ASSESSMENT OF COMPUTER USES IN TEXAS UNIVERSITY AND COLLEGE FOODSERVICE

THESIS

Presented to the Graduate Council of the University of North Texas in Partial Fulfillment of the Requirements For the Degree of

MASTER OF SCIENCE

By

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The purposes of this study were to identify current uses of computers by university foodservice operations and to determine if there are any differences in computer use among university foodservice operations.

The twelve university foodservice directors who responded to the research questionnaire varied significantly in their computer usage and computer characteristics. Institutions serving more than 1,000 meals per day represented 91% of the sample using computers. Chi Square analysis found a significant use of menu-costing programs. The computers were used more than six hours a day by 75% of the sample.

The problems relating to hardware and software selection indicate a lack of assessment of operational needs for foodservice operations. Guidelines to assist foodservice directors in computerization are needed.
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CHAPTER I

INTRODUCTION

The foodservice industry today is more complex than ever. Even fast food chains, which offered limited menus in the past, now may serve thirty item menus during breakfast, lunch, and dinner. Today, commercial foodservice operations change their menus frequently, promote specials, offer take-out items and serve elaborate brunches on weekends. In addition to these changes, the foodservice operators must control all their resources. They cannot afford to waste personnel, money, or time (Vanegemond 1985).

The changes within the commercial establishments have also affected the university foodservice systems. Cash sales have taken on an important role. Major changes that are occurring within university foodservice organizations include the introduction of cash operations, a la carte programs, nontraditional board plans and greater variety in menus (Spears 1985). In addition, the increased size and complexity of the operations have made the management task difficult and complex.

The task of managing today's modern university foodservice operation is usually complex because nutritional considerations must be combined with sound management
techniques. Furthermore, like everything else, foodservice costs will continue to increase. Without using every available means to implement maximum management controls throughout each facility, many university operators will find themselves in serious difficulty (Boehner 1985, 8).

An efficient computer system can help the foodservice operators coordinate many elements of their organization into a cohesive flow (Eudy 1985, 59-60). As a result, their employees will be more productive, and their customers will be much happier.

Realizing that a computer can be of great benefit to the university foodservice operator is only the first step in a complex process. Few managers are accustomed to the involved process of implementation and utilization of a computer system (Boehner 1985, 8). The difficulty for most people is the newness of the technology and the vocabulary, the variety of the computer systems available in the marketplace and the unfamiliarity of it all. Many university foodservice operators spend unnecessary money and time on a system because they do not know how to evaluate it in practical terms (Raffio, Helene, and Gindin 1983). Today, assessing the needs of the university foodservice operation is an essential part of the computerization process.

Statement of the Problem

There is a great deal of confusion among university foodservice operators concerning their need for a computer
system. This confusion exists because university foodservice operators may not be able to identify their particular computer needs. An assessment of current computer utilization among university foodservice operations is needed.

**Purpose of the Study**

The purposes of this study were to identify the current uses of computers by the university foodservice operations in the state of Texas and to determine if there are any differences in the computer use among these university food service operations.

**Objectives**

The specific objectives of this study were to:

1. design and administer a questionnaire to identify current university foodservice computer systems within the State of Texas and determine uses of the computer by these food service facilities.

2. determine the extent of knowledge of the university food service operators about their computer systems.

3. present a summary of computer utilization within university foodservice operations.

**Significance of the Study**

This study is significant because the data gathered will provide the university foodservice operators with information on computer applications in university
foodservice operations of different sizes and geographical locations in Texas. This data will aid the university foodservice operators in helping them to understand how the computer could be utilized in their particular operation.

Limitations of the Study

The following are considered limitations of the study:

1. This research included only those foodservice operations that currently utilize a computer system.

2. Since there have been no similar studies available for reference, comparison of findings was difficult.

3. An adequate sample size was not obtained because of the limitation in the number of university foodservice operations that currently use a computer in their operation.

Hypothesis

To carry out the purposes of the study, the following research question was asked: Is there a difference in computer use among university foodservice operations in the state of Texas?
CHAPTER II

REVIEW OF THE LITERATURE

A Historical Perspective of Computer Use in Foodservice

In 1962 Tulane University initiated research to investigate the use of computer technology in foodservice management. As a result, Computer-Assisted Menu Planning (CAMP) was designed to plan low cost menus that met criteria for nutritive values, menu pattern, and frequency offering (Balintfy and Nobel 1966, 88). This research showed that computer utilization for dietary management was feasible. Four hospitals (Sace Mayo Hospital, U.S. Public Health Service Hospital, and West Jefferson Hospital, all in New Orleans, and University of Missouri Medical Center, Columbia) tested the program (Balintfy 1971, 92).

The University of Missouri Medical Center has continued to develop computer applications, especially in the area of food service management. By 1968 staff members could discuss four subsystems which were either in operation or in planning stages (Andrew and Tuhill 1968, 117). These included an inventory system that automatically produced purchase orders, maintained a perpetual inventory, and costed food purchases; a food cost accounting system that separated cost of food by service; a menu planning system;
and a micrologistic system designed to coordinate flow of food from storeroom to production area.

In 1980 faculty members at the University of Missouri described their upgraded and sophisticated food cost accounting system in which fiscal reports provided managers with quick access to the data critical to decisions related to revenue and expenses (Fromm and Moore 1980, 170).

Ten years ago, in an effort to computerize their food service operations, thirty college and hospital foodservice departments leased a state-of-the-art computer software system. A great deal of money was spent on both hardware and software before the project was dissolved for monetary reasons (Raffio, Helene, and Gindin 1983).

Over time, significant accomplishments have been made in the use of computer technology in foodservice management. As the cost and mystique of computers have decreased, foodservice operators' interest in computerizing their establishments has increased.

Today's university foodservice operators realize that not only buying a computer, but also operating it, is affordable. They realize that once they overcome a reluctance to enter the world of computerization, a computer can help their business in more ways than one. Computerization of a foodservice operation can increase controls of financial matters, relieve managers from extra work load, increase productivity, improve customer service,
and provide management with sound information on a timely basis (Demarco, Mann, and Mason 1967, 41).

Currently foodservice computer systems are designed to handle many different applications (Bowman and Bernnan 1969, 107; Vanegemond 1985, 20; Brisbane 1964, 453-455; Demarco, Mann, and Mason 1967, 88-93; Raffio, Helene, and Gindin 1983; Fromm, Moore, and Hoover 1980, 170-174; Guley and Stinson 1980, 482-485; David 1973, 80). Computer generated information or assistance can include the following:

1. Menu planning--planning, analyzing, precosting, printing.
2. Forecasting--purchasing, order operation, inventory, cost analysis.
4. Production--recipe adjustment.
5. Point of sale--employee time cards, employee meals.
7. Word processing--memos, reports, menu printing.
10. Scheduling--labor costs, production.
12. Management information--food cost reports, budget reports, supply/inventory reports, personnel scheduling, payroll reports, income statements.

13. Service--employee training, reservations, marketing.

Several computer programs have been developed to meet the specific needs of the foodservice operations. Some of the more popular computer applications in foodservice management are:

1. Menu planning and printing. Computer-assisted menu planning is a tool that can be used by the foodservice operators to meet predetermined criteria such as nutrient value or cost. Computer-assisted menu planning bridges a gap between applications unique to foodservice or to clinical dietetics. Several institutions report use of or guidelines for developing computer-generated menus (CAMP, GP 1968, 153). Various benefits of planning and/or printing menus by computer include providing greater control of food service operations (Bowman and Bernnan 1969, 107), controlling cost (Raskin 1970, 102), and allowing dietitians to spend more time in patient care (Hartman 1969, 178).

2. Forecasting. The importance of forecasting food and labor needs as a component of decision making is growing with the need to contain costs. The ability to predict accurately the quantity of food needed for a specified
period of time dramatically influences inventory stock levels as well as labor requirements.

Even though production demand forecasting was discussed in the early 1970's (Urich and Noort 1979, 106), only in the last half of the decade was significant research and development reported. The University of Wisconsin reported the development, implementation, control, and evaluation of a computer-assisted forecasting system which required the two major inputs of a cycle menu and historical usage data (Tienor and David 1976, 460). Forecasting based on menu item demand was found to be more accurate than forecasting based on diet category demand because of the complexity of categorizing multi-restricted diets.

In a study of the cost/benefit of computer-assisted forecasting, menu item forecast errors were approximately 40% less than costs of the manual forecasting systems (Messersmith and Moore 1978, 509).

3. Production control. One suggested means of combating skyrocketing costs in foodservice management is implementation of a computer system designed to increase foodservice efficiency, effectiveness, and productivity (Williamson 1975, 499). In a computerized system, as well as in a conventional system, data can automatically be generated regarding food requirements, standardized recipes, ingredient control, work schedules and distribution, purchasing requirements, cost analysis, and nutrient
analysis. Some efforts toward this include computerization of data regarding food production and entree serving times (Beach 1969, 290).

4. Recipe adjustment. The factor method and the percentage method are two techniques for adjusting recipes. The computer system developed at Kansas State University uses the percentage method in which ingredients are converted to weights and listed by the percent of the total weight they represent (Torrence 1976, 407). The system requires a food item file and a master recipe file to determine the amount of each ingredient needed on the basis of the forecast, portion size, and number of portions required for each menu item. Food item requirements, as derived from standardized recipes, are totaled for a seven-day period and are printed on a computer-generated order form which includes an inventory adjustment column for manual adjustment of the order based on current inventory.

5. Inventory control/purchasing system. Over time the sophistication of the computer-based inventory system has increased to better meet the needs of the user. As early as 1966, the University of Missouri described its perpetual inventory system, which required five inputs for each transaction (Hospitals 1966, 158). These included the type of transaction (requisition or removal) from the storeroom, delivery to the storeroom, order sent, or adjustment due to physical inventory), a five digit code number for each food
which categorized and subcategorized a food into a group and subgroup, the quantity in number of stock units; the kitchen area requisitioning the food (i.e., kitchen, cafeteria); and the code number of the person recording the transaction.

The system was programmed to produce reports of the amount of food to buy based on the amount on hand and the minimum/maximum stock levels. It was also based on daily and monthly reports that specified the amount and cost of food items and food categories and the value of the inventory and food issues based on purchase price. Greater speed and detail of inventory reports was cited as a major advantage of the system.

6. Nutrient analysis. Computerized nutrient analysis has gained momentum as dietitians, nutritionists, and foodservice directors document the speed and accuracy of obtaining detailed nutrient information or reports generated by data processing (Flook 1974, 62). This information can assist the nutritionist, dietitian or foodservice director to offer nutritionally adequate menus to their clients. They can also be used for educating individual clients about their diets.

The standardization of a data base for nutrient analysis is, however, a concern of professionals (Bisbane 1969, 92). The USDA is presently establishing a nutrient data bank and acting as a clearing house for research regarding the nutrient values needed for specific food items.
(Watt and Gibhardt 1974, 257). Several nutrient analysis programs based on various data bases have been developed and in some cases are commercially available. It is the responsibility of each institution to pick the system most suitable for them.

7. Foodservice administration. A major application of computer technology is the generation of timely information to facilitate food and labor cost accounting and containment (Tuhill 1980, 479). An example of this application is presented in the "Historical Perspective" section of this chapter.

A second administrative application is personnel management. At the University of Missouri, Columbia, a personnel data system stores information such as employment data, personal information, attendance, and termination and produces six labor-accounting reports (Moe, Hoover, and Moore 1979, 448). Another institution suggests computer-assisted performance evaluation as an easy-to-use, objective means of preventing inflation in the evaluation process (Schick 1980, 47).

Third, administrators have reported computer use as a form of clerical support. Computer-generated menus are reported by certain institutions to be more cost-effective than manually typed, and photocopies (Bergaila 1977, 185).

A fourth administrative application is the use of the computer as a decision support system. Managers can
evaluate various alternatives through simulation without actually implementing the alternative. Simulation uses are reported for determining dining room seating capacity (Knickrehm 1966, 199), measuring preference for menu food items (Balintfy 1975, 15), testing alternatives to expand storage space for frozen foods (Balondeau and Davis 1971, 362), measuring the effect of varying the number of entree selections (Matthews and David 1971, 575), and altering production scheduling for a ready food system (Geeley and Stinson 1980, 482).

These programs may not meet the particular needs of a foodservice operation. Foodservice operators do not have guidelines to help them in assessing the proper system selection to meet their operational needs. An important first step in this process is the identification of current computer utilization within university foodservice operations.

Making the Choice

Increasingly, foodservice operators are turning to computers in an effort to increase productivity and efficiency. Many have been successful, many have not. To help ensure successful computerization, foodservice operators need to shop for a computer only after they have acquired an understanding of the computer applications that may be appropriate for their operation and after a thorough evaluation of their operations' needs (Fromm, Moore, and
Often people buy the best looking, the cheapest, or the best known computer without understanding whether it will meet their organizations' needs.

To help the university foodservice operators make an intelligent decision on purchasing their computers, informative and specific guidelines are necessary. Unfortunately, not much research has been done on the specific computer uses and needs of university foodservice operations.

Of the few guidelines developed today, one is by Joseph A. Mark and Richard G. Moore of the School of Hotel Administration, Cornell University. The researchers developed a model for hotel management computer systems. Their model emphasizes the following steps before purchasing a computer for a hotel foodservice operation (Marko and Moore 1980, 60-70).

1. Analyzing the operation
2. Preliminary review of vendors
3. Initial sales visit and site survey
4. Visits to existing system installations
5. Preparing the request for vendor proposals
6. Review of vendor proposals and vendor visitations
7. Analyzing indirect costs
8. System selection
9. Writing the contract
10. Developing an implementation schedule.

Foodservice operators must realize that the selection of a computer system involves a great deal more than just relying on the good name of a major company or believing the promises of an enthusiastic salesperson. Purchasing the wrong computer system can cost the foodservice operation a great deal of money, time, and productivity (Heller 1983, 154-158). Most of the guidelines that advise foodservice operators on how to evaluate computer systems emphasize cost justification, speed and accuracy, reliability, general accounting, financial planning and internal control (Alvarez 1980, 8; Marko and Moore 1980, 60-70). These criteria are general and unclear for most university foodservice operators who have specific needs. Guidelines for purchasing a computer system for university foodservice operations are needed. By assessing and evaluating the current uses of computers in university foodservice operations, guidelines may be developed based on these findings.
CHAPTER III

PROCEDURE AND METHODOLOGY

The Population

The population for this study was university foodservice operations which use a computer in their operations. Only universities in Texas were studied.

Selection of the Sample

A list of 50 universities located in Texas were obtained from the Yearbook of Higher Education (Yearbook of Higher Education 1983-84). The foodservice directors at these universities were contacted by phone by the researcher and asked if they used computers in their operation. If they used computers, they were asked if they would participate in this study. All twenty university foodservice operations that utilize computers were selected. For the purposes of this study a questionnaire was mailed to each of these twenty universities’ foodservice directors.

Research Design

A cover letter (Appendix, page 37) and the questionnaire (Appendix, pages 38-44), designed by the researcher, was mailed to twenty universities in Texas which used computers in their foodservice operations.
Follow-up phone calls were made to foodservice directors of the universities who had failed to return the questionnaire by the return deadline. Twelve directors, 60% of the sample, returned the questionnaire.

**Term Definition**

The following term has a restricted meaning and is thus defined for this study: university foodservice operations will be defined as an auxiliary service to provide food within a university or college which complements other activities.

**Questionnaire**

The questionnaire utilized in this study was a 32-item checklist designed by the researcher (Appendix, page 38). Content validity of the questionnaire was established through a review of relevant literature and a review by four experts in the fields of foodservice management and computers. The questionnaire was designed to identify the size of the university foodservice facility, type of computer used in the facility, and different computer functions in each university foodservice operation. It also allowed the foodservice directors to identify specific problems they have experienced in using their computers.

**Analysis of Data**

The chi-square goodness-of-fit test was used to determine significant differences in responses to each
question item. The PSTAT computer program was used to analyze the data.
CHAPTER IV
RESULTS AND DISCUSSION

A questionnaire was developed to identify current university foodservice computer systems within the state of Texas, determine uses of the computers by these foodservice facilities, and assess the extent of knowledge of the university foodservice operators about their computer systems.

Major Findings of Study

The following were the major findings of the study. There was a significant difference in computer use between university foodservice operations that served more than 1,000 meals per day and the university foodservice operations that served less than 1,000 meals per day. Computers were used by about 91% of all institutions serving 1,000 or more meals per day which suggests that larger institutions are more likely to have tasks suitable for computer applications (Table 1).

The following findings were significant at the $p < .05$ level. The majority of the facilities were computerized at a time other than during new construction and renovation of offices as indicated by a response of 66% (Table 2). Only one facility did not respond to this question.
TABLE 1  
NUMBER AND PERCENTAGE OF MEALS SERVED EACH DAY

<table>
<thead>
<tr>
<th>Number of Meals Served Daily</th>
<th>Number</th>
<th>Percent of Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>More than 1000</td>
<td>11</td>
<td>91%</td>
</tr>
<tr>
<td>500-1000</td>
<td>1</td>
<td>8%</td>
</tr>
<tr>
<td>Below 500</td>
<td>0</td>
<td>0%</td>
</tr>
</tbody>
</table>

TABLE 2  
PERCENT RESPONDENTS OF THE TIME OF THE COMPUTERIZATION OF THE FACILITY

<table>
<thead>
<tr>
<th>Time of Computerization</th>
<th>Number</th>
<th>Percent of Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>During New Construction</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>During Renovation</td>
<td>3</td>
<td>25%</td>
</tr>
<tr>
<td>Other</td>
<td>8</td>
<td>66%</td>
</tr>
</tbody>
</table>

All facilities kept their computers in an office as indicated by a response of 100%. Only 16% of the respondents indicated that they also had a computer in their kitchen (Table 3).

Almost all respondents had a national service organization for their computers as indicated by a response rate of 83% (Table 4). One director did not respond to this question.
TABLE 3
COMPUTER LOCATION

<table>
<thead>
<tr>
<th>Computer Location</th>
<th>Number</th>
<th>Percent of Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>Office</td>
<td>12</td>
<td>100%</td>
</tr>
<tr>
<td>Kitchen</td>
<td>2</td>
<td>16%</td>
</tr>
<tr>
<td>Other</td>
<td>1</td>
<td>8%</td>
</tr>
</tbody>
</table>

TABLE 4
RESPONDENTS HAVING NATIONAL SERVICE ORGANIZATION

<table>
<thead>
<tr>
<th>Response</th>
<th>Number</th>
<th>Percent of Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>10</td>
<td>83%</td>
</tr>
<tr>
<td>No</td>
<td>1</td>
<td>8%</td>
</tr>
</tbody>
</table>

Nine of ten respondents to the question used menu costing programs in their production control as indicated by a response rate of 75% (Table 5).

TABLE 5
RESPONDENTS' SOFTWARE USE

<table>
<thead>
<tr>
<th>Menu Costing</th>
<th>Number</th>
<th>Percent of Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>Production</td>
<td>9</td>
<td>75%</td>
</tr>
<tr>
<td>Other</td>
<td>1</td>
<td>8%</td>
</tr>
</tbody>
</table>
Nine of ten respondents to the question had the capability of adding terminals to their computer systems as indicated by a response rate of 75% (Table 6).

**TABLE 6**

<table>
<thead>
<tr>
<th>Response</th>
<th>Number</th>
<th>Percent of Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>9</td>
<td>75%</td>
</tr>
<tr>
<td>No</td>
<td>1</td>
<td>8%</td>
</tr>
</tbody>
</table>

All nine persons responding to the question indicated that storage capacity (additional disks) could be added to their computer systems (Table 7).

**TABLE 7**

<table>
<thead>
<tr>
<th>Response</th>
<th>Number</th>
<th>Percent of Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>9</td>
<td>75%</td>
</tr>
<tr>
<td>No</td>
<td>0</td>
<td>0%</td>
</tr>
</tbody>
</table>

Nine respondents to the question had the ability for networking in their computer systems. This was indicated by a response rate of 75% (Table 8).
TABLE 8
RESPONDENTS' CAPACITY TO ADD NETWORKING TO COMPUTER

<table>
<thead>
<tr>
<th>Response</th>
<th>Number</th>
<th>Percent of Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>9</td>
<td>75%</td>
</tr>
<tr>
<td>No</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Most respondents use their computers more than six hours per day as indicated by the response rate of 75% (Table 9). One person did not respond.

TABLE 9
EXTENT OF COMPUTER USE BY RESPONDENTS

<table>
<thead>
<tr>
<th>Hours of Use Per Day</th>
<th>Number</th>
<th>Percent of Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>More than 6 hours</td>
<td>9</td>
<td>75%</td>
</tr>
<tr>
<td>More than 4 hours</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>4-6 hours</td>
<td>1</td>
<td>8%</td>
</tr>
<tr>
<td>Less than 2 hours</td>
<td>1</td>
<td>8%</td>
</tr>
</tbody>
</table>

Although not statistically significant, because of the importance to this study, the problems that the respondents have in the use of their computers will be reported. Sixty percent of the respondents reported dissatisfaction with their present computer system. Software selection and implementation seem to be the major problems. Employee
attitude toward computerization, start up, and not having the right computer that fits the operational needs are some of the other problems listed by the respondents.

The most reported reasons for computerization of the university foodservice operations were:

1. to reduce or eliminate the need to perform repetitive tasks.
2. to save money.
3. to provide improved customer service.
4. to increase operational and internal control.
5. to access students authorized to eat.
6. to forecast food production, labor, and number of meals served per day.
7. to increase effectiveness and efficiency of ordering, storage, and shipping.
8. to increase the ability to obtain financial and historical information too cumbersome to collect manually.
9. to facilitate purchasing.
10. to produce management reports and financial statements.

A variety of reasons were reported for selecting a specific computer. Forty-one percent of the facilities made their selection because of the services offered by the computer company. Thirty-three percent of the respondents did some research. Eight percent of the respondents selected a computer that was compatible with other computers.
in the university. Eight percent of the respondents made their selections based on a salesperson's recommendations. Eight percent chose a specific computer because of advertisement and eight percent selected a certain system after identifying their needs.

Fifty percent of all the facilities using computers in this study invested between $12,000 to $100,000 on their computers. Forty percent did invest over $100,000.

Fifty-eight percent of respondents used a personal computer on the job. Thirty-three percent used minicomputers and thirty-three percent used mainframe, time shared inside institution, outside facility. Sixteen percent used personal computers at home and sixteen percent used mainframe, time shared, outside institution.

There were a variety of national computer brands reported. About fifty percent reported using an IBM computer. About thirty percent of respondents reported using a Honeywell computer. Apple, McIntosh, and DEC POP II were some of the other computers used by the respondents.

An equal number of facilities used a custom or a packaged software in their systems. Fifty percent used custom software and fifty percent used packaged software.

Menu planning software was mostly used for forecasting (75%), analysis (66%), planning (66%), and printing (66%).

Purchasing software systems were used for cost analysis (75%); inventory (75%); order operation (66%);
forecasting (58%); and other (33%) which includes post costing, daily purchase record, identifying lowest big.

Nutrient analysis software systems were used for caloric control (33%) and other (16%).

In relation to production, computers were used for recipe adjustment (83%) and other (33%) which includes production sheets, purchase orders, menu printing, forecasting, record keeping, and distribution.

Point-of-sale software systems were used for employee time cards (25%), employee meals (46%), and other (25%) which includes university identification systems, student meal count, and cash operations.

Spreadsheet software systems were used for budgeting (41%); payroll (25%); and other (33%) which includes cost reports, daily purchase records, accounts payable, and analysis of various factors of business.

Wordprocessing software was used for memos (41%), reports (33%), and menu planning (33%).

Graphics software was used for reports (16%), advertisement (16%), and other (16%) which included memos.

Menu costing software was used for production (75%) and other (8%) which includes cost and production.

Scheduling software programs are used for labor cost (25%).
Statistics software programs are used for costing information (41%), payroll (33%), and profit/loss status (33%).

Management information software programs were used for food cost reports (83%), supply/inventory reports (83%), payroll reports (33%), budget reports (33%), income status (33%), balance sheet (25%), and personal scheduling (8%).

Service software programs were used for employee training (25%).

About 75% of all computers in use could have terminals added to them and 75% could have additional drives added to them if the need arises.

About 75% of the respondents used their computers more than six hours a day.

User's Profile

A variety of people used the computers in these facilities. Secretaries were reported as using the computers the greater share of time (58%), followed by dietitians (41%), foodservice directors (33%), and bookkeepers (33%).

Individuals using the computers were reported as having the following training: orientation by manufacturers (41%), formal training (41%), computer specialists (25%), and on the job training (8%).
Summary

The twelve university foodservice directors who responded to the research questionnaire varied significantly in their computer usage and computer characteristics. Institutions serving more than 1,000 meals per day represented 91% of the sample using computers. Chi Square analysis found a significant number of institutions computerizing at a time other than construction and housing the computer in an office rather than kitchen. A significant number used a national service organization. The number of respondents using menu costing programs; and having capacity to add terminals, disks, and networking to their computer systems was significant. The computers were used extensively, more than six hours a day by 75% of the sample.
CHAPTER V

CONCLUSIONS AND RECOMMENDATIONS

Due to a number of economic factors, the task of managing today's university foodservice operations is becoming more complex. The economic utilization of all resources in food production is a major goal of all foodservice managers. As the costs of labor, food, energy, and equipment increases, new approaches to decision making will be required to control these resources. Therefore, a management tool is needed to assist the university foodservice directors in efficient management of their operations.

An efficient computer system can assist the university foodservice operators in increasing productivity while decreasing food and labor costs. Although very advanced in other fields, the total concept of computerization is relatively new to most university food service operators.

The primary purpose of this study was to identify the current uses of computers by the university foodservice operations in the state of Texas and to determine if there were any differences in the computer use among these university foodservice operations.
A questionnaire was developed by the researcher and administered to twenty university foodservice operations in Texas which utilized a computer in their facility. Twelve questionnaires were returned, representing a 60% rate of return. Each question was measured for frequency of response. Descriptive data were analyzed using the chi-square goodness-of-fit test.

The findings obtained from the analysis of data answered the research question: Is there is a difference in computer use among university foodservice operations in the state of Texas? There is a difference in computer use among university foodservice operations in the state of Texas and this difference mainly relates to the size of the foodservice operation as indicated by the number of meals served per day. Of 50 universities in Texas, 20 utilize computers in food service. Of 12 directors from the 20 universities who responded to the questionnaire, 11 served over 1,000 meals per day.

These findings may indicate that university foodservice operators who serve more meals per day find the computer a more cost effective tool than their colleagues who manage smaller operations. The more meals served means having more repetitive paper work for the supervisory staff, requiring more labor and having a higher food and beverage cost. Today's university foodservice operators need to use every available means to contain cost, and so computers become a
valuable tool in managing their operations. Furthermore, the greater number of meals served generates a higher revenue for the operation which in turn will pay for the computerization cost. Since a larger university is more likely to use computers in other areas of the school, it may be easier for the foodservice operators to convince administrators of their need for a computer system.

Although computerization of foodservice began in the 1960's, fewer than half of the Texas university foodservice operations listed in the Yearbook of Higher Education (1983-84) utilize computers. Computer generated information or assistance is available for many different applications. The foodservice operations in this study utilized a broad spectrum of applications. Most significant was the use of menu costing for production purposes, reflecting managers' concern for cost containment and efficient use of time.

The capacity to add terminals, disks, and networking to computer systems by a significant number of the operations indicates the purchasers' concern for expansion of use of their systems. While use is limited, the use of programs can be increased based upon need.

Those operations with computers used the computers most of their operating day. For 75%, computers are an integral part of their foodservice operation. The decision to computerize was beneficial to the institutions.
Of the computerization problems the respondents have experienced, the following were listed most often: software selection, not having the right computer for their specific needs, implementation, start up, employees' attitudes towards computerization.

The problems relating to hardware and software selection indicates a lack of assessment of operational needs of each foodservice operation. It also suggests insufficient knowledge of the types of hardware and software available to meet their needs.

Problems in implementation and start up may be a result of lack of training and adequate planning for employees involved with computerization. Involvement of employees in the planning and operational stages of computerization may increase their acceptance level of computer usage.

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Recommendations Based on Findings

Based on the findings of this study and the literature reviewed, the following recommendations are proposed:

1. The uniqueness of each institution usually requires significant individualization of implementation plans. Major factors to be considered are the institution's goals.
the analysis and design process, and the timetable for conversion. The impact of computerization on current employees and their possible resistance to change emphasizes that there is a need to involve employees who are affected by computers in the planning process. Initial plans should include the methodology for evaluating the cost/benefit of a system. Cost/benefit data should include a comparison of the cost of personnel to accomplish a stated function versus the cost of computer time and support personnel.

2. A prior review of articles or case studies can provide the foodservice director with additional information, as well as a historical background which may be of use in the planning process (Eudy 1985-60, 59-60; Marko and Moore 1980, 60-70; Heller 1983, 154-158; Raffio and Gindin 1983).

3. Educational facilities with the responsibility for training foodservice professionals should devote more instruction time to the subject of computer use in food service.

4. The findings of this study indicate a lack of suitable software in the market for university foodservice operations. Therefore, computer manufacturers may be better able to meet the needs of the university foodservice operations by reviewing studies done that assess the computer needs of university foodservice operations.
Recommendations for Further Research

Findings from this study indicate the need for further research to investigate the role of computers in the university foodservice.

1. A profile of university foodservice operators who use computers needs to be developed. Users' ages could be considered to see if younger managers with more recent academic background would be more willing to use computers. Also, there could be a relationship between sex of user and computer usage in university foodservice management since most of the university foodservice managers are women, but computers seem to be used more by men in other areas of the industrialized world. Foodservice operators' educational backgrounds might influence computer usage in university foodservice. Also, employment characteristics such as full-time or part-time status or the length of employment might be of importance.

2. There is a need to further study the specific problems that foodservice operators have encountered during and after computerization. It is important to rank these problems for each institution to study the relevance of the problem to the institution's characteristics, user's profile, and extent of the operation's computerization.

3. It could prove to be just as important and beneficial to study those university foodservice operations who do not use a computer. Learning why institutions do not
computerize would be helpful to other facilities in their decisions related to computerization.

4. There is a need for more research in specific software use that will benefit university foodservice operations.

5. There is a need for more research to identify a set of specific, step-by-step guidelines to follow when considering computerization of university foodservice facilities.

6. Cost analysis research of university foodservices using computers as compared with university foodservices not using a computerized system is recommended.
APPENDIX
Dear Foodservice Director:

Computer utilization in university foodservice facilities is an area that needs further research. As part of my graduate research, I am attempting to assess computer usage in Texas university and college foodservices.

This is a generalized study which is not meant to criticize current computer systems in use, but to gather information so that guidelines can be developed for computer selection in university foodservices. The information gathered would be valuable in developing guidelines.

I would appreciate your taking the time to complete and return the enclosed questionnaire by October 25 in the self-addressed, stamped envelope provided. I will be very happy to share the results with you if you will indicate your interest.

Thank you very much for taking the time to complete the questionnaire. I greatly appreciate your participation.

Sincerely,

Afsaneh Sahba
North Texas State University
Graduate Student in Food & Nutrition
Tel. (817) 387-8175
A Survey of University Foodservice Computer Systems

Name of Establishment: ____________________________

Location: ____________________________

Telephone: Area code ___ Number ________

Directions: Please complete the following concerning computers and computerization in your foodservice facility. Return the completed questionnaire in the self-addressed stamped envelope provided or return to: Afsaneh Sahba P.O. Box 13893 N.T. Station Denton, TX 76203

1. What is the average number of meals served daily?
   ____ below 500
   ____ 500-1,000
   ____ over 1,000

2. What is the average sales volume per day?
   ____ below $2,500
   ____ $2,500-$5,000
   ____ $5,000-$10,000
   ____ over $10,000

3. What are your reasons for computerization in your foodservice facility?
   ____ Reducing or eliminating the need to perform repetitive tasks
   ____ Providing improved guest service
   ____ Saving money
   ____ Other (specify) ________________________________
4. When was the establishment computerized?
   _____ During new construction
   _____ During renovation
   _____ Other (specify) ________________________________

5. Where is the computer located:
   _____ Office
   _____ Kitchen
   _____ Other (specify)

6. Why was the computer in use selected?
   _____ Friend's recommendation
   _____ Advertisement
   _____ Salesperson's recommendation
   _____ Compatibility with other computers
   _____ Research
   _____ User group club
   _____ Services offered by company
   _____ Other (specify) ________________________________

7. What type of computer do you use? (check as many as apply)
   _____ Personal computer on the job
   _____ Minicomputer
   _____ Main frame, time shared inside institution, in facility
   _____ Personal computer at home
   _____ Main frame, time shared outside institution, in facility
   _____ Other (specify) ________________________________
8. What is the investment level of computerization at your facility?

- below $1,000
- $1,000-$4,999
- $5,000-$11,999
- $12,000-$100,000
- over $100,000

9. What brand is your computer?

10. Does the computer manufacturer have a national service organization?

- Yes
- No

11. Is the software in use

- custom
- packaged

** For each of the types of software below, check the applications used in your foodservice.

12. Menu

- planning
- printing
- analysis
- precosting
- other (specify) __________________________
13. Purchasing
   ______ order operation
   ______ forecasting
   ______ inventory
   ______ cost analysis
   ______ other (specify) ________________________________

14. Nutrient analysis
   ______ calorie count
   ______ other (specify) ________________________________

15. Production
   ______ recipe adjustment
   ______ other (specify) ________________________________

16. Point of sales
   ______ employee time cards
   ______ employee meals
   ______ other (specify) ________________________________

17. Spreadsheet
   ______ budgeting
   ______ payroll
   ______ other (specify) ________________________________

18. Wordprocessing
   ______ memos
   ______ reports
19. Graphics
   _____ reports
   _____ advertisement
   _____ other (specify) ____________________________

20. Menu costing
   _____ production
   _____ other (specify) ____________________________

21. Scheduling
   _____ labor cost
   _____ other (specify) ____________________________

21. Statistics
   _____ payroll
   _____ costing information
   _____ profit/loss status
   _____ other (specify) ____________________________

23. Management information
   _____ food cost report
   _____ supply/inventory report
   _____ payroll report
   _____ balance sheet
   _____ budget report
   _____ personnel scheduling
24. Service
   _____ employee training
   _____ other (specify) ________________________________

25. Can terminals be added to the present system?
   _____ Yes
   _____ No

26. Can storage capacity (additional disks) be added?
   _____ Yes
   _____ No

27. Is there ability for net-working?
   _____ Yes
   _____ No

28. To what extent is your computer used?
   _____ more than 6 hours
   _____ 4 - 6 hours
   _____ less than 4 hours
   _____ less than 2 hours

29. Who uses the computer?
   _____ dietician
   _____ manager
   _____ foodservice director
30. What types of training do the individuals using the computer have?

- reading the users manual
- friend
- computer specialists
- formal training (classroom)
- orientation provided by manufacturer
- other computer users
- on the job training
- other (specify) ____________________________

31. Are you satisfied with computerization of your facility?

- Yes
- No

32. If not, what problems have you experienced?

- implementation
- employee's attitudes towards computerization
- access time
- software selection
- down time
- other (specify) ____________________________
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