



THE PRACTICABILITY OF OFFICE
MECHANIZATION PROCEDURES IN A
HOSPITAL DIETARY DEPARTMENT

Thesis for the Degree of M. S.
MICHIGAN STATE UNIVERSITY
Letitia W. Warnock
1961

LIBRARY
Michigan State
University

SCHOOL OF HOME ECONOMICS
MICHIGAN STATE COLLEGE
EAST LANSING, MICHIGAN

Warnock, Letitia W.

The Practicability of Office
M.S. 1961

DATE	ISSUED TO

Warnock, Letitia W.

The Practicability of Office Mecha
M.S. 1961

MICHIGAN STATE UNIVERSITY
COLLEGE OF HUMAN ECOLOGY
REFERENCE LIBRARY

PLACE IN RETURN BOX to remove this checkout from your record.
TO AVOID FINES return on or before date due.
MAY BE RECALLED with earlier due date if requested.

DATE DUE	DATE DUE	DATE DUE

THE PRACTICABILITY OF OFFICE MECHANIZATION
PROCEDURES IN A HOSPITAL DIETARY DEPARTMENT

By

Letitia W. Warnock

A PROBLEM

Submitted to
Michigan State University
in partial fulfillment of the requirements
for the degree of

MASTER OF SCIENCE

Department of Institution Administration

1961

TABLE OF CONTENTS

	Page
LIST OF FIGURES	iii
INTRODUCTION	1
DATA PROCESSING FUNDAMENTALS	2
Automation--Evolution and Current Concept	2
Electronic Data Processing	4
Electronics in Office Mechanization	6
The Digital Computer	8
MANAGEMENT INFORMATION SYSTEMS	11
OFFICE MECHANIZATION FOR HOSPITAL FOOD SERVICE	13
Dietary Department Clerical Problems	13
Inquiries Relevant to Mechanization in Food Service	15
A Dietary Department Computer Program	18
An Appraisal	19
BIBLIOGRAPHY	22

LIST OF FIGURES

FIGURE	Page
1. Menu-Matic System	17

INTRODUCTION

Electronic data processing is currently playing a prominent role in the operation of many business firms and service institutions. The results of experience and research indicate that hospitals adapt easily to labor-saving devices previously associated with industry. The vast amounts of required clerical and paper work are cited as activities which respond profitably to mechanized "programming." Investment in data processing equipment affords the probability of decreased salary costs and increased operational efficiency.

Among the numerous units of the hospital which can enjoy benefits of automation, the dietary department is worthy of consideration. In this area, the demand for qualified dietitians far exceeds the available supply. Since there is poor prognosis for any appreciable improvement in the situation, it is management's problem to provide means which permit better utilization of available professional skills.

Dietitians are frequently devoting too much valuable supervisory time to paper work and clerical duties. These include tasks as charting and tallying food production sheets; entering census changes on food distribution forms; writing individual modified diet menus for patients; filing records and miscellaneous forms; determining the total quantities of subsistence items to be procured; and, taking physical inventories. It is postulated that office mechanization procedures can offer a solution to various time-consuming facets of the dietitian's job.

The purpose of this study is to investigate better usage of professional staff by exploring the opportunities which electronic data processing presents for absorbing significant amounts of the dietitians' paper work; and, appraising the results of the investigation for practicability and efficiency.

DATA PROCESSING FUNDAMENTALS

It is essential that management acquires sufficient knowledge of elementary principles and basic information pertinent to data processing before attempting to adopt its usage. The fact that this type of labor-saving device constitutes one phase of automation is often eclipsed by the belief that it personifies the epitomy of electronic control. This section of the study primarily encompasses a review of literature. It traces the lineage and briefly depicts several branches of the "family tree" responsible for the comparatively recent birth of electronic data processing.

Automation--Evolution and Current Concept

Although the readers of texts in American History find no significant discrepancies in recorded events, one does not encounter similar accord amid writers in the field of automation. Considerable disparity exists in tracing its evolution. This can be attributed to the fact that authors differ in their opinions of which labor-saving device commenced the era of automatic control.

The origin of automation has even been accredited to mechanical innovations which predated the advent of Christianity. Booth (9) delved back to 350 B.C. and attributed its evolution to the Chinese invention of the water trip hammer, for grinding cereals. Few writers have ascribed such an early date to the genesis of automatized work methods.

More than a thousand years elapsed before significant "birth" claims for automation were established by other authors. Veillette (42) reverted to the thirteenth century in an attempt to base its beginnings.

He cited the legend which claimed that Albertus Magnus, a German monk, built a robot which advanced to the door and opened it when someone knocked. Macmillan (31) considered that the first automatic contrivance was the steam pressure control which was invented in 1680 by Denis Papin, a Frenchman. Though Dreher (19) depicted automation as the grandchild of radio and the child of electronics, he traced its origin to 1713. At that time Newcome and Watt developed a cylindrical engine containing a pump, which removed excess water from the copper, tin, and coal mines in Great Britain. Since the device performed the removal task without the necessity of expending human energy, Dreher considered it to be of prominence in automation's "family tree."

A majority of writers believed that the seeds of automatic control were sown during the industrial revolution, from 1750 to 1850. Grabbe (22) and Pyke (38) made reference to the general mechanical inventions which were realized during that period, without specificity. The number of discoveries in that era undoubtedly made it difficult for authors to deal in anything but generalities.

Evolutionary claims were practically non-existent for the ensuing century. Almost one hundred years had elapsed before sufficient inventive progress was achieved to permit the replacement of substantial human efforts by machines of precision design. There is no doubt that the 1940 decade commenced the age of automation, as related to its present conception.

In 1946 Delmar S. Harder, a Ford executive, introduced the word "automatization" at a staff meeting. The term denoted automatic transfer of work pieces, during the production process, from one machine to another without the use of man power. John Diebold, management consultant, simultaneously employed the same maxim to describe both automatic operation and the process of making tasks

automatic. While writing a report at the Harvard Graduate School of Business in May 1951, Diebold shortened the vocable to "automation" (11). The new expression enjoyed immediate popularity and broad interpretation.

In its present meaning, automation encompasses wide areas and eludes specific definition. Though its connotation varies with users, Harder and Webster now refer to the term as advanced mechanization plus electronic control. This description forms the basis of an acceptable current concept of automation. The magnitude of mechanized electronic control is manifested in many phases of business, where its popularity is constantly expanding.

Electronic Data Processing

There is no doubt that electronic data processing (EDP) comprises the phase of automation which has achieved greatest advancement during the last decade. This descriptive phrase generally applies to the pre-determined handling of desired information by means of an automatic electrical computer system. It has become such a focus of attention that, to many people, EDP is synonymous with automation.

Vast sums of money have been expended in the research and development of computers which employ the electron to process information with amazing speed and accuracy. The initial machines were developed to handle complex scientific and engineering calculations. Application of similar computers for purposes of processing mass information was not considered until several years later. Management was then supplied with data and reports which were difficult or impossible to obtain by other methods.

Charles Babbage had invented the basic principles of the computer during the first half of the nineteenth century, but had failed to

promote its construction. The first electronic computing machine was built at Harvard University in 1944, through the efforts of Howard Aiken, with modifications and improvements in Babbage's plan. This calculator was called the "Harvard Mark I Computer" (31). Its impact in the area of business management was soon realized, and the production of additional machines was undertaken. The subsequent calculators which were constructed became increasingly more complex in nature and had greater capacities for work-methods improvement.

Adler (1) referred to computers as "hardware brains" or "thinking machines." He believed that they accomplished tasks more quickly and accurately than the unaided human brain. He acceded, however, that they were only capable of routine thinking, and unable to accomplish creative thinking.

An article in a national business magazine (15) stated that computers were starting to run the plants, by taking over the ultimate job of production supervision at an accelerating pace. The Department of Agriculture, Treasury Department, Post Office, and several other governmental agencies have adopted the use of data processing equipment. Railroads, airlines, schools, insurance companies, and banks have also employed electronic calculators with beneficial results.

Contribution of funds by the United States Public Health Service and the California Hospital Association recently supported research in the needs and prospects for hospital automation. Blumberg (7) reported that tasks were examined to determine if they required human judgment and skill, or could be accomplished by a machine. A survey of institutions in Los Angeles indicated that ten percent of total salary expenses were vested in the performance of accounting, payroll, personnel, and purchasing activities. It was concluded that these clerical duties were susceptible to ready solution by methods of data processing.

Electronic company executives proposed that new computers, under construction, will enhance data processing with increased abilities for information recall. Bello (5) stated that the International Business Machines Corporation estimated that the industry spent two million dollars on research in that field during 1960. It was expected that the amount would reach one hundred million dollars in 1965, and double every three years thereafter. Such expenditures indicate the prospect for even greater proficiency in the operational efficiency of many business firms.

Electronics in Office Mechanization

As the volume of business has expanded during the past several decades, there has been a corresponding increase in the office work to be accomplished. It has become necessary to supply management with additional information concerning policies, production, distribution, control, and cost, in order to provide tools for successful administration. Levin (29) theorized that the responsibility for providing this type of information has been vested primarily in clerical personnel. The incumbent problems of collecting, processing, and utilizing necessary data have become a most expensive operation. Executives have been forced to examine the office confines in terms of cost versus contribution.

The literature contained many proponents of electronic data processing as a solution to the amplitude of routine office clerical duties. There was evidenced a firm belief that the accomplishment of these tasks least inhibited the computer's ability and flexibility. A number of authors (3, 8, 9, 29) claimed that office procedures would find immediate application in the use of such equipment.

Keenoy (26) joined other writers in speculating that we are on the verge of realizing an accounting and business management revolution which will rival the industrial revolution in its effect upon the lives of everyone. He suspected that we were making the electron our servant at a most opportune time. Otherwise, American business would become submerged in its constantly mounting volume of paper work.

A statistical review of the increasing number of clerical workers, as cited by Keenoy, was of significant interest. At the beginning of the twentieth century only one man in every forty was a "paper worker." Prior to World War II record-keeping had mushroomed into such awesome proportions that, in 1940, one man in ten was required to perform such tasks. In 1958 the United States Census Bureau estimated that one employee in every six was a paper worker. It is no wonder that the cost of clerical work has become a major economic and management problem.

This is not a remarkable phenomenon when one considers the comments of other authors. Their views are similar to those expressed by Grabbe in his summation of the office problem: "Larger fractions of personnel seem to be engaged in moving information, papers, directives, and plans about, and a smaller fraction seems to be engaged in the substantive matters with which the business at first glance appears to be primarily concerned."¹

Further emphasis of the problem was reiterated in Bright's (10) observation that a substantial amount of the work force was engaged in paper work. He added impetus to the situation by stating that communication now stands revealed as a chaotic and costly anachronism; and, that channeling of information controls the speed with which

¹E. M. Grabbe, Automation in Business and Industry (New York: John Wiley and Sons, Inc., 1957), p. 11.

instructions are received and production results. Though Bright's analogies were related to factories, they certainly convey an impact to many other areas of endeavor. It is difficult to conceive that any business fails to rely on the receipt of some type of information in order to determine its volume of production.

Several writers (1, 29, 40) have expressed the view that office mechanization will free man from drudgery; eliminate expensive clerical workers; increase efficiency; improve production speed; enlarge the scope of available information; and, enable the multiplication of a single clerical employee's efforts many times. They believed that we need management sensitivity, imagination, and aggressiveness in the role which electronics can play in office mechanization. These aspects are deemed necessary in order to provide the basis for a concept of successful American management.

Can we afford to ignore such sound advice? Will our business ventures succeed if we fail to keep abreast of new trends? It seems most unlikely that future attainments can be achieved if there is a lack of cognizance for progressive methods of work improvement.

Macmillan has quoted a very pertinent statement contributed by D. W. Hooper: "The electronic computer is the finest tool in the field of management that has yet been devised; let us not hesitate to use it, but let us at the same time make sure that we do not misuse it."¹

The Digital Computer

Fundamentally, there are two types of computers, analogue and digital. Those of the analogue variety achieve calculations by electronic waves which measure deviations between previously known

¹R. H. Macmillan, Automation Friend or Foe? (London: Cambridge University Press, 1956), p. 77.

and presently desired conditions. They are used in many fields where the information sought is not primarily of routine nature.

The digital computer processes data by converting a sequence of electric pulses into numbers and letters. It is essentially a counting machine which adds and subtracts digits to present desired information. The machine consists of five components: input, control, arithmetic, memory, and output. These computers are most appropriate for office mechanization.

Levin (29) stated that the typical business problem requires little computation, but necessitates repetitive processing of many data. A digital computer can perform the requisite arithmetic operations with amazing speed and accuracy. Such a machine is able to add, sort, and compare information without human intervention.

There is one very important aspect which must be considered in the use of electronic data processing equipment. It is necessary to plan and prepare detailed instructions for the tasks which the machine is to accomplish. "Programming" is the term used to describe preliminary planning of computer activities. Pyke (38) stated that the designer or operator must do all thinking beforehand; and, that the effectiveness of the machine's performance depends on the initial human directions it receives.

For practical purposes, detailed information concerning the engineering and mathematical features of a digital computer is not included in this section. It suffices to present a brief description of pertinent terms and to maintain that office clerical duties respond well to machines of this type.

Terminology

Computer - an electronic machine which performs calculations.

Digital Computer - an electronic machine which operates with information represented in digital form.

Input Device - mechanical equipment which transmits information to be processed to the computer. Examples: punched cards, magnetic tapes.

Main Frame - the functional center of the computer containing:

Control Unit - which sets up instructions for the machine.

Arithmetic Unit - which performs all the mathematical operations.

Memory Unit - which stores information necessary to perform the required computations.

Output Device - equipment which receives processed information and converts it into intelligible form. Examples: printers, electric typewriters.

Programming - the preparation of detailed instructions which activate the computer's control unit.

MANAGEMENT INFORMATION SYSTEMS

Electronic data processing equipment represents a substantial monetary investment. Every operation does not sufficiently respond to computer techniques in order to justify such expenditure. Therefore, it behooves management to undertake a thorough investigation before installing electronic equipment. Pyke (38) stated that the first task of those considering automation is to decide if it will accomplish work more economically.

A systems and procedures analysis can provide desired information relative to the wisdom of adopting data processing methods. Executives are advised to solicit assistance in evaluating their current modes of work accomplishment. Management consultant firms or representatives of computer manufacturing concerns can supply valuable help in the appraisal. Greater objectivity usually results in analysis by those who are unfamiliar with the operation. They are not as prone as management to continue using a particular form primarily because it is celebrating its golden anniversary.

There are many aspects of information-handling which must be considered in examining current office practices. They include the types of data and purposes which they fulfill; the paper forms used to record information; the methods of processing the incumbent forms; the number of employees and total work hours required to perform the clerical tasks; the cost of labor involved; the manner in which processed information is utilized; the speed with which stored data is rendered accessible; and, the availability of equipment funds.

Thorough investigation of the existing operation permits the analyst to recommend work-improvement methods. If the installation of electronic processing equipment is advocated, an approximate cost

of the new system is determined, as well as the estimated savings to be realized in time and labor. However, in the final evaluation, management must decide whether to accept or reject the proposals.

The ramifications of economic savings versus the sociological problems of technical unemployment rarely balance sufficiently well to permit an easy choice.

OFFICE MECHANIZATION FOR HOSPITAL FOOD SERVICE

A review of the literature clearly established the fact that information-handling responds effectively to electronic equipment. Since clerical tasks in the hospital dietary department are primarily routine, it can be hypothesized that they will be easily accomplished by computers. Therefore, this section of the study will be devoted to ascertaining the feasibility of office mechanization for hospital food service.

Dietary Department Clerical Problems

The shortage of qualified dietitians has become increasingly prevalent. It is evident that the days of selecting from a number of applicants for a vacant position belong to ancient history. Current administrators deplore the fact that it is frequently impossible to encounter any applicants for existing vacancies.

A study of 118 hospitals was recently conducted in New York State (6). The results indicated that vacancies existed in three percent of the total budgeted positions in the dietary departments questioned; twenty-nine percent of those vacancies were in the professional category. Although the study represented a minute segment of the national picture, it was of significant interest.

Despite the scarcity of dietitians, observations and studies indicate that many who are employed are performing tasks which do not require professional training. Paper work and clerical duties absorb valuable supervisory time. Wright (43) reported a 1951 survey of fifty hospitals, in which eighty-three percent of the food service directors were copying daily diet sheets. She questioned if we can

afford to use professional help in this manner. It was her belief that many of the clerical tasks could be performed by non-skilled personnel. Northrup (36) stated that if the dietitian remains a detailist, absorbed in routines, she will realize ultimate defeat and a poorly operated department.

The foregoing admonishments present a challenge to active members of the dietetic profession. They must undertake the task of eliminating the misuse of their skills and abilities. This problem is further complicated by the fact that the amount of paper work in the dietary department has increased tremendously. The introduction of selective menus and increased demands, by other departments, for cooperative improvement in patient care are partially responsible for the additional clerical tasks. Unfortunately, poor administration often contributes its share to needless paper duties.

It is proposed that creative thinking may well eliminate some of the detailed chores which are not considered necessary. Another alternative suggests that unskilled employees be trained to perform those duties which must be retained. Warren L. Ganong (20,21), hospital management consultant, advocates the use of automation in the dietary department. He believes that, with sufficient study, every work method can be improved.

The literature is far from devoid of statements which predict that the use of electronic equipment will contribute to the sociological problem of unemployment. Other comments indicate that it will permit the business to expand its services appreciably, necessitating an increase in the labor force. Neither of these views should provoke concern among dietitians in considering the use of mechanized control. Their problem is to attain the best method for eliminating unnecessary duties in a seriously depleted professional category. Electronic data processing does offer a possible solution to the excessive paper work characteristic of most hospital food services.

Inquiries Relevant to Mechanization in Food Service

The companies which are presently engaged in the manufacture of electronic computers are too numerous to mention. They are located throughout the country, and include familiar business names as well as those which represent recent invasions of the market. The types of machines which they produce vary with the purposes for which they are designed. Performance requirements are met by simple computers, which are capable of calculating one "program," and range to complex machines, which are able to process many "programs" of exacting demand.

Three firms were selected for non-directive interviewing through personal visitation. They included Minneapolis-Honeywell Regulator Company, Itek Corporation, and International Business Machines Corporation. Attempts were made to obtain information which would determine the feasibility of using a digital computer in performing some facets of the dietitians' paper work. Copies of forms currently used in the dietary departments of two United States Public Health Service Hospitals¹ provided a basis for inquiry. They included food production and distribution sheets, individual patient menus, and subsistence inventory cards.

Each company representative advocated that most food service clerical problems could find easy solution in a relatively simple data processing system, with input-output devices employing mark-sensed and punched cards. The task of obtaining the daily production totals for various food items could be easily determined without imposing upon the calculator's memory unit. Recorded issuance of subsistence items would entail one program for machine computation.

¹United States Public Health Service Hospitals at New Orleans, Louisiana, and Staten Island, New York.

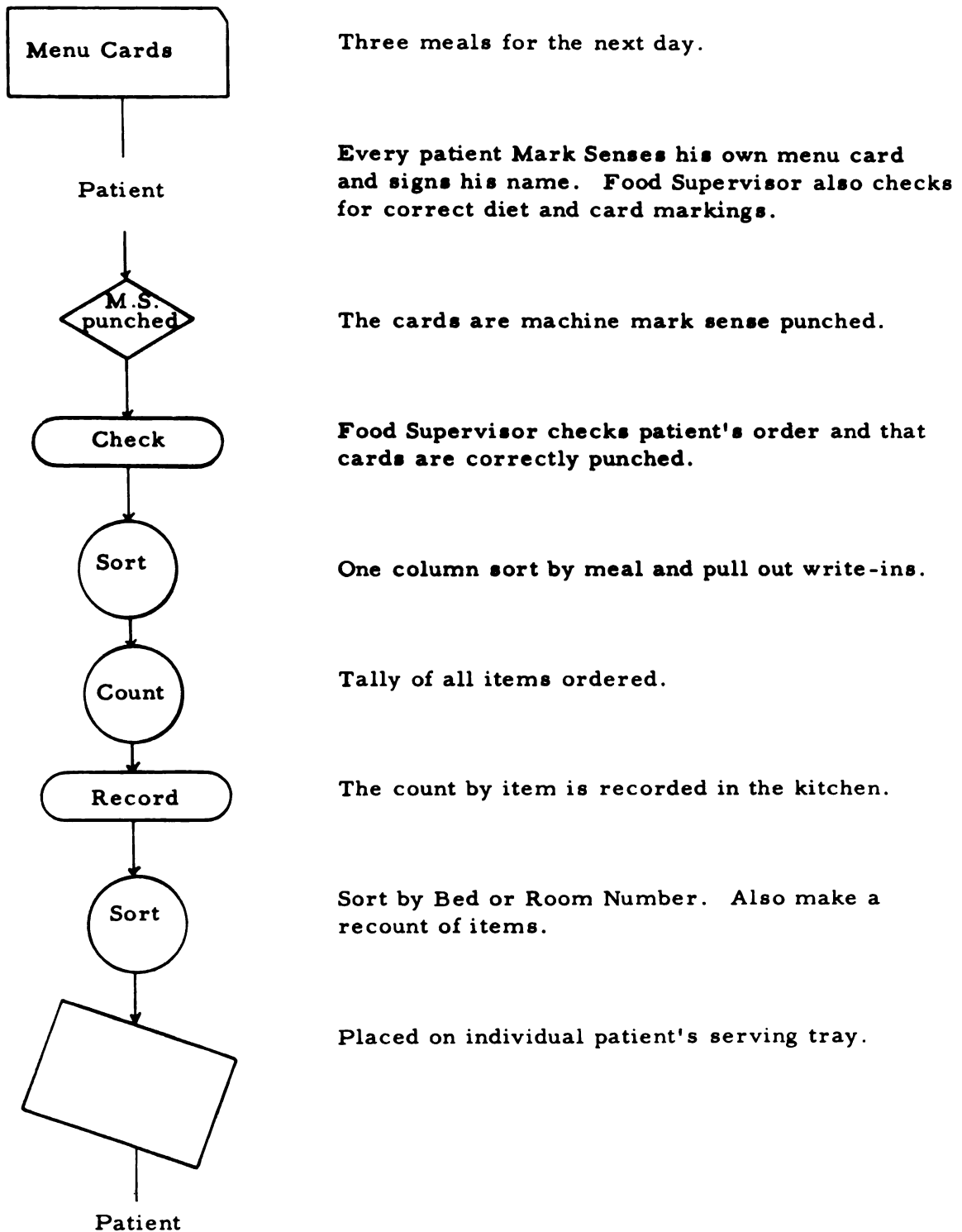
The price of equipment increases as the computer's memory unit is enlarged. Exorbitant cost and the absence of desired input-output devices remove two of the companies from further consideration. Minneapolis-Honeywell produces machines which, because of their ability to store information, are suited to research and scientific calculations. Utek computers are manufactured to service Military Systems, and concentrate on large capacities for information retrieval. The simplicity of dietary department clerical problems would be an insult to such electronic "brains."

Valuable assistance was obtained from Mr. Jack Rockhart, a representative of International Business Machines Corporation in Boston, Massachusetts. IBM has invaded the area of hospital accounting to such an extent that they have established a separate division dealing exclusively with problems in that field. Their "General Information Manual" on the subject provided a valuable guide for the possibilities of data processing in various hospital units.

One section of the publication, "Menu-Matic Service" in the dietary department, is of relevant significance. Although it is primarily designed for hospitals offering selective menus, it can be adapted to other types of meal service and food production (see Figure 1).

This system employs the least intricate type of equipment to obtain desired information. Individual cards are mark-sensed with a special pencil which leaves a carbon deposit. They are then run through the reproducing machine, where the marks are converted into punched holes. All counting and tallying is accomplished by inserting the punched cards into a sorter, equipped with a counter. The current rental cost of the equipment approximates one hundred and seventy dollars monthly. Cards, in a variety of colors and designs, are available for slightly over one dollar per thousand. An unskilled employee can be taught to operate the required machinery in less than one day.

Figure 1

MENU-MATIC SERVICE*

* International Business Machines Corporation

IBM also recommends that a systems analysis be completed before definitely deciding to install data processing. In a dietary department this would include a detailed study of present procedures and forms; determination of the total work hours spent in completing clerical tasks; the number of personnel performing these duties; the cost of required machines; and, an estimate of the savings in time and money to be realized by the installation of the system.

Every evaluation does not result in positive recommendations. The dietary department in a hospital of less than two hundred bed capacity would usually find the cost of equipment to be prohibitive and the total savings in time to be negligible. However, such a department might advantageously use a computer which functions for other units in the hospital. IBM reports that many companies are not utilizing their present electronic equipment to full advantage. .

A number of larger hospitals are using the "Menu-Matic System" effectively, with variable savings in time, personnel, and money. No formula exists for predicting the exact savings to be realized in all institutions of a given size. The problems to be solved are individual with each dietary department.

Programming the information to be processed is the most time-consuming factor encountered. This involves placement of the material to be computed on the cards in the most efficient and effective manner. Once this task is completed it need not be repeated unless future changes in methods or objectives are desired. The mechanical fulfillment of the initial program is a relatively simple operation.

A Dietary Department Computer Program

Various adaptations of the basic IBM system have been installed in a number of dietary departments. The Memorial Hospital, Wilmington, Delaware, was a pioneer in this field. Lowder and Medill (30) indicated

that the key to success was a well designed card, containing the desired menu items with the necessary coding information for processing.

The daily menu, at Memorial Hospital, was mimeographed on individual cards, with a different colored strip to distinguish each meal. After breakfast, every patient received three cards to be marked for the following day's selections. The completed cards were collected after lunch; checked for accuracy; separated according to meals; and, placed in the reproducer for processing. Total counts of each food item for all three meals were obtained from the sorter within ten minutes. This provided information for preliminary food production planning.

When the first count was tallied, the cards were returned to the sorter, to be arranged in serving order. At the completion of this process, in less than seven minutes, they were placed in visible card holders. This method of handling permitted easy access for making diet changes. Cards for admissions and discharges were added or deleted as necessary. A final production count was obtained on the following day by re-processing the cards approximately forty minutes prior to the service of each meal. As a result of this system, speed and accuracy were increased and food waste was decreased.

Absence of other pertinent information made an evaluation of the Memorial Hospital operation impossible. The report did not mention the length of time which was required in preliminary programming; the total number of employee work hours which were saved; or, the monetary gain, if any was realized. Attempts to obtain additional enlightenment, through personal correspondence, yielded negative results.

An Appraisal

The foregoing information provokes many ideas for thought. A resultant appraisal leads one to conclude that there are both advantages

and disadvantages in the use of electronic data processing in the dietary department. Management must consider all aspects carefully before making a definite decision to install this type of equipment.

In many instances, the "Menu-Matic System" definitely affords an opportunity for decreasing the total work hours devoted to paper work. This is especially true in larger institutions. Certainly a hospital which requires thirty or more hours daily to prepare total counts for food production and distribution can find relief in data processing. Valuable time can thus be released for supervisory duties.

The prospect of less expenditure of time to complete these tasks implies monetary savings through lower payroll costs. Fewer personnel are required to achieve desired results. Several dietary departments are presently accomplishing this work with four or five less people than former methods necessitated.

There is no doubt that the sorter increases the speed and accuracy of tallying the amounts of food items to be prepared. The possibility of obtaining last minute counts for production is of valuable assistance in eliminating waste and unnecessary food cost. This aspect alone promotes favorable consideration in some instances.

Conversely, one can ascertain disadvantages to the system. More time is required for the preliminary programming than is implied. The final results of planning efforts do not always attain efficiency of operation. This fact can prove to be most discouraging when repeated revision is necessary.

In some operations, limited dimensions prevent inclusion of all necessary menu items on one card. Of equal concern is the problem that the processed forms frequently prove difficult to read for accuracy in dispensing requested foods. These faults preclude efficiency and require unanticipated expenditure of supervisory time.

Plans to utilize computers which are primarily installed for use in other departments do not always materialize. The machines are often unavailable at designated or requested hours. An additional enigma arises in determining whether a member of the dietary department or outside personnel will perform the operation in the hospital area which contains the equipment.

One must also consider that installation of the described system does not eliminate the possibility of error. In the final analysis, it can be classified as a semi-automatic arrangement. The contribution of human effort is still required in the initial preparation and terminal checking of processed material.

Despite numerous disadvantages, office mechanization procedures offer a practical solution to the clerical problems which are inherent in many dietary departments. Furthermore, there is no reason why dietitians can not exert concentrated efforts to abolish the existing defects in data processing systems. Creative thinking affords great possibilities for future work methods improvement. An environment of creativity provides excellent insurance against professional absorption in superfluous routine tasks. Amidst such atmosphere, the dietetic profession can not ignore the benefits which hospital automation promises.

BIBLIOGRAPHY

1. Adler, I. Thinking Machines. New York, The John Day Co., 1961.
2. Administration of Electronic Data Processing. Studies in Business Policy, No. 98. National Industrial Conference Board, 1961.
3. Becker, E. R. and Murphy, E. F. The Office in Transition. New York, Harper & Brothers, 1957.
4. Bell, W. D. A Magnificent Guide to Electronic Computers. New York, McGraw-Hill Book Co., 1957.
5. Bello, F. "How to Cope With Information," Fortune, LII (September 1960), 162-167.
6. Bloetjjs, M. K., Gottlieb, R., and Couch, M. A. "A Study of Dietetic Training," J. Am. Dietet. A., XXXV (July, 1961), 32-34.
7. Blumberg, M. S. "Hospital Automation: The Needs and the Prospects," Hospitals, XXXV (August 1, 1961), 34-43.
8. Brown, R. H. Office Automation: Integrated and Electronic Data Processing. New York, Automation Consultants, Inc., 1955.
9. Booth, A. D. Automation and Computing. New York, The Macmillan Company, 1959.
10. Bright, J. R. "Are We Falling Behind in Mechanization?" Harvard Business Review, XXXVIII (November-December 1960), 93-106.
11. Bright, J. W. Automation and Management. Boston, Harvard Business School Publication, 1958.
12. Buckingham, W. Automation. New York, Harper & Brothers, 1961.

13. Canning, R. G. Installing Electronic Data Processing Systems. New York, Wiley & Sons, 1957.
14. Chapin, N. An Introduction to Automatic Computers. Princeton, N. J., Van Nostrand, 1957.
15. "Computers Start to Run the Plants," Business Week, MDCXXVII (November 5, 1960), 50-78.
16. Darrow, D. W. "Planning for Electronic Data Processing in the Hotel." Unpublished M. A. Thesis, East Lansing, Michigan, Michigan State University Library, 1961.
17. Diebold, J. "Office Automation: Is Management Getting Its Money's Worth?" American Management Association, The Management Review (September 1958).
18. Downs, E. "Three Looks at Hospital Food Service in the Sixties." Hospitals, XXXIV (January 1, 1960), 66-68.
19. Dreher, C. Automation: What It Is, How It Works, Who Can Use It. New York, W. W. Norton & Company, Inc., 1957.
20. Ganong, W. L. "Automation in Food Processing and Serving," J. Am. Dietet. A. XXXVIII (February, 1961), 119-121.
21. Ganong, W. L. "Work Simplification and Measurement," J. Am. Dietet. A., XXXVIII (February, 1961), 122-127.
22. Grabbe, E. M. Automation in Business and Industry. New York, John Wiley & Sons, Inc., 1957.
23. Grapski, L. F., Throne, M. N., and Sherber, J. "Central Data Processing Planned for Maryland Hospitals," Hospitals, XXXV (August 1, 1961), 41.
24. Gregory, R. H. Automatic Data Processing Systems--Principles and Procedures. San Francisco, Wadsworth Publishing Co., 1960.
25. Jacobson, H. B. and Roueck, J. S. Automation and Society. New York, Philosophical Library, Inc., 1959.
26. Keenoy, C. L. Automation and the Accountant. In Jacobson, H. S. and Roueck, J. S. Automation and Society. New York, Philosophical Library, Inc., 1959.

27. Kozmetsky, G. Electronic Computers and Management Control. New York, McGraw-Hill Book Co., 1956.
28. Laubach, P. B. Company Investigations of Automatic Data Processing. Boston, Division of Research, Graduate School of Business Administration, Harvard University, 1957.
29. Levin, H. S. Office Work and Automation. New York, John Wiley & Sons, 1956.
30. Lowder, W. and Medill, C. "Punch Cards Simplify Selective Menus," Modern Hospital (January 1958), 102-106.
31. Macmillan, R. H. Automation Friend or Foe? London: Cambridge University Press, 1956.
32. Management's Role in Electronic Data Processing. Studies in Business Policy, No. 92. National Industrial Conference Board, Inc., 1959.
33. "Mechanize Your Paper Work," Volume Feeding Management, XII (February, 1959), 36-40.
34. Miller, B. "Gaining Acceptance for Major Methods Changes." AMA Research Study 44. American Management Association, 1960.
35. Neuschel, R. F. Management by System. New York, McGraw-Hill Book Co., 1960.
36. Northrup, M. W. "Which Road for Dietitians?" Hospitals, XXXIV (May 1, 1960), 68-73.
37. Postley, J. A. Computers and People. New York, McGraw-Hill Book Co., 1960.
38. Pyke, M. Automation: Its Purpose & Future. New York, Philosophical Library, Inc., 1957.
39. Rusinoff, S. Automation in Practice. Chicago, American Technical Society, 1957.
40. Sanford, S. J. Management Approach to Electronic Digital Computers. London, McDonald & Evans, 1957.

41. "The Automation Jobless," Time, LXXVII (February 24, 1961), 69.
42. Veillette, P. T. The Rise of the Concept of Automation. In Jacobson, H. B. and Roueck, J. S. Automation and Society. New York, Philosophical Library, Inc., 1959.
43. Wright, M. J. "The Precise Art of Delegation," Hospitals, XXXIV (July 16, 1960), 85-89.

SCHOOL OF HOME ECONOMICS
MICHIGAN STATE COLLEGE
EAST LANSING, MICHIGAN

Problem

Wernock, Letitia W.

The Practicability of Office

Mechanization Procedures

in a Hospital Dietary Department

MICHIGAN STATE UNIVERSITY LIBRARIES



3 1293 02429 2900