To the Graduate Council:

I am submitting herewith a thesis written by Stephanie D. Ference entitled "The Impact of Computer Use on Food Service Organizations." I have examined the final copy of this thesis for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Science, with a major in Food Systems Administration.

Mary Jo Hitchcock, Major Professor

We have read this thesis
and recommend its acceptance:

Michael Evans

Accepted for the Council:

Vice Chancellor
Graduate Studies and Research

THE IMPACT OF COMPUTER USE ON FOOD SERVICE ORGANIZATIONS

A Thesis

Presented for the

Master of Science

Degree

The University of Tennessee, Knoxville

Stephanie D. Ference

March 1983

ACKNOWLEDGEMENTS

The author expresses sincere appreciation and gratitude to Mary Jo Hitchcock, Ph.D., her major professor, for her guidance and encouragement throughout this graduate study; to Michael Evans, Professor of Tourism Food and Lodging for his assistance, suggestions, and encouragement; and, to Kevin O'Kane, Ph.D., Associate Professor of Computer Science for his technical expertise and assistance in the course of this study.

Appreciation is extended to Mr. Hill, Director of The University of Tennessee Food Service Department, Mr. Ridneour, Manager of Knoxville College Foodservices Department, and Mr. Fugway, Business Manager of Roane State Community College.

The author wishes to thank the Department of Nutrition and Food Services, The University of Tennessee, Knoxville, for the financial assistance to conduct this study.

Sincere appreciation is extended to friends and fellow graduate students for their encouragement and support. Finally the author gives special thanks to her parents and family members for their love, support and encouragement throughout her graduate course of study.

ABSTRACT

An investigation was conducted in college and university food services to assess the present situation and probable future developments in the use of computers as well as to identify and evaluate the effect of computer use on employee skill requirements and employment trends. Results were obtained by two mail questionnaires. The first questionnaire inquired about the present and future use of the computer. The second questionnaire was used to evaluate the effect of computer utilization on employee skill requirements and labor trends. Eighty-five or 40% of the college and university food service directors responded to the questionnaire.

Forty-seven percent, or forty of the respondents did not utilize the computer. Fifty-three percent or forty-five of the respondents did utilize the computer. Twelve of the food service facilities utilizing the computer were making use of output pertaining to accounting transactions only. Food service employees of these facilities were not directly involved with the utilization of the computer.

Computer functions least utilized and showing little potential for utilization, were sophisticated decision making functions such as simulation models and menu planning. Accounting and inventory functions were utilized to the greatest extent. Functions showing the most potential for future implementation were reports pertaining to production, sales and cost analysis, purchasing, and the use of standardized recipes.

Correlations were made between: (1) the number of meals served per day and the use of the computer; and (2) the number of meals

served per day and the number of functions utilized. Results indicated that a significant correlation did not exist for either relationship at a significance level of .05.

Overall, there was an upgrading of skill requirements for the non-supervisory, supervisory, and administrative personnel. Although overall skill levels were rated as having increased for supervisory and administrative personnel only. Results indicated that there was no routinization, and no elimination of jobs for the non-supervisory employee. Routine supervisory tasks were eliminated as a result of utilization. Supervisory employees were felt to have more free time. Job elimination did not result at the supervisory level. Administrative decision making activities were shown to have increased. Routine tasks had been eliminated due to the use of the computer and there was no indication of job elimination at this level.

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CHAPTER I

INTRODUCTION

The utilization of the computer has been slow to infiltrate the food service industry. It has been estimated that fewer than five percent of the food service operations in this country are using the computer to produce sophisticated management information, that is widely utilized by other industries (Schuster, 1981). However, the utilization of computers in the food service industry is entering a period of dynamic growth. Contributing factors include rapid development and sophistication of the industry, competitive pressures requiring more efficient procedures, the increased availability and decreased cost of computers, and the increasing expense of food production (Giglio, 1981).

During the 1950's and 1960's when equipment replacement was occuring in other industries, concerns of management were changing skill needs, job requirements, and transitions that were taking place in the labor market (Jakubauskus, 1960). The food service industry is also vulnerable to these problems. As management plans for the future, questions arise as to the necessary skill changes needed in personnel, and the changes that will occur in the labor force. The upgrading or downgrading of skill requirements, the elimination of certain jobs in favor of others, and the net effects upon the profile of the jobs in the industry are concerns which must be faced (Whisler, 1970). Unfortunately many of these questions are unanswered due to a paucity of research concerning the subjects. The extent to which

employees are being affected by computer utilization needs to be investigated as management needs to plan for this change in the food service industry.

The manager of today and tomorrow must possess knowledge of how information technology will affect the human factor in the organization (Whisler, 1970). Management initiates change, maps out the direction that the organization should take, and then persuades those that are affected to follow with minimum conflict (Whisler, 1980). Knowledge of how computer technology affects skill requirements and employment trends, in the food service industry, will provide direction for management in adjusting to their personnel changes, manpower needs, and in taking positive action when new technology is introduced (Jakubauskus, 1960). In order to obtain awareness, one must have a clear understanding of how computer technology is being utilized in food services, and the impact it is having in relation to job skill requirements and employment trends.

The purpose of this study is to identify how the computer is being utilized and evaluate the impact of computer use on employee skill requirements, and employment trends in the food service industry. The objectives of the study are as follows:

1. Assess the present situation and probable future developments in the use of computers in selected college and university food services.
2. Evaluate the effect of computer use on employee skill requirements and employment trends in selected college and university food services.

It is hypothesized that:

1. Computer use in college and university food services will have an impact on employee skill requirements.
2. Computer use in college and university food services will have an impact on employment trends.
3. Skill requirements will be decreased at the non-supervisory level and increased at the supervisory and top management level.
4. Employment trends will only have an impact on non-supervisory employees.

CHAPTER II

REVIEW OF LITERATURE

The onset of data processing in food services has occurred in the 1970's (Levy, 1975). In the 1970's computers could be found in many large food service organizations. For these facilities the period of initial experimentation appears to be over. Many facilities who began experimenting with computers fifteen years ago now utilize them as a matter of course in their operations (Levine, 1981). However, only five percent of the food service operations in this country are using the computer extensively. Most food service departments are making use of the computer primarily for "accounting" tasks, such as billing, payroll, and purchase orders. The food service industry is moving slowly in using the computer for producing the type of information upon which management can base decisions. However this status may be about to change. Schuster (1981) states "the computer is a sleeping giant lying dormant and the signs are that it is about to be awakened."

The implementation, utilization and expansion of computer use produces major changes for the human element in the organization (Miller, 1975). Changing skill requirements and employment trends, resulting from computer use in other industries, has been the cause of deep concern in the past. Careful planning, preparation, and monitoring are needed when changes are made in a system affecting the human element. If management neglects to examine it's future plan of action in relation to computer implementation, the results could be

disastrous and valuable time and money could be wasted in an attempt to repair the system (Cowen, 1974). It is vital that management have a clear understanding of how computer technology is being utilized and how it is affecting the human element in the organization.

Computer Utilization

The food service industry has been slow to gain acceptance of the computer. Data-base and software problems, priority of food service departments in relation to the budget, and finances are some factors contributing to the slow acceptance of computer technology in the food service industry.

Data Base

The data base is the body of information that is stored by the computer that supports managerial requests for information. The constituent parts of the data base are files, records, and data elements or small units of information. Acquiring the appropriate data base was not viewed as an easy task by many food service managers. Building a data base was found to be one of the most difficult, tedious, and time consuming jobs. The amount of time and effort spent feeding the necessary information into the computer to acquire that control was felt to be staggering. One administrator stated that management was required to work alongside kitchen employees for two years to get menus standardized prior to gaining access to the use of the computer.

Software

Obtaining the appropriate software for an organization also presents a problem. Software packages tailored specifically to an individual organization would contribute to the system's practical, cost efficient application (Marko and Moore, 1980). Purchasing a standardized software package cuts time, and cost, however there usually is not a complete package to cover an entire operation (Schuster, 1981). The ultimate decision is a trade-off between what is desired and what is reasonable in terms of time and cost. An example cited in the literature demonstrated how one manager attempted to purchase a program to be utilized in a new 1.4 million dollar warehouse. There was no complete software package for food service warehousing and packaging (Schuster, 1981). In a study conducted at Iowa State University, 59% of the respondents utilized software designed by university personnel, while 47% of those leasing software reported that it was custom designed to fit their particular needs (Finley and Simpson, 1982). In the food service industry, it is apparant that software development is still in its infancy. At present no single equipment vendor or system provides software and hardware to support all or even most of the food service operating functions (Marko and Moore, 1980). The majority of food services depend on custom designed software versus purchasing packages. However with their $150 billion sales volume, the food service industry is becoming very attractive to the purveyors of computers and computer services. Likewise the food service industry has every reason to be interested in computers.

Versatile software packages may be readily available within the next few years (Riggs, 1982).

Many professionals in the food service industry generally have little knowledge of computer use or software. This contributes to the hesitation of food service managers to initiate the implementation of a computer system. Present sources of information include libraries, industry or university sponsored classes, brochures, and trade journals. There is a need for formalized instruction of food service professionals or management so that they might participate in the development of computer applications, or at least be able to request particular developments (Linton and See, 1979).

Priority

There is usually low priority given to food service departments when allocating money or time for computer use (Linton and See, 1979). The Board of Education was a major obstacle in Detroit's school food service system. They claimed there was insufficient funds for providing the food service department with a fulltime programmer (Stephenson, 1981). The dietitian and associate food service director at the University of Kansas Medical Center spent eight years convincing administration that computer implementation would be advantageous (Schuster, 1981). With the availability of micro and minicomputers, this problem may not be as serious as in previous years, yet some food services are too large to be handled entirely by these smaller computers. It is necessary that food service managers be strong in asserting their needs for computer use.

Finances

Finances were found to be a significant deterrent to the implementation of computers. Bids for Detroit's school food service system ranged from $255,000 to $855,000. The administrators also noted a $250,000 overrun as the result of redesigning the program following the purchase of the system (Stephenson, 1981). As a result of high computer costs, many food service professionals feel that the cost of the computer does not justify its services (Schuster, 1981).

It is also necessary for management to be aware of the tremendous cost benefits obtained through computer use, in spite of its high investments. University Hospitals of Cleveland claimed that they reduced food and labor costs by $2,300,000 during the period from 1971 through 1975. This was attributed to the application of the computer in all phases of food handling. Rigid control over the types and the amounts of ingredients that were made available for food preparation alone resulted in an annual savings of more than $300,000 in 1975 and a cumulative total savings of $700,000 for a period from '71 - '75 (Schuster, 1981). The food and nutrition director at Memphis City Schools, Tennessee stated:

> If we had to do all the things ourselves that the computer does for us now, it would cost us $10 million yearly (Schuster, 1981).

Many facilities have reported astronomical savings as the result of computer utilization. Due to todays inflation, companies require that items be costed out at least six times yearly. Time studies show it takes 100 hours to cost 200 recipes. At a rate of $5 per hour, the

cost to a company would be $500 each time, or $3000 a year to cost the recipes monthly. If this function were computerized, the break even point would be attained in less than two years. Additionally, the computer provides the flexibility to recost recipes whenever profitability becomes questionable since only one hour of labor is required versus 100 hours. CAMP, Computer-Assisted Menu Planning, developed in 1969, was first utilized by hospitals. By 1973, it was reported that menu planning by the computer was 10% of the food cost for those hospitals utilizing the program. For the fast food industry, the average cash loss and pilferage can run as high as four percent. Burger King, with aid of it's system was able to reduce the cash loss from 2 to .4%, which is an almost non-existent level of .1% of total sales. Burger Kings director of operation's systems management, explained that "without tight inventory controls, you can't have complete cash control." This savings was achieved through the use of the inventory control feature (Levine, 1981).

The cost of the system for CN Tower, the largest revolving restaurant in the world, in Toronto, Canada was substantial since research and development were involved. Problems encountered prior to the utilization of the computer included overbooking, reservation cancellations, overstocking, etc. Computerized handling of reservations and reception, table allocation and reception, table allocation and release, as well as food and beverage management resulted in astronomical savings. The food and beverage programs were the heart of the system. The use of the computer controlled the ordering of ingredients for more than 600 menu items and produced sales analysis

reports. Itemized bills recorded by electronic cash registers eliminated petty theft. Sales analysis data provided management with information to make timely decisions concerning the profitability of menu items. Forcasting according to weather, season, and the time of day enabled management to accurately predict the volume of business. The table allocation and reservation system controlled the flow of patrons. The computer allocated tables, and alloted a duration time before a table could be expected to be free. It also provided a continuous monitor of empty seats and full tables. Since the waiting area was at the base of the tower, far removed from the restaurant, the instant and timely communication was vital (Levine, 1981). The organized turnover of patrons it generated, and the management information it made available enabled the system to pay for itself. Labor savings alone at the level of the front line clerks as well as the back office assumed a good part of the return on investment (Levine, 1981).

Food service managers of today have a tremendous challenge to contain spiraling costs. Traditional methods tend to be slow. Controlling food production, and producing daily records to enable management to monitor the organization are vital functions that computer technology can generate efficiently and rapidly (Tuthill, 1980).

Computer Functions

Management of a food system has become increasingly complex due to large quantities of information and data requiring analysis. The computer is one tool utilized to generate timely and accurate reports

to aid in decision making (Sifferman and Hoover, 1981). Accounting, food cost accounting, inventory control, and personnel data are areas where computer application has occurred (Fromm et. al., 1980). Applications have taken place in other areas such as patient diet orders and menu printing systems; nutrient analysis; menu planning; food production control; automated equipment and simulation; inventory and materials management; purchasing and sales analysis. Computer applications that have occurred but not as extensively as the latter are in areas of training and education; labor and production scheduling; personnel management; cost containment; and clinical management of medical nutrition problems (Willard, 1982).

The economic utilization of system resources in attaining food production objectives is a major goal of all food systems management. As the cost of labor, equipment, food, energy and space escalate, innovative approaches to decision making will be required for allocation and control of these resources (Fromm et. al., 1980). Scheduling, line queuing, determining the effects of certain decisions on the system, etc. will need to be utilized in order to provide management with the required information for appropriate decisions to be made regarding the entire system.

The hospitality facet of the food service industry has been the most progressive in regard to computer utilization. By limiting the discussion of functions utilized to the restaurant industry, it will eliminate repetition and will encompass the full relm of functions that are available to the entire food service industry. Figure 1 contains a model showing a set of computer applications for a restaurant

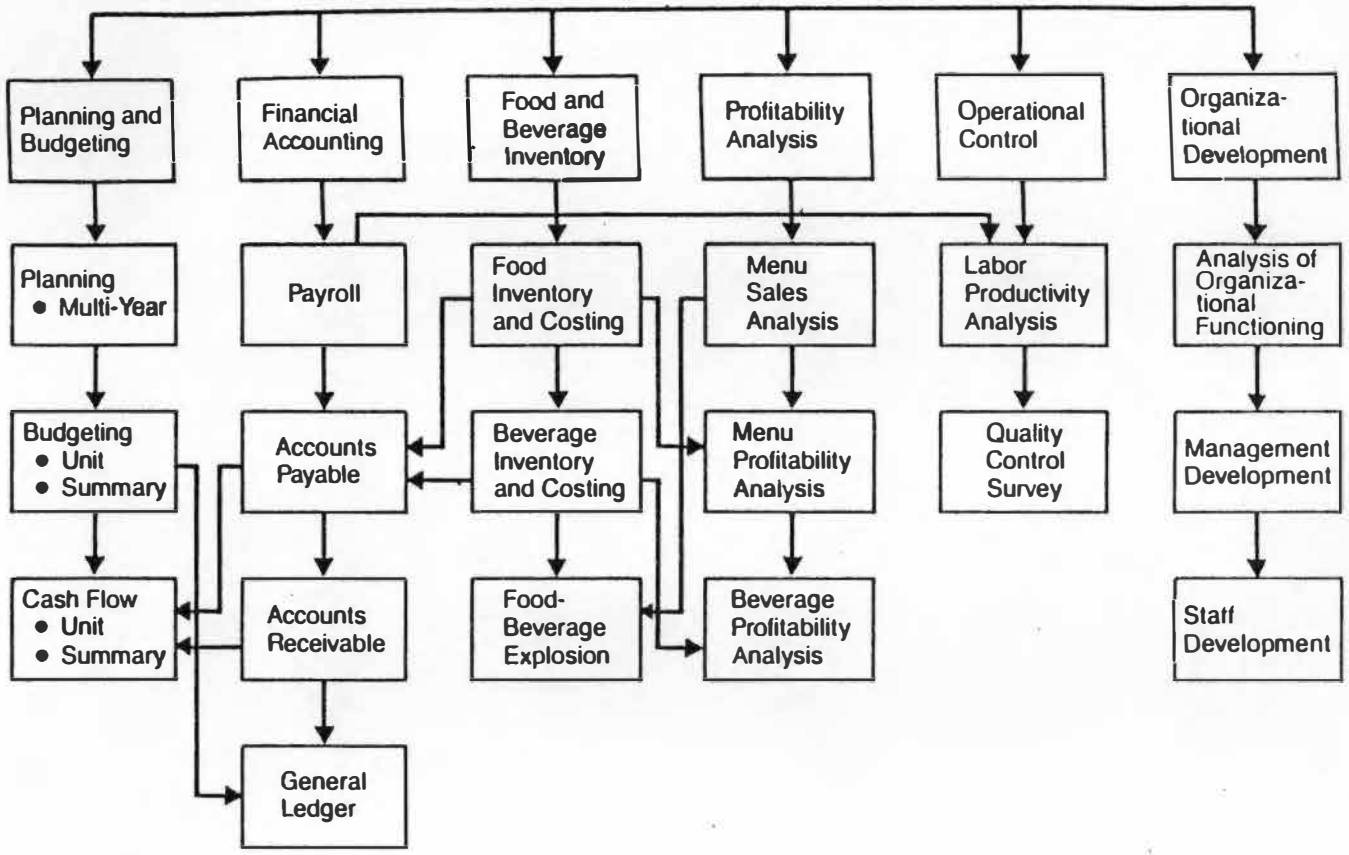

Figure 1

Restaurant Management System Applications.

Source: Levine, J. 1981. "Counting on Computers." Chain Store Publishing Co., New York, New York.

management system. The model displays a fairly complete set of computer applications available to any food service operation. The discussion of functions will be in general terms due to the variability of different systems.

Cost Accounting

The major functions of the cost accounting system which facilitate cost identification are: calculation of standard portion costs for standardized recipes, and cost for meals; and daily, weekly, monthly, or yearly printouts of reports and summaries of food costs.

McDonalds has developed a system, called McClass, which is a total financial accounting system. The system has many of the standard features. It also allows the user a choice of reports and formats in each of the various parts of the system. There are, for example different profit and loss statements ranging from simple year to date statements to complex reports showing current period and year to date comparisons, for amount and percent of this year's budget, last year performance, and year to date adjustments (Levine, 1981).

Recipes

The recipe system generally consists of two components, the inventory file and the recipe file. The inventory file lists all food and supply items used in the facility. The recipe file contains recipes for all menu items and correlates each ingredient with the appropriate one in the inventory file. Forecasts of anticipated volume are entered into the computer. This information is based on historical data and the manager's experience. Based on the food

production manager's prediction need, the computer multiplies or divides the recipe batch and prints out a recipe for the desired quantity of the menu item. Some recipe systems allow the recipe file to be updated as necessary for ingredient, portion, procedure, and any other adjustments that are required (Hart, 1978).

Purchasing

The purpose of the purchasing module is to organize price, package size, and vendor data so that purchasing decisions can be made by management. A number of reports in varying sequences are available, depending on how the data is to be used. For example all vendors of flour can be listed sequentially either by the lowest price per pound, by various package sizes, or by price per unit. Depending on the system, reports can be generated for: purchases made for a given period of time; price paid by the product; comparison of price paid versus price quoted by the vendor; vendor price fluctuation; information concerning seasonal availability; and delivery schedules. Products can also be ordered based on forecasts and inventory (Levine, 1981).

Inventory

The inventory module consists of two facets, purchasing and physical inventory. The systems use two forms of input: purchases and physical inventory. Purchases may include such information as ingredient number, quantity, amount, discount, and vendor identification. The inventory report may show the beginning and ending inventory with received and usage figures, comparison of the actual usage of every

ingredient with the projected usage figure, and reports inventory items that have fallen below established minimum requirements (Levine, 1981).

Nutrient Analysis

Gaps in nutrient data base systems is a topic of primary concern. There are gaps in the data base for vitamins, minerals, sugars, fats, starches, fiber, etc. Several reasons for the missing data are that investigators usually analyze a food item for nutrients that are of interest to them, and manufacturers do not provide complete nutrient information. Missing data needs to be controlled inorder to prevent misinterpretation of the computer-generated nutrient information.

In 1979, developers and users of computer systems held a conference to discuss the status of nutrient data base applications. The National Nutrient Data Bank Conference (NNDBC) is held annually. This organization encourages communication between suppliers of nutrient data and the professionals using the data (Willard, 1982).

Nutrient analysis systems are not utilized extensively at the present time. However the demand for computerized nutrient banks is increasing (Levine, 1981). Computer stored nutrient data banks were introduced in the late 1950's. The demand for their use has not been extensive until recently. The demand for nutrient analysis systems has grown in direct proportion to the increase in emphasis on good nutrition (Willard, 1982). Automated nutrient analysis services once limited to professionals employed in institutions with abundant computer support are now available in many nursing homes and offices of

dietitians. This is primarily a result of the increased microcomputer capabilities and availability.

Examples of output from this system include a nutrient analysis per serving portion of a recipe. This can be used to plan menus, evaluate an individuals nutrient intake, and to provide information to the consumer.

Menu Planning

In 1964, Balintfy utilized an integer programming algorithm to plan menus by computer based on prices, recipes, nutrients, and frequency ratings. Systems are presently available that can take many factors into account when planning menus for both regular and modified diets (Hoover et.al., 1982). Increasing competitive pressures and the increase in emphasis on good nutrition makes a well planned menu a vital necessity.

Sales Analysis

The purpose of the sales analysis system is to capture sales data by menu items, and meals, for given periods of time. A comparison of data can be made for different time periods, food service units, and menu items. The electronic cash register or point-of-sale (P.O.S.) system serves to help improve security over inventory and cash, and increase service to customers without increasing their manpower needs (Berlinski, 1975).

> Our P.O.S. system provides us with maximum control over walkouts. It also has substantially reduced errors in our guest checks, such as waitress addition and cashier change

making mistakes. Our error factor is down to two or three cents a day" (Berlinski, 1975).

Production Reports

Production analysis focuses on analyzing the hours and dollars spent, as compared to the total revenue and the number of customers served. Production analysis combines data from the payroll system and the sales analysis system. The general type of information produced consists of: statistics on the number of meals served by the type of meal; the number of personnel used to produce the meals, and the cost of personnel (Levine, 1981).

Simulation

Simulation provides an effective means of testing, manipulating, and evaluating a proposed system without any direct action on the real system. "Simulation is a symbolic representation that can provide measurements not attainable in any other way" (Guley and Stinson, 1980). It consists of a model which duplicates in a simplified form, the real system.

As the costs of personnel, equipment, food, energy, and space increase innovative approaches to decision making will be required for allocation and control of these resources. When scheduling decisions are made about activities, personnel, and equipment, influences on all operational resources and activies must be considered (Fromm et al., 1980). Scheduling decisions in the food service industry are usually based on experience. Analytical and computer techniques utilized in other industries could provide food service facilities with methods

for predetermining resource requirements for production and information on the effects of changes in system resources on the product scheduling. "A management tool is needed to assist in the scheduling of production personnel and equipment" (Fromm et al., 1980). Simulation models entail the computerization of management decision making. This function is employed by very few food service operations (Schuster, 1981).

Equipment

The computerization of food service production equipment has a great many possibilities. Skeeters, a 450 seat dining establishment, is one of the most extensively computerized dining facilities in the country. Skeeters implemented several forms of computerized equipment. Skeeters computerized system includes: (1) A computerized bar; (2) computerized fryers that automatically drop and lift baskets as the product is needed, using computerized controls; and (3) computer controlled low temperature roasting ovens. These ovens operate by the condition of the roast contained in them. The roast is monitored by a sensor. When the roast is medium rare, for example, the ovens automatically turn off and convert to a hold status, which can then be maintained for up to 14 hours without promoting doneness (Levine, 1981). Few facilities utilize automated equipment as extensively as Skeeters. There appears to be a paucity of literature on the subject. The major contributing factor could be the low utilization of equipment. Computerized starting and shut-downs of equipment based on peak demand periods can be implemented in food service

organizations, resulting in energy savings. Yet it seems few facilities have taken advantage of this.

Accounting

The typical breakdown of the financial accounting system is payroll, accounts payable, accounts receivable, and general ledger. The computerization of the clerical functions minimize labor requirements, eliminate occupational error and significantly decrease the time needed to obtain information. This application is widely utilized, and numerous reports can be generated from this system (Levine, 1981).

Skill Requirements and Employment Trends

Whisler (1970) states that there was a great deal of popular interest and concern pertaining to the effects of the computer on skill requirements and labor trends. Unfortunately there is a paucity of research regarding the changing skill requirements and employment trends of food service employees. Reviewing research from other facets of industry will enable one to obtain an awareness of the effect of computer utilization on employment trends and skill requirements.

Whisler (1970) conducted a study that examined various changes that had taken place in a group of life insurance companies. Two areas that were examined were job content and organizational structure. Information obtained about these areas included data concerning skill requirements and job displacement for clerical,

supervisory, and administrative personnel. Whisler hypothesized that: (1) There would be a tendency to routinize and narrow job content at the clerical and supervisory levels, and to broaden it at the upper-management level; and (2) there would be a decline in the number of clerks and supervisors, while there would be a slight growth in the number of upper level management.

Findings of the study revealed that clerical jobs had become more routinized, while supervisory jobs had tended toward enlargement. No clear trends were visible in regard to the routinization or enlargement at the managerial level. Overall, skills at all organizational levels had been affected, and changes were most pervasive at the clerical level, diminishing at successively higher levels. Overwhelmingly, the effect was perceived to be an upgrading of skills which was tempered at the clerical level, where nearly one third of the changes reported to be a downgrading of skills. No clear trends were visible for managerial jobs.

Employment trends were assessed by asking managers to estimate the number of people that would be required to do the present job in computerized areas if the computers were not utilized. For clerical workers the increase was 60%, 9% for supervisory employees, and 2% for managerial. The evidence from this study indicated that employment effects were concentrated at the clerical level, where employment had declined. Employment changes had occurred at the supervisory level, but the effects were mixed. Little employment change had occurred at the managerial level. Thus, if computers were to be removed, and companies were to attempt to maintain the same level and quality of

service, increases in employment would be required at all three levels of employment.

Clamon (1964) investigated certain social and technical aspects of the effects of automation upon an organization and its management. Four major changes were observed as a result of utilization and the implementation of automated equipment. The changes were as follows: (1) The function of supervision had increased as reflected by the increase in the number of jobs with authority; (2) hiring had been curtailed at lower levels of employment, and managements dealings with new employees had decreased; (3) jobs were upgraded due to contact with complex machines; and (4) jobs were upgraded due to increased responsibility.

The U.S. Department of Labor Bureau of Labor Statistics completed a study in 1957 of 20 private industry offices that had introduced million dollar computers and had a years operating experience prior to the study. It was found that a little over 80% of the employees affected by the change were in routine jobs. While little unemployment resulted there had been a great deal of displacement.

During the same period, the federal government was also introducing computers in large numbers in various agencies. The office of the Treasurer in the U.S. Treasury Department had established a system for the computerized processing of checks in 1957. As a result, out of 755 employees none were layed off, and 4% of the workers were displaced. The U.S. Treasury Department Bureau of the Public Debt had 36% of their workers either displaced or layed off (Jakubauskas, 1960).

Lund (1981) studied companies making microprocessor-based products or using microprocessor-based tools in production. Results showed that companies making computer products had increased employment in the duration of the short term study. Companies utilizing the tools either had no change or a reduction in employment, while the productivity of some users increased by one third. Lund stated that overall, displacement appeared to be more prevalent versus unemployment. However, even if enough jobs were available in the future, the transition to the new technology must not be viewed as being insignificant. Displaced workers must be able to adapt to the new technology. Concerns would be retraining and relocation. This transition could be very difficult for those unable to adjust (Lund, 1981).

Unions are also interested in these concerns. In 1979 the United Auto Workers union presented proposals to both General Motors and Ford regarding computer technology. The Ford proposal sought to involve the union in the design and implementation of new technology. This would be an attempt to prevent the devaluing of skills and unemployment. To ensure that guidelines were met, the union demanded the right to strike over technology related issues (Lund, 1981).

Salerno (1981) states that until recently the literature had not kept pace with the expanding technology and its effects on jobs, offices, industrial production, and other areas. There was general agreement that the new technology will reduce employment, especially of blue-collar jobs ranging as high as 30% over the next 25 years.

There is one aspect that should not be overlooked. Although the use of the computer increases productivity without porportionately

increasing manpower needs, it does enable increased growth potential for companies; in turn resulting in increased employment as a result of company expansion.

It is agreed that computer implementation does initiate change. However, there is disagreement about the nature and degree of this change. There is a paucity of structured research concerning the food service industry in relation to the subject. Therefore it is vital to know how or to what extent food service employees are being affected, or how to plan for this change.

The following quotes demonstrate the conflicting views that exist in relation to employment trends. The supervisor in a public school states:

> You've got to show employees at all levels that the computer will not eliminate their jobs but merely change those jobs, eliminating many of the tasks they didn't enjoy anyway (Schuster, 1981).

Tuthill, R. D. (1980) expressed a view quite opposite of this:

> When cooks are not required to adjust recipes, order ingredients, and weigh them for each menu item, considerable time of some of the most expensive people, in food production, can be saved. Either positions can be eliminated through attrition or new services can be assumed.

Schuster (1981) indicated that opinions of food service managers were greatly diversified in relation to employment trends and skill requirements. Managers felt that employees would not be displaced, but would not have to spend as much time dealing with the mechanics of the job or routine tasks. Others felt that if routine tasks were eliminated, less employees would be needed. The opinion that more

efficient computerized scheduling would contribute to a decreased labor force was prevalent. A university hospital reduced food and labor costs by $2,300,000 as a result of computer utilization (Schuster, 1981). Another hospital facility reported an increase in its production volume without proportionally increasing labor or productive man hours (Schuster, 1981). Previously Memphis City Schools served 30,000 meals per day employing five supervisors. The school system presently serves 96,000 meals per day and still only employs five supervisors (Schuster, 1981).

Another food service saved approximately 150 hours of the managers and staffs time the first month following the implementation of the computer. As a result no jobs had been abolished, management had more time for managerial duties, and the school district had not needed to hire additional staff (Schuller and Fuller, 1982).

It is felt that the computer increases the precision that has to occur in all aspects of food preparation today, and that a different type of employee is needed today than in the past (Sebgar, 1981). There is a need for individuals who can follow precise directions. For example, with frequent costing and menu changes, precisely following standardized recipes becomes even more important; "success depends on the cook's ability to conform to standardized recipes" (Balsley, 1980). There may be conditions in the new situation that makes it impossible for the person to act as he or she should. The system changes may have created new situations for the employee to respond to, which the employee may not recognize, or if recognized, the employee may not know what to do. The job performance

requirements may have changed, or delineation of responsibilities may need to be reassigned (Whisler, 1970). It was felt that a factor contributing to the cost effective application of the computer was the release time which results when cooks, clerks, and other personnel are relieved of repetitive routine tasks (Tuthill, 1980).

Middle and top level management are not faced with as many problems as the non-supervisory employees in terms of adaptation. A common feeling is that since particular routine decisions with identifiable factors are programmed into computers, there is a decreasing need for, and often a change in the type of daily decision making which was one of the principle functions of middle management and supervisory personnel (Levine, 1981). Managers have been freed to manage versus spending time on routine tasks. At one time Burger King Managers had to fill out 26 different forms each day on inventory, sales, variance reports, labor, scheduling, etc. With the use of systems these were reduced to one sheet of figures-manager time spent with paperwork was reduced from three hours to less than one hour. Managers now had the opportunity and information necessary to make decisions based on timely, accurate information, not intuition. Managers now had the information needed to operate an efficient and economical operation (Levine, 1981). Top level management felt that the purchasing of software has been a problem due to their lack of knowledge about the subject (Schuster, 1981).

The human element, in relation to computer use and job performance, is a universal problem and one of most concern. New Jersey's Department of Human Services, where one of the most extensive food

service computerization systems exists, found that they had "fewer problems with the system than with our employees" (Shuster, 1981). Directors and administrators felt they were not knowledgeable enough about computers (Stephenson, 1981). Professionals had difficulties accepting data from a machine that does what they went to college to do (Schuster, 1981). Cooks viewed the computer with fear since it was felt that it threatened their creativity. Other difficulties experienced pertained to the mechanics of the machines, and lack of education. In Detroit's school system, computerized cash registers were difficult to operate, which caused problems for students who had limited time for lunch. The inability of some employees to read, write, and decipher were other difficulties encountered (Stephenson, 1981).

The literature indicates that in the past industry has been effected by the implementation and utilization of the computer. It is also apparent from the literature review that the use of the computer is having an impact on employees and jobs in the food service industry. However, what we don't know is the extent to which employees are being affected and how to plan for this change. Knowledge of how computer technology is being utilized and how it affects skill requirements and employment trends will provide direction for management in adjusting to their personnel changes and in taking positive action when new technology is introduced (Whisler, 1970). The entire situation requires assessment of the present and future plans for computer utilization, in food services, and the impact it is having in relation to job skill requirements and employment trends.

CHAPTER III

PROCEDURE

The food service industry has been slow to gain acceptance of the computer in comparison to other industries. However its potential is beginning to be recognized. The food service industry is presently facing problems that other industries faced five to ten years ago as a result of computer infiltration. Changes in an organization that are related to computer implementation and have received a great deal of attention concerning employee skill requirements and employment trends (Whisler, 1980). College and university food services were surveyed to determine the extent of computer utilization and the degree to which employee skill requirements and employment trends have been affected as a result of computer utilization.

Questionnaire

Two questionnaires were developed. The first questionnaire was developed to obtain information about computer utilization (see Appendix C). The second questionnaire sought information concerning employee skill requirements and employment trends (see Appendix C). The questionnaires were field tested at three colleges or universities in the state of Tennessee, by two food service directors, and a business manager who was responsible for business transactions in the food service department. The purpose of the field test was to determine readability and accuracy.

Suggestions for improvement were solicited. The suggestions primarily concerned readability of instructions, and clarity of several questions.

The question format was designed for easy comprehension. The first questionnaire consisted of questions pertaining to computer use and other profile data. The questionnaire consisted of a checklist of computer functions, with a category for both present and future use. Future utilization was considered to be within the next few years. Areas covered in the first questionnaire included cost analysis, computerized recipes and recipe information, inventory, nutrient analysis, production reports, simulation models, equipment, and accounting information. An open ended question was included to ensure that all functions utilized were considered.

The second questionnaire was divided into three major sections. Each section pertained to either the non-supervisory, supervisory, or administrative personnel. These sections were statements concerning employee skills and employment trends. The choice of responses in the second questionnaire ranged from increased to decreased, and agree to disagree. Two additional choices included uncertain and don't know.

Selection of the Food Service Facilities

Universities and colleges were randomly selected from 50% of the National Association of College and University Food Service members (NACUF's) 1981 membership list. Preliminary decisions were made to limit to survey to colleges and universities in the United States. Membership to NACUF's, whether the facility was a college or

university, and location in the United States served as criteria for selection.

Sample Selection

Fifty percent of the facilities that met criteria for selection, or 211 facilities represented the population to be surveyed. The final population to be surveyed was randomly selected.

Collection of Data

A mail questionnaire was chosen to collect data on present and future utilization of the computer in food service facilities, and to determine its impact on employee skill requirements and employment trends. A cover letter explaining the project was addressed to each director of the food service departments. The questionnaires, stamped, and self addressed envelopes, accompanied the cover letter (see Appendix C). The first questionnaire was completed whether or not the organization was utilizing the computer. The second questionnaire was completed only by the respondents of facilities that were utilizing the computer.

Analysis of Data

The analysis of data consisted of computerized tabulation of responses from the mail questionnaires. Percentages, frequencies, intensity and direction of responses and correlation coefficients were determined. Three point Likert-type scales were also utilized in the second questionnaire to measure the direction and intensity of the

responses. The Pearson Product Moment Correlation Coefficient was determined for the relationships between: (1) meals per day versus the use of the computer; (2) the number of meals prepared daily and the total number of functions utilized; and (3) whether a school contracted with a food service company and computer use. The Spearman Rho Correlation Coefficient was determined for the relationships: (1) between the total number of functions utilized and the utilization of the computer by non-supervisory employees; (2) the use of the computer and the involvement of the non-supervisory, supervisory and administrative personnel, and (3) the total number of functions utilized and the elimination of routine clerical tasks for the supervisory personnel.

CHAPTER IV

RESULTS AND DISCUSSION

The food service industry has been slow to gain acceptance of the computer in comparison to other industries. However its potential is beginning to be recognized. The food service industry is presently facing problems that other industries faced five to ten years ago, as a result of computer infiltration. Changes in an organization, due to the use of computers that have received a great deal of attention concern employee skill requirements and employment trends (Whisler 1980). Management must have a clear understanding of how computer technology is being utilized and the impact it is having in relation to skill requirements and labor trends in order to take positive action when this new technology is introduced.

College and university food service departments were surveyed to determine the extent of computer utilization and the degree to which employee skill requirements and employment trends have been affected. Two hundred and eleven questionnaires were sent to college and university food service directors throughout the United States. Eighty-five questionnaires, or forty percent were returned.

Sample

The number of meals prepared daily was utilized as an indicating factor of the institution's size. The respondents were divided into three groups based on the number of meals prepared daily. The groups were (1) up to 1000 and less, (2) 1000 to 9,999, and (3) 10,000 meals

and greater. The division of the categories was based on univariate statistics (see Table 15, Appendix A) and verified by professional opinion. The number of meals prepared daily ranged from 150 to 60,000 meals per day. The mean number of meals was 8948. The greatest number of respondents, 58%, were from group two. Twenty-six percent were from group one. Twelve percent of the facilities which was a frequency of ten did not indicate the number of meals that were served daily. (see Figure 2).

Computer Utilization

Forty-seven percent, or forty of the respondents did not utilize the computer. Fifty-three percent or forty-five of the respondents did utilize the computer (see Table 16, Appendix A). Twelve of the food service departments utilizing the computer were only making use of output pertaining to accounting transactions. Food service employees of these facilities were not directly involved with the utilization of the computer.

Computer Type

Computers are classified into three major categories. These categories are basically based on power, memory, versatility and cost. The largest and most sophisticated is the mainframe computer. It can store vast amounts of information and perform complicated calculations. The minicomputer is a medium sized machine that is less expensive, and has less memory than the mainframe computer. Otherwise it functions similiar to the mainframe.

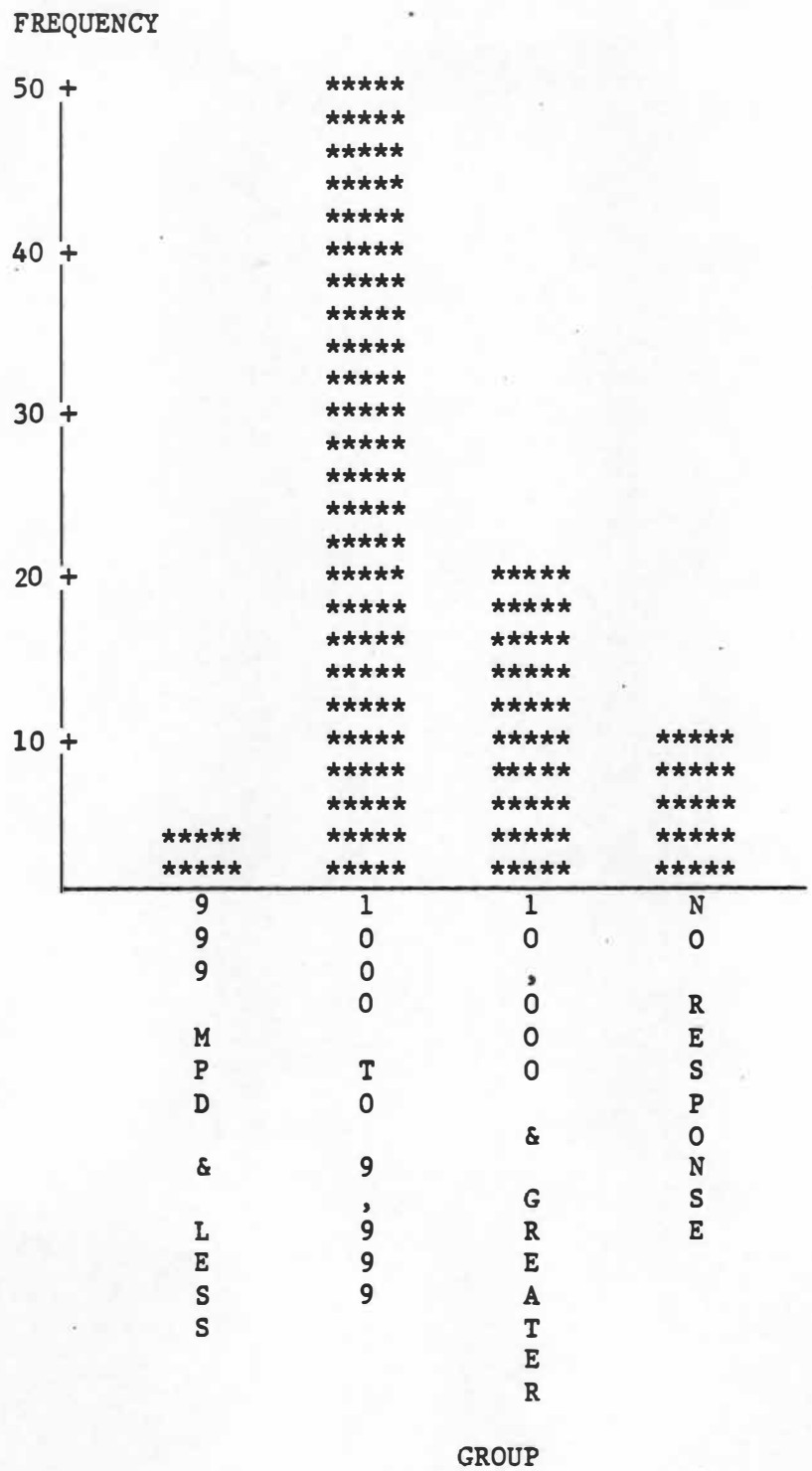

Figure 2. Distribution of Respondents According to Size of Facilities.[1]

[1]Frequency Bar Chart, Question 1--First Questionnaire.

The microcomputer is the smallest of all three. It can perform the necessary computing functions at an affordable price. Microcomputers are fully easy to program, operate and maintain, however the amount of memory is much less in comparison to the mini or mainframe computer.

The questionnaire inquired about the type of computer being utilized. The three options given in the questionnaire were mainframe, microcomputer, and both. The greatest percentage of respondents utilized a mainframe computer. There was an equivalent number of respondents that utilized the microcomputer and both the mainframe and microcomputer. Two respondents indicated, in the open ended question, that they utilized a minicomputer (see Table 1 and Figure 3).

Table 1

Types of Computers Utilized[1]

Type	Frequency	Cum Freq.	Percent	Cum Percent
Mainframe	19	19	42.222	42.222
Microcomputer	10	29	22.222	64.444
Both	10	39	22.222	86.667
Minicomputer	2	41	4.444	91.111
No Response	4	45	8.888	100.000

[1]Frequency Chart, Question 2B--First Questionnaire.

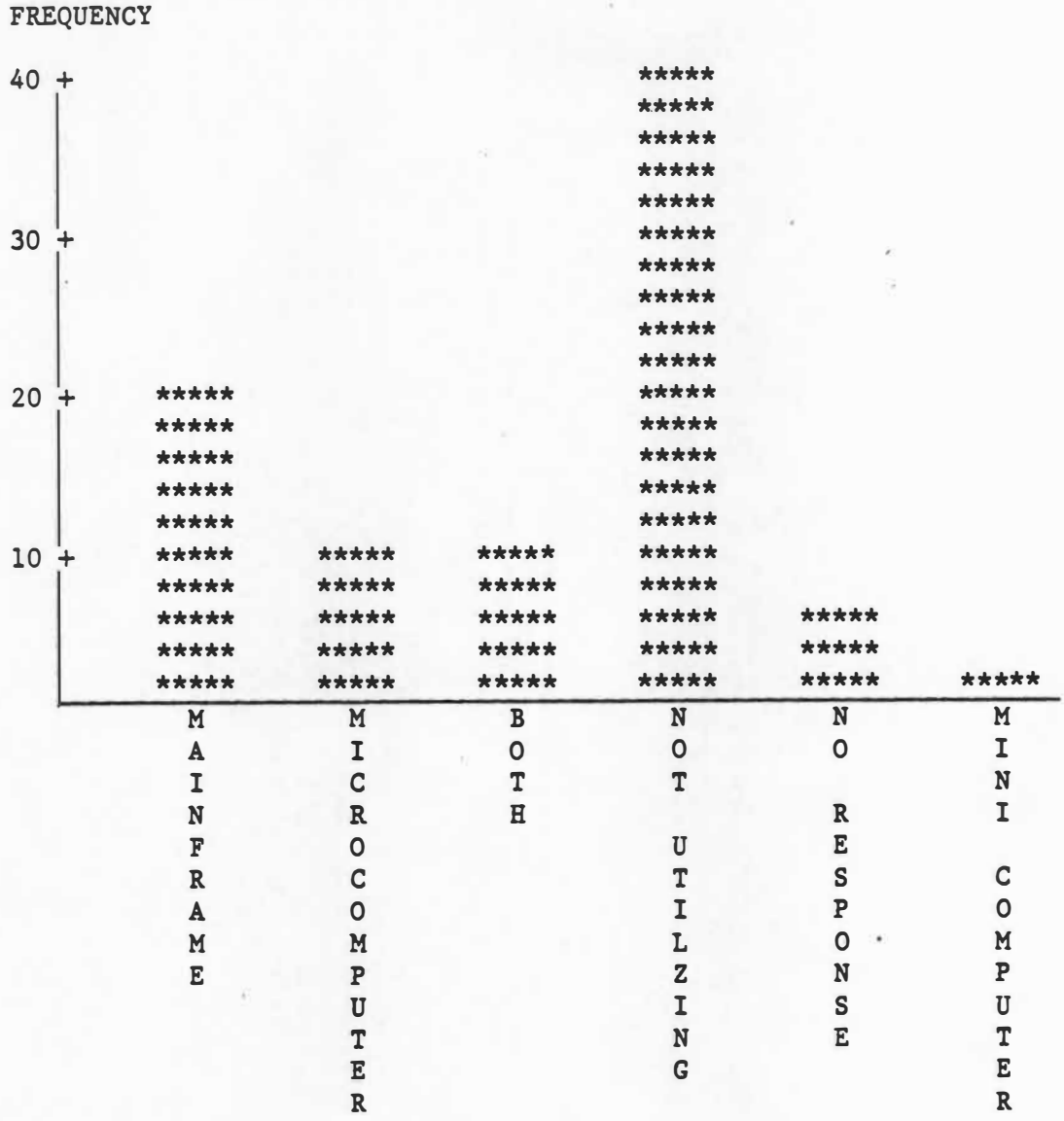

Figure 3. Types of Computers Utilized.[1]

[1]Frequency Bar Chart, Question 2B--First Questionnaire.

Computer Utilization Within Each Group

Group three, which produced 10,000 and greater meals per day had the greatest percentage of computer utilization within the group. Group one contained the lowest number of facilities who utilized the computer (see Table 2 and Figure 4). One of the respondents who utilized the computer for accounting purposes only was from group one, eight were from group two, two were from group three and one from the "unknown" group, or the group that did not respond to the question pertaining to meals served per day.

The Pearson Product Moment Correlation was employed to test the strength of the relationship between the number of meals prepared daily and the use of the computer. The coefficient was .109 with a probability of .35. This indicates that there was not a significant relationship between computer utilization and the number of meals prepared daily at a significance level of .05 (see Table 17, Appendix A).

The Pearson Product Moment Correlation was utilized to determine the strength of the relationship between the number of meals prepared daily and the number of computer functions utilized. The coefficient was .196 with a probability equal to .09. There was not a significant relationship between the number of meals prepared daily and the number of computer functions utilized at a significance level of .05. (see Table 18, Appendix A).

Table 2.

Computer Utilization by Group[1]

Computer Use	Group				
Frequency percent row Pct Col Pct	999 MPD & Less	1000 to 9,999	10,000 & Greater	No Response	Total
No Utilization	2 2.353 5.43 50.00	23 27.059 46.93 58.97	8 7.059 1.54 .25	8 9.411 80.00 20.51	39 45.882
Utilizing	2 2.353 4.35 50.00	26 30.588 56.52 53.06	16 18.824 34.78 72.72	2 2.353 4.35 20.00	46 54.118
Total	4 4.70	49 57.65	22 25.88	10 11.76	85 100

[1]Cross Tabulation, Questions 1A and 2A--First Questionnaire.

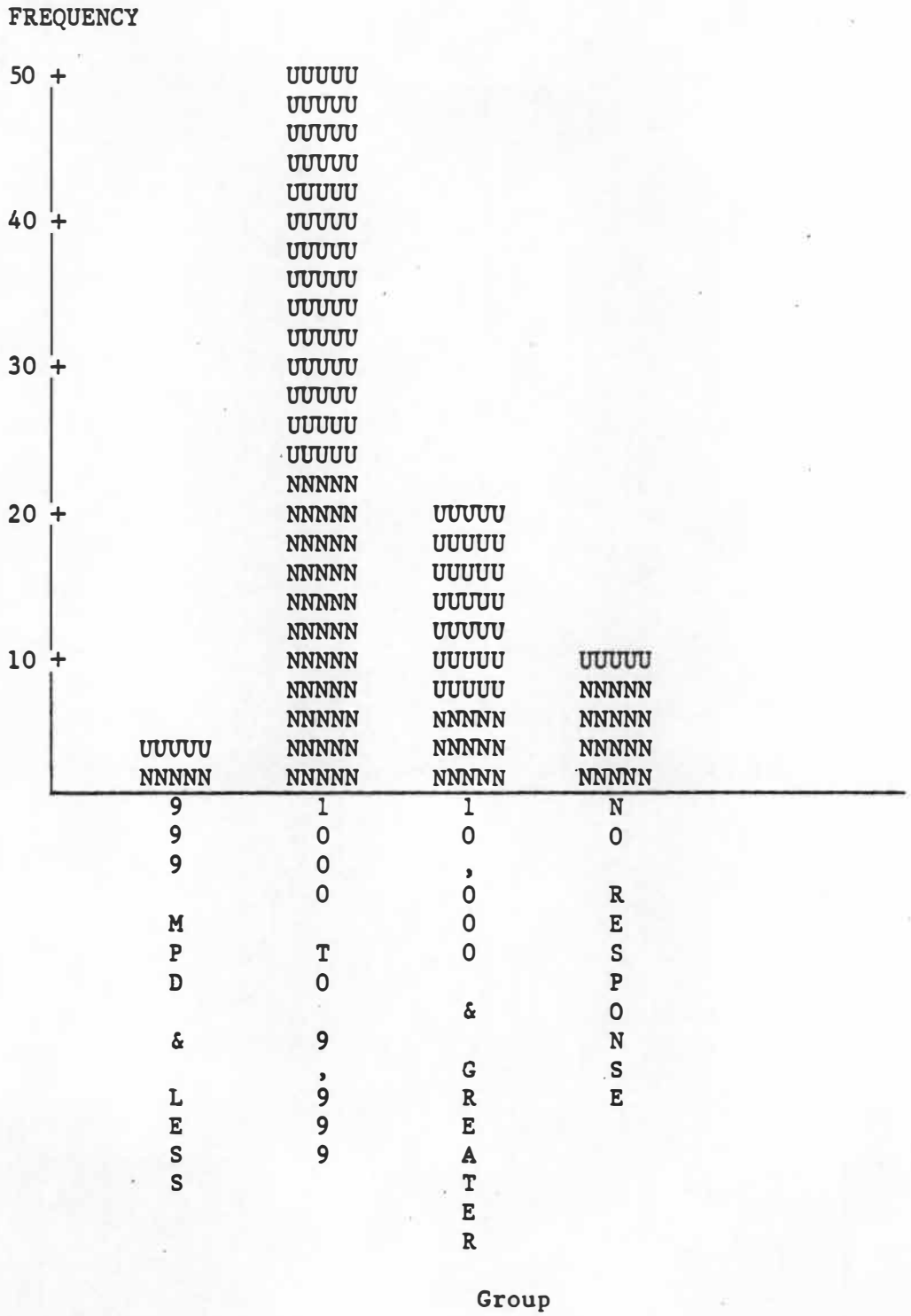

Figure 4. Computer Utilization by Group.[1]

[1]Frequency Bar Chart Questions 1 and 2B--First Questionnaire. Symbols: U Utilization, N No Utilization.

Future Use

Sixty-eight percent of the respondents indicated plans for future use of the computer. Those utilizing the computer planned to implement additional functions, and those not making use of the computer planned to initialize its implementation.

Contracting

Eighty-six percent of the respondents did not contract with a food service company (see Table 19, Appendix A). Computer utilization and plans to implement new or additional functions did not appear to be related to whether a facility was contracting with a food service company.

The Pearson Product Movement Correlation was employed to test the strength of the relationship between whether a facility contracted with a food service company and the use of the computer. There was a significant relationship at a significance level of .05. The correlation coefficient was negative, indicating that the variables were inversely related. Schools that were contracting were less likely to utilize the computer versus those who were not contracting. This could be the result of smaller schools having a greater dependency on food service companies. The correlation coefficient had a value of -.3034 which was not large. This indicated that the inverse relationship was not one of great strength. (See Table 20, Appendix A).

Computer Functions Utilized in College and University Food Services

The first questionnaire, Computer Utilization In College and University Food Services, inquired about functions presently utilized and functions that have the potential of being implemented within the next few years. Cost analysis, recipe information, inventory, nutrient analysis, production reports, simulation models, automated equipment, and accounting information were areas that were investigated in the first questionnaire. An open ended question was included to ensure that all functions utilized were considered.

The responses from the first questionnaire will be discussed in terms of trends of use rather than examining individual questions. Frequency bar charts were produced for each question. (see Figures 5-62, Appendix B). These charts display the frequency of facilities not utilizing, presently utilizing, and planning to utilize a function. Tables showing frequencies and percentages for present trends, future trends, and all functions presently utilized were produced (see Tables 3-5). Percentages for the table displaying future trends were given as a percentage of the total number of respondents versus a percentage of those utilizing the computer.

Present Use

Of those facilities utilizing the computer, the payroll function was presently utilized by the greatest percentage (71.%) of the respondents utilizing the computer. Records displaying accounts payable resulted in the next highest percentage of utilization (55%).

Table 3

Trends in the Present Use of the Computer in College and University Food Services

Function	Question	Frequency	Percentage of those Using
Simulation: Equipment scheduling	12A	0	0
Simulation: Line queing	12C	0	0
Menu Planning: Plans menus based on nutritional adequacy	8A	1	2
Menu Planning: Plans menus based on seasonal availability	8B	1	2
Purchasing: Based on Seasonal availability	9I	1	2
Simulation: Utilized to determine the effects of menu items	12D	1	2
Nutrient Analysis: Water	7H	2	4
Simulation: Scheduling labor	12B	2	4
Equipment: Automated production equipment	13A	2	4
Nutrient Analysis: Carbohydrates	7D	3	7
Nutrient Analysis: Sodium	7E	3	7
Nutrient Analysis: Other Minerals	7F	3	7
Nutrient Analysis: Vitamins	7G	3	7
Inventory: Actual use versus projected use	6C	4	9
Nutrient Analysis: Calories	7A	4	9
Nutrient Analysis: Protein	7B	4	9
Nutrient Analysis: Fat	7C	4	9
Sales Analysis: Reports of sales by menu item	10E	5	11

Table 3 (continued)

Function	Question	Frequency	Percentage of Those Using
Sales Analysis: Shows relationship of items sold	10F	5	11
Production Reports: Reports the number of personnel used to produce meals	11B	5	11
Purchasing: Reports showing purchases made for a particular period of time	9A	21	47
Accounting: General ledger	14E	23	51
Inventory: Reports showing beginning and ending inventory	6A	25	55
Accounting: Accounts payable	14C	25	55
Accounting: Payroll	14A	32	71

Table 4

Trends in the Future Use of the Computer in College and University Food Services

Function	Question	Frequency	Percentage % of Totals	Percentage % of Those Using
Equipment: Automated start-ups and shut-downs	13C	4	5	9
Simulation: Equipment scheduling	12A	5	6	11
Simulation: Line Queing	12C	5	6	11
Simulation: Determining the effects of menu items on production	12D	6	7	13
Purchasing: Reports showing the prices paid versus prices-quoted by vendor	9B	17	20	38
Cost Analysis: Planned cost for menu items	4A	20	24	44
Recipes: Price and portion adjustments	5C	20	24	44
Inventory: Reports showing actual versus projected use	6C	20	24	44
Sales Analysis: Reports showing the total sales for given periods of time for different units	10C	20	24	44
Inventory: Reports showing beginning and ending inventory	6A	21	25	47
Inventory: Reports showing received versus usage figures	6B	21	25	47
Production: Meal statistics	11A	21	25	47
Production: Reports showing the number of personnel in production	11B	21	25	47
Cost Analysis: Reports showing planned versus actual costs	4E	22	26	49
Recipes: Standardized	5A	22	26	49

Table 4 (continued)

Function	Question	Frequency	Percentage % of Total	Percentage % of Those Using
Recipes: Printouts of recipes	5B	22	26	49
Sales Analysis: Reports showing comparison of sales for a given period of time	10D	22	26	49
Production: Reports cost of personnel	11C	23	27	51
Cost Analysis: Actual Cost in dollars and percentage for menu items	4B	27	32	60

Table 5

Functions Utilized and Planning to be Implemented within the Next Few Years in College and University Food Services

Question	Present Use Frequency	Present Use % of Those Using	Present Use % of Total	Future Use Frequency	Future Use % of Those Using	Future Use % of Total
4. COST ANALYSIS						
A. Planned cost in dollars and percentage for menu items.	16	36	19	20	44	24
B. Actual cost in dollars and percentage for menu items.	14	31	16	27	60	32
C. Planned cost in dollars and percent for meals.	21	47	25	19	42	22
D. Acutal cost in dollars and percent for meals.	18	40	21	25	56	29
E. Variance between planned and actual costs.	9	20	11	22	49	26
F. Reports indicating gross profit and percent of profit by each menu item.	7	16	8	18	40	21
5. RECIPES						
A. Standardized recipes.	20	44	24	22	49	26
B. Printouts of standardized recipes are provided based on forecasted amounts.	20	44	24	22	49	26
C. Computer system allows for management to make price or portion adjustments as necessary to recipes.	16	36	19	20	44	24
6. INVENTORY						
A. Reports the beginning and ending inventory.	25	55	29	21	47	25
B. Report in A also shows received and usage figures for items.	18	40	21	21	47	25

Table 5 (continued)

Question	Present Use Frequency	Present Use % of Those Using	Present Use % of Total	Future Use Frequency	Future Use % of Those Using	Future Use % of Total
C. Shows a comparison of the actual usage of every item (ingredient) with the projected figure (from sales system).	4	9	5	20	44	24
D. Reports inventory items that have fallen below established minimum requirements.	11	24	13	18	40	21
7. NUTRIENT ANALYSIS						
A. Calories	4	9	5	19	42	22
B. Protein	4	9	5	17	38	20
C. Fat	4	9	5	17	38	20
D. Carbohydrate	3	7	4	17	38	20
E. Sodium	3	7	4	18	40	21
F. Other minerals	3	7	4	16	36	19
G. Vitamins	3	7	4	16	36	19
H. Water	2	4	2	12	27	14
8. MENU PLANNING						
A. Plans menus based on nutritional adequacy.	1	2	1	10	23	12
B. Plans menus based on seasonal availability.	1	2	1	14	32	16
C. Plans menus based on popularity.	6	14	7	16	36	19
D. Plans menus based on cost.	8	18	9	16	36	19
9. PURCHASING						
A. Reports purchases made for a particular period of time	21	47	25	22	49	26
B. Reports the price paid for products and compares to the price quoted by the vendor.	7	16	8	17	38	20
C. Shows price trends by product for a particular period of time (example, 12-month period).	7	16	8	17	39	20

Table 5 (continued)

Question	Present Use Frequency	Present Use % of Those Using	Present Use % of Total	Future Use Frequency	Future Use % of Those Using	Future Use % of Total
D. Reports the current month's prices paid by the product (bread, meat, etc.).	19	42	22	19	42	22
E. The report in D(d) also prints vendor price fluctuations.	6	14	7	13	29	15
F. The report in D(d) also identifies vendors.	14	31	16	16	36	19
G. Orders products according to forecasts and inventory.	9	20	11	17	38	20
H. Reports last date an item was purchased.	13	29	15	17	38	20
I. Provides information about seasonal availability.	1	2	1	12	27	14
J. Provides information about delivery schedules.	13	29	15	9	20	11
10. SALES ANALYSIS						
A. Daily reports providing general information about sales activities.	13	29	15	19	42	22
B. Reports showing the total sales for a given period of time.	17	38	20	19	42	22
C. Reports showing the total sales for given periods of time for different units.	14	31	16	20	44	24
D. Reports showing comparisons of sales for given periods of time.	8	18	9	22	49	26
E. Reports providing sales comparison by menu items for today, month-to-date, and year-to-date (or other periods).	5	11	6	18	40	21
F. Reports showing the relation of each item sold in terms of total sales for today, month-to-date, and year-to-date (or other periods).	5	11	6	18	40	21

Table 5 (continued)

Question	Present Use Frequency	Present Use % of Those Using	Present Use % of Total	Future Use Frequency	Future Use % of Those Using	Future Use % of Total
11. PRODUCTION REPORTS						
A. Compiles the statistics on the number of meals served by the type of meal (breakfast, lunch, dinner).	20	44	24	21	47	25
B. Reports the number of personnel used to produce meals.	5	11	6	21	47	25
C. Reports the cost of personnel.	8	18	9	23	51	27
12. SIMULATION MODELS						
A. Equipment scheduling	0	0	0	5	11	6
B. Scheduling labor	2	4	2	10	22	12
C. Line queuing	0	0	0	5	11	6
D. Determining the effects of menu items on production.	1	2	1	6	13	7
13. EQUIPMENT						
A. Automated production equipment. Examples: automated fryers--drop and lift baskets as needed, ovens controlled by sensor, shuts off automatically when roast reaches a particular internal temperature.	2	4	2	4	9	5
B. Automated cash registers.	16	36	19	12	27	14
C. Timing of start-ups and shut-downs on various kinds of equipment.	3	7	4	4	9	5
14. ACCOUNTING						
A. Payroll	32	71	38	10	23	12
B. Purchasing	19	42	22	16	36	19
C. Accounts Payable	25	55	29	13	29	15
D. Sales Accounting	19	42	22	10	23	12
E. General Ledger	23	51	27	12	27	14
F. Weekly P&L Statements	10	23	12	19	42	22
G. Monthly P&L Statements	19	42	22	16	36	19

These two functions with the greatest percentage of utilization were related to business functions, versus being directly utilized by the employees in the food service department. A study conducted at The University of Pennsylvania indicated that 59% of the respondents utilizing the computer utilized computerized financial reports and 55% made use of computerized payroll reports. Fifty-nine percent and 55% were the two highest percentages of utilization (McKinnon, 1982).

Reports showing beginning and ending inventory were also used by 55%, of the respondents. Fifty-one percent of the facilities used a computerized general ledger, and 47% of the facilities utilized the computer for producing reports displaying purchases made for a particular period of time.

Simulation models resulted in the lowest percentage of utilization. Simulation is used to solve isolated production problems, and can also be utilized to analyze the operation of the entire production system. A given course of action may be evaluated for cost, time, and or distance minimization, and maximization of profit, value, and/or return on investment. An advantage of simulation models is that the results of a decision can be determined prior to its implementation in the real world (Hopeman, 1980).

The computer can be programmed for simulation. Several factors can be entered into the computer and the computer in turn determines the effects of altering a variable or variables. Despite the great number of benefits that can be obtained from simulation models, it is apparent from this study that it was the least utilized of all functions. The reason for this might be that development and research

in this area has not been very extensive. For simulation, all categories or choices were utilized by less than 11% of the respondents, whereas only some aspects of other functions were utilized by less than 11% of the facilities. Simulation models for equipment scheduling and line queing were not utilized by any of the facilities. One facility (2%) utilized a computerized simulation model for determining the effects that menu items had on production. Menu planning based on nutritional adequacy and seasonable availability and purchasing based on seasonal availability was also included in this category of 2% utilization. Nutrient analysis for water, simulation models for scheduling labor, and automated production equipment were utilized by 4% of the facilities. Nutrient analysis of carbohydrate, sodium, vitamins, and other minerals was utilized by 7% of the respondents. The Pennslyvania State survey indicated that 7% of the total number of respondents or 9% of those using the computer also utilized computerized nutrition information. However, in the Penn State Survey the use of computerized nutrition information resulted in the greatest percentage of facilities planning to implement the function within the next five years (McKinnon, 1982). Computer stored nutrient data banks were introduced in the late 1950's, and their use has only started to increase tremendously in the 1980's. Two reasons for this might be the increased emphasis on good nutrition, and the availability of microcomputers and remote telecommunication access toncentral data base systems (Willard, 1982).

The inventory function of actual usage versus the projected figure (from sales system), nutrient analysis for calories, protein,

and fat were utilized by 9% of the facilities. Eleven percent of the respondents utilized computerized reports providing sales comparison by menu items for today, month-to-date, and year-to-date, (or other periods), reports showing the relation of each item sold in terms of total sales for today, month-to-date, and year-to-date (or other periods), and reports displaying the number of personnel used to produce meals. These functions resulted in the lowest percentages of utilization by the respondents who were utilizing the computer.

The remaining functions resulted in 11% to 45% utilization by facilities making use of the computer. Forty percent had implemented cost analysis function for determining actual cost in dollars and percentages for meals, and reports showing received and useage figures for menu items. Forty-two percent utilized reports which displayed the current months prices paid by the product, sales accounting information, and monthly P & L statements. Thirty-eight percent of the facilities used a sales analysis report showing the total sales for a given period of time. Thirty-six percent of the respondents made use of computerized reports of planned cost in dollars and percentages for menu items, price and portion adjustments to recipes, and computerized cash registers. Thirty-one percent utilized computerized reports exhibiting actual cost in dollars and percentages for menu items, and reports showing the relationship of each item sold in terms of total sales for different units. Twenty-nine percent used reports showing the last date an item was purchased, reports providing information about delivery schedules, and daily reports about sales activities. Twenty-four percent made use of reports for inventory

items that had fallen below established minimum requirements. Twenty-three percent made use of P & L statements, and 20% used reports showing variance between planned and actual costs and utilized the computer for ordering products according to forecasts and inventory. Eighteen percent utilized the computer to plan menus based on cost, and made use of computerized reports displaying comparison of sales for given periods of time, and production reports exhibiting the cost of personnel. Sixteen percent made use of cost analysis reports indicating gross profit and percent of profit by each menu item, reports displaying the price paid for products versus the price quoted by the vendor, and reports showing price trends by the product for a particular time period. Fourteen percent made use of the computer to plan menus based on popularity, and utilized reports showing fluctuations in vendor prices.

The two highest and lowest frequencies and percentages of presently utilized functions were zero frequency or zero percent, and a frequency of 32 or 71%. The functions utilized least frequently pertained to simulation models for scheduling equipment and labor. The functions that were utilized with the greatest frequency were computerized reports displaying accounts payable and payroll information.

Future Use

Timing of start-ups and shut-downs on various types of equipment, and simulation models for equipment scheduling and scheduling of labor were the functions least likely to be implemented within the next few years. The functions most likely to be implemented within the next

few years, were computerized reports exhibiting personnel cost, reports showing comparison of sales for given periods of time, reports displaying prices paid and comparisons of prices quoted by vendors, standardized recipes, and reports exhibiting the variance between planned and actual costs.

The highest percentage of facilities planning to implement a function within the next few years was 32% and the lowest was 5%. Percentages were calculated for the total number of respondents, and respondents who were utilizing the computer. The discussion of percentages will be limited to percentages of the total number of respondents.

Thirty-two percent of the facilities planned to utilize computerized reports displaying actual cost in dollars and percentages for menu items. Twenty-seven percent of the respondents planned to generate computerized reports displaying the cost of personnel. Twenty-six percent of the respondents indicated that they planned to implement recipe functions such as standardized recipes and printouts of recipes, cost analysis reports showing the variance between actual and planned costs, and sales analysis reports exhibiting comparisons of sales for given periods of time. Twenty-five percent of the facilities proposed to generate inventory reports showing beginning and ending inventories, received and useage figures, production reports indicating statistics on the number of meals served by the type of meal, and reports displaying the number of personnel utilized to produce meals. Twenty-four percent of the facilities planned to utilize cost analysis reports showing planned cost in dollars and percentages

for menu items, inventory reports showing a comparison of actual useage of items versus the projected figure, sales analysis reports displaying the total sales for given periods of time for different units, and a function enabling recipe price and portion adjustments. Twenty percent planned to generate reports displaying the price paid for products versus the price paid by the vendor.

The lowest percentages pertaining to functions planning on being implemented were 5%, 6%, and 7%. Five percent of the facilities planned to implement automated equipment and start-ups and shut-downs of equipment. Six and seven percent of the respondents proposed the implementation of simulation models for equipment, line queing, and to assess the effect of menu items on production. The highest percentages utilized were for production reports, sales analysis reports, recipes, inventory reports, and cost analysis reports.

The study conducted at The University of Pennsylvania resulted in similar trends. A table was produced showing a comparison of percentages for present and future use for this study and the study conducted at The University of Pennsylvania (see Table 6).

Open Ended Question

Facilities that utilized functions that were not included on the survey were requested to provide this information in the open ended question. A table was produced showing the frequencies and percentages of facilities utilizing functions not included in the questionnaire (see Table 7).

Table 6

Comparison of Results from The State University of Pennsylvania and The University of Tennessee Surveys Regarding the Present and Future Use of Computer Functions

Functions Listed in Penn State Survey	The State University of Pennsylvania[1]		The University of Tennessee[2]		
	Percent Usage of Total Number of Respondents	Percent Future Useage of Total Number of Respondents	Percent Usage of Total Number of Respondents	Percent Usage of Those Using	Percent Future Usage of Total Number of Respondents
Budgeting**	27	30	2	4	-
Financial reports	59	18	25	43	17
Menu	30	34	5	9	17
Recipe files	39	27	22	41	25
Inventory and Order filling	54	34	21	36	26
Forecasting production*	32	34	-	-	-
Pricing menus	27	36	22	41	23
Ordering of products based on production forecaats	30	39	11	20	20
Nutrition information	7	48	4	8	18
Daily reports--meal counts, food costs	39	32	24	44	25
Dining room access**	41	25	13	24	-
Manning tables*	7	23	-	-	-
Payroll	55	16	38	71	12
Personnel records*	36	23	2	4	-
Reorder points for purchasing	27	27	13	24	21

Table 6 (continued)

Functions Listed in Penn State Survey	The State University of Pennsylvania[1]		The University of Tennessee[2]		
	Percent Usage of Total Number of Respondents	Percent Future Usage of Total Number of Respondents	Percent Usage of Total Number of Respondents	Percent Usage of Those Using	Percent Future Usage of Total Number of Respondents
Price trends by product for period of time (i.e. revolving 12-month period)	14	34	8	16	20
Food usage by product for period of time (monthly, yearly)	32	36	29	40	25

[1]Respondents N=44, Percentage of those using the computer %=69

[2]Respondents Total N=85, Percentage of those using the computer %=53
Those using N=45

*Functions not included in The University of Tennessee survey.

**Functions not included in The University of Tennessee survey, indicated in open ended question.

Table 7

Functions Listed in Open Ended Question that were not Included in Survey[1]

Function	Present or Future Use	Frequency	Percent of Those Using The Computer
Budgeting	Present	2	4
Customer Surveys	Present	1	2
Dining Room Access	Present	11	13
Labor Productivity Analysis	Future	1	2
Restaurant Club Billing	Present	2	4
Sales Promotions	Present	1	2
Employee Time and Attendance	Present	2	4
Word Processor	Present	2	4

[1]Question Q15--First Questionnaire

Computer Utilization and Effects on Skill Requirements and Employment Trends

The second questionnaire was designed to measure the effect of the use of the computer on employee skill requirements and employment trends (See Appendix C). The questionnaire was divided into three sections. The first section pertained to non-supervisory personnel, the second section applied to supervisory employees, and the third section to administrative personnel. Each section was divided into three categories. The first category pertained to skill requirements, the second section consisted of statements concerning skill requirements, and the third category consisted of statements relating to employment trends.

Three point Likert-type scales were used to evaluate responses. The first category in the questionnaire provided three options for response. The first option was that the need for a particular skill requirement had decreased as a result of computer utilization, the second response was that it had remained the same, and the third was that it had increased as a result of computer use. The remaining sections containing statements about skill requirements and employment trends provided the four options, disagree, uncertain, agree and don't know.

In using the Likert scale, each response is given a numeric score indicating its favorability or unfavorability. Often favorable responses are given a high value and unfavorable the low value. The algebraic summation of the scores indicates the overall opinion. The

rationale for using such total scores is that the probability of agreeing with any one series of favorable items, varies directly with the degree of favorability of the attitude (Johoda, 1966).

Decreased skill need was assigned a numeric value of one, remained the same a numeric value of two, and increased a value of three. The first section concerned skill requirements of non-supervisory employees. There were eight statements. Therefore, the lowest possible score for that section would be eight, which would indicate an overall decreased need for skills. A score of 24 would indicate a high intensity response for overall increased skill needs. The same would apply for the second scale. The don't know response was not be given a numeric value. It will not be included in the evaluation scale, however the frequency and percentage of respondents choosing this response will be shown. The first set of questions regarding skills will be evaluated separately and cumulatively. The second set of statements regarding skill requirements and labor trends will be evaluated separately.

Each question was analyzed separately for frequencies and percentages. Tables displaying the frequencies and percentages for each skill level are located following the discussion of each section.

Forty-five of the respondents indicated they were utilizing the computer. Twenty-four respondents indicated that the non-supervisory employee was involved with the use of the computer. Twenty-eight of the facilities indicated that the supervisory personnel were involved. Administrative personnel were involved in thirty-three of the facilities (see Table 8).

Table 8

Computer Involvement By Employee Level

Employee Level	Frequency	Cumulative Frequency	Percent	Cumulative Percentage
Non-supervisory Personnel				
Not involved	21	21	46.667	46.667
Involved	24	45	53.333	100.000
Supervisory Personnel				
Not involved	17	17	37.778	37.778
Involved	28	45	62.222	100.000
Administrative Personnel				
Not involved	12	12	26.667	26.667
Involved	33	45	73.333	100.000

[1]Frequency chart, Question 1--Second Questionnaire

Non-Supervisory

Four out of the seven skill requirements for the non-supervisory employee were rated by the majority of respondents as having as increased need as a result of computer utilization. These skills were reading, assessing and analyzing computer output, the ability to work with numbers and the ability to follow precise directions. The ability to write, the ability to make decisions concerning recipe ingredients and procedures, and the ability to operate computerized machinery were rated as remaining the same. None of the skill needs for this section were rated by a majority as having decreased. The overall skill level for this employee was felt to have remained the same by 54% of the respondents. The cumulative score for this section was 19 on a scale of 8-24. Therefore the cumulative score indicated an overall upgrading of skill requirements. However, the direction of response was not one of high intensity.

The literature indicated that some industries had reported a downgrading of skills for the non-supervisory employee as a result of computer utilization. The increased skill requirements of the non-supervisory employee in the food service industry appeared to be the result of an increased need for literacy and the ability to work with numbers. This appears to be unique in comparison to other industries.

Skill needs regarding the operation of equipment were seen as having remained the same for the non-supervisory employee. Results indicated a limited use of computerized equipment in college and university food services. It appeared that skill requirements pertaining

to the operation of computerized equipment had not effected the non-supervisory employee due to minimal use of computerized equipment in production. Routine tasks were not seen as being eliminated for this group of employees. It is felt that with the increased use of computerized equipment routine tasks will be eliminated, and skills concerning the operation of the equipment will be increased.

Sixty-three percent of the respondents disagreed that job specifications for the non-supervisory should be upgraded due to increased skill requirements. The score for this statement was 1.5 on a scale of 1 to 3. This indicated a moderate intensity of disagreement with the statement. Forty-six percent disagreed that the use of the computer had eliminated routine tasks for this level of personnel. A score of 1.8 on a scale of 1-3 indicated a weak intensity of disagreement with the statement. Fifty-eight percent agreed that the use of the computer had not eliminated jobs but had eliminated routine tasks. Seventy-one percent agreed that the use of the use of computer had not resulted in any significant job changes. A score of 2.6 on a scale of 1-3 was indicative of a moderate to strong intensity of agreement for these two statements. Eighty-eight percent disagreed that there had been a decrease in the number of non-supervisory employees. A score of 1.1 indicated intense disagreement with the statement (see Tables 9 and 10).

The Spearman Rho Correlation Coefficient was employed to test the strength of the relationship between the total numbr of functions utilized and the utilization of the computer by non-supervisory personnel (see Table 21, Appendix A). The correlation coefficient was .5 with a

Table 9

Non-Supervisory Skill Requirements[1]

Question	Frequency					Percent of Those Involved				
	Decreased	Same	Increased	No Response	Not Applicable	Decreased	Same	Increased	No Response	Not Applicable
Section I: Skills										
2. A. The ability to read.	0	11	13	0	0	0	46	54	0	0
B. The ability to assess and analyze computer outout.	0	10	14	0	0	0	42	58	0	0
C. The ability to work with numbers as a result of standardized recipes, computerized machinery, etc.	5	8	9	2	0	21	33	38	8	0
D. The ability to write	3	15	5	0	1	13	63	21	0	4
E. The ability to make decisions concerning ingredients and procedures of recipes.	6	8	7	3	0	25	33	29	13	0
F. The ability to follow precise directions.	0	5	18	1	0	0	21	75	4	0
G. The ability to operate computerized machinery.	0	16	7	1	0	0	67	29	4	0
H. The overall skill level of the non-supervisory employee has:	1	13	8	2	0	4	54	33	8	0

[1]Frequencies and Percentages, Questions 2A-2H--Second Questionnaire, Section I. Number of respondents for non-supervisory level was 24.

Table 10

Non-Supervisory Skill Requirements and Employment Trends[1]

Question	Frequency						Percent of Those Involved					
	Disagree	Uncertain	Agree	Don't Know	NR[2]	NA[3]	Disagree	Uncertain	Agree	Don't Know	NR	NA
Section II: Skills/Statements												
2. I. Job specifications for the non-supervisory employee should be upgraded since skill requirements have increased to a great extent as a result of computer utilization.	15	4	3	0	2	0	63	17	13	0	8	0
J. The use of the computer has eliminated many routine tasks for the non-supervisory employee.	11	3	8	1	1	0	46	13	33	4	4	0
Section III: Employment Trends/Statements												
2. K. The use of the computer has not eliminated jobs, but has merely eliminated routine tasks.	6	2	14	1	1	0	25	8	58	4	4	0
L. The use of the computer has not resulted in any significant job changes at this level and therefore jobs have not been eliminated.	3	3	17	0	1	0	13	13	71	0	4	0
M. There has been a decrease in the number of non-supervisory employees as a result of computer utilization.	21	1	1	0	1	0	88	4	4	0	4	0

[1]Frequencies and Percentages, Questions 2I-2M--Second Questionnaire, Sections II and III. Number of respondents for non-supervisory level was 24.

[2]No Response

[3]Not Applicable

probability equal to .0005. This indicates that a significant relationship did exist at a significance level of .05. The relationship was one of moderate strength. Nevertheless, there was a direct linear relationship between the number of computerized functions utilized, and the involvement of the non-supervisory employee with the use of the computer.

Supervisory

Five out of the eight skill needs pertaining to the supervisory employee were felt to have increased. The skills were the ability to make decisions regarding the daily ordering of food and supplies, the ability to make decisions regarding inventory, the ability to operate computerized machinery, the ability to determine cost and selling prices of items, and the ability to educate subordinates about computer use. The expected response concerning the ability to determine cost and selling price of items was a decreased skill need, due to the availability of the computer which calculated food cost percentages and selling prices. The need was seen as increasing, since the computer provided information that was previously unavailable, thereby resulting in increased skill needs to assess the information. The skill needs that were ranked as having remained the same were the ability to make decisions regarding scheduling of personnel and equipment and the ability to plan menus. None of the skills were ranked by a majority of respondents as having decreased. The majority of respondents felt the overall skill level of the supervisory employee

had increased. A cumulative score of 22 on a scale of 9-27 indicated a response of moderate intensity of agreement pertaining to the upgrading of skill requirements.

Fifty-nine percent of the respondents disagreed with the statement that since routine decisions with identifiable factors could be programmed into computers, there is a decreasing need for routine daily decision making. A score of 1.8 on a scale of 1-3 showed that the response was in the direction of disagreement, however the intensity of the response was not strong. Eighty-one percent agreed with strong intensity (score=2.8) that the use of the computer in food services had freed managers to manage food service production versus performing clerical tasks. Sixty-six percent agreed with moderate intensity (score=2.5) that the use of the computer had not eliminated jobs, but merely routine tasks. Fifty-nine percent agreed with weak to moderate intensity (score=2.3) that the computer had not resulted in any significant job changes and therefore jobs had not been eliminated. Eighty-five percent disagreed with strong intensity (score=1.3) that there had been a decrease in the number of supervisory employees as a result of computer utilization (see Table 11 and 12).

The Pearson Product Moment Correlation was employed to test the strength of the relationship between the number of functions utilized and involvement of the supervisory employee. At a significance level of $p = .05$ there was a significant relationship between the total number of functions utilized and involvement of supervisory personnel. The correlation coefficient had a value of .6695, indicating a

Table 11

Supervisory Skill Requirements[1]

Question	Frequency					Percent of Those Involved				
	Decreased	Same	Increased	No Response	Not Applicable	Decreased	Same	Increased	No Response	Not Applicable
Section I: Skills										
3. A. The ability to make decisions regarding the daily ordering of food and supplies.	1	9	16	2	0	4	33	59	4	0
B. The ability to make decisions regarding inventory.	3	8	16	1	0	11	30	59	0	0
C. The ability to make decisions regarding the scheduling of personnel.	0	22	4	2	0	0	81	15	4	0
D. The ability to make decisions regarding the scheduling of equipment.	0	24	2	2	0	0	88	7	4	0
E. The ability to operate computerized machinery.	0	11	15	2	0	0	41	56	4	0
F. The ability to plan menus.	0	15	10	3	0	0	56	37	7	0
G. The ability to determine cost and selling prices of items.	4	7	15	2	0	15	19	56	4	0
H. The ability to educate subordinates about computer use.	0	6	20	1	1	0	22	74	0	4
I. The overall skill level of the supervisory employee has:	0	11	16	1	0	0	41	59	0	0

[1]Frequencies and Percentages, Questions 3A-3I--Second Questionnaire, Section I. Number of respondents for supervisory level was 28.

Table 12

Supervisory Skill Requirements and Employment Trends[1]

Question	Frequency						Percent of Those Involved					
	Disagree	Uncertain	Agree	NR[2]	NA[3]	Don't Know	Disagree	Uncertain	Agree	NR	NA	Don't Know
Section II: Skills/Statements												
3. J. Since routine decisions with identifiable factors can be programmed into computers, there is a decreasing need for routine daily decision making.	16	0	10	1	0	1	59	0	37	0	0	4
K. The use of the computer in food services has freed managers to manage food service production versus performing clerical tasks.	1	3	22	1	0	1	4	11	81	0	0	4
L. The use of the computer has not eliminated jobs, but has merely eliminated routine tasks.	5	3	18	1	0	1	19	11	66	0	0	4
M. The use of the computer has not resulted in any significant job changes at this level and therefore jobs have not been eliminated.	7	4	16	1	0	0	26	15	59	0	0	0
N. There has been a decrease in the number of supervisory employees as a result of computer utilization.	23	1	3	1	0	0	85	37	11	0	0	0

[1]Frequencies and Percentages, Questions 3J-3N--Second Questionnaire, Sections I and III. Number of respondents for supervisory level was 28.

[2]No Response

[3]Not Applicable

moderate to strong degree of strength for the relationship. (See Table 22, Appendix A).

The Spearman Rho Correlation Coefficient was determined for the relationships between the total number of functions used, and the elimination of routine tasks for the supervisory employee. There was not a significant relationship between the total number of functions used and routinization of supervisory tasks, at a significance level of $p = .05$. The correlation coefficient had a value of .2733 (see Table 23, Appendix A).

Administrative

Four out of the five skill requirements inquired about were ranked as having an increased need as a result of computer utilization. The skill requirements were the ability to make decisions concerning hardware and software, the ability to make decisions concerning employees as a result of computer implementation and ongoing utilization, the ability to perform cost accounting analysis, and the ability to plan training programs regarding computer use. The majority of respondents felt the ability to plan manpower needs had remained the same in spite of the availability of computerized simulation models. This demonstrates, again, that computerized functions used for management decision making were not widely utilized. None of the skills were ranked as having decreased. The overall skill level of the administrative employee was ranked as having increased by the majority (73%) of respondents. The cumulative score of 15 on a scale of 6 to 18 indicated the response was one of moderate intensity of agreement concerning the upgrading of skill requirements.

Seventy percent disagreed with moderate intensity (score=1.4) that overall the number of administrative decision making activities had decreased since many were performed by computer functions. Forty-five percent agreed with weak intensity (score=1.9) that overall, decision making activities had increased. Forty-five percent disagreed with moderate intensity (score=1.6) that the number of decision making activities had remained the same. Eight-two percent agreed with strong intensity (score=2.7) that the use of the computer had not eliminated jobs, but had merely eliminated routine tasks. Sixty-four percent of the respondents agreed with weak to moderate intensity that the use of the computer had not resulted in any significant job changes, and therefore jobs had not been eliminated. Eighty-eight percent disagreed with strong intensity that there had been a decrease in the number of managerial or administrative employees as a result of computer utilization (see Tables 13 and 14).

The Spearman Rho Correlation between the number of functions utilized and the involvement of the administrative employee indicated that there was a significant relationship at a significance level of p = .05. The correlation coefficient for this relationship was .5849. The relationship was therefore, one of moderate strength. (See Table 24, Appendix A).

Overall, results indicated that skills had been upgraded for all three employee levels. Although overall skill levels were rated as having increased for the supervisory and administrative personnel only. The upgrading of non-supervisory skills was felt to be unique to the food service industry or any industry requiring an increased

Table 13

Administrative Skill Requirements[1]

Question	Frequency					Percent of Those Involved				
	Decreased	Same	Increased	No Response	No Applicable	Decreased	Same	Increased	No Response	No Applicable
Section I: Skills										
4. A. The ability to make decisions concerning the purchasing of software and hardware.	0	8	23	1	1	0	24	70	3	3
B. The ability to make decisions concerning problems that arise with employees as a result of computer implementation and ongoing utilization.	0	12	19	2	0	0	36	58	6	0
C. The ability to plan manpower needs. (Computerized simulation models can be utilized for this function.)	1	21	8	2	1	3	64	24	6	3
D. The ability to perform cost accounting analysis.	3	8	20	2	0	9	24	61	6	0
E. The ability to plan training programs regarding computer use.	0	7	24	2	0	0	21	73	6	0
F. The overall skill level of the administrative employee has:	0	6	24	3	0	0	18	73	9	0

[1]Frequencies and Percentages, Questions 4A-4F--Second Questionnaire, Section I. Number of respondents for Administrative level was 33.

Table 14

Administrative Skill Requirements and Employment Trends[1]

Question	Frequency						Percent of Those Involved					
	Disagree	Uncertain	Agree	NR[2]	NA[3]	Don't Know	Disagree	Uncertain	Agree	NR	NA	Don't Know
Section II: Skills/Statements												
4. G. Overall, the number of administrative decision making activities have decreased since many are performed by computer programs.	23	4	5	1	0	0	70	12	12	3	0	0
H. Overall, decision making activities have increased.	10	4	15	3	0	1	30	12	45	9	0	3
I. Overall, the number of decision making activities have remained the same.	15	5	9	4	0	0	45	15	27	12	0	0
Section III: Employment Trends/Statements												
4. J. The use of the computer has not eliminated jobs, but has merely eliminated routine tasks.	2	3	27	1	0	0	6	9	82	3	0	0
K. The use of the computer has not resulted in any significant job changes at this level, and therefore jobs have not been eliminated.	6	4	21	1	0	1	18	12	64	3	0	3
L. There has been a decrease in the number of managerial or administrative employees as a result of computer utilizations	29	2	1	1	0	0	88	6	3	3	0	0

[1]Frequencies and Percentages, Questions 4G-4L--Second Questionnaire, Sections II and III. Number of respondents for administrative level was 33.

[2]No Response

[3]Not Applicable

need for literacy or ability to comprehend mathamatical computation. Routinization of tasks occurred only at the supervisory and administrative levels. The statement indicating that supervisory employees had a greater amount of free time due to the elimination of routine tasks was one of two statements having a response with the greatest intensity. The direction of the response was toward agreement. There was a significant correlation between the elimination of routine supervisory tasks and the number of computer functions used.

The number of functions utilized was directly related to the involvement of all three levels of personnel. Facilities utilizing few functions most likely were making use of accounting functions which did not involve food service personnel.

Results indicated that unemployment was not prevalant at any level. Unemployment may be masked by increased growth of facilities, lack of knowledge concerning the status of the labor force prior to the use of the computer, or curtailment of hiring with a simultaneous increase in productivity. Further research is needed for more conclusive results concerning the subject.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary

An investigation was conducted to assess the present situation and probable future developments in the use of computers, and to identify and evaluate the effect of computer use on employee skill requirements and employment trends in selected college and university food services. Two mail questionnaires were developed. The first questionnaire was designed to obtain information about computer utilization. The second questionnaire sought information concerning employee skill requirements and employment trends. An identification of functions presently used and those planning on being implemented in the future were obtained from the first questionnaire. Responses from the second questionnaire pertained to opinions of food service directors regarding the effect of computer utilization on employee skill requirements and labor trends. Responses were evaluated for direction and intensity utilizing Likert-type scales.

Computer utilization was evaluated for the number of facilities making use of the technology and the present and probable future use of computer functions. Fifty-three percent of the respondents utilized the computer and 47% were presently not involved with its use. Sixty-eight percent of all the respondents indicated plans for future use.

Sophisticated functions were least utilized such as simulation models, menu planning functions, automated equipment and nutritional analysis of several nutrients. Accounting and inventory functions were by far utilized to the greatest extent.

Functions which few facilities planned to implement within the next few years were automated equipment and simulation models. Those functions showing the greatest potential for future implementation were production reports, sales and cost analysis reports, purchasing reports, and the use of standardized recipes.

The Pearson Product Moment Correlation indicated significant relationships did not exist between the number of meals prepared daily and the use of the computer, and between the number of meals prepared daily and the number of functions utilized. The Pearson Product Moment Correlation also indicated that there was a negative correlation between the use of the computer and whether a school contracted with a food service company. This could be the result of smaller facilities having a greater dependency on food service companies. Smaller facilities also have less need for the implementation of computer technology. However, further research is required for more conclusive results regarding this relationship.

Overall skill requirements had increased for all three employee levels. Results indicated that there was no routinization and no elimination of jobs for the non-supervisory employee. Supervisory routine tasks were eliminated as a result of computer utilization. Supervisory employees were felt to have an increased amount of free time without experiencing a problem with job elimination. Skill

needs related to administrative decision making activities concerning computer use were shown to have increased. Routine tasks had been eliminated as a result of computer utilization. There was no indication of job elimination at this level. Statements resulting in scores of greatest intensity were the statements indicating disagreement that unemployment had resulted at all levels and for the statement implying agreement that the supervisory employee had an increased amount of free time due to the use of the computer. Decision making skill requirements were seen as remaining the same at the supervisory and administrative level. This is most likely the result of minimal utilization of sophisticated decision making computer functions.

The Spearman Rho Correlation Coefficient was utilized to test the strength of several relationships. The number of functions utilized was significantly related to the involvement of all three levels of personnel. Facilities utilizing few functions were most likely making use of accounting functions only, which would not involve food service personnel.

There was not a significant correlation between the elimination of supervisory clerical tasks and the number of functions used. The elimination of supervisory clerical tasks appeared to occur regardless of the number of functions used.

Conclusions

It was hypothesized that computer use in college and university food services would have an impact on employee skill requirements and employment trends. The hypothesis also stated that skill requirements

would have decreased at the non-supervisory level and would have increased at the administrative level. Employment trends were anticipated to occur only at the non-supervisory level.

The initial implication of the four hypotheses was accepted. Skill changes had occurred among all three levels of personnel. The skill levels of supervisory and administrative employees had increased. The remainder of the projections in the hypothesis indicated expectations for decreased skill requirements and demand for the non-supervisory employee.

Findings showed that employee skill requirements had increased at all three levels with no elimination of jobs. Elimination of routine tasks had occurred at the administrative and supervisory level. However skills pertaining to decision making functions had remained the same. This may be the result of the extensive use of accounting functions. It is felt that computer use in the college and university facet has not been extensive enough to have affected the non-supervisory routine tasks.

It is vital that management take action in regard to changes presently occurring and plan for those that are expected. This study indicated that college and university food services were not using the computer extensively. Overall skill requirements for all three levels of personnel were perceived as having increased. Management needs to act according to changes that have occurred such as the upgrading of skill requirements and increased free time of the supervisory employee.

Unemployment did not appear to be an immediate problem. Further research is needed for more conclusive results concerning the subject. Unemployment may be masked by increased growth of the facility, lack of knowledge concerning the status of the labor force prior to computer use, or curtailment of hiring with a simultaneous increase in productivity. For example Memphis City Schools increased their production of 30,000 meals per day to 96,000 meals per day without employing additional supervisors (Schuster, 1981). Although layoffs did not occur, the hiring of new employees was curtailed. It is felt that the growth of facilities, due to the use of computer technology, will probably result due to company expansion. This in turn will result in increased employment. Therefore, it is not felt that unemployment will pose a serious problem.

If changing skill needs are not acknowledged and planned for unnecessary displacement or unemployment may occur. Workers not trained adequately will be unable to adapt to the technology change. Management does not know what the future will entail in terms of overall employment trends. However, management can act upon changes that they are aware of, such as changing skill requirements in an attempt to prevent unnecessary displacement and unemployment. It is necessary to plan for human and technical change such as changes in skill requirements and the labor force. These changes can either be advantageous or detrimental to the industry, depending on how and if management plans for them.

Recommendations

College and university foodservices have not made extensive use of the many computer functions available to them. Literature indicates that tremendous benefits have been obtained by those industries making use of the computer. It is felt that the food service industry, in general, has been slow to gain acceptance of this new technology. However, it is predicted that this will soon change. Scott (1982) states that computers have recently infiltrated the food service industry. In hospitals alone, the computer market is expected to grow from $1.3 billion in 1981 to $4 billion in 1986. Management must plan for this change today to ensure a successful tomorrow. Awareness regarding this new technology is vital in order to plan accordingly and appropriately for the future.

Further research is recommended to identify factors that have contributed to the slow growth of computer use in college and university food services. This information could be obtained by a comparison of another facet of industry such as the commercial facet of the food service industry with college and university food services. A second recommendation is to conduct a longitudinal study on a group of facilities planning to implement the use of the computer. It would be necessary to follow these facilities through the stages of planning, implementation and growth. The purpose of the study would be to identify changing skill requirements and, the nature and effects of these changes on the organization's training needs and employment trends. Training programs could be developed according to the

organizations retraining needs and to enhance or expand the use of the computer in the operation. Understanding todays use of computers provides a glimpse of future possibilities, and seeing the current difficulties may aid management in avoiding future stumbling blocks.

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APPENDICES

APPENDIX A

Table 15

Univariate Statistics Used to Determine Division of Groups.[1]

MOMENTS				QUANTILES(DEF=4)			
N	75	SUM WGTS	75	100% MAX	60000	99%	60000
MEAN	8948	SUM	671100	75% Q3	11500	95%	29100
STD DEV	10613.3	VARIANCE	112642124	50% MED	4600	90%	22400
SKEWNESS	2.51231	KURTOSIS	7.95268	25% Q1	2500	10%	1420
USS	1.434E+10	CSS	8335517200	0% MIN	150	5%	710
CV	118.611	STD MEAN	1225.52			1%	150
T:MEAN=0	7.3014	PROB>|T|	0.0001	RANGE	59850		
SGN RANK	1425	PROB>|S|	0.0001	Q3-Q1	9000		
NUM ^= 0	75			MODE	2000		

MISSING VALUE	.
COUNT	10
% COUNT/NOBS	11.76

[1]Univariate Statistics, Question 1--First Questionnaire.

Table 16

Computer Utilization[1]

COMPUTER USE	FREQUENCY	CUM FREQ	PERCENT	CUM PERCENT
NO UTILIZATION	40	40	47.059	47.059
UTILIZING	45	85	52.941	100.000

[1]Frequency Chart, Question 1 and Question 2A--First Questionnaire.

Table 17

Pearson Product Moment Correlation Between the Number of Meals Prepared Daily and the Use of the Computer[1]

VARIABLE	N	MEAN	STD DEV	SUM	MINIMUM	MAXIMUM
COMPUSE	85	0.529	0.50	45.0	0	1.00
MPD	75	8948.000	10613.30	671100.0	150.00	60000.00

CORRELATION COEFFICIENTS / PROB > |R| UNDER HO:RHO=0 / NUMBER OF OBSERVATIONS

	COMPUSE	MPD
COMPUSE	1.00000	0.10900
COMPUTER USE	0.0000	0.3519
	85	75
MPD	0.10900	1.00000
MEALS PREPARED DAILY	0.3519	0.0000
	75	75

[1]Pearson Product Moment Correlation Coefficient, Questions 1 and 2A--First Questionnaire.

Table 18

Pearson Product Moment Correlation Between the Number of Meals Prepared Daily and the Number of Computer Functions Utilized[1]

VARIABLE	N	MEAN	STD DEV	SUM	MINIMUM	MAXIMUM
MPD	75	8948.000	10613.30	671100.0	150.00	60000.00
TOTAL	85	7.176	9.02	610.0	0	33.00

CORRELATION COEFFICIENTS / PROB > |R| UNDER HO: RHO=0 / NUMBER OF OBSERVATIONS

	MPD	TOTAL
MPD	1.00000	0.19625
MEALS PREPARED DAILY	0.0000	0.0915
	75	75
TOTAL	0.19625	1.00000
	0.0915	0.0000
	75	85

[1]Pearson Product Moment Correlation Coefficient, Question 1 and 4A-4G--First Questionnaire.

Table 19

Colleges and Universities Food Services Contracting
With a Food Service Company

CONTRACT	FREQUENCY	CUM FREQ	PERCENT	CUM PERCENT
NO	73	73	85.882	85.882
YES	3	76	3.529	89.412
NO RESPONSE	9	85	10.588	100.000

Table 20

Pearson Product Moment Correlation Between Computer Utilization and Contracting with a Food Service Company

VARIABLE	N	MEAN	STD DEV	SUM	MINIMUM	MAXIMUM
COMPUSE	85	0.5294118	0.5020964	45.00000	0	1.000000
CONTRACT	85	0.2470588	0.6344454	21.00000	0	2.000000

CORRELATION COEFFICIENTS / PROB > |R| UNDER HO:RHO=0 / N = 85

	COMPUSE	CONTRACT
COMPUSE	1.00000	-0.30337
COMPUTER USE	0.0000	0.0048
CONTRACT	-0.30337	1.00000
CONTRACTING WITH A FOOD SERVICE COMPANY	0.0048	0.0000

Table 21

Spearman Rho Correlation Between the Number of Computer Functions Utilized and the Involvement of the Non-Supervisory Employee[1]

VARIABLE	N	MEAN	STD DEV	MEDIAN	MINIMUM
EMPLEVLA	45	0.533333	0.5045250	1.000000	0
TOTAL	45	13.333333	8.4718786	12.000000	0

SPEARMAN CORRELATION COEFFICIENTS / PROB > |R| UNDER HO:RHO=0 / N = 45

	EMPLEVLA	TOTAL
	1.00000	0.50131
NONSUPERVISORY PERSONNEL	0.0000	0.0005
TOTAL	0.50131	1.00000
	0.0005	0.0000

[1]Spearman Rho Correlation Coefficient, Question 1--Second Questionnaire with Total Cumulative Frequency of Questions 4A-4G--First Questionnaire.

Table 22

Spearman Rho Correlation Between the Number of Computer Functions Utilized and Involvement of the Supervisory Employee

VARIABLE	N	MEAN	STD DEV	MEDIAN	MINIMUM
EMPLEVLB	45	1.244444	0.9806203	2.000000	0
TOTAL	45	13.333333	8.4718786	12.000000	0

SPEARMAN CORRELATION COEFFICIENTS / PROB > |R| UNDER HO:RHO=0 / N = 45

	EMPLEVLB	TOTAL
EMPLEVLB	1.00000	0.66954
SUPERVISORY PERSONNEL	0.0000	0.0001
TOTAL	0.66954	1.00000
	0.0001	0.0000

Table 23

Spearman Rho Correlation Between the Total Number of Computer Functions Utilized and Routinization of Supervisory Skills

VARIABLE	N	MEAN	STD DEV	MEDIAN	MINIMUM
Q3K	26	2.807692	0.4914656	3.000000	1.000000
TOTAL	26	18.115385	7.1962597	18.500000	5.000000

SPEARMAN CORRELATION COEFFICIENTS / PROB > |R| UNDER HO:RHO=0 / N = 26

	Q3K	TOTAL
Q3K	1.00000	0.27331
FREED MANAGERS OF CLERICAL TASKS	0.0000	0.1767
TOTAL	0.27331	1.00000
	0.1767	0.0000

Table 24

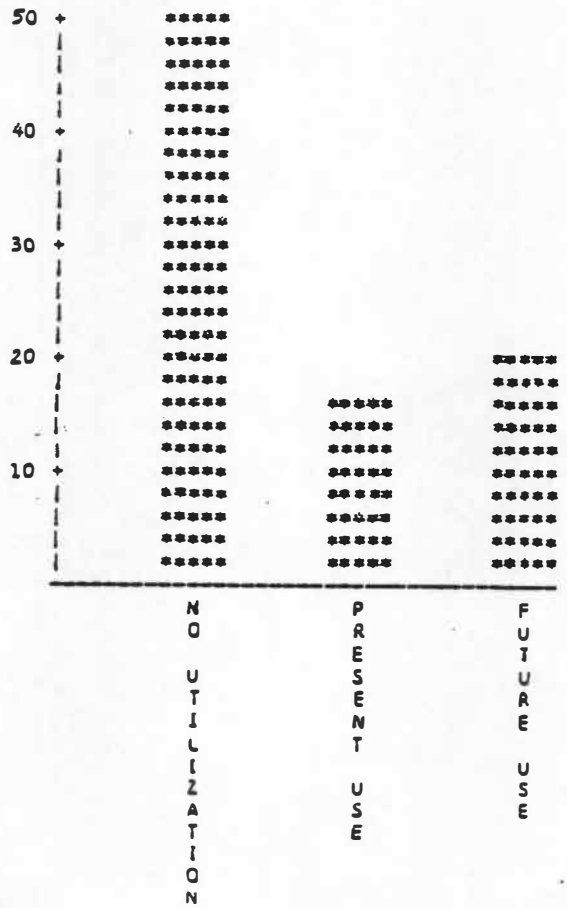
Spearman Rho Correlation Between the Number of Computer Functions Utilized and Involvement of the Administrative Employee

VARIABLE	N	MEAN	STD DEV	MEDIAN	MINIMUM
EMPLEVLC	45	2.200000	1.3416408	3.000000	0
TOTAL	45	13.333333	8.4718786	12.000000	0

SPEARMAN CORRELATION COEFFICIENTS / PROB > |R| UNDER HO:RHO=0 / N = 45

	EMPLEVLC	TOTAL
EMPLEVLC	1.00000	0.58493
ADMINISTRATIVE PERSONNEL	0.0000	0.0001
TOTAL	0.58493	1.00000
	0.0001	0.0000

APPENDIX B



Computer Use of Cost Analysis Function

Figure 5. Planned Cost in Dollars and Percentages for Menu Items.[1]

[1]Frequency Bar Chart, Question 4A--First Questionnaire

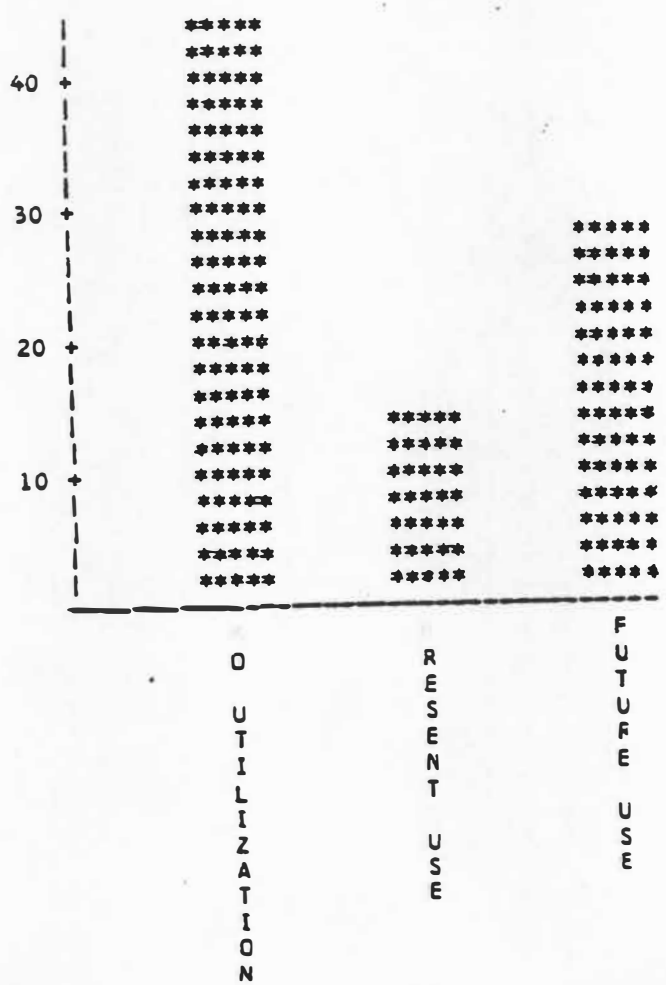


Figure 6. Actual Cost in Dollars and Percentages for Menu Items.[1]

[1]Frequency Bar Chart, Question 4B--First Questionnaire.

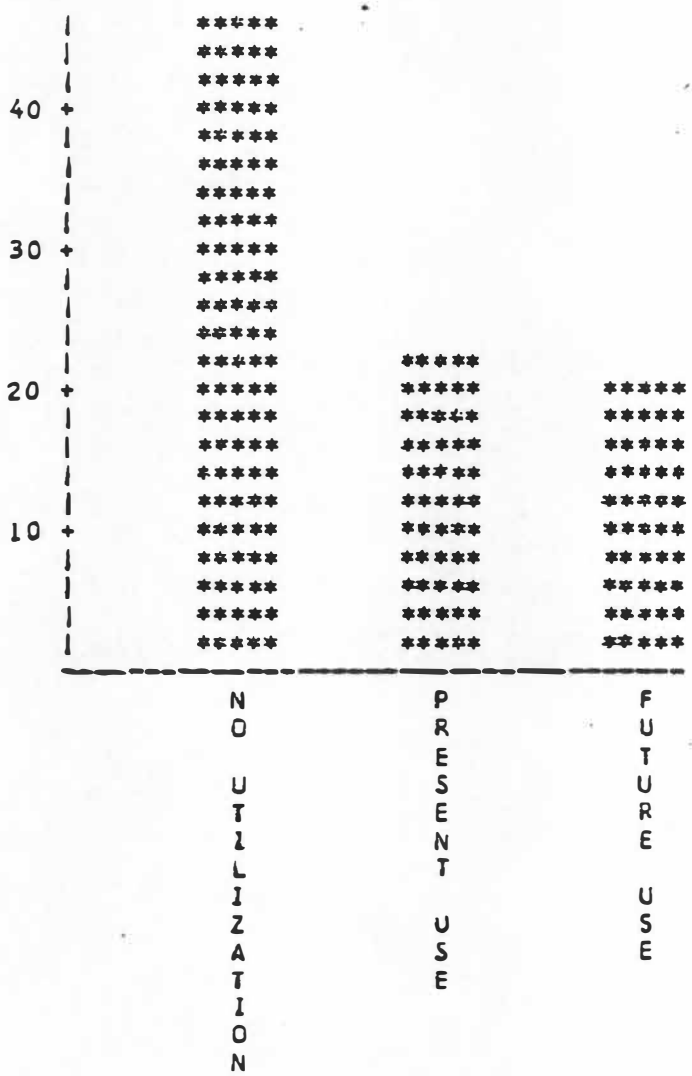


Figure 7. Planned Cost in Dollars and Percentages for Meals.[1]

[1]Frequency Bar Chart, Question 4C--First Questionnaire.

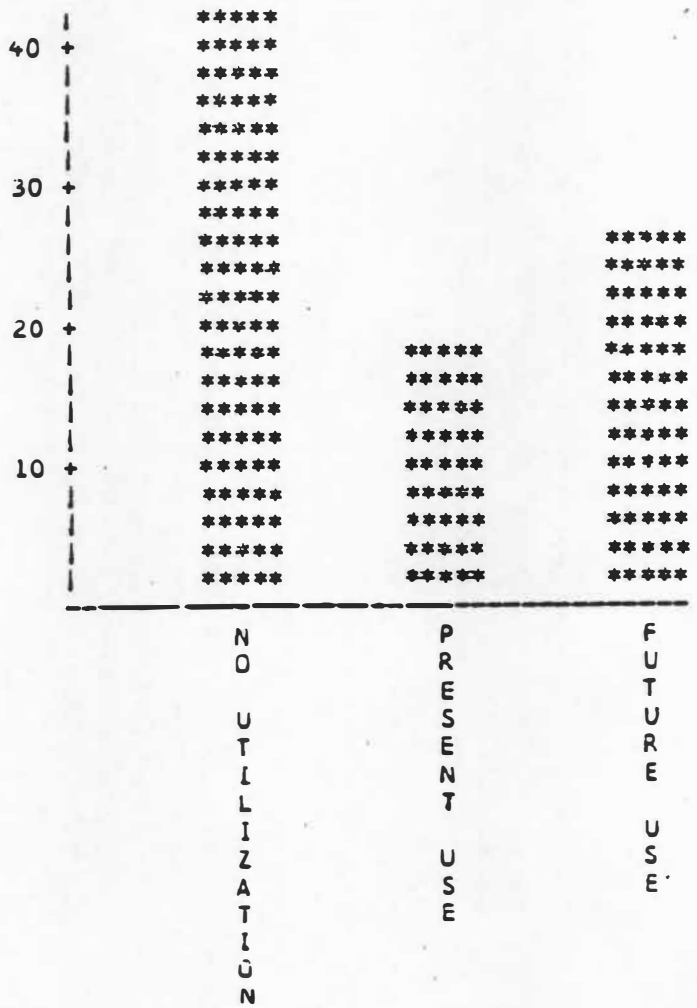


Figure 8. Actual Cost in Dollars and Percentages for Meals.[1]

[1]Frequency Bar Chart, Question 4D--First Questionnaire.

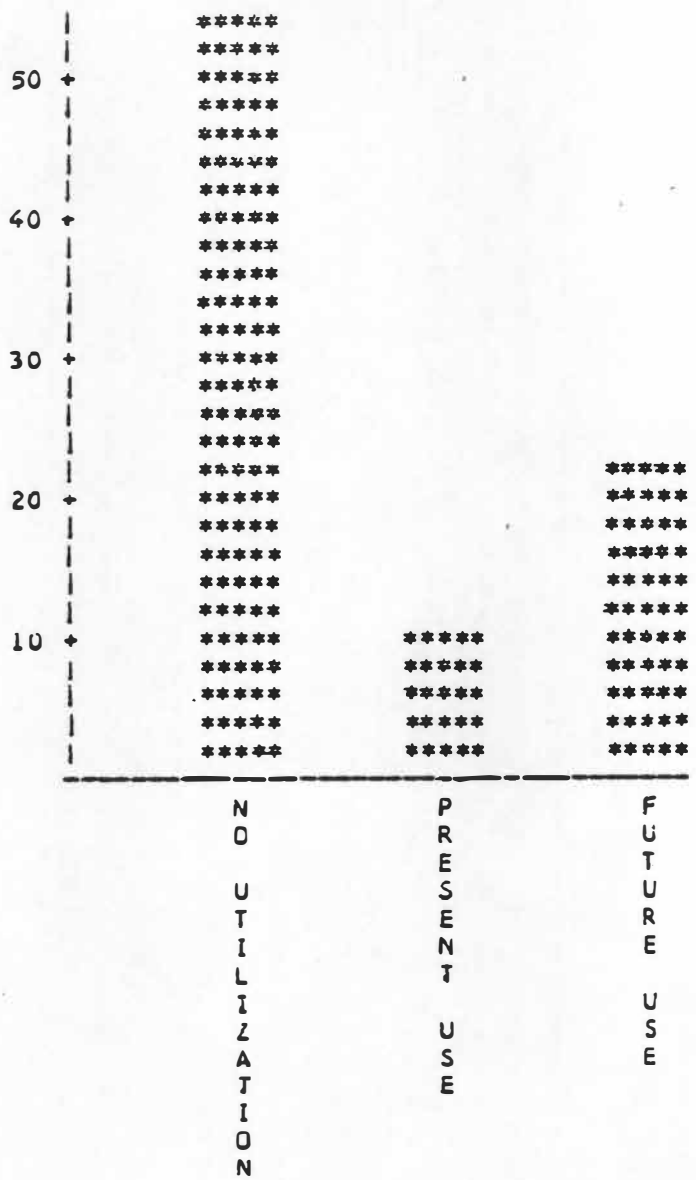


Figure 9. Variance Between Planned and Actual Costs.[1]

[1]Frequency Bar Chart, Question 4E--First Questionnaire.

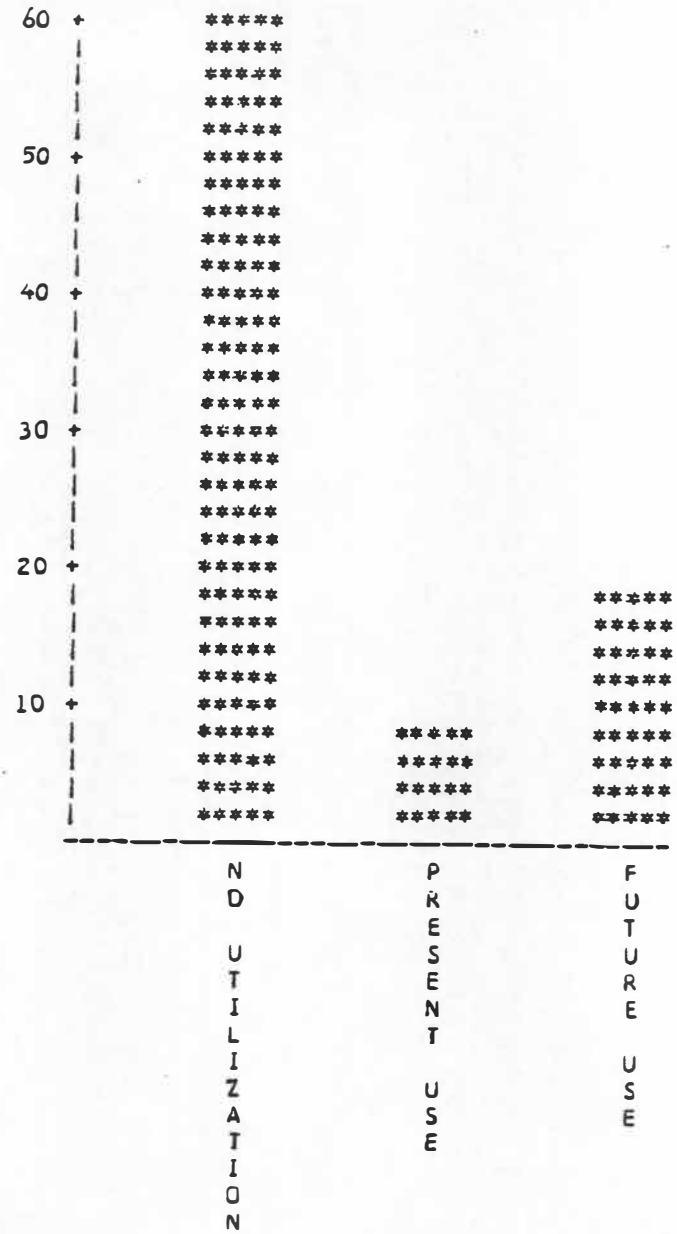


Figure 10. Reports Displaying Profit and Percent of Profit by Each Menu Item.[1]

[1]Frequency Bar Chart, Question 4F--First Questionnaire.

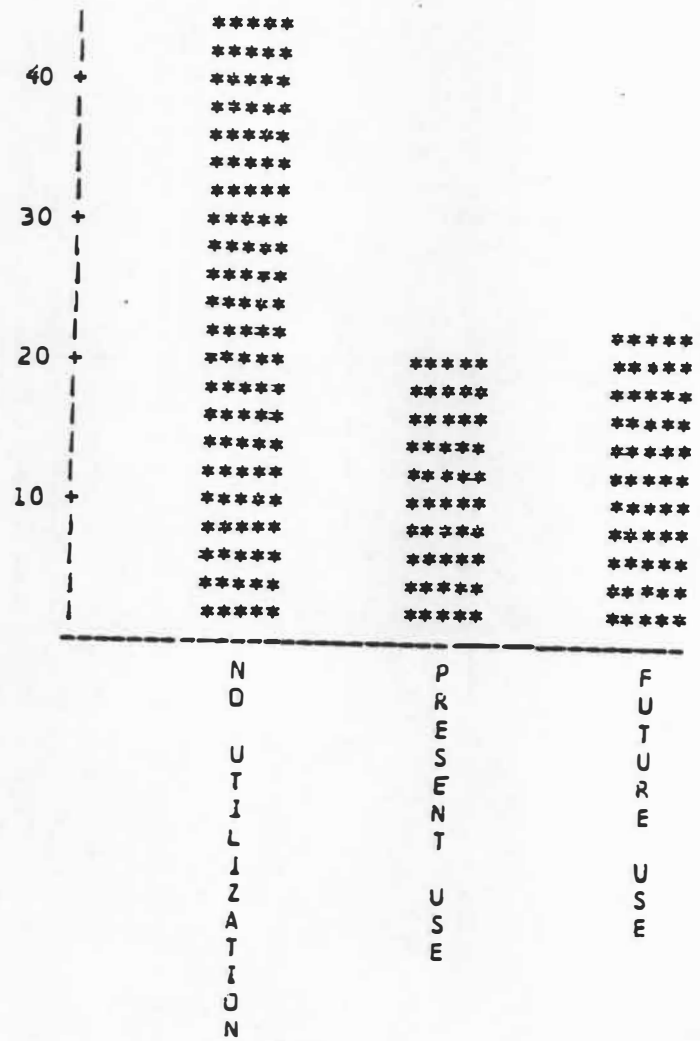


Figure 11. Use of Standardized Recipes.[1]

[1]Frequency Bar Chart, Question 5A--First Questionnaire.

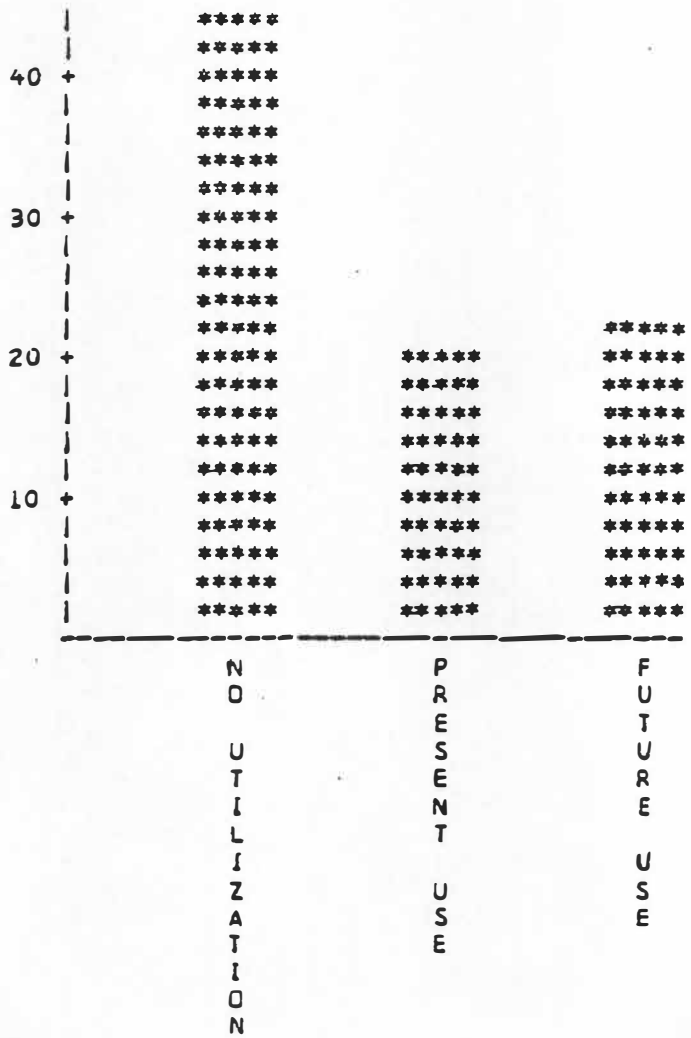


Figure 12. Printouts of Standardized Recipes According to Forecasted Amounts.[1]

[1]Frequency Bar Chart, Question 5B--First Questionnaire.

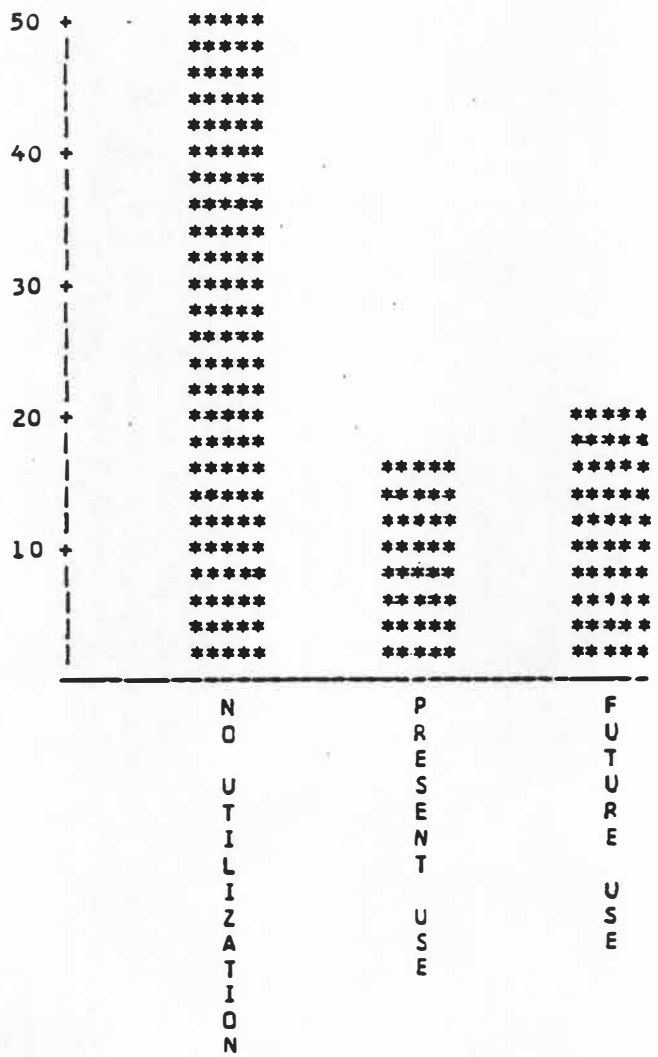


Figure 13. Price and Portion Adjustments Allowed.[1]

[1]Frequency Bar Chart, Question 5C--First Questionnaire.

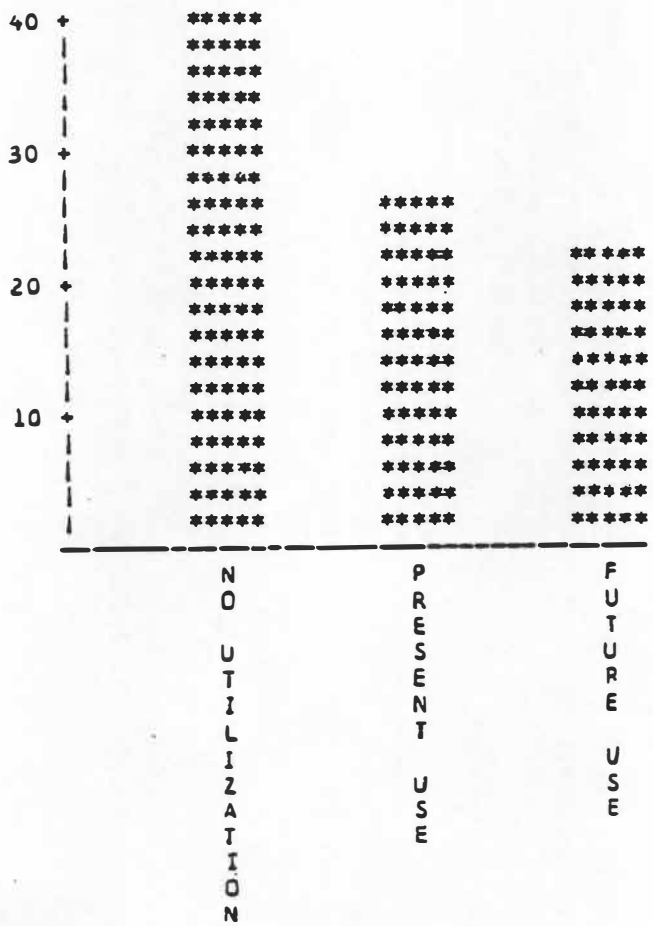


Figure 14. Reports Indicating Beginning and Ending Inventory.[1]

[1]Frequency Bar Chart, Question 6A--First Questionnaire.

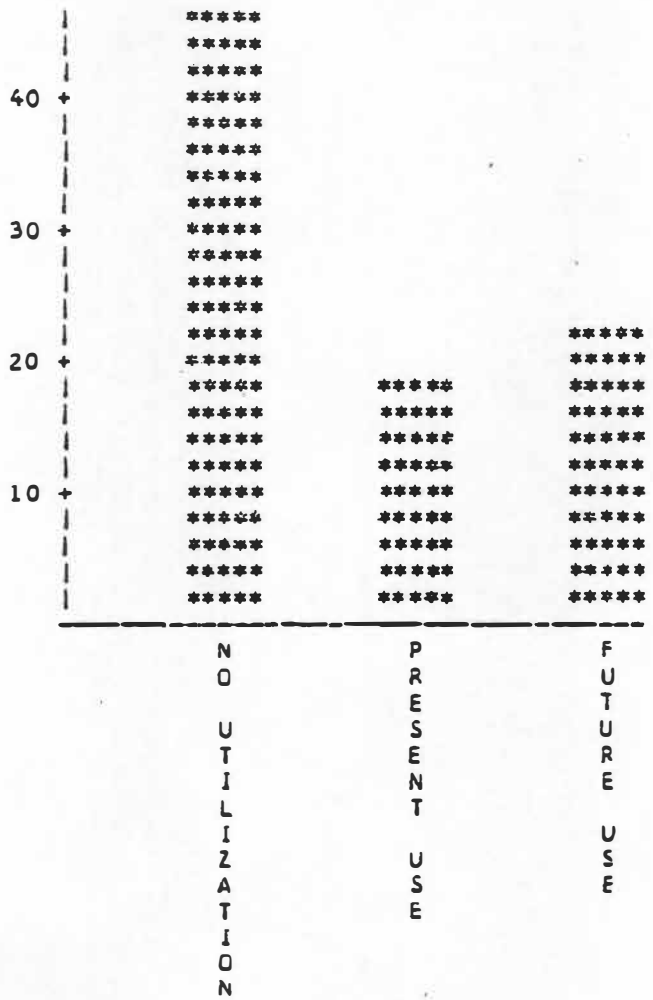


Figure 15. Inventory Reports Displaying Received and Usage Figures.[1]

[1]Frequency Bar Chart, Question 6B--First Questionnaire.

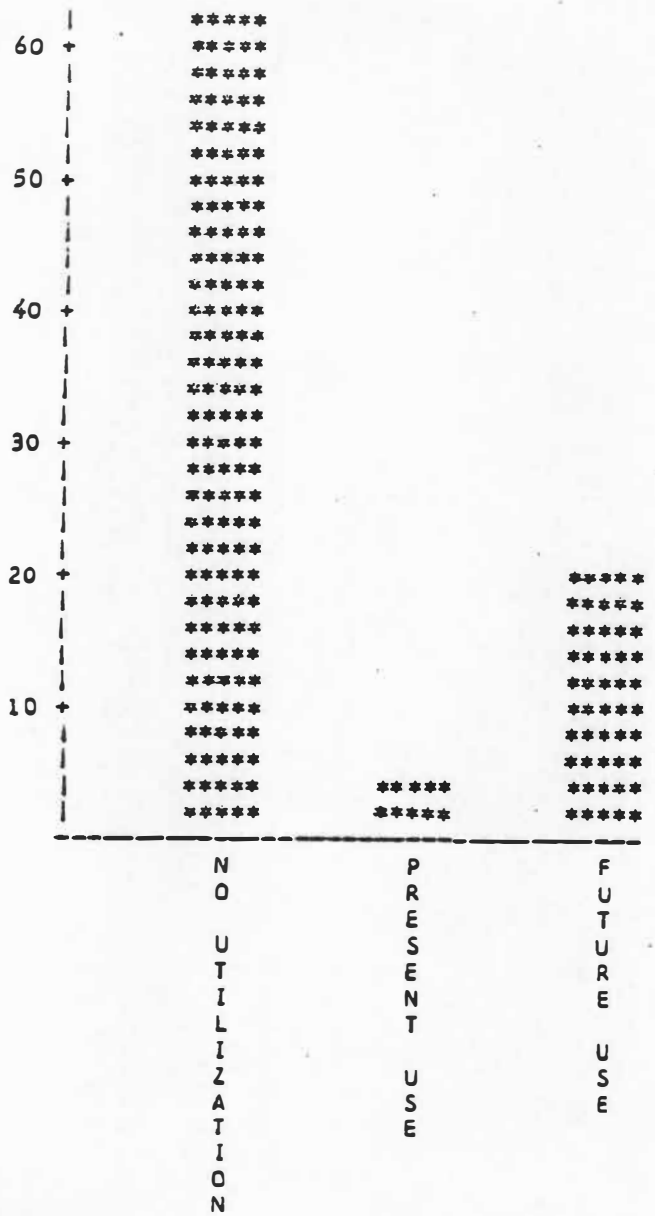


Figure 16. Reports Displaying a Comparison of Actual Versus Projected Use of Items.[1]

[1]Frequency Bar Chart, Question 6C--First Questionnaire.

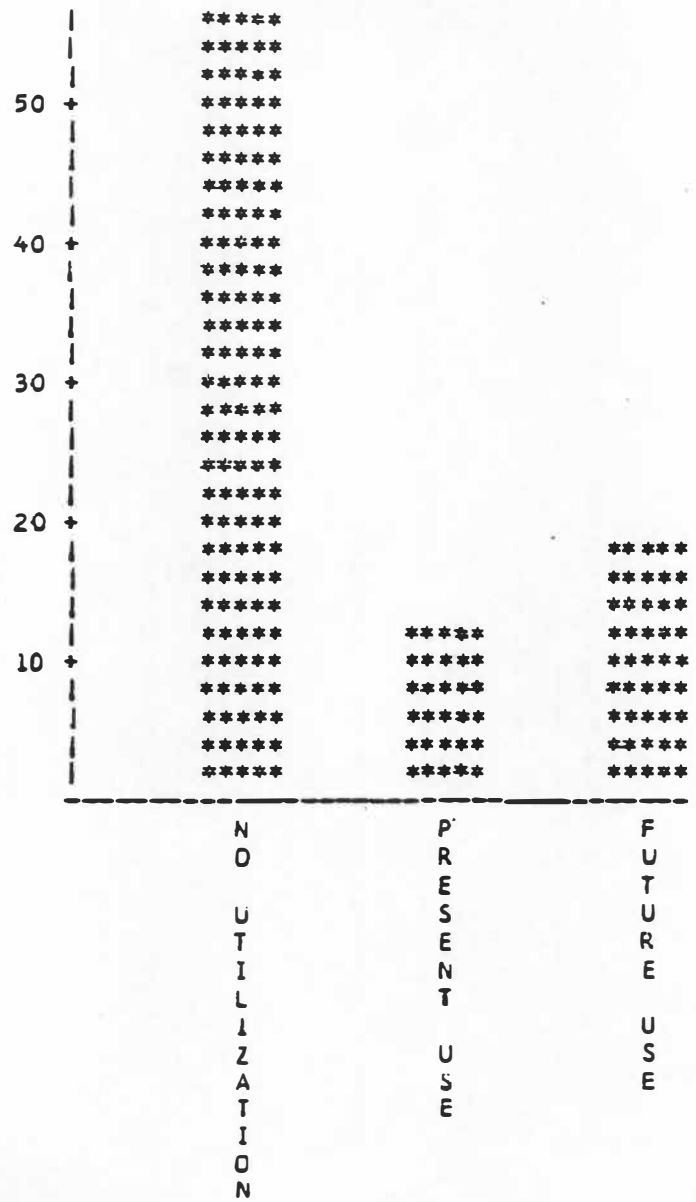


Figure 17. Reports Indicating Items Below Established Minimum Requirements.[1]

[1]Frequency Bar Chart, Question 6D--First Questionnaire.

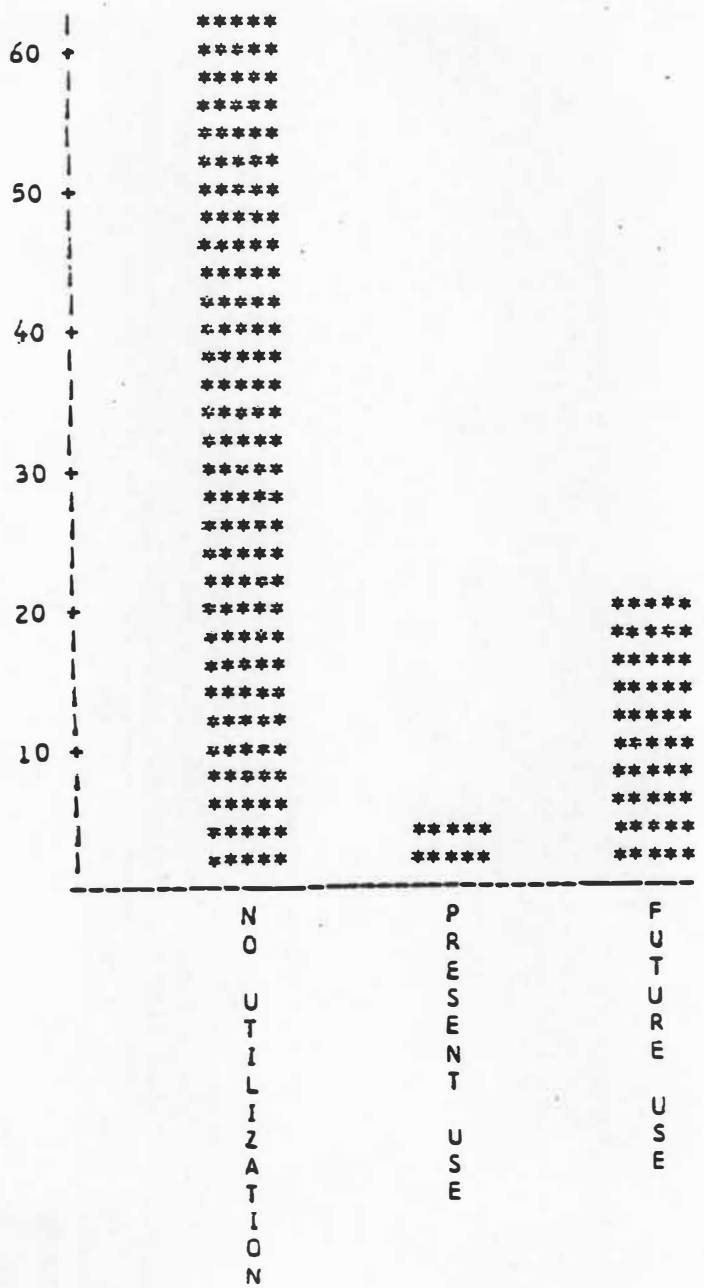


Figure 18. Nutrient Analysis--Calories.[1]

[1]Frequency Bar Chart, Question 7A--First Questionnaire.

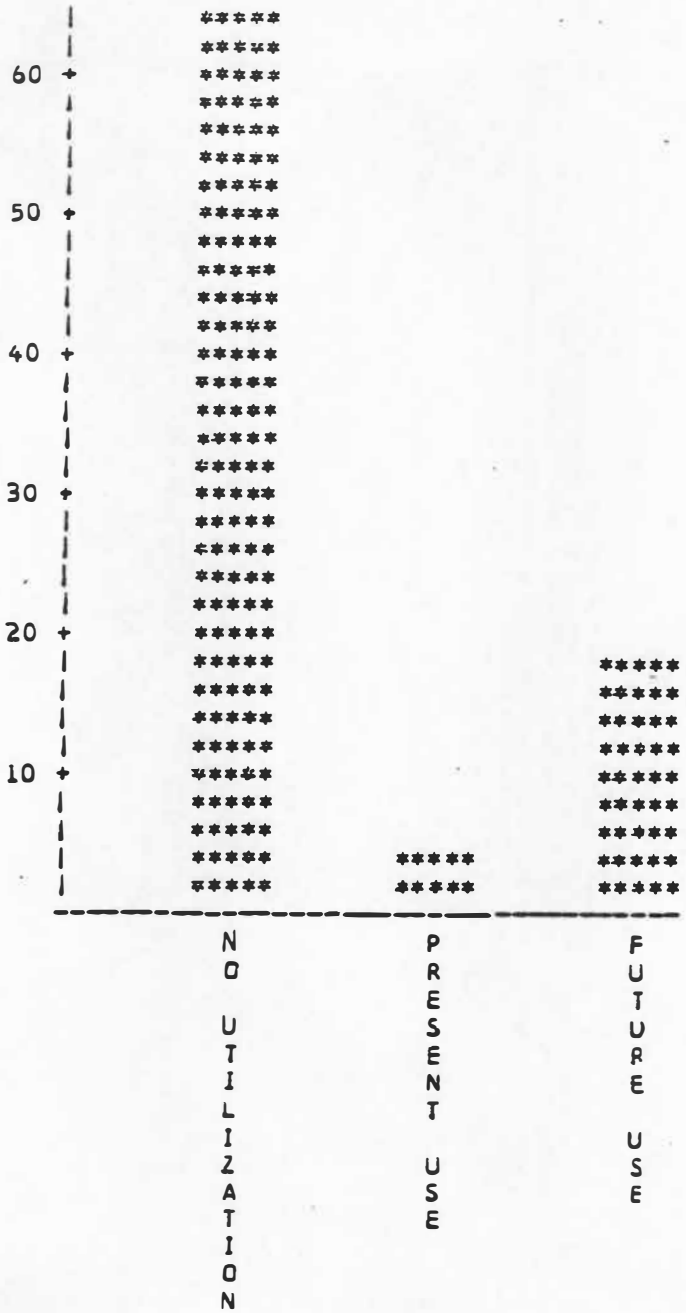


Figure 19. Nutrient Analysis--Protein.[1]

[1]Frequency Bar Chart, Question 7B--First Questionnaire.

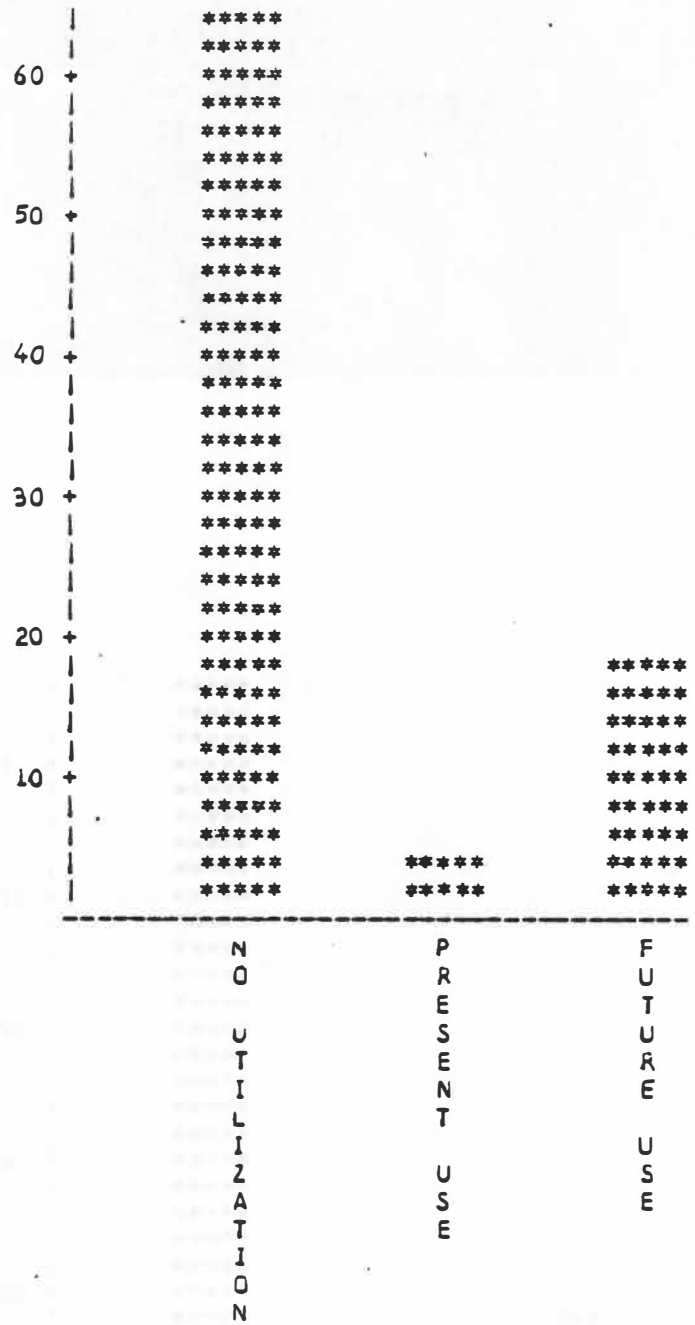
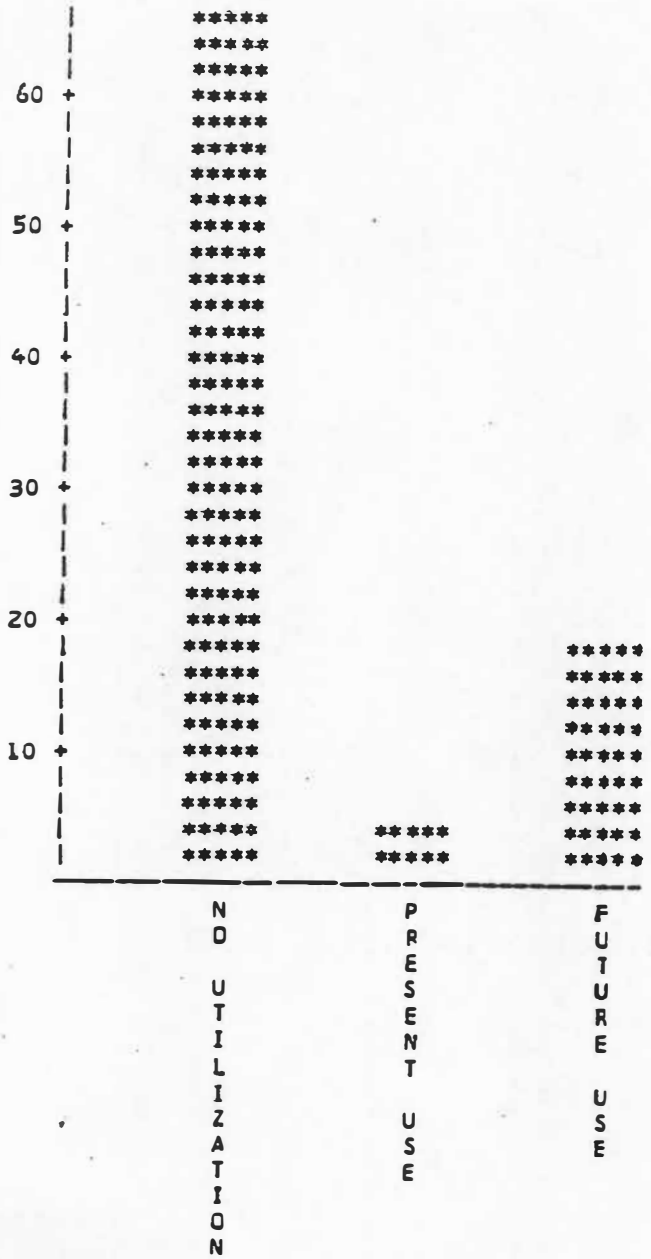


Figure 20. Nutrient Analysis--Fat.[1]

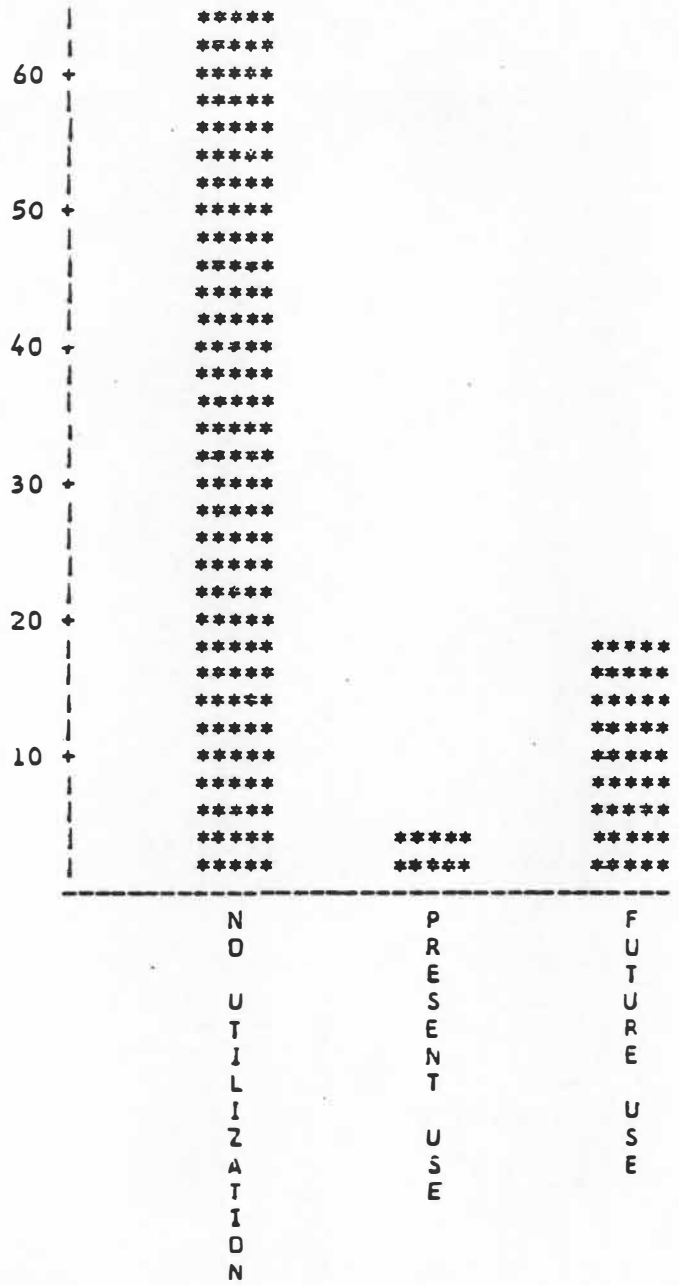
[1]Frequency Bar Chart, Question 7C--First Questionnaire.



Computer Use of Nutrient Analysis

Figure 21. Nutrient Analysis--Carbohydrate.[1]

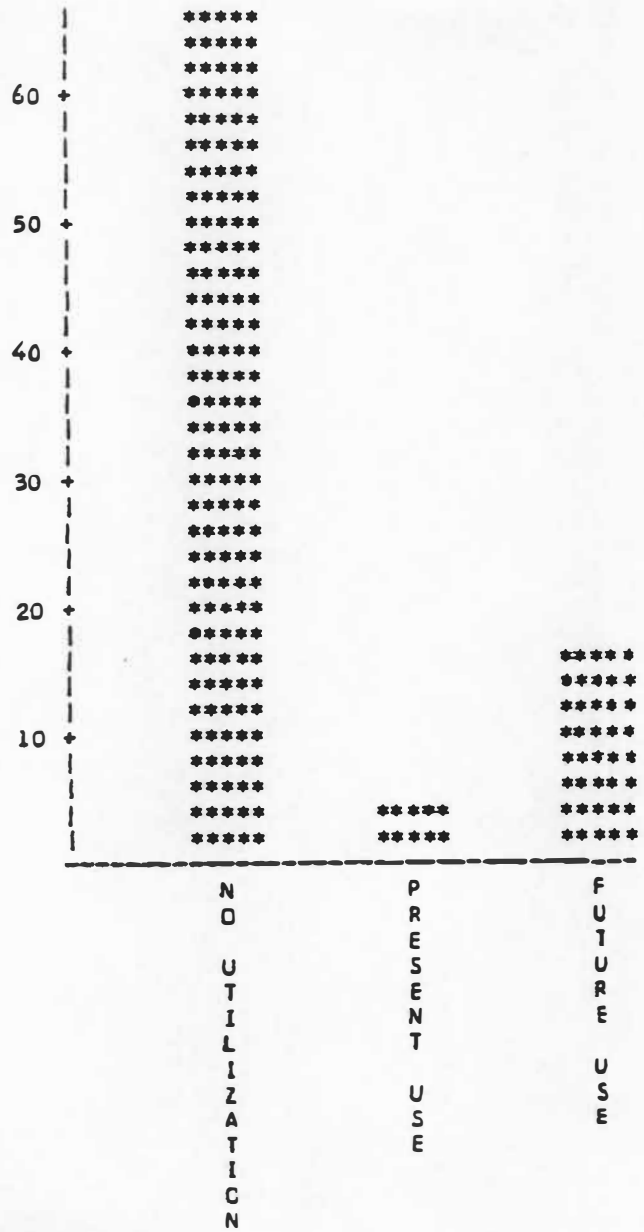
[1]Frequency Bar Chart, Question 7D--First Questionnaire.



Computer Use of Nutrient Analysis Function

Figure 22. Nutrient Analysis--Sodium.[1]

[1]Frequency Bar Chart, Question 7E--First Questionnaire.



Computer Use of Nutrient Analysis Function

Figure 23. Nutrient Analysis--Other Minerals.[1]

[1]Frequency Bar Chart, Question 7F--First Questionnaire.

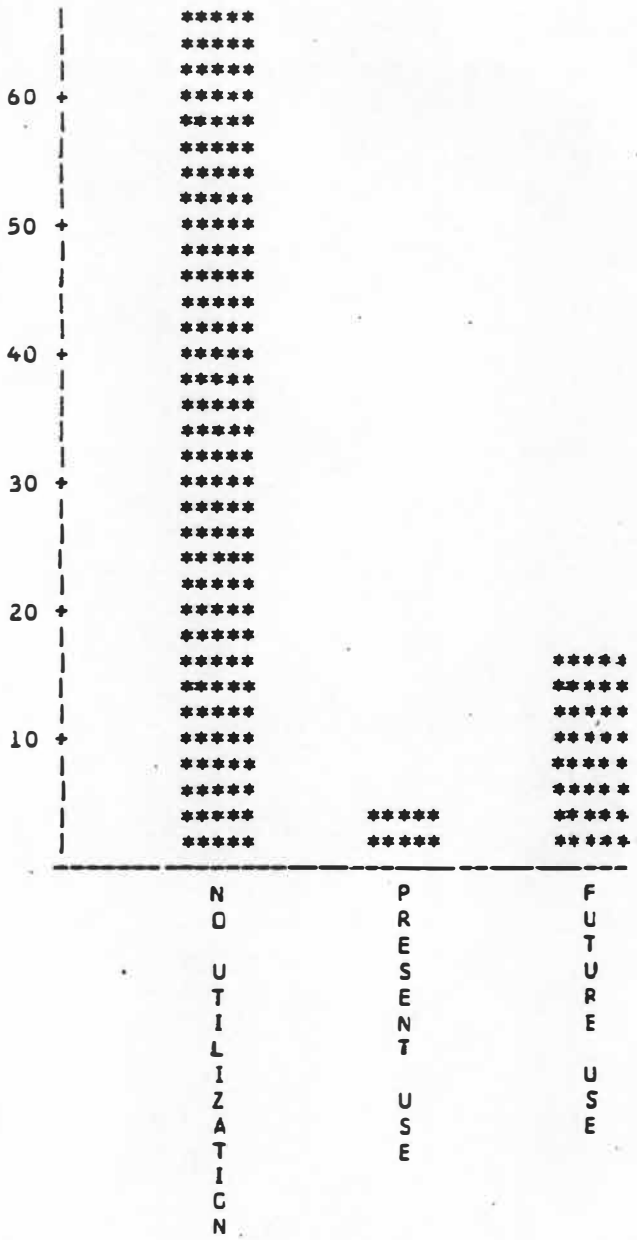


Figure 24. Nutrient Analysis--Vitamins.[1]

[1]Frequency Bar Chart, Question 7G--First Questionnaire.

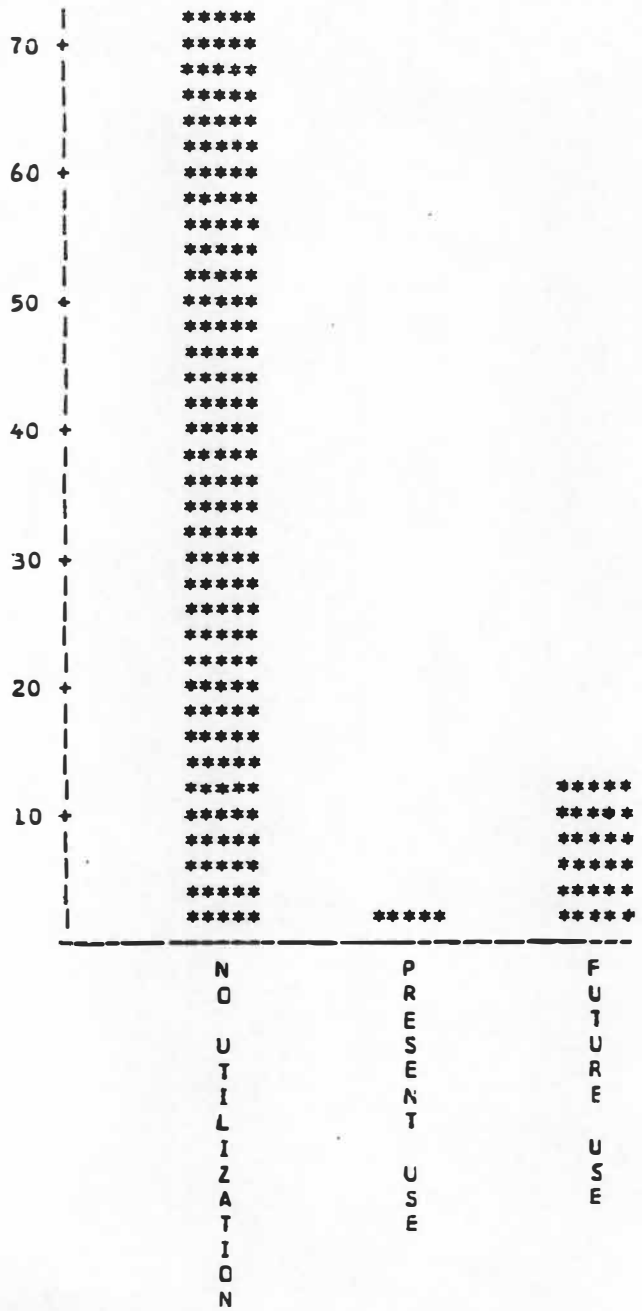


Figure 25. Nutrient Analysis--Water.[1]

[1]Frequency Bar Chart, Question 7H--First Questionnaire.

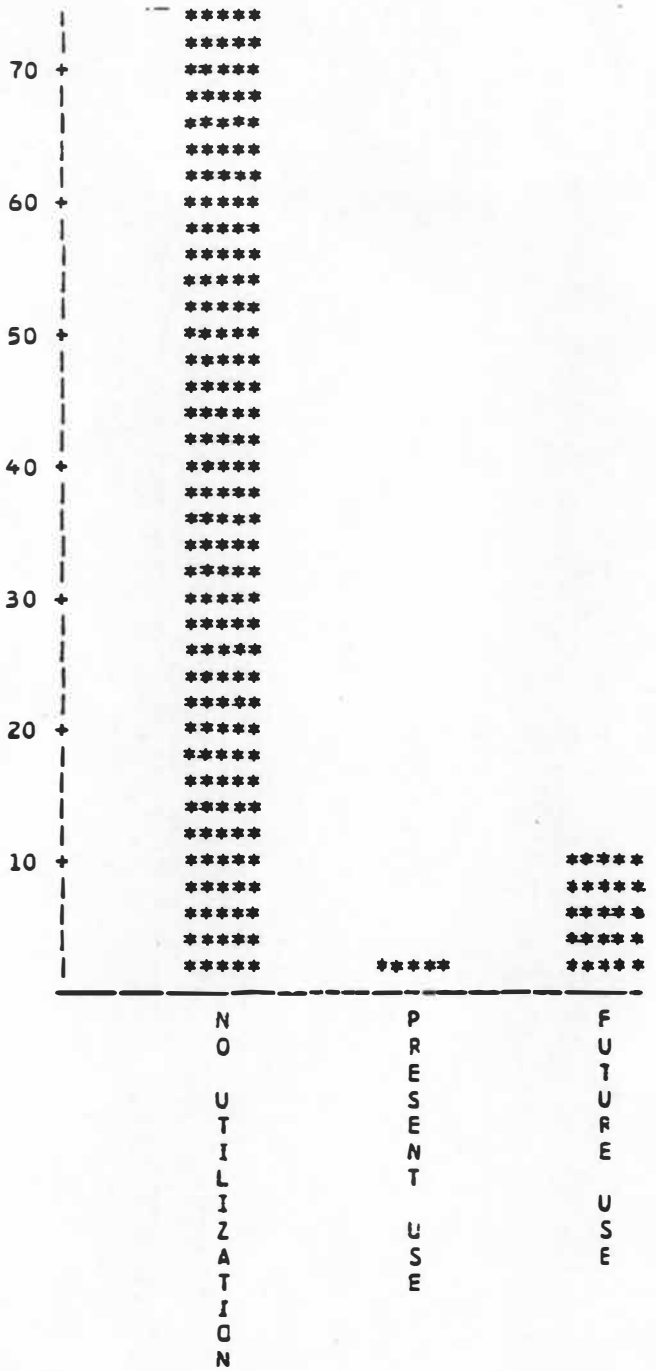


Figure 26. Menus Planned on Basis of Nutritional Adequacy.[1]

[1]Frequency Bar Chart, Question 8A--First Questionnaire.

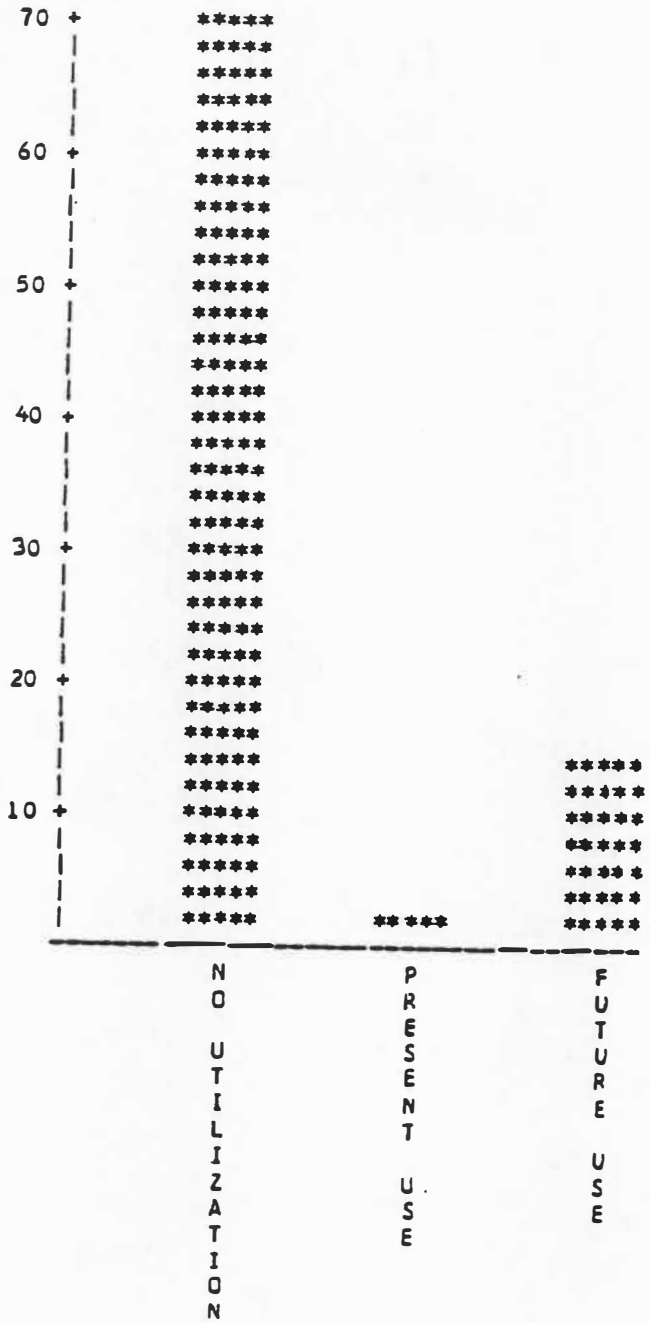


Figure 27. Menus Planned on Basis of Seasonal Availability.[1]

[1]Frequency Bar Chart, Question 8B--First Questionnaire.

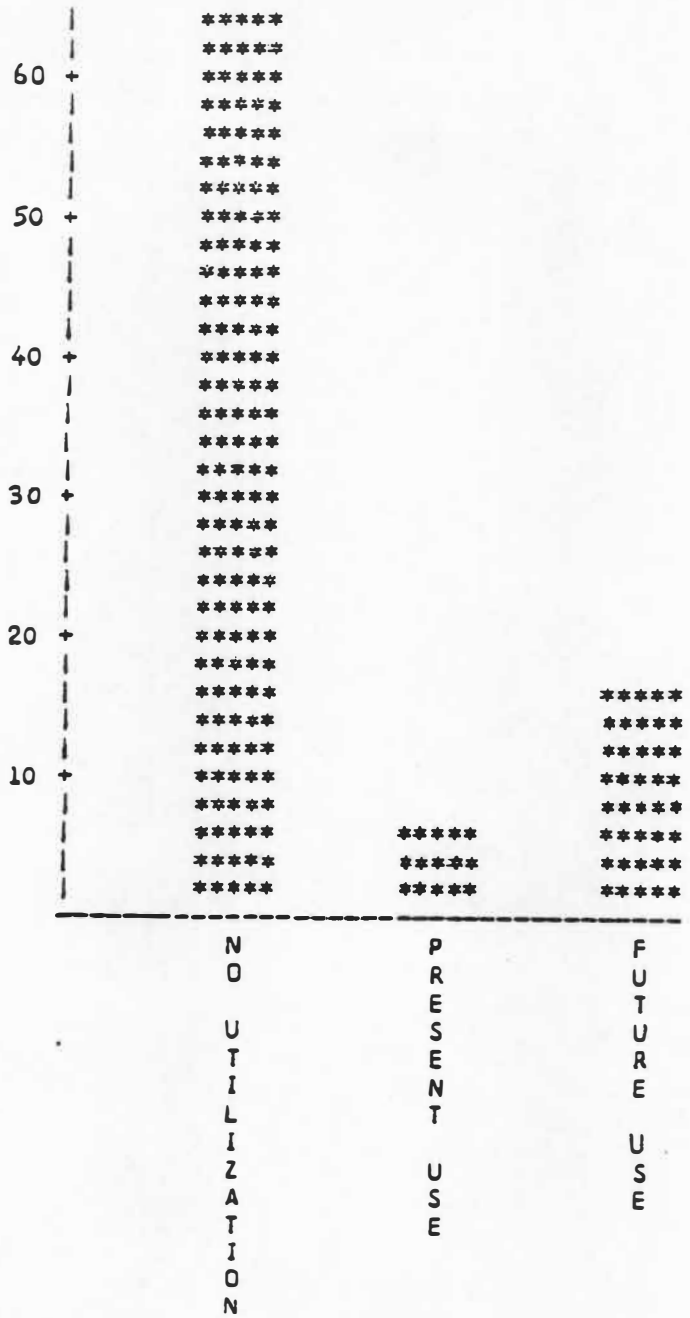


Figure 28. Menus Planned on Basis of Popularity.[1]

[1]Frequency Bar Chart, Question 8C--First Questionnaire.

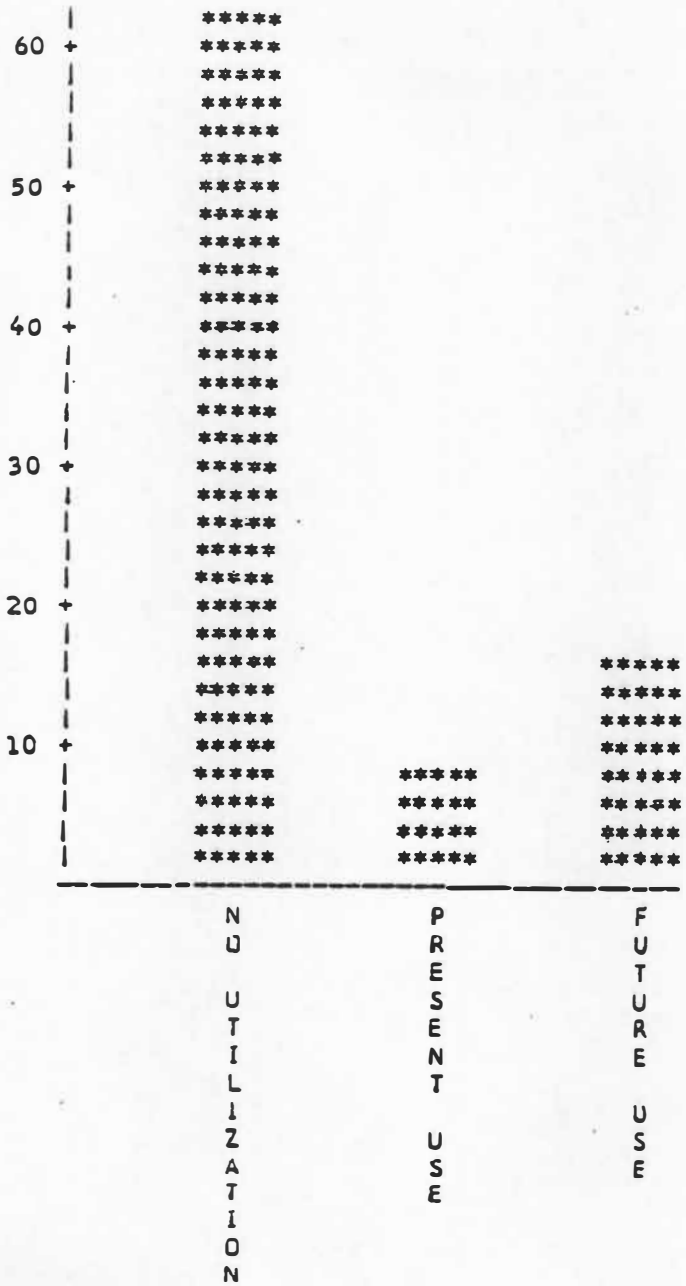


Figure 29. Plans Menus Based on Cost.[1]

[1]Frequency Bar Chart, Question 8D--First Questionnaire.

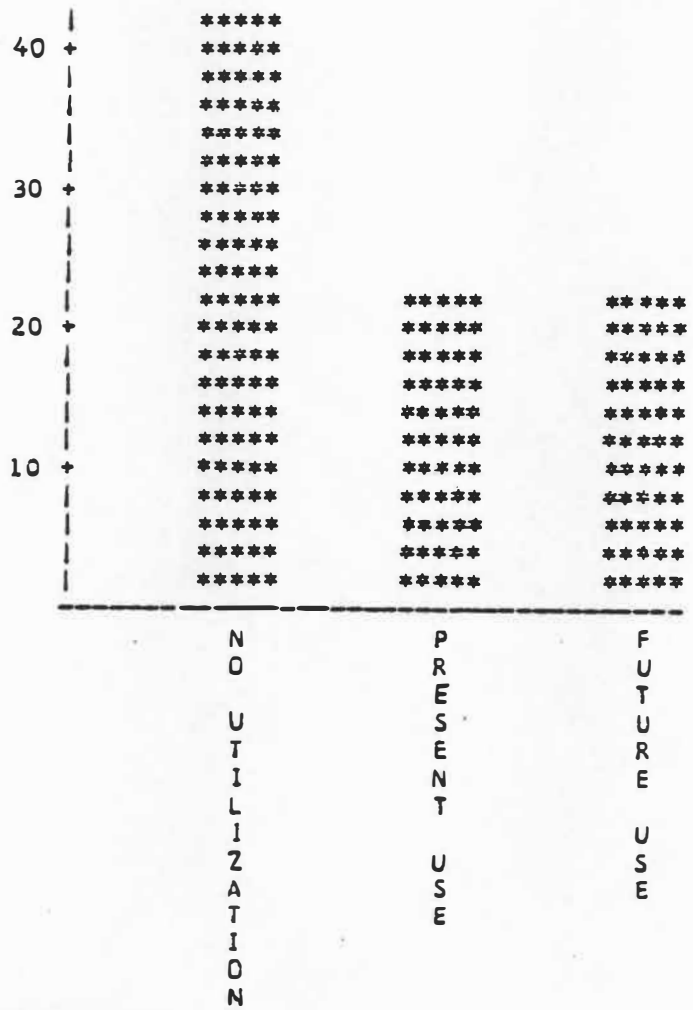


Figure 30. Reports Displaying Purchases Made for a Particular Period of Time.[1]

[1]Frequency Bar Chart, Question 9A--First Questionnaire.

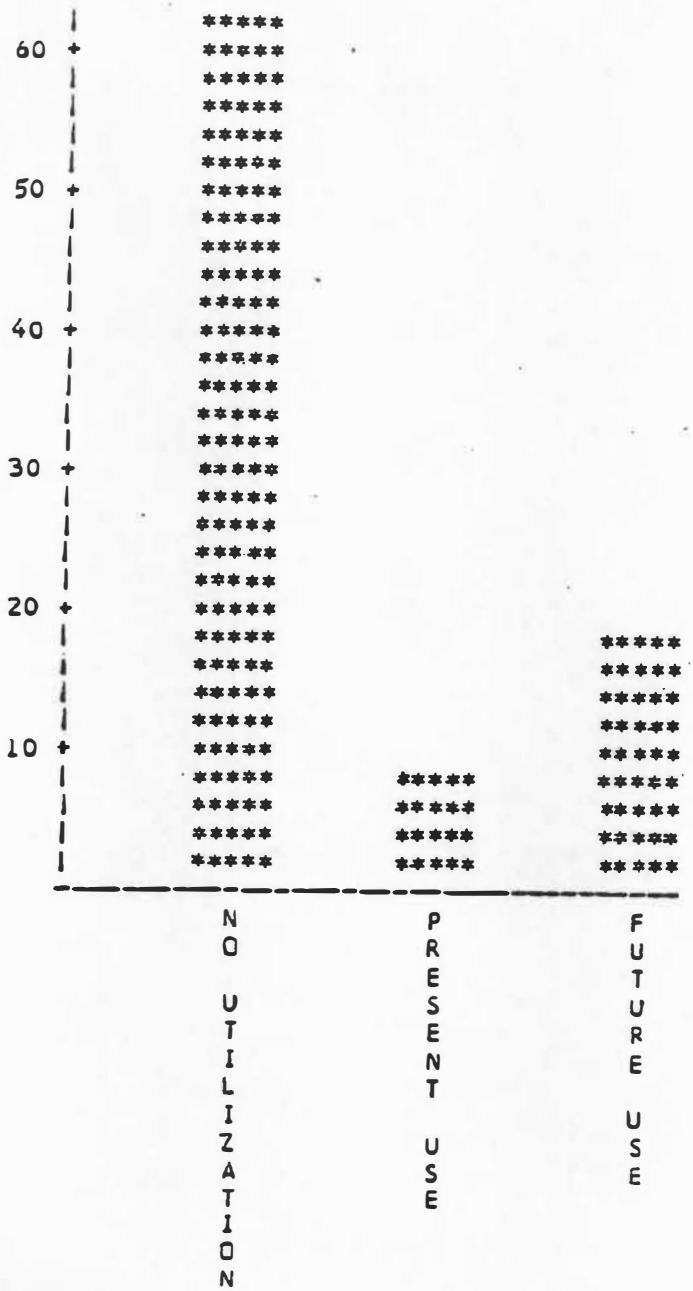


Figure 31. Reports Displaying Prices Paid Versus Prices Quoted.[1]

[1]Frequency Bar Chart, Question 9B--First Questionnaire.

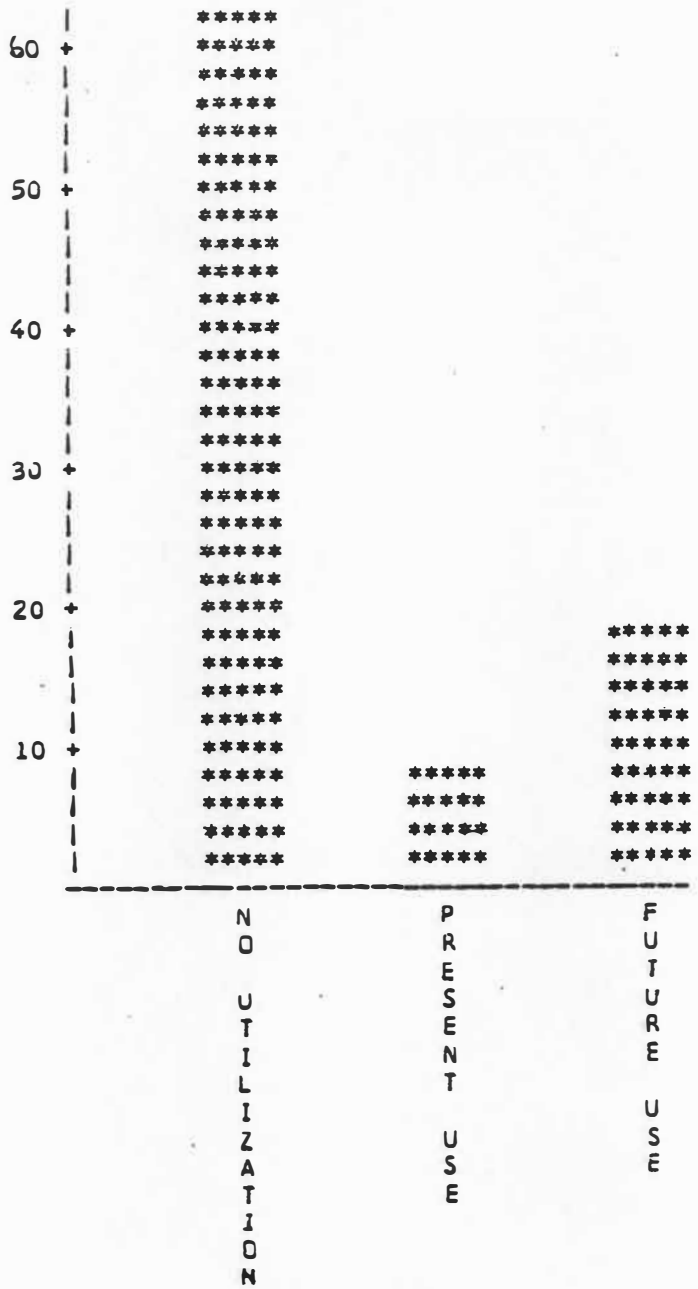


Figure 32. Reports Displaying Price Trends by Product for a Period of Time.[1]

[1]Frequency Bar Chart, Question 9C--First Questionnaire.

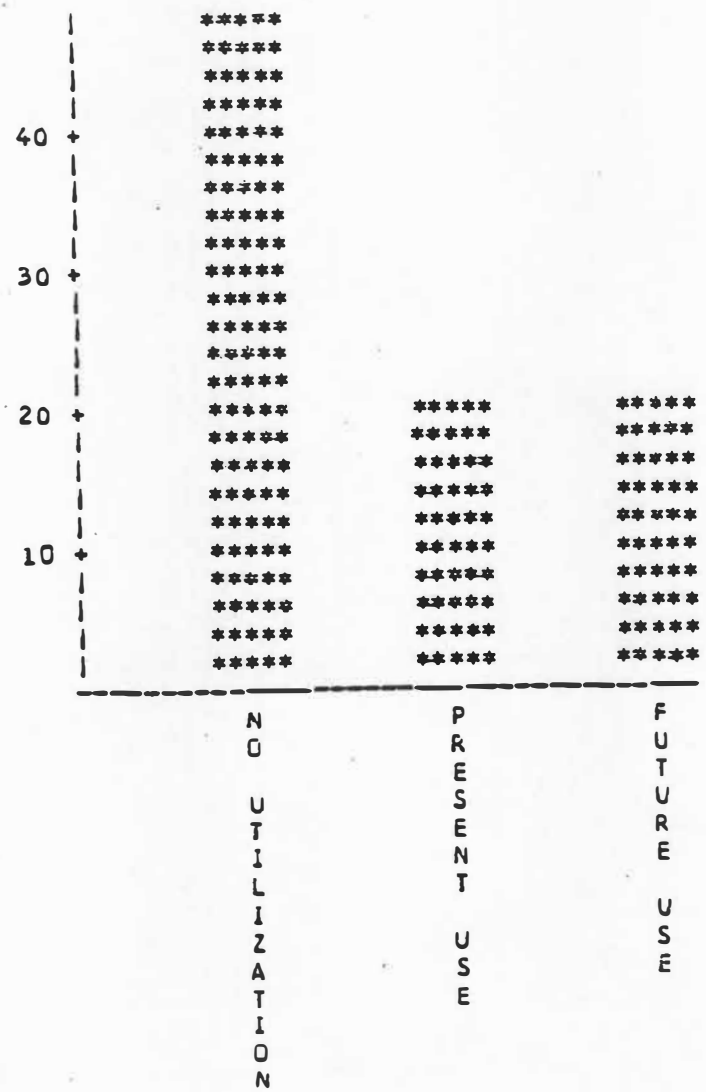
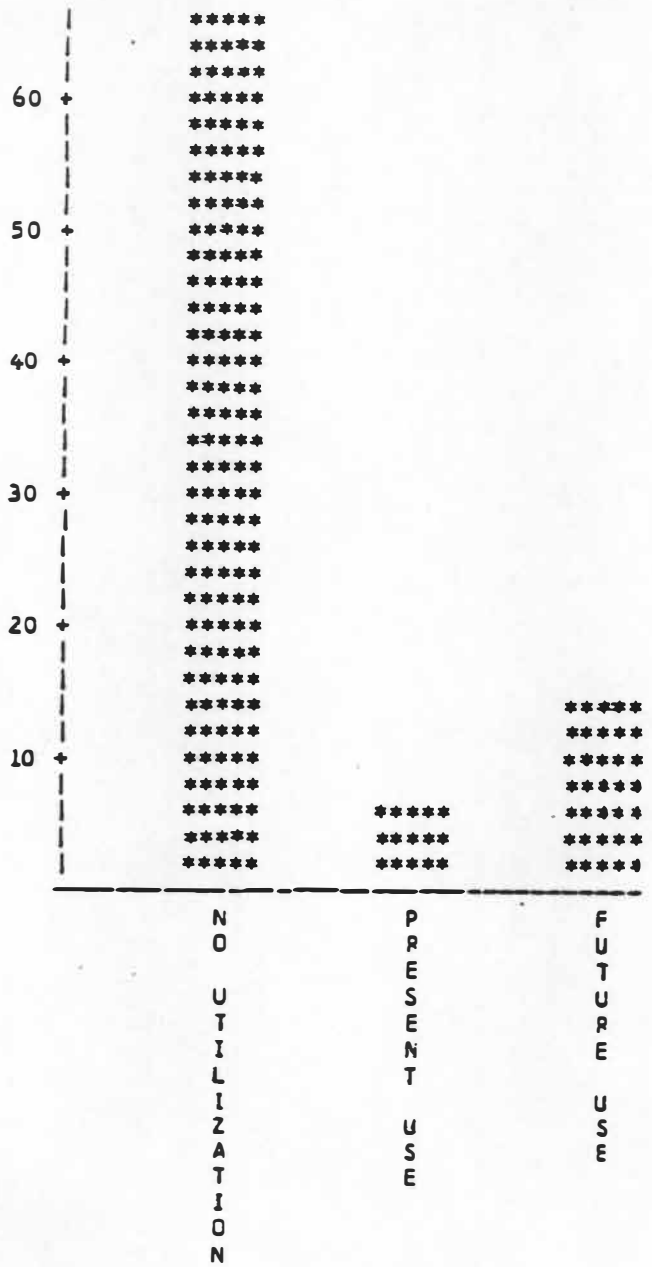


Figure 33. Reports Showing Current Months Prices Paid by Product.[1]

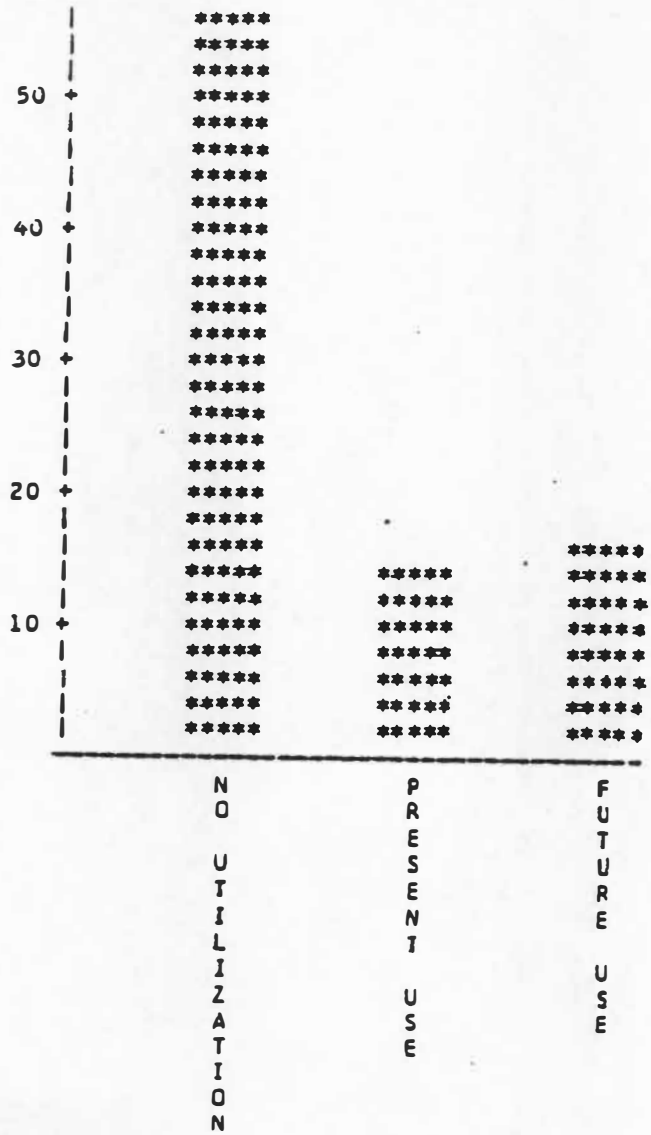
[1]Frequency Bar Chart, Question 9D--First Questionnaire.



Computer Use of Purchasing Function

Figure 34. Reports Displaying Vendor Price Fluctuations.[1]

[1]Frequency Bar Chart, Question 9E--First Questionnaire.



Computer Use of Purchasing Function

Figure 35. Identifies Vendors on Price Fluctuation Report.[1]

[1]Frequency Bar Chart, Question 9F--First Questionnaire.

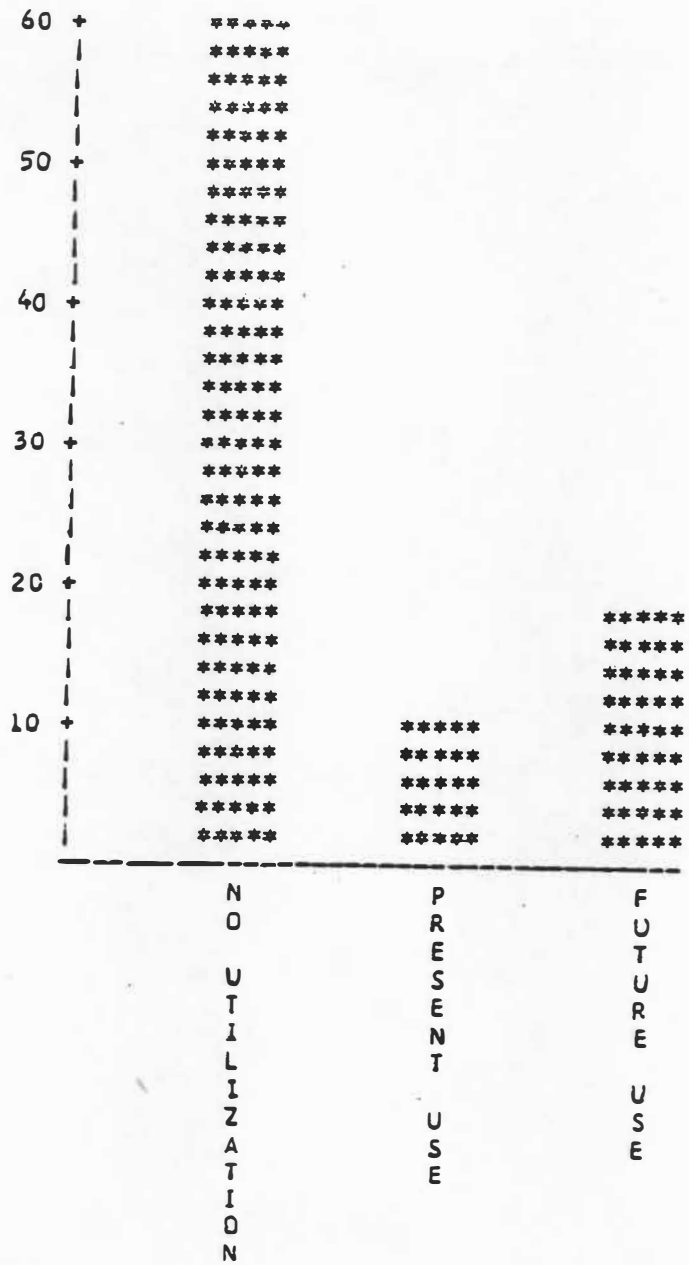


Figure 36. Orders Products According to Forecasts and Inventory.[1]

[1]Frequency Bar Chart, Question 9G--First Questionnaire.

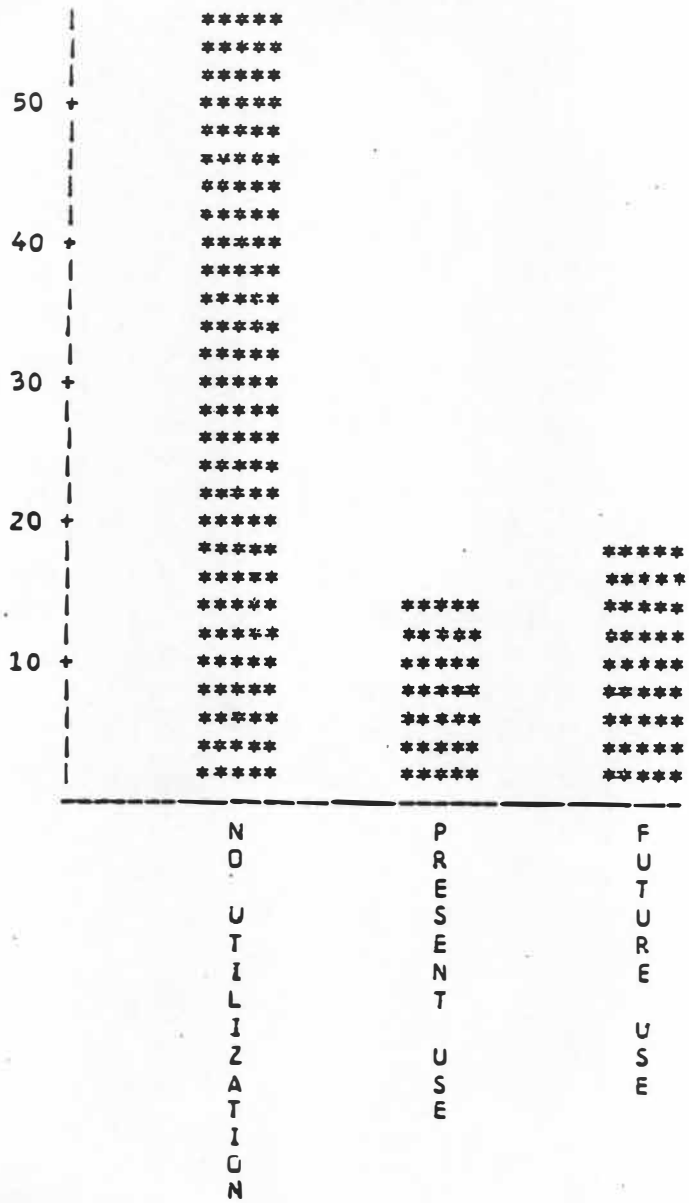


Figure 37. Reports Displaying the Last Date an Item was Purchased.[1]

[1]Frequency Bar Chart, Question 9H--First Questionnaire.

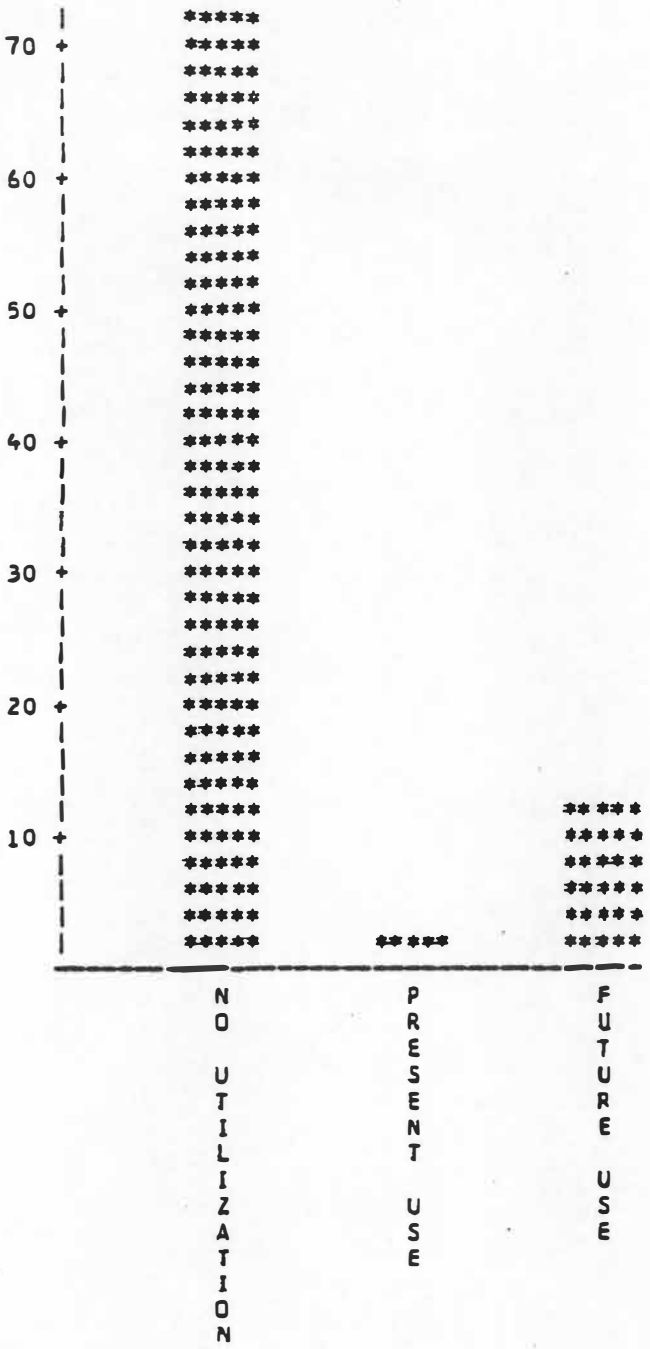


Figure 38. Reports Providing Information about Seasonal Availability of Items.[1]

[1]Frequency Bar Chart, Question 9I--First Questionnaire.

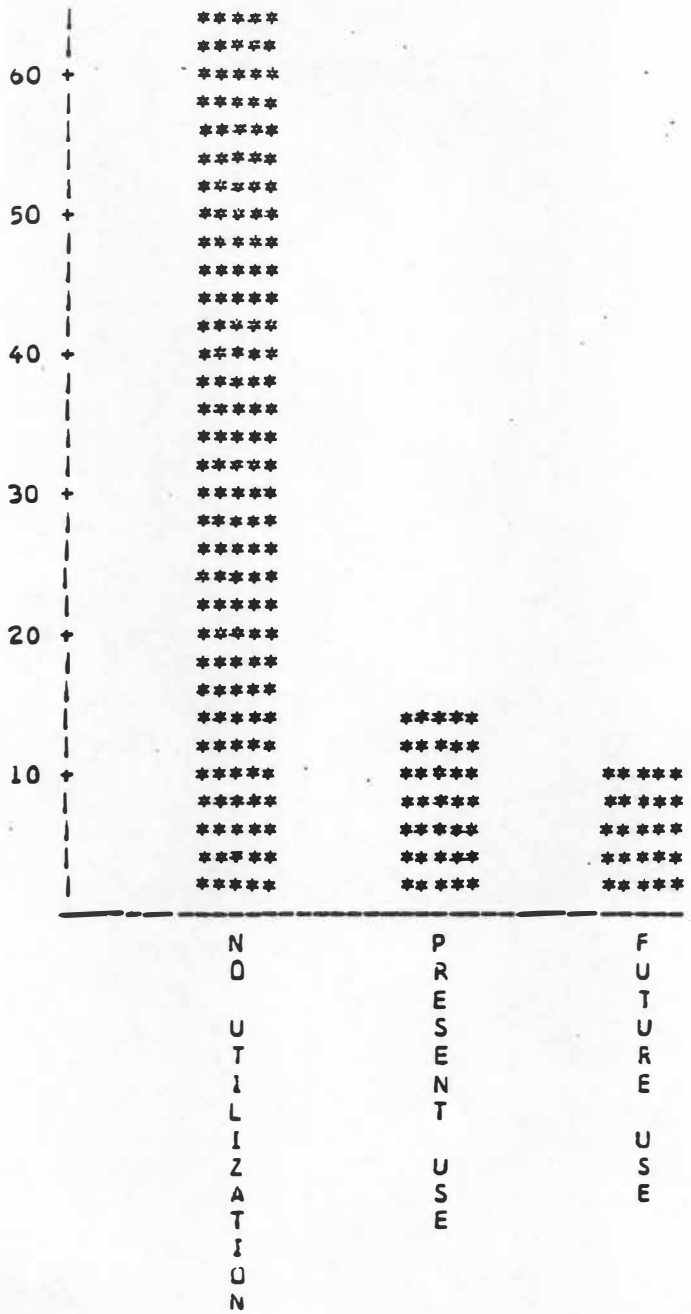
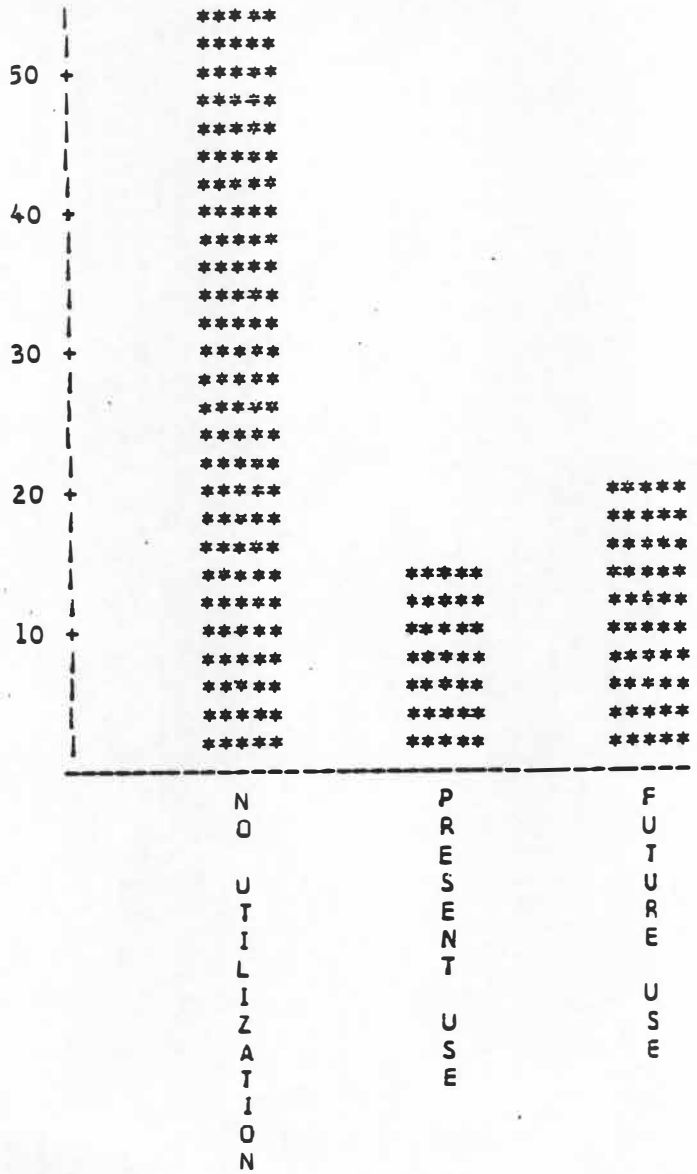


Figure 39. Reports Displaying Information About Delivery Schedules of Vendors.[1]

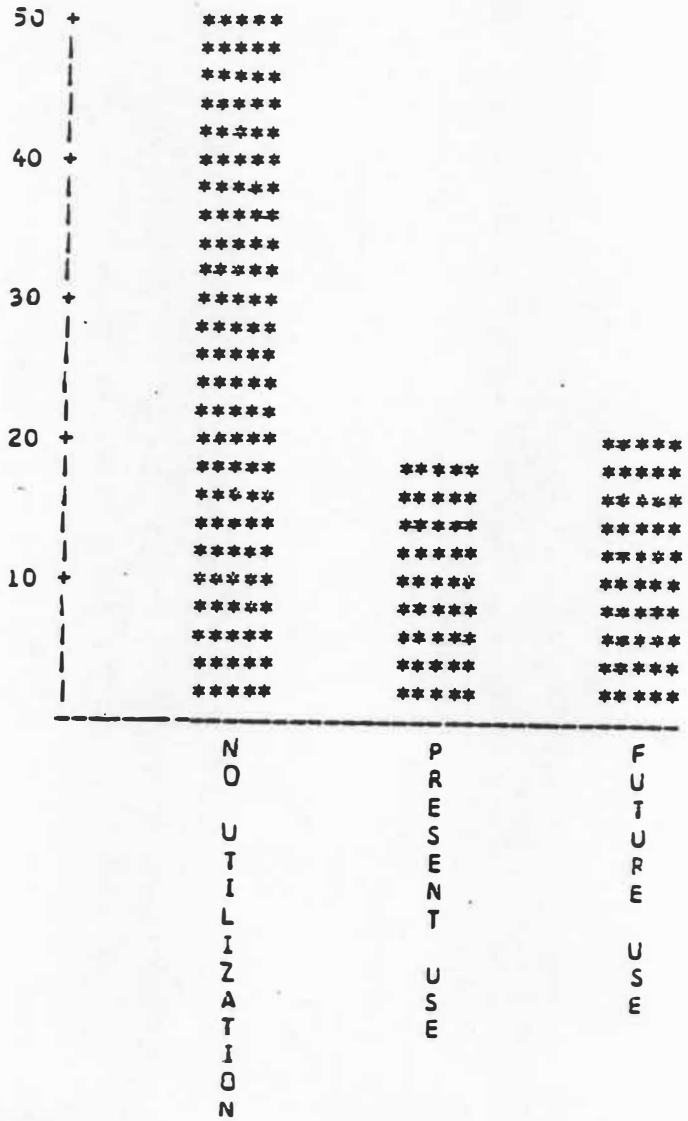
[1]Frequency Bar Chart, Question 9J--First Questionnaire.



Computer Use of Sales Analysis Function

Figure 40. Reports Displaying Information About Daily Sales Activities.[1]

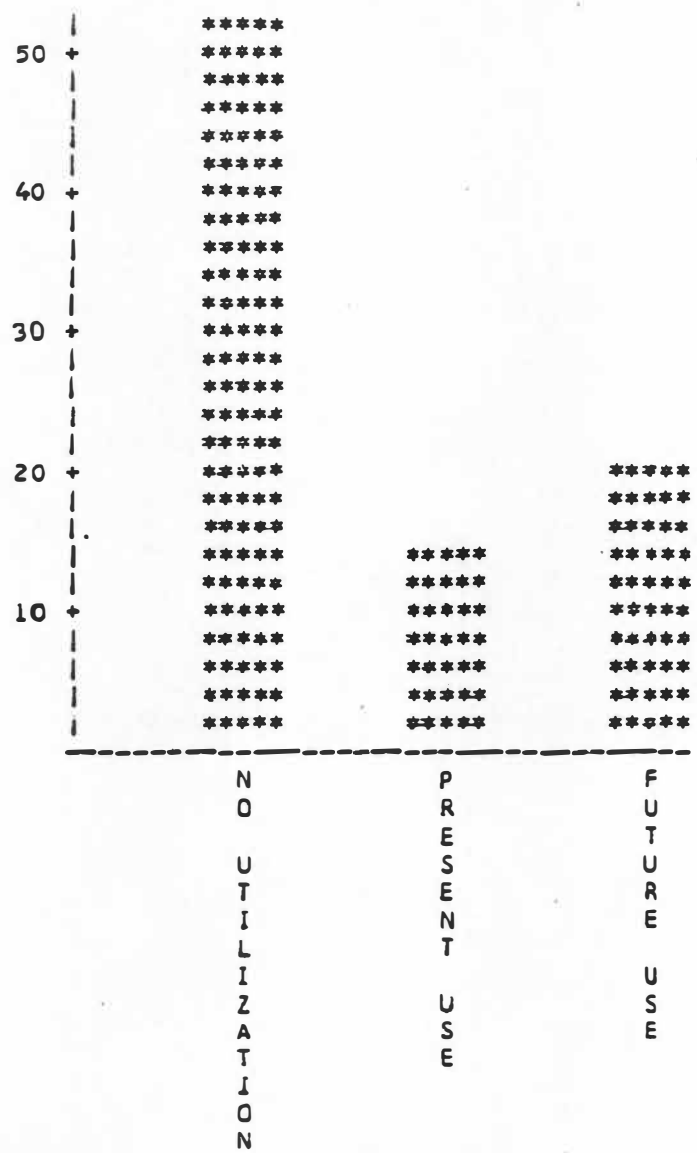
[1]Frequency Bar Chart, Question 10A--First Questionnaire.



Computer Use of Sales Analysis Function

Figure 41. Reports Displaying Total Sales for a Period of Time.[1]

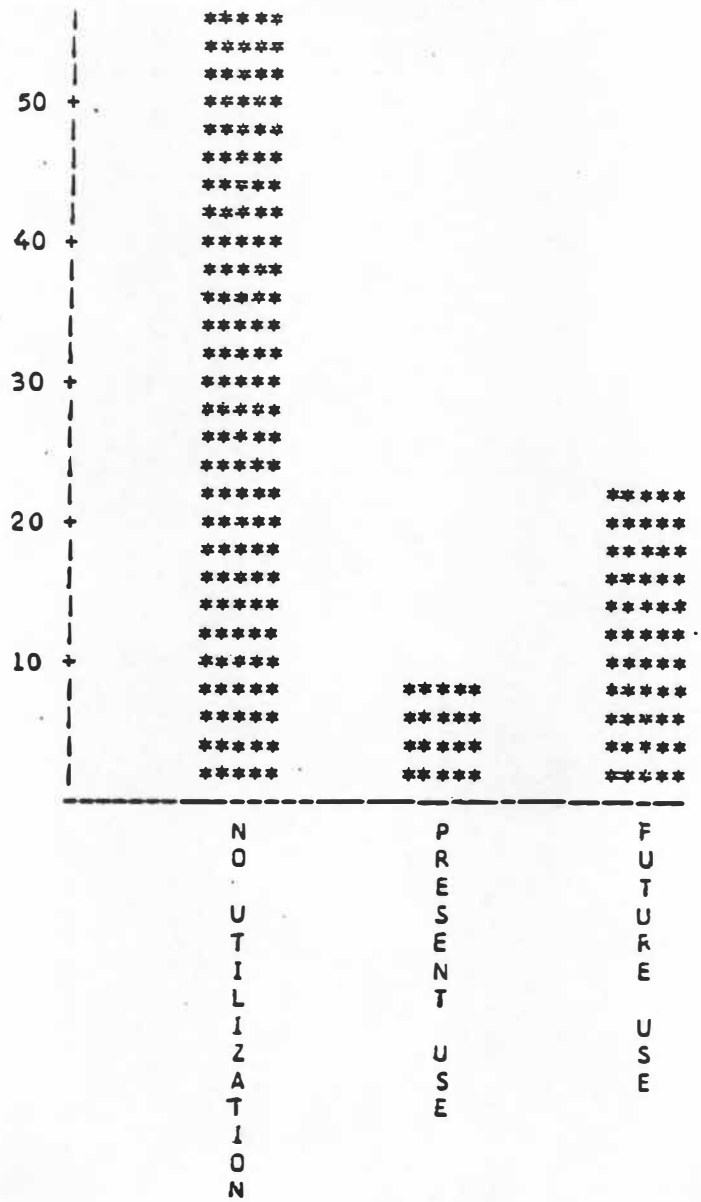
[1]Frequency Bar Chart, Question 10B--First Questionnaire.



Computer Use of Sales Analysis Function

Figure 42. Reports Displaying Total Sales for a Period of Time by Unit.[1]

[1]Frequency Bar Chart, Question 10C--First Questionnaire.



Computer Use of Sales Analysis Function

Figure 43. Reports Displaying A Comparison of Sales for a Period of Time.[1]

[1]Frequency Bar Chart, Question 10D--First Questionnaire.

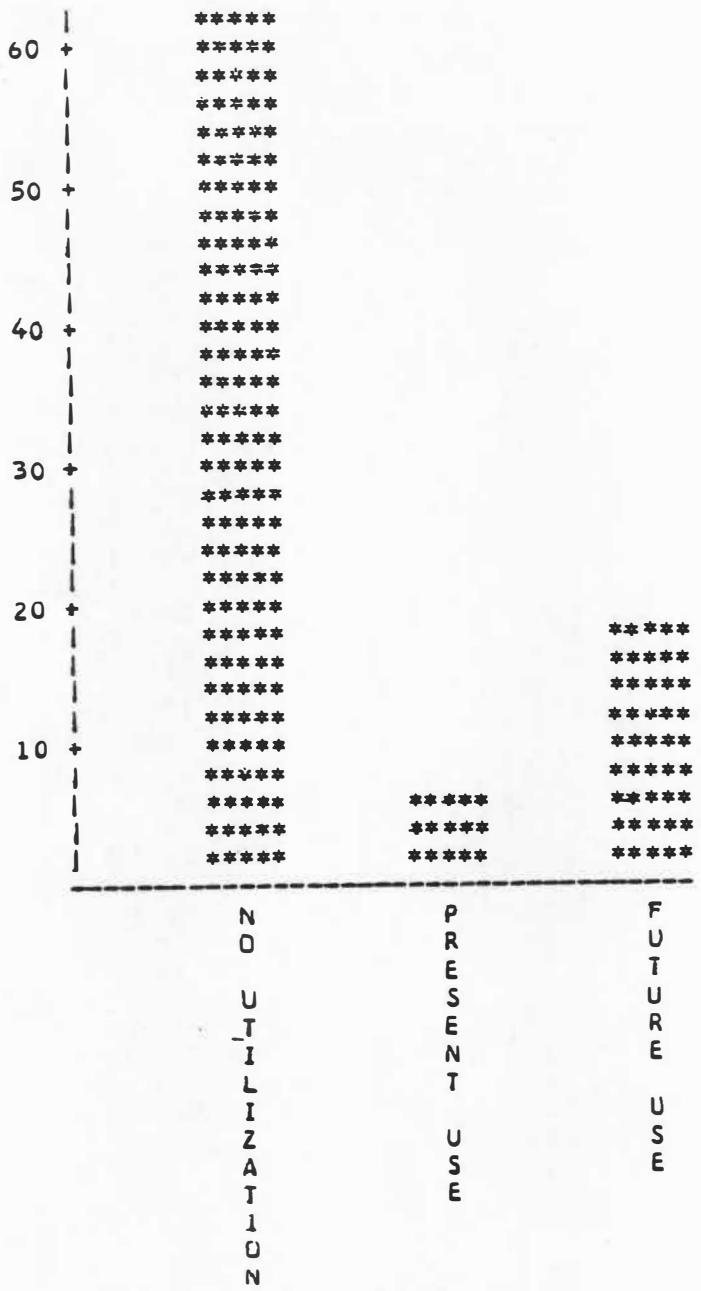
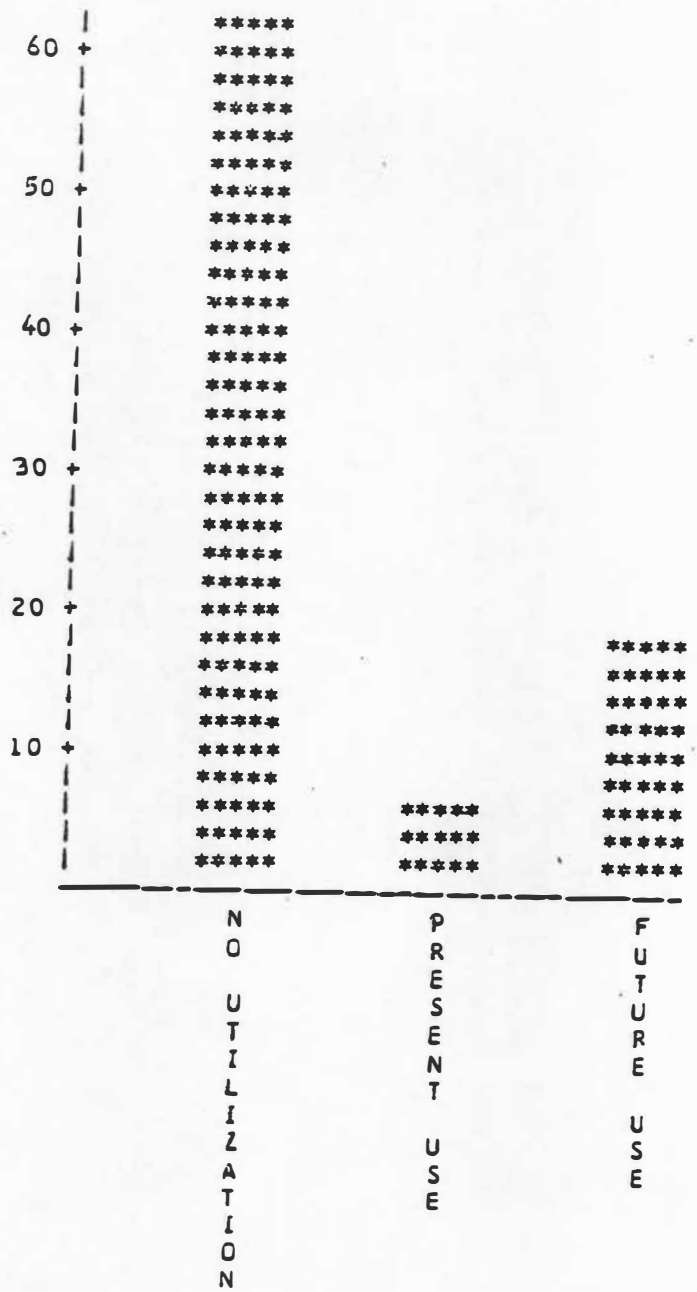


Figure 44. Reports Displaying Comparison of Sales by Menu Item for a Period of Time.[1]

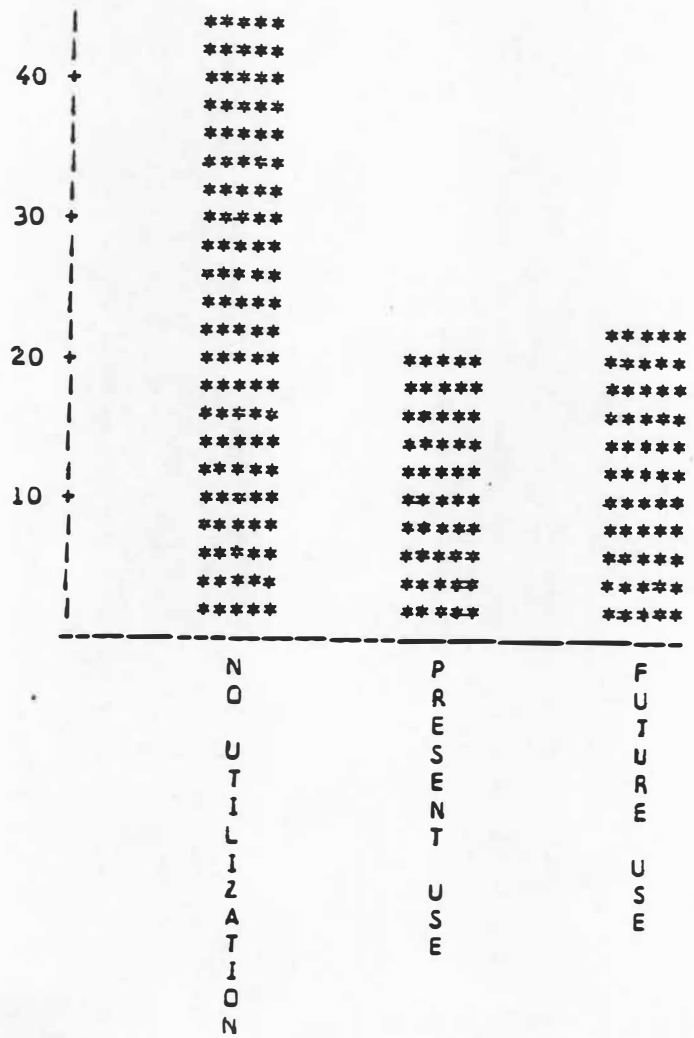
[1]Frequency Bar Chart, Question 10E--First Questionnaire.



Computer Use of Sales Analysis Function

Figure 45. Reports Displaying the Relation of Items Sold in Terms of Total Sales for a Period of Time.[1]

[1]Frequency Bar Chart, Question 10F--First Questionnaire.



Computer Use of Production Function

Figure 46. Reports Displaying Meal Statistics.[1]

[1]Frequency Bar Chart, Question 11A--First Questionnaire.

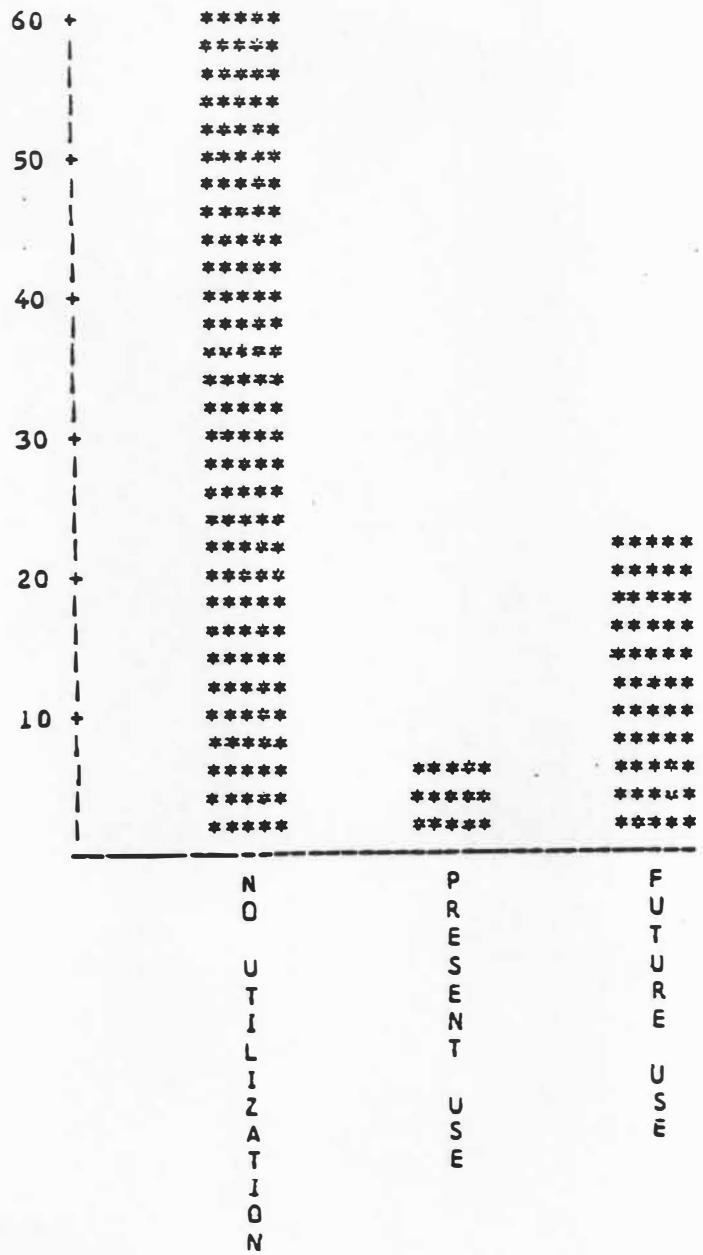


Figure 47. Reports Providing Information About Labor and Production.[1]

[1]Frequency Bar Chart, Question 11B--First Questionnaire.

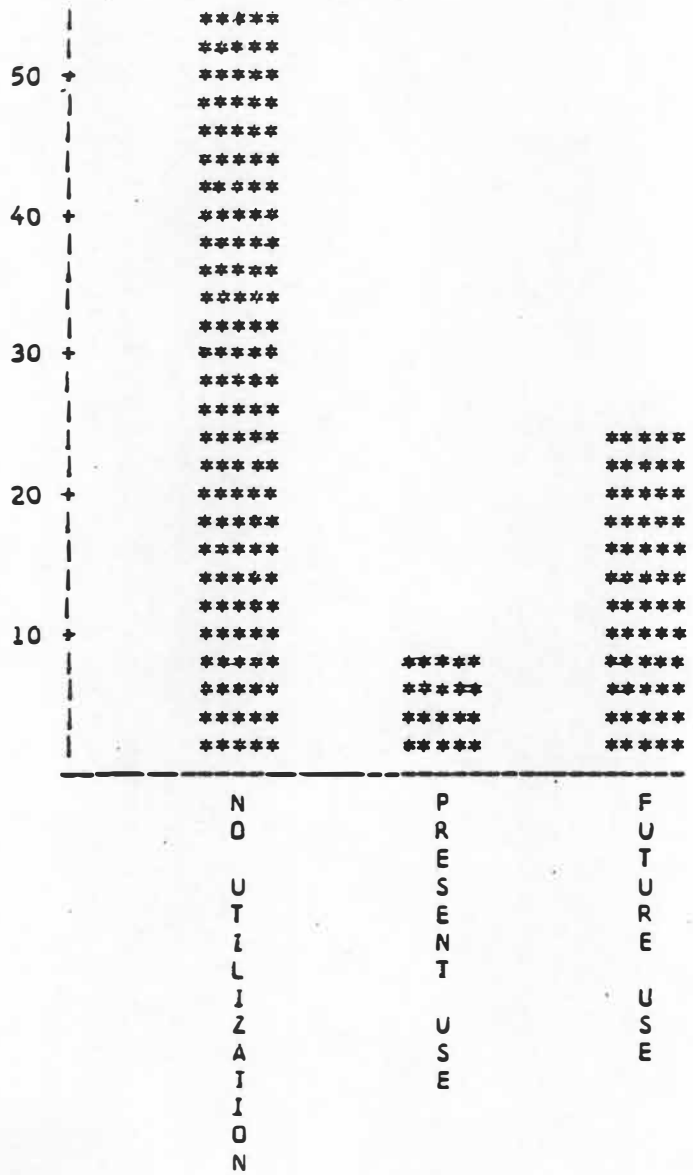


Figure 48. Reports Displaying the Cost of Personnel.[1]

[1]Frequency Bar Chart, Question 11C--First Questionnaire.

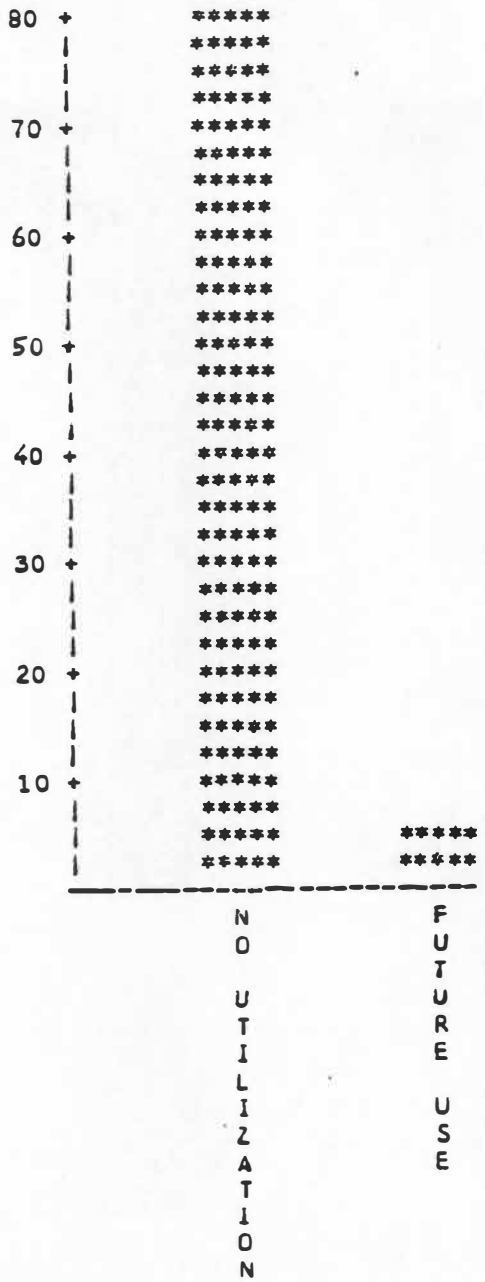


Figure 49. Simulation Model--Equipment Scheduling.[1]

[1]Frequency Bar Chart, Question 12A--First Questionnaire.

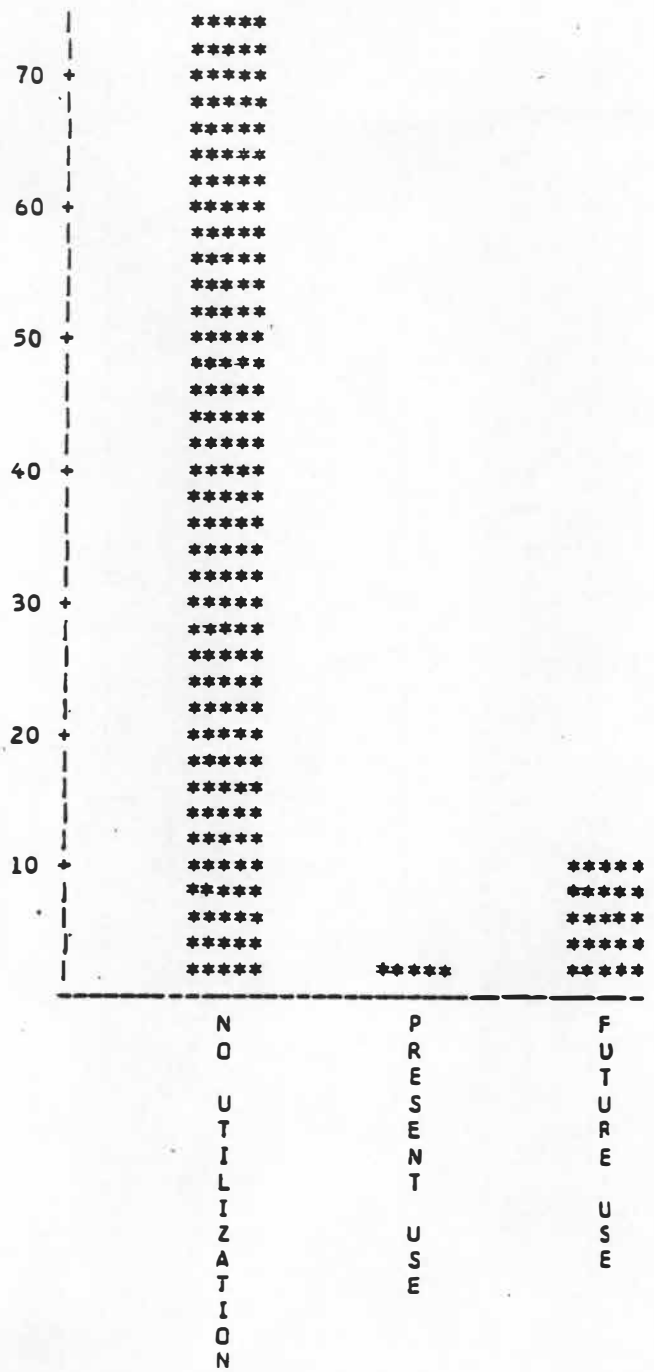
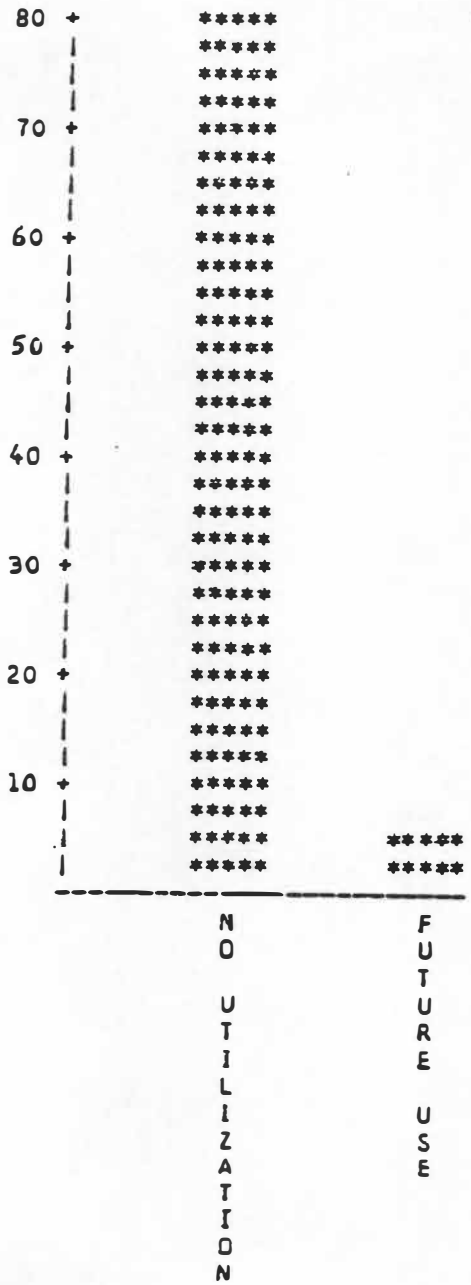


Figure 50. Simulation Model--Scheduling Labor.[1]

[1]Frequency Bar Chart, Question 12B--First Questionnaire.



Computer Use of Simulation Function

Figure 51. Simulation Model--Line Queuing.[1]

[1]Frequency Bar Chart, Question 12C--First Questionnaire.

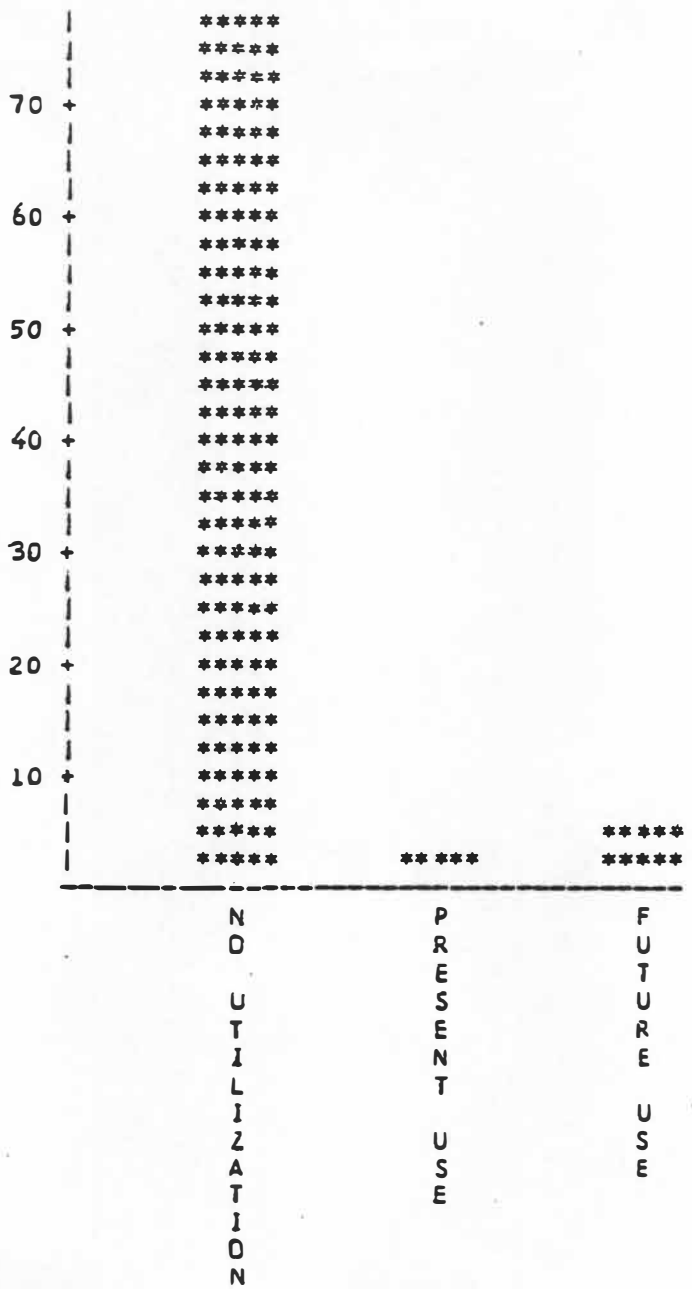


Figure 52. Simulation Model--Determines the Effects of Menu Items on Production.[1]

[1]Frequency Bar Chart, Question 12D--First Questionnaire.

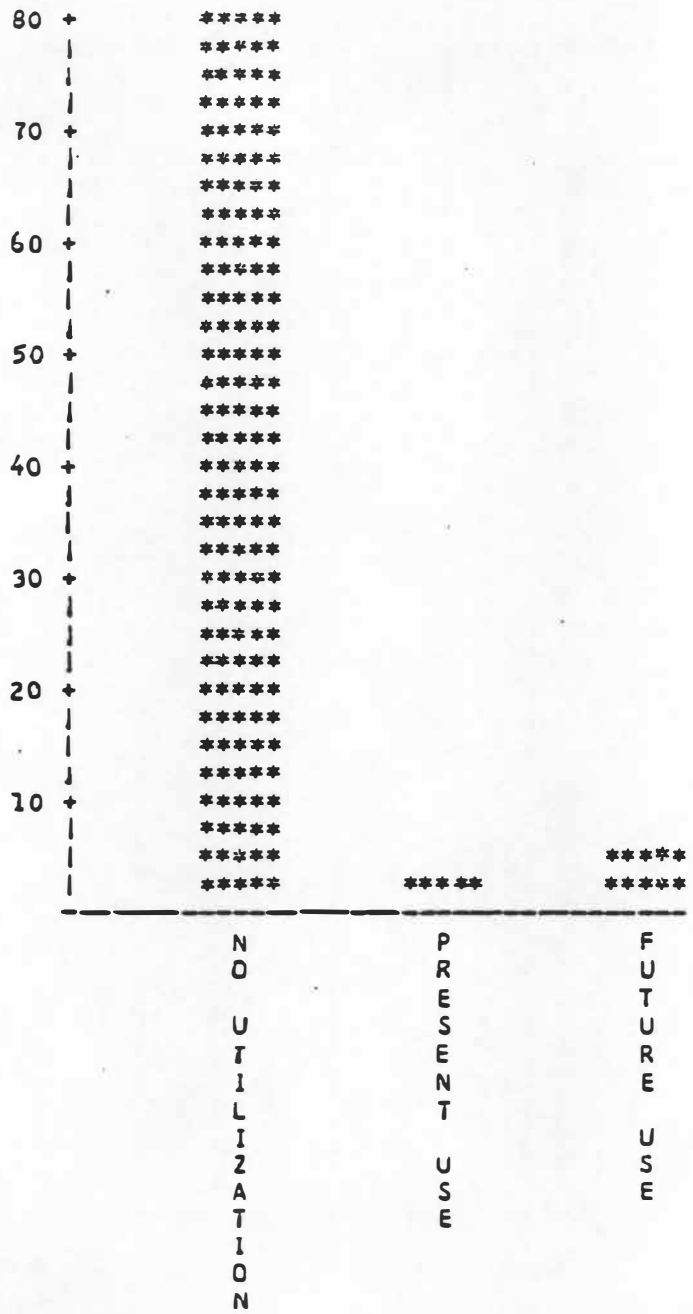


Figure 53. Automated Production Equipment.[1]

[1]Frequency Bar Chart, Question 13A--First Questionnaire.

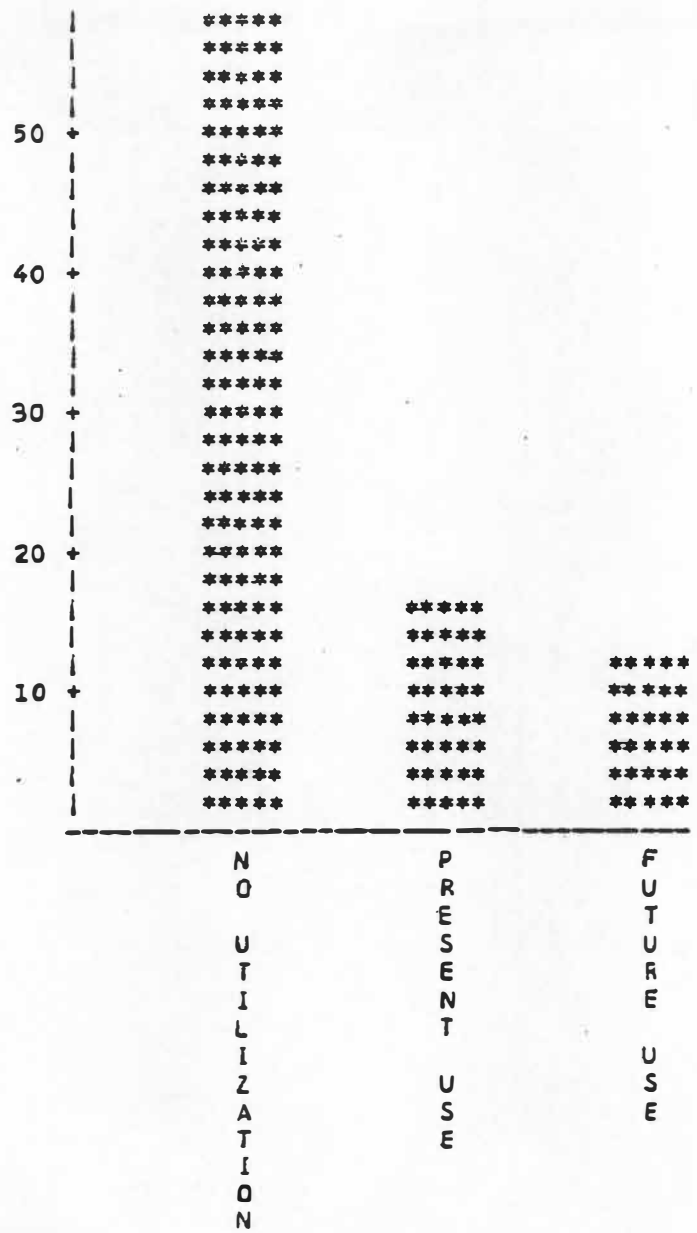


Figure 54. Automated Cash Registers.[1]

[1]Frequency Bar Chart, Question 13B--First Questionnaire.

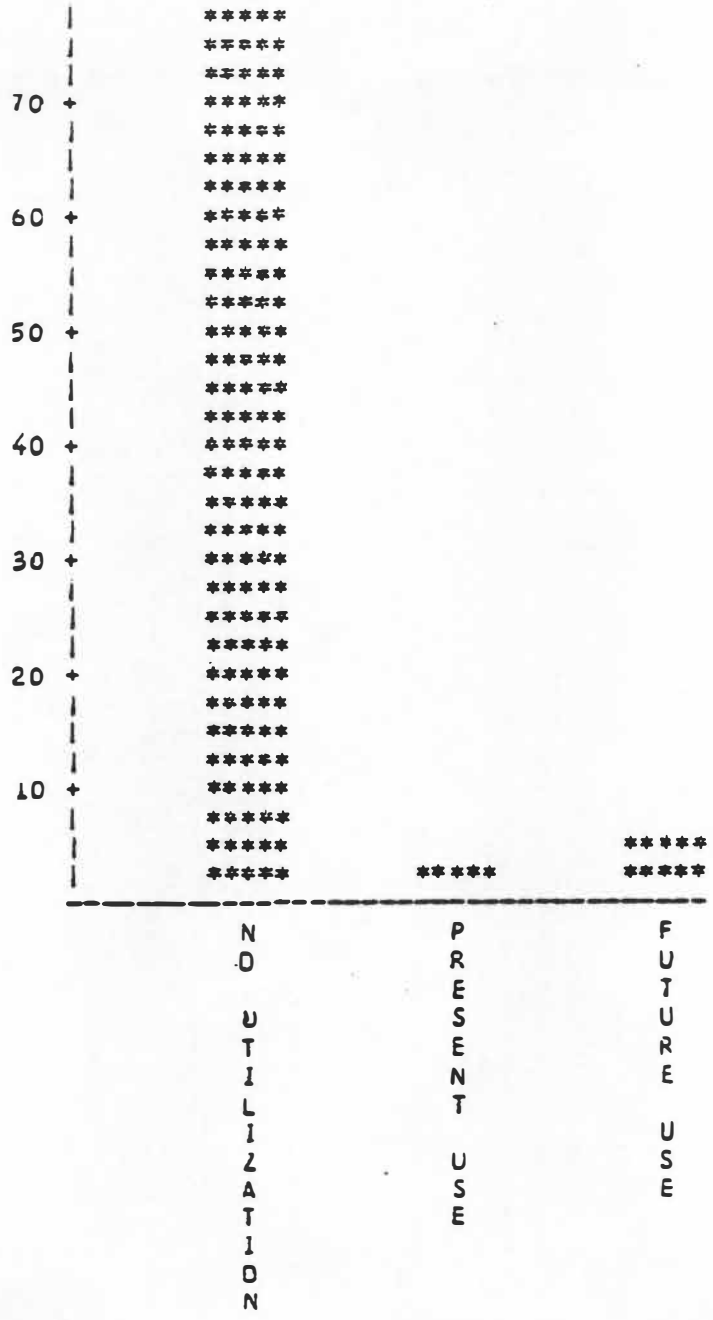


Figure 55. Automated Timing of Start-ups and Shut-downs of Equipment.[1]

[1]Frequency Bar Chart, Question 13C--First Questionnaire.

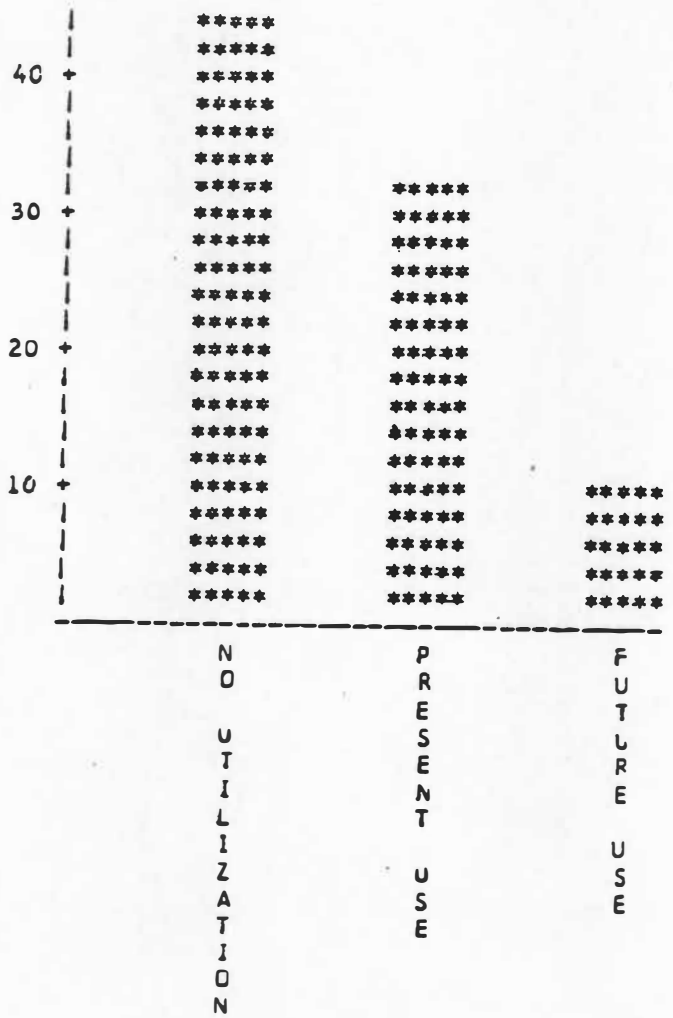


Figure 56. Accounting--Payroll.[1]

[1]Frequency Bar Chart, Question 14A--First Questionnaire.

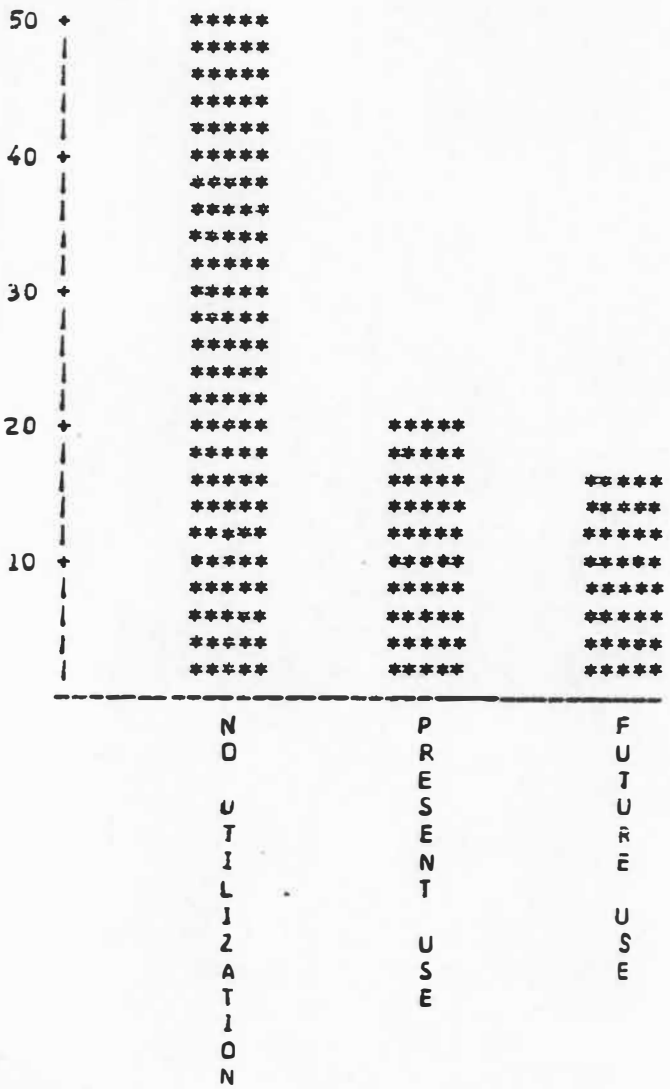


Figure 57. Accounting--Purchasing.[1]

[1]Frequency Bar Chart, Question 14B--First Questionnaire.

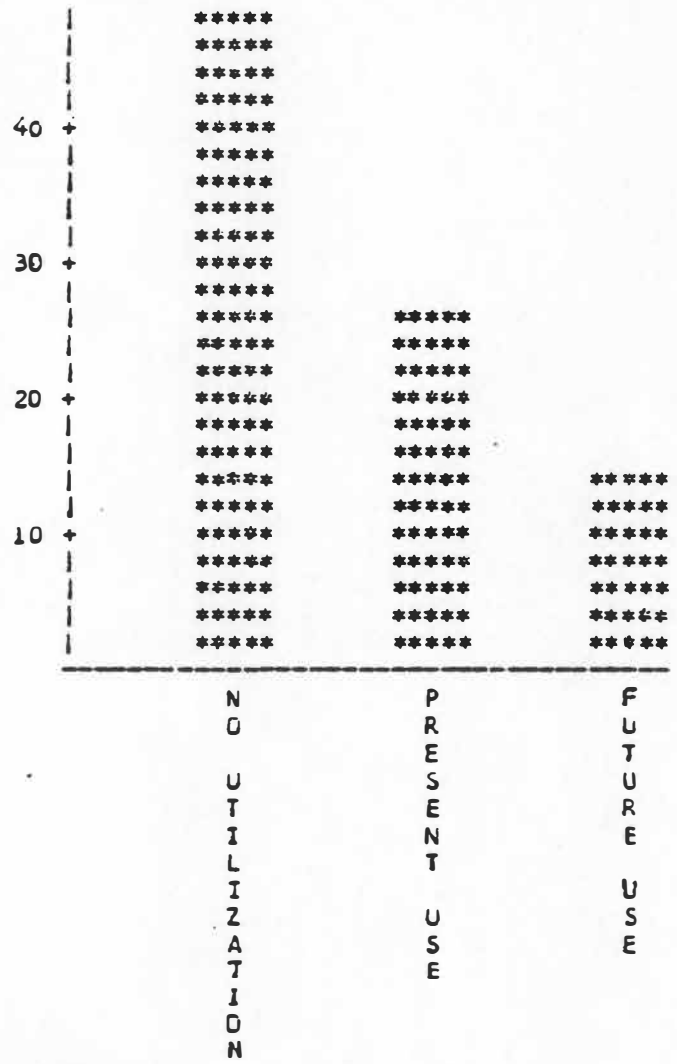


Figure 58. Accounting--Accounts Payable.[1]

[1]Frequency Bar Chart, Question 14C--First Questionnaire.

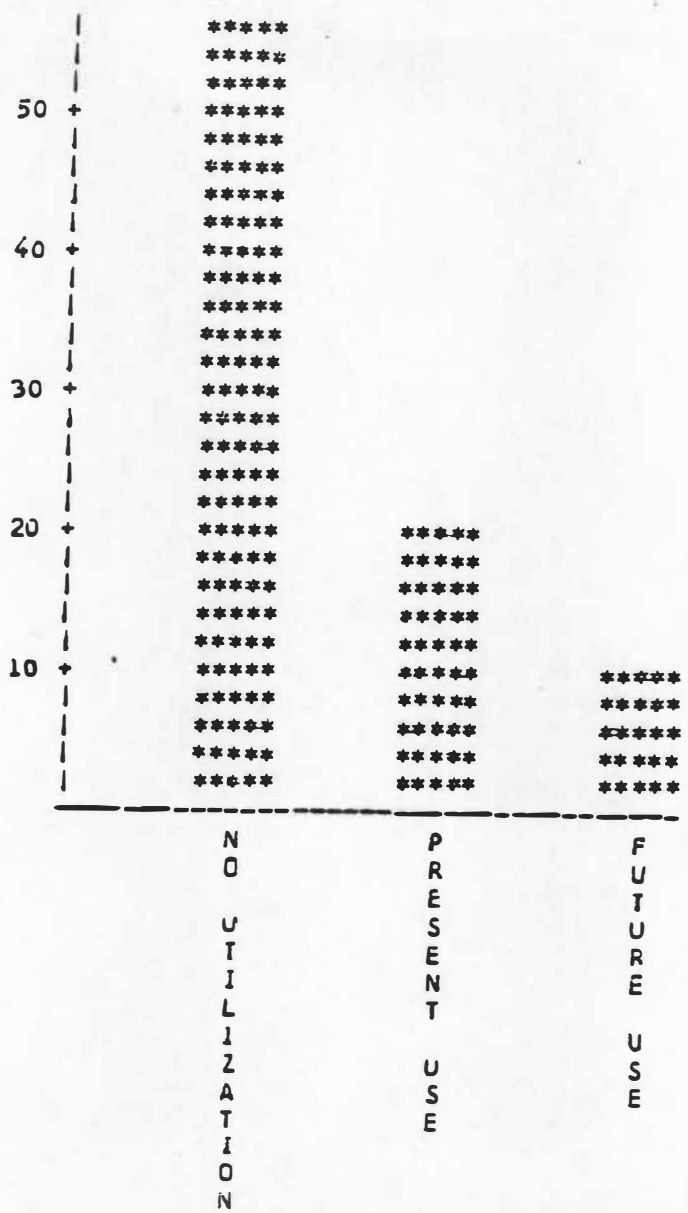


Figure 59. Accounting--Sales Accounting.[1]

[1]Frequency Bar Chart, Question 14D--First Questionnaire.

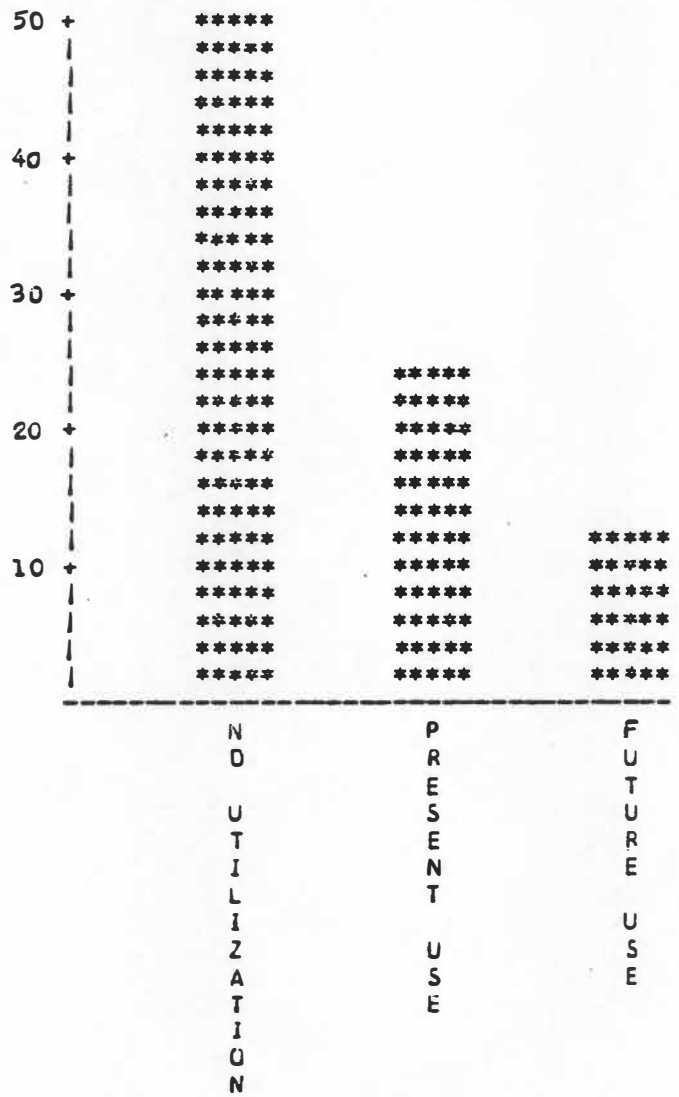


Figure 60. Accounting--General Ledger.[1]

[1]Frequency Bar Chart, Question 14E--First Questionnaire.

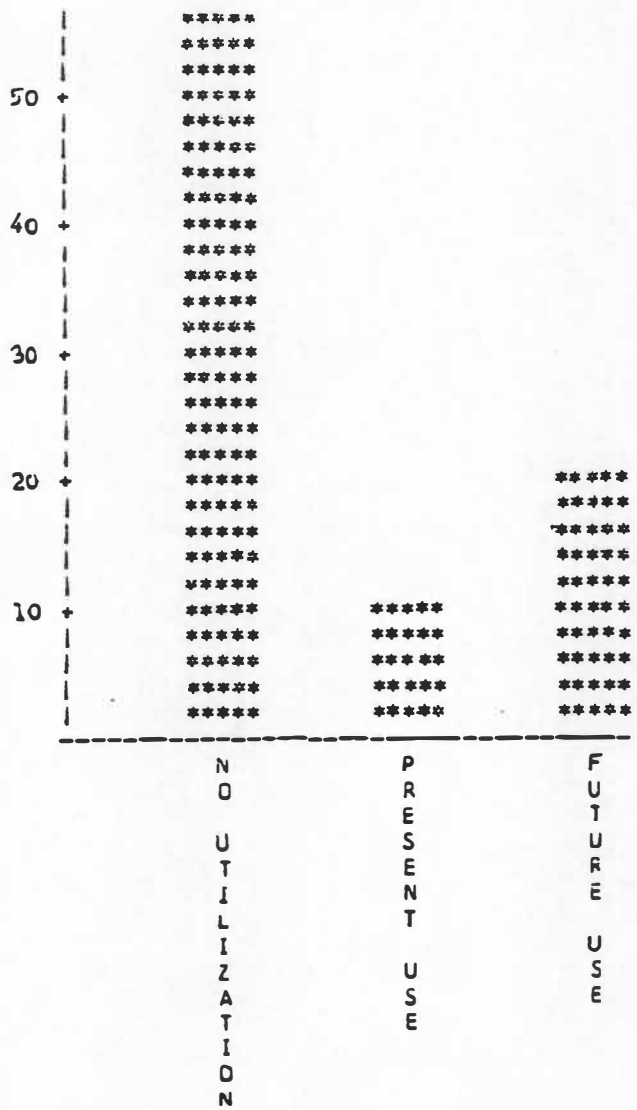


Figure 61. Accounting--Weekly P&L Statements.[1]

[1]Frequency Bar Chart, Question 14F--First Questionnaire.

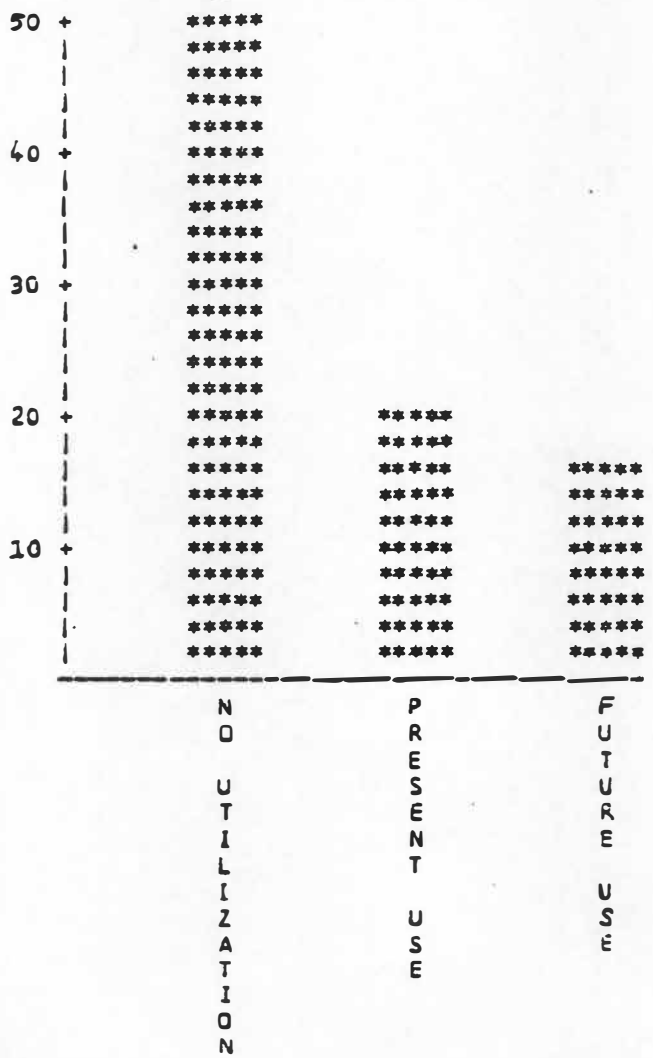


Figure 62. Accounting--Monthly P&L Statements.[1]

[1]Frequency Bar Chart, Question 14G--First Questionnaire.

APPENDIX C

SAMPLE COVER LETTER

Dear:

I am interested in obtaining information for the preparation of a graduate thesis. The completed report will be submitted as a partial requirement of the curriculum for the master's degree in Food Systems Administration offered by The University of Tennessee.

The information I seek concerns computer utilization in college and university food services. The purpose is to assess the present situation and probable future developments in the use of computers on employee skill requirements and employment trends in college and university food services. For those questionnaires not directed to food service directors, if it is felt that the questionnaires have not been directed to the appropriate individual, please use your discretion and forward to the individual felt to be most capable of answering the questionnaire(s).

Please complete and return the first questionnaire by August 13, 1982 whether or not a computer is being utilized. The same deadline applies to those completing both of the questionnaires.

Sincerely,

Mary Jo Hitchcock
Professor

Stephanie Ference
Graduate Student

COMPUTER UTILIZATION IN COLLEGE AND UNIVERSITY FOOD SERVICES

Your answers to these questions are strictly confidential. Please fill in or check your response to the first three questions.

1. What is the number of meals prepared per day at your institution? _____

2a. Do you use the computer? Yes _____ No _____

2b. At the present time the type of computer that is utilized is:
1. _____ Microcomputer
2. _____ Main Frame
3. _____ Both

3. Does your food service department contract meals with a food service company?
a. _____ Yes
b. _____ No

For the following questions please check the capital letter if your department is currently using the computer for the function listed, the lower case letter if your department plans to implement the function within the next few years, or leave blank if the function is not currently being utilized and will not be implemented within the next few years.

	CURRENT/FUTURE		
			COST ANALYSIS
4.	A.____	a.____	Planned cost in dollars and percentage for menu items.
	B.____	b.____	Actual cost in dollars and percentage for menu items.
	C.____	c.____	Planned cost in dollars and percent for meals.
	D.____	d.____	Actual cost in dollars and percent for meals.
	E.____	e.____	Variance between planned and actual costs.
	F.____	f.____	Reports indicating gross profit and percent of profit by each menu item.
			RECIPES
5.	A.____	a.____	Standardized recipes
	B.____	b.____	Printouts of standardized recipes are provide based on forecasted amounts.
	C.____	c.____	Computer system allows for management to make price or portion adjustments as necessary to recipes
			INVENTORY
6.	A.____	a.____	Reports the beginning and ending inventory.
	B.____	b.____	Report in A(a) also shows received and usage figures for items.

	CURRENT/FUTURE		
	C.____	c.____	Shows a comparison of the actual usage of every item (ingredient) with the projected figure (from sales system).
	D.____	d.____	Reports inventory items that have fallen below established minimum requirements.
			NUTRIENT ANALYSIS
7.	Computes the content of menu items for the following nutrients:		
	A.____	a.____	Calories
	B.____	b.____	Protein
	C.____	c.____	Fat
	D.____	d.____	Carbohydrate
	E.____	e.____	Sodium
	F.____	f.____	Other minerals
	G.____	g.____	Vitamins
	H.____	h.____	Water
			MENU PLANNING
8.	A.____	a.____	Plans menus based on nutritional adequacy.
	B.____	b.____	Plans menus based on seasonal availability.
	C.____	c.____	Plans menus based on popularity.
	D.____	d.____	Plans menus based on cost.

CURRENT/FUTURE

PURCHASING

9. A.____ a.____ Reports purchases made for a particular period of time.
B.____ b.____ Reports the price paid for products and compares to the price quoted by the vendor.
C.____ c.____ Shows price trends by product for a particular period of time (Example, 12-month period).
D.____ d.____ Reports the current month's prices paid by the product (bread, meat, etc.).
E.____ e.____ The report in D(d) also prints vendor price fluctuations.
F.____ f.____ The report in D(d) also identifies vendors.
G.____ g.____ Orders products according to forecasts and inventory.
H.____ h.____ Reports last date an item was purchased.
I.____ i.____ Provides information about seasonal availability.
J.____ j.____ Provides information about delivery schedules.

SALES ANALYSIS

10. A.____ a.____ Daily reports providing general information about sales activities.
B.____ b.____ Reports showing the total sales for a given period of time.
C.____ c.____ Reports showing the total sales for given periods of time for different units.
D.____ d.____ Reports showing comparisons of sales for given periods of time.
E.____ e.____ Reports providing sales comparison by menu items for today, month-do-date, and year-to-date (or other periods).
F.____ f.____ Reports showing the relation of each item sold in terms of total sales for today, month-to-date, and year-to-date (or other periods).

PRODUCTION REPORTS

11. A.____ a.____ Compiles the statistics on the number of meals served by the type of meal (breakfast, lunch, dinner).

CURRENT/FUTURE

B.____ b.____ Reports the number of personnel used to produce meals.
C.____ c.____ Reports the cost of personnel.

SIMULATION MODELS

12. Simulation models used for the following functions:
A.____ a.____ Equipment scheduling
B.____ b.____ Scheduling labor
C.____ c.____ Line queuing
D.____ d.____ Determining the effects of menu items on production.

EQUIPMENT

13. A.____ a.____ Automated production equipment. Examples: automated fryers--drop and lift baskets as needed, ovens controlled by sensor, shuts off automatically when roast reaches a particular internal temperature.
B.____ b.____ Automated cash registers.
C.____ c.____ Timing of start-ups and shut-downs on various kinds of equipment.

ACCOUNTING

14. A.____ a.____ Payroll
B.____ b.____ Purchasing
C.____ c.____ Accounts Payable
D.____ d.____ Sales Accounting
E.____ e.____ General Ledger
F.____ f.____ Weekly P&L Statements
G.____ g.____ Monthly P&L Statements

15. Please briefly describe any operations that the computer is being utilized for, or is to be utilized in the next few years, in your department that were not mentioned in the survey.

_____

_____

_____

_____

_____

_____

_____

_____

COMPUTER UTILIZATION AND ITS EFFECT ON SKILL REQUIREMENTS ANE EMPLOYMENT TRENDS

If your department does not utilize a computer, check here and return both surveys. _____

Answers to these questions are strictly confidential. With the exception of the first question, the questionnaire is divided into three categories of statements. Each category deals with the skill requirements and employment trends of either non-supervisory, supervisory (middle management), or administrative personnel. Occupational titles are categoried according to the three levels of personnel and are listed in the questionnaire for your reference.

Occupation Titles and Employee Levels

NON-SUPERVISORY: Cooks, diet aides, dishwashers, storeroom clerks, cooks' helpers (short order cooks, sandwich makers, salad makers), or any other employee having no supervisory authority.

SUPERVISORY: Chef or chief cook, pantry supervisor, food production manager, dietitian, or executive chef.

ADMINISTRATIVE: Administrator, department head, chief or administrative dietitian.

1. Please indicate the employees who are involved with utilizing computer hardward or computerized output by circling the appropriate letter(s) corresponding to the three employee levels.

   A. Non-supervisory
   B. Supervisory
   C. Administrative

NON-SUPERVISORY

Cooks, diet aides, dishwashers, storeroom clerks, cook's helpers (short order cooks, sandwich makers, salad makers), or any other employee having no supervisory authority.

Set I: For the first set of statements regarding skill requirements, indicate whether the need for the skill requirements listed have increased, remained the same, or decreased in your food service department as a result of computer utilization.

Scale: Decreased - Increased
Please indicate your answer by placing a check to the right of the statement.

	Decreased As a Result of Computer Utilization	Remained the Same	Increased As a Result of Computer Utilization
2. A. The ability to read.	_____	_____	_____
B. The ability to assess and analyze computer output.	_____	_____	_____
C. The ability to work with numbers as a result of standardized recipes, computerized machinery, etc.	_____	_____	_____
D. The ability to write.	_____	_____	_____

	Decreased As a Result Of Computer Utilization	Remained the Same	Increased As a Result of Computer Utilization
E. The ability to make decisions concerning ingredients and procedures of recipes.			
F. Tha ability to follow precise directions.			
G. The ability to operate computerized machinery.			
G. The over-all skill level of the non-supervisory employee has:			

Set II: For the second set of statements regarding skill requirements and employment trends, indicate whether you agree, disagree, don't know, or are uncertain regarding the statements.

Scale: Disagree - Agree - Don't Know
Please indicate your answer by placing a check to the right of the statement.

	Disagree	Uncertain	Agree	Don't Know
I. Job specifications for the non-supervisory employee should be upgraded since skill requirements have increased to a great extent as a result of computer utilization.				
J. The use of the computer has eliminated many routine tasks for the non-supervisory employee.				
K. The use of the computer has not eliminated jobs, but has merely eliminated routine tasks.				
L. The use of the computer has not resulted in any significant job changes at this level and therefore jobs have not been eliminated.				
M. There has been a decrease in the number of non-supervisory employees as a result of computer utilization.				

SUPERVISORY

Chef or chief cook, pantry supervisor, food production manager, dietitian, or executive chef.

Set I: For the first set of statements regarding skill requirements, indicate whether the need for the skill requirements listed have increased, remained the same, or decreased in your food service department as a result of computer utilization.

Scale: Decreased - Increased
Please indicate your answer by placing a check to the right of the statement.

		Decreased As a Result of Computer Utilization	Remained The Same	Increased As a Result of Computer Utilization
3. A.	The ability to make decisions regarding the daily ordering of food and supplies.			
B.	The ability to make decisions regarding inventory.			
C.	The ability to make decisions regarding the scheduling of personnel.			
D.	The ability to make decisions regarding the scheduling of equipment.			
E.	The ability to operate computerized machinery.			
F.	The ability to plan menus.			
G.	The ability to determine cost and selling prices of items.			
H.	The ability to educate subordinates about computer use.			
I.	The overall skill level of the supervisory employee has:			

Set II: For the second set of statements regarding skill requirements and employment trends, indicate whether you agree, disagree, don't know, or are uncertain regarding the statements.

Scale: Disagree - Agree - Don't Know
Please indicate your answer by placing a check to the right of the statement.

		Disagree	Uncertain	Agree	Don't Know
J.	Since routine decisions with identifiable factors can be programed into computers, there is a decreasing need for routine daily decision-making.				
K.	The use of the computer in food services has freed managers to manage food service production versus performing clerical tasks.				
L.	The use of the computer has not eliminated jobs, but has merely eliminated routine tasks.				

		Disagree	Uncertain	Agree	Don't Know
M.	The use of the computer has not resulted in any significant job changes at this level and therefore jobs have not been eliminated.				
N.	There has been a decrease in the number of supervisory employees as a result of computer utilization.				

ADMINISTRATIVE

Administrator, department head, chief or administrative dietitian.

Set I: For the first set of statements regarding skill requirements, indicate whether the need for the skill requirements listed have increased, remained the same, or decreased in your food service department as a result of computer utilization.

Scale: Decreased - Increased
Please indicate your answer by placing a check to the right of the statement.

		Decreased As a Result of Computer Utilization	Remained the Same	Increased As a Result of Computer Utilization
4. A.	The ability to make decisions concerning the purchasing of software and hardware.			
B.	The ability to make decisions concerning problems that arise with employees as a result of computer implementation and ongoing utilization.			
C.	The ability to plan manpower needs. (Computerized simulation models can be utilized for this function.)			
D.	The ability to perform cost accounting analysis.			
E.	The ability to plan training programs regarding computer use.			
F.	The overall skill level of the administrative employee has:			

Set II: For the second set of statements regarding skill requirements and employment trends, indicate whether you agree, disagree, don't know, or are uncertain regarding the statements.

Scale: Disagree - Agree - Don't Know
Please indicate your answer by placing a check to the right of the statement.

	Disagree	Uncertain	Agree	Don't Know
G. Overall, the number of administrative decision-making activities have decreased since many are performed by computer programs.	_____	_____	_____	_____
H. Overall, decision-making activities have increased.	_____	_____	_____	_____
I. Overall, the number of decision-making activities have remained the same.	_____	_____	_____	_____
J. The use of the computer has not eliminated jobs, but has merely eliminated routine tasks.	_____	_____	_____	_____
K. The use of the computer has not resulted in any significant job changes at this level, and therefore jobs have not been eliminated.	_____	_____	_____	_____
L. There has been a decrease in the number of managerial or administrative employees as a result of computer utilization.	_____	_____	_____	_____

VITA

Stephanie Dawn Ference was born in Norwich, Connecticut, on July 17, 1959. She attended elementary school in Schenectady, New York, and graduated from Linton High School in 1977. The following September she entered in The University of Connecticut, Storrs, Connecticut, and received a Bachelor of Science degree in Clinical Dietetics in May 1981. In October 1981 she received her license as a Registered Dietitian.

She entered the Graduate School at The University of Tennessee, Knoxville in the fall of 1981 and began study toward the Master of Science degree in Food Systems Administration. In March 1983 she received her Master of Science degree from The University of Tennessee.