--	--	980	7	--	--	1,043
Delivery Room (4)	--	--	--	--	--	--	--	1,530
Dietary (5)	--	--	--	4,741	--	--	--	4,954
Emergency Room (6)	--	--	--	--	--	--	--	4,309
Housekeeping (7)	52	25	30	11,457	443	21	26	14,120
Laboratory & Pathology (8)	--	--	--	--	--	--	--	29,202
Medical Records (9)	168	--	--	376	--	--	--	1,082
Maintenance & Eng. (10)	294	24	249	2,258	738	6	87	9,760
Nursing Services (11)	--	--	--	--	--	--	--	83,297
Operating Room (12)	--	--	--	--	--	--	--	15,482
Personnel (13)	45	68	60	1,105	102	6	124	2,084
Pharmacy (14)	4	--	--	2,719	12	--	--	2,865
Purchasing (15)	43	12	40	227	91	2	9	724
Radiology (16)	--	--	--	--	--	--	--	25,894
Recovery Room (17)	--	--	--	--	--	--	--	2,690
E.K.G. (18)	--	--	--	--	--	--	--	2,534
Total Income (19)								245,477
Depreciation (Equip.) (20)	267	48	33	1,315	274	11	12	3,610
Depreciation (Plant) (21)	512	566	178	9,222	535	489	111	21,255
Utilities (22)	128	41	72	2,221	353	112	31	5,117
Salaries & Wages (23)	12,567	2,029	6,385	36,523	5,971	850	2,660	110,536
Taxes (24)	550	87	280	1,598	261	39	116	4,829
Supplies & Expenses (25)	973	100	898	1,421	3,558	65	--	29,089
TOTAL (26)	16,250	3,255	8,546	83,183	13,396	1,985	3,408	

FEBRUARY TRANSACTIONS (CONTINUED)

FEBRUARY 1968	Purch. (15)	Rad. (16)	R.R. (17)	E.K.G. (18)	Outside (19)	Total Charge (20)	Pat. Inc. (21)	TOTAL (22)
Administration (1)	\$ 708	\$ 396	\$ 228	\$ 168	\$ --	\$	\$38,372	\$ 40,372
Business Office (2)	31	70	17	46	--		--	3,535
Central Services (3)	--	--	33	--	--		--	1,043
Delivery Room (4)	--	--	--	--	--		1,530	1,530
Dietary (5)	--	--	--	--	--		--	4,954
Emergency Room (6)	--	--	--	--	--		4,309	4,309
Housekeeping (7)	30	192	243	21	--		--	14,120
Laboratory & Pathology (8)	--	--	--	--	--		29,202	29,202
Medical Records (9)	--	40	--	--	40		--	1,082
Maintenance & Eng. (10)	31	386	67	3	--		--	9,760
Nursing Services (11)	--	--	--	--	--		83,297	83,297
Operating Room (12)	--	--	--	--	--		15,482	15,482
Personnel (13)	15	30	12	3	--		--	2,084
Pharmacy (14)	--	3	--	--	--		--	2,865
Purchasing (15)	--	4	--	8	--		--	724
Radiology (16)	--	--	--	--	--		25,894	25,894
Recovery Room (17)	--	--	--	--	--		2,690	2,690
E.K.G. (18)	--	--	--	--	--		2,534	2,534
Total Income (19)								245,477
Depreciation (Equip.) (20)	26	515	23	16	--		--	3,610
Depreciation (Plant) (21)	1,090	512	222	89	--		--	21,255
Utilities (22)	251	118	46	20	--		--	5,117
Salaries & Wages (23)	1,168	12,133	1,086	996	--		--	110,536
Taxes (24)	48	531	48	43	--		--	4,829
Supplies & Expenses (25)	129	848	274	88	--		--	29,089
TOTAL (26)	3,527	15,778	2,299	1,501	--	226,615	--	

D-4. MARCH TRANSACTIONS

MARCH 1968	Adm. (1)	B.O. (2)	C.S. (3)	D.R. (4)	D. (5)	E.R. (6)	H.K. (7)	TOTAL (22)
Administration (1)	\$ --	\$ 300	\$ 384	\$ 672	\$ 612	\$ 264	\$ 360	\$ 53,072
Business Office (2)	710	92	11	6	42	695	32	3,692
Central Services (3)	--	--	--	--	--	27	--	1,216
Delivery Room (4)	--	--	--	--	--	--	--	1,350
Dietary (5)	154	--	--	--	--	--	--	4,548
Emergency Room (6)	--	--	--	--	--	--	--	5,344
Housekeeping (7)	347	101	606	162	112	284	--	14,111
Laboratory & Pathology (8)	--	--	--	--	--	--	--	29,749
Medical Records (9)	323	36	--	--	--	5	--	1,941
Maintenance & Eng. (10)	6,171	71	50	24	38	38	133	10,187
Nursing Services (11)	--	--	--	--	--	--	--	89,377
Operating Room (12)	--	--	--	--	--	--	--	15,515
Personnel (13)	6	244	90	--	123	30	117	1,919
Pharmacy (14)	81	--	10	--	2	73	--	2,662
Purchasing (15)	90	6	86	--	21	36	56	756
Radiology (16)	--	--	--	--	--	--	--	28,289
Recovery Room (17)	--	--	--	--	--	--	--	2,620
E.K.G. (18)	--	--	--	--	--	--	--	2,808
Total Income (19)								269,156
Depreciation (Equip.) (20)	136	213	219	106	337	30	29	3,610
Depreciation (Plant) (21)	4,026	334	489	1,300	912	267	400	21,255
Utilities (22)	908	75	110	231	206	60	100	5,012
Salaries & Wages (23)	1,491	10,811	1,564	939	7,139	4,543	4,587	115,669
Taxes (24)	63	452	68	39	302	190	190	4,865
Supplies & Expenses (25)	9,763	436	199	592	3,360	944	4,928	28,883
TOTAL (26)	24,269	13,171	3,886	4,071	13,152	7,486	10,932	

MARCH TRANSACTIONS (CONTINUED)

MARCH 1968	Lab. (8)	M.R. (9)	M&E (10)	N.S. (11)	O.R. (12)	Pers. (13)	Phar. (14)	TOTAL (22)
Administration (1)	\$ 420	\$ 216	\$ 288	\$ 5,448	\$ 960	\$ 384	\$ 192	\$ 53,072
Business Office (2)	254	36	25	1,480	95	--	18	3,692
Central Services (3)	--	--	--	1,142	8	--	--	1,216
Delivery Room (4)	--	--	--	--	--	--	--	1,350
Dietary (5)	--	--	--	4,394	--	--	--	4,548
Emergency Room (6)	--	--	--	--	--	--	--	5,344
Housekeeping (7)	52	25	30	11,411	440	21	26	14,111
Laboratory & Pathology (8)	--	--	--	--	--	--	--	29,749
Medical Records (9)	615	--	--	568	--	--	--	1,941
Maintenance & Eng. (10)	156	61	106	2,465	153	1	17	10,187
Nursing Services (11)	--	--	--	--	--	--	--	89,377
Operating Room (12)	--	--	--	--	--	--	--	15,515
Personnel (13)	101	18	130	862	102	6	27	1,919
Pharmacy (14)	3	--	--	2,442	18	--	--	2,662
Purchasing (15)	52	32	25	204	109	2	15	756
Radiology (16)	--	--	--	--	--	--	--	28,289
Recovery Room (17)	--	--	--	--	--	--	--	2,620
E.K.G. (18)	--	--	--	--	--	--	--	2,808
Total Income (19)								269,156
Depreciation (Equip.) (20)	267	48	33	1,315	274	11	12	3,610
Depreciation (Plant) (21)	512	566	178	9,222	535	489	111	21,255
Utilities (22)	125	40	70	2,175	346	110	30	5,012
Salaries & Wages (23)	13,471	2,345	8,233	38,719	6,630	1,108	3,804	115,669
Taxes (24)	272	97	345	1,635	277	49	160	4,865
Supplies & Expenses (25)	994	121	1,042	1,588	3,501	62	--	28,883
TOTAL (26)	17,294	3,605	10,505	85,070	13,448	2,243	4,412	

MARCH TRANSACTIONS (CONTINUED)

MARCH 1968	Purch. (15)	Rad. (16)	R.R. (17)	E.K.G. (18)	Outside (19)	Total Charge (20)	Pat. Inc. (21)	TOTAL (22)
Administration (1)	\$ 708	\$ 396	\$ 228	\$ 168	\$ --	\$ --	\$41,072	\$ 53,072
Business Office (2)	45	82	19	49	--	--	--	3,692
Central Services (3)	--	--	38	--	--	--	--	1,216
Delivery Room (4)	--	--	--	--	--	--	1,350	1,350
Dietary (5)	--	--	--	--	--	--	--	4,548
Emergency Room (6)	--	--	--	--	--	--	5,344	5,344
Housekeeping (7)	30	202	241	21	--	--	--	14,111
Laboratory & Pathology (8)	--	--	--	--	--	--	29,749	29,749
Medical Records (9)	--	68	--	--	326	--	--	1,941
Maintenance & Eng. (10)	61	534	98	11	--	--	--	10,187
Nursing Services (11)	--	--	--	--	--	--	89,377	89,377
Operating Room (12)	--	--	--	--	--	--	15,515	15,515
Personnel (13)	15	33	12	3	--	--	--	1,919
Pharmacy (14)	--	10	23	--	--	--	--	2,662
Purchasing (15)	--	10	--	12	--	--	--	756
Radiology (16)	--	--	--	--	--	--	28,289	28,289
Recovery Room (17)	--	--	--	--	--	--	2,620	2,620
E.K.G. (18)	--	--	--	--	--	--	2,808	2,808
Total Income (19)								269,156
Depreciation (Equip.) (20)	26	515	23	16	--	--	--	3,610
Depreciation (Plant) (21)	1,090	512	222	89	--	--	--	21,255
Utilities (22)	246	115	45	20	--	--	--	5,012
Salaries & Wages (23)	1,168	13,487	1,461	1,143	--	--	--	115,669
Taxes (24)	49	569	58	49	--	--	--	4,865
Supplies & Expenses (25)	124	919	290	71	--	--	--	28,883
TOTAL (26)	3,562	17,452	2,758	1,652		238,978		

D-5. SUMMARY OF TRANSACTIONS

(Dec. to March)	Adm. (1)	B.O. (2)	C.S. (3)	D.R. (4)	D. (5)	E.R. (6)	H.K. (7)	TOTAL (22)
Administration (1)	\$ --	\$ 1,200	\$ 1,536	\$ 2,688	\$ 2,448	\$ 1,056	\$ 1,440	\$176,177
Business Office (2)	2,714	368	41	23	179	2,558	111	14,409
Central Services (3)	--	--	--	--	--	100	--	4,543
Delivery Room (4)	--	--	--	--	--	--	--	6,179
Dietary (5)	839	29	--	--	--	--	--	22,445
Emergency Room (6)	--	--	--	--	--	--	--	20,414
Housekeeping (7)	1,173	365	2,436	1,538	356	1,093	45	54,380
Laboratory & Pathology (8)	--	--	--	--	--	--	--	107,036
Medical Records (9)	1,206	630	--	32	--	27	--	5,281
Maintenance & Eng. (10)	18,535	517	405	909	875	769	490	39,142
Nursing Services (11)	--	--	--	--	--	--	--	323,508
Operating Room (12)	--	--	--	--	--	--	--	54,928
Personnel (13)	24	764	347	--	435	227	509	8,051
Pharmacy (14)	239	--	23	18	5	221	--	9,056
Purchasing (15)	284	94	299	10	98	125	202	2,795
Radiology (16)	--	--	--	--	--	--	--	97,743
Recovery Room (17)	--	--	--	--	--	--	--	10,660
E.K.G. (18)	--	--	--	--	--	--	--	9,950
Total Income (19)								966,697
Depreciation (Equip.) (20)	544	852	876	424	1,348	120	116	14,440
Depreciation (Plant) (21)	16,104	1,336	1,956	5,200	3,648	1,068	1,600	85,020
Utilities (22)	3,758	311	456	955	852	248	414	20,761
Salaries & Wages (23)	5,964	41,568	5,226	3,663	23,968	17,325	17,012	439,944
Taxes (24)	248	1,804	230	162	1,043	750	737	19,105
Supplies & Expenses (25)	37,928	1,708	845	2,383	12,093	3,558	19,083	110,593
TOTAL (26)	89,560	51,546	14,776	18,005	47,348	29,243	41,759	

SUMMARY OF TRANSACTIONS (CONTINUED)

(Dec. to March)	Lab. (8)	M.R. (9)	M&E (10)	N.S. (11)	O.R. (12)	Pers. (13)	Phar. (14)	TOTAL (22)
Administration (1)	\$ 1,680	\$ 864	\$ 1,152	\$ 21,792	\$ 3,840	\$ 1,536	\$ 768	\$176,177
Business Office (2)	968	151	115	6,020	374	--	115	14,409
Central Services (3)	--	--	--	4,268	30	--	--	4,543
Delivery Room (4)	--	--	--	--	--	--	--	6,179
Dietary (5)	--	24	--	21,473	11	--	--	22,445
Emergency Room (6)	--	--	--	--	--	--	--	20,414
Housekeeping (7)	204	97	122	42,461	2,396	211	109	54,380
Laboratory & Pathology (8)	--	--	--	--	--	--	--	107,036
Medical Records (9)	942	--	--	1,709	--	1	--	5,281
Maintenance & Eng. (10)	944	94	579	11,052	2,092	78	104	39,142
Nursing Services (11)	--	--	--	--	--	--	--	323,508
Operating Room (12)	--	--	--	--	--	--	--	54,928
Personnel (13)	302	119	450	3,859	502	24	196	8,051
Pharmacy (14)	11	--	--	8,346	68	77	--	9,056
Purchasing (15)	148	72	114	815	405	21	40	2,795
Radiology (16)	--	--	--	--	--	--	--	97,743
Recovery Room (17)	--	--	--	--	--	--	--	10,660
E.K.G. (18)	--	--	--	--	--	--	--	9,950
Total Income (19)								966,697
Depreciation (Equip.) (20)	1,068	192	132	5,260	1,096	44	48	14,440
Depreciation (Plant) (21)	2,048	2,264	712	36,888	2,140	1,956	444	85,020
Utilities (22)	518	166	291	9,011	1,433	456	125	20,761
Salaries & Wages (23)	49,211	8,633	25,423	148,497	25,300	3,658	12,121	439,944
Taxes (24)	1,843	372	1,105	6,413	1,098	164	521	19,105
Supplies & Expenses (25)	4,461	467	2,921	5,321	14,426	244	--	110,593
TOTAL (26)	64,348	13,515	33,111	332,196	55,211	8,470	14,591	

SUMMARY OF TRANSACTIONS (CONTINUED)

(Dec. to March)	Purch. (15)	Rad. (16)	R.R. (17)	E.K.G. (18)	Outside (19)	Total Charge (20)	Pat. Inc. (21)	TOTAL (22)
Administration (1)	\$ 2,832	\$ 1,584	\$ 912	\$ 672	\$ --	\$	\$138,177	\$176,177
Business Office (2)	152	307	73	190	--		--	14,409
Central Services (3)	--	--	142	--	--		--	4,543
Delivery Room (4)	--	--	--	--	--		6,179	6,179
Dietary (5)	--	68	--	--	--		--	22,445
Emergency Room (6)	--	--	--	--	--		20,414	20,414
Housekeeping (7)	132	749	833	63	--		--	54,380
Laboratory & Pathology (8)	--	--	--	--	--		107,036	107,036
Medical Records (9)	--	116	--	--	616		--	5,281
Maintenance & Eng. (10)	214	1,134	259	43	50		--	39,142
Nursing Services (11)	--	--	--	--	--		323,508	323,508
Operating Room (12)	--	--	--	--	--		54,928	54,928
Personnel (13)	60	186	48	12	--		--	8,051
Pharmacy (14)	--	15	33	--	--		--	9,056
Purchasing (15)	--	30	--	37	--		--	2,795
Radiology (16)	--	--	--	--	--		97,743	97,743
Recovery Room (17)	--	--	--	--	--		10,660	10,660
E.K.G. (18)	--	--	--	--	--		9,950	9,950
Total Income (19)								966,697
Depreciation (Equip.) (20)	104	2,060	92	64	--		--	14,440
Depreciation (Plant) (21)	4,360	2,048	888	356	--		--	85,020
Utilities (22)	1,018	477	186	82	--		--	20,761
Salaries & Wages (23)	4,672	47,620	3,990	4,069	--		--	439,944
Taxes (24)	201	2,065	172	176	--		--	19,105
Supplies & Expenses (25)	487	3,260	1,049	346	--		--	110,593
TOTAL (26)	14,232	61,719	8,677	6,110		904,327		

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VITA

Tee H. Hiett was born in Dora, Alabama on January 8, 1926, the first son of Tee H. and Ethel (nee Gresham) Hiett. He attended public schools in Dora and graduated from Dora High School in June, 1943.

After serving in the U.S. Navy during World War II, Mr. Hiett enrolled in the agricultural engineering curriculum at the University of Auburn. Following graduation with the Bachelor of Science degree in 1949, he worked with the J. I. Case Company in Atlanta, Georgia, as a service engineer.

In 1954, Mr. Hiett enrolled in the graduate program of the School of Industrial Engineering at Georgia Tech. With the acceptance of his thesis, *An Analysis of the Efficiency of Acceptance Sampling Plans*, under the direction of Professor Donald F. Holmes, Mr. Hiett completed the requirements for the Master of Science degree in 1957.

As he completed the degree requirements, Mr. Hiett began his teaching career as a Lecturer in the School of Industrial Engineering at Georgia Tech, teaching in the areas of engineering statistics, production control, engineering economy, electronic data processing, motion and time study, and statistical quality control. In January, 1957, he married the former Monterey Kirby of Birmingham, Alabama. When Dr. Harold E. Smalley came to Georgia Tech in 1958, Mr. Hiett was introduced to hospital industrial engineering. In association with Dr. Smalley, he assisted in the development of the first full-time

hospital industrial engineering program in Alabama at the University of Alabama Hospitals and Clinics in Birmingham. As Assistant Research Engineer at the Engineering Experiment Station at Georgia Tech, Mr. Hiatt participated in a project investigating the economic feasibility of disposable versus reprocessed supply items for hospitals. Mr. Hiatt was promoted to the rank of Assistant Professor of Industrial Engineering and served as the assistant to the director of the School of Industrial Engineering.

In 1960, a daughter, Lynne Monterey, was born. Also during this year Mr. Hiatt resigned his appointment from Georgia Tech in order to join the Agency for International Development of the U.S. Government to work in El Salvador, Central America. In his two-year tour of duty, Mr. Hiatt assisted in the development of an industrial engineering curriculum at the University of El Salvador. He also advised and assisted the National Industrial Development Agency of the government of El Salvador in the development of an industrial engineering section, and he guided studies in such areas as motion and time study, plant layout, and production planning.

In 1963, after returning to Atlanta, Mr. Hiatt enrolled in the Ph.D. program of the School of Industrial Engineering at Georgia Tech, and also began working as the Director of the Hospital Division of Management Science America, Inc. In this assignment, he was instrumental in establishing the first full-time hospital industrial engineering program in Georgia at Hall County Hospital in Gainesville.

A daughter, Deborah Jean, was born in 1964. Resigning from MSA

in 1965, Mr. Hiatt accepted a position as Lecturer in the School of Industrial Engineering at Georgia Tech while continuing his studies toward the Ph.D. degree. Areas of teaching responsibility included methods and systems analysis and engineering economy. Mr. Hiatt continued to work with Dr. Smalley in hospital industrial engineering and participated in the development, design, and conduct of a program to train and install hospital management systems analysts in ten hospitals.

Mr. Hiatt reduced his teaching load in 1968 in order to form Management Science Health, Inc., a firm organized to provide management consulting services to hospitals and to the health industry, and in 1969 he resigned his faculty appointment. One of the initial major projects undertaken by Mr. Hiatt in this firm was the development of the industrial engineering program at Central State Hospital in Milledgeville, Georgia. In 1971, Mr. Hiatt resigned from the firm to devote his time to completing the dissertation and to pursuing his interest in the area of hospital management systems.

In September, 1972, Mr. Hiatt accepted an appointment as Associate Professor in the Graduate Program in Hospital and Health Administration at the University of Alabama in Birmingham.

Mr. Hiatt is a registered professional engineer in Alabama and a member of the American Institute of Industrial Engineers, the Hospital Management Systems Society, Alpha Phi Mu, and Sigma Xi.