

PILOT STUDY TO EVALUATE FOODSERVICE SYSTEMS USED
IN TITLE VII ELDERLY NUTRITION PROGRAM

A THESIS

SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR
THE DEGREE OF MASTER OF SCIENCE
IN THE GRADUATE SCHOOL OF THE
TEXAS WOMAN'S UNIVERSITY

COLLEGE OF
NUTRITION, TEXTILES, AND HUMAN DEVELOPMENT

BY

JOICE CARTER, B.S.

DENTON, TEXAS

MAY 1979

The Graduate School
Texas Woman's University
Denton, Texas

_____ May _____ 19 79

We hereby recommend that the thesis prepared under

our supervision by Joice Carter

entitled Pilot Study to Evaluate Foodservice

Systems Used in Title VII Elderly Nutrition

Program

be accepted as fulfilling this part of the requirements for the Degree of
Master of Science.

Committee:

Anna Shepherd

Chairman

Olivia M. Milner

Carol Shanklin

Accepted:

Phyllis Bridges

Dean of The Graduate School

· ACKNOWLEDGMENTS

The author wishes to express sincere appreciation to each of the following persons who have offered encouragement and assisted her in the completion of this research:

To the chairman of her graduate committee, Mrs. Irma Shepherd, Assistant Professor of Nutrition and Food Sciences, for her interest and assistance throughout the graduate program, and especially for her time, patience, and devotion in the preparation and completion of the thesis.

To Dr. Carol Shanklin, Assistant Professor of Nutrition and Food Sciences, for her time and assistance in completion of the thesis.

To Dr. Alice Milner, Acting Chairman of the Department of Nutrition and Food Sciences, for her time and assistance in the completion of the thesis.

To Edgar Sprinkle, III, Statistician, Texas Woman's University Research Institute, for his time in the statistical analysis of the data.

To the project directors of Texas who returned the completed questionnaires, for their cooperation in

contributing data for the research.

To Stedson B. Carter, III, the author's husband, for his patience and support throughout the graduate program, especially throughout the preparation and completion of the thesis; and

To Trey and Kerri Carter, the author's children, for their patience and excellent behavior throughout the preparation and completion of the thesis.

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CHAPTER I - INTRODUCTION

According to a 1970 census, more than 20 million (9.3 percent) of our population are 65 years of age or older. In some states, Florida, for example, 14.6 percent of the population are 65 years of age or older (1). Within the last few years, Americans have increasingly recognized the problems of the elderly, including those related to nutrition. The Nutrition Program for the Elderly, as contained in Public Law 92-158, dated March 22, 1972, requires that projects provide at least one hot meal per day that meets one-third of the Recommended Dietary Allowance, five days per week (2). Hot meals are served in community centers, housing projects, schools, churches, and other target population areas. The meals should be prepared in a safe, sanitary facility utilizing procedures which yield high quality food.

The four major types of foodservice systems used in the nutrition programs throughout the nation are: 1) conventional; 2) convenience; 3) ready, and 4) commissary (5,7). A combination of two or more of the systems is used in many instances (7). The current trend is towards centralization of services in foodservice similar to those in purchasing, laundry, and pharmacy (5). As with all types

of foodservice systems, the building, equipment, administration, labor, and energy should be designed to deliver a high quality finished food product at minimal cost (3).

Recent studies have not been conducted in the national nutrition programs to determine which type of foodservice system can produce the best quality meal at minimal cost. Earlier preliminary studies indicated that catered and project-prepared meals cost about the same in urban areas (4). The profit in catered meals was offset by lower raw food costs through mass purchasing. Comparison of meal costs demonstrated that raw food costs were similar in rural and urban projects (4). Labor costs for project-prepared meals was higher in urban areas, making total meals cost higher for urban than for rural project-prepared meals (4). In Detroit, when a shift was made from catered to project-prepared meals, cost increased from \$2.30 to \$4.12, an increase of \$1.82 per meal. The change was from a fully catered meal to prepacked meals which were reconstituted and assembled on site referred to in this study as a convenience system (4).

Purpose

Today, every mass feeding operation is experiencing the effects of spiraling labor and food cost, as well as a

growing shortage of both skilled and unskilled employees. The attainment of the important goals of providing nutritious, high quality food and service depends, in part, on information which discloses the costs incurred to achieve these goals.

The major purpose of this study is to determine the cost of the four major foodservice systems used in Title VII Nutrition Programs, both rural and urban in the State of Texas. The primary objectives of the project are a) analyze the factors contributing to the differences in the cost of the four major foodservice systems used in Title VII Nutrition Programs; b) design representative models of food delivery for semi-conventional decentralized service (one central kitchen) and for semi-conventional decentralized service (two preparation sites) for a project with 18 centers serving 1,200 meals in Tarrant County. The following information will be provided in narrative form:

- A. Location or locations of kitchen facilities.
- B. Description - building design in relation to dietetic service needs.
- C. Dietetic service organization and operation to include meal plan, type of service, type of menu, convenience foods and extent of use; use of disposables, purchasing and deliveries (methods and frequency); number

and location of preparation areas, dining room, dishroom, preparation and delivery of food, number of full time and part time employees (to include professional and clerical).

- D. Major job descriptions of each employee position will be outlined.

Budget

- A. The cost of remodeling and equipping two representative semi-conventional decentralized centers to prepare food on site will be determined.
- B. The cost of building and equipping a semi-conventional centralized kitchen to serve 18 centers will be determined.
- C. The cost of operating foodservice for semi-conventional decentralized service (two preparation sites) and semi-conventional decentralized service (one central kitchen) with respect to utilities, food cost, labor cost and other supplies will be determined.

REVIEW OF LITERATURE

Overview of Components of Foodservice Delivery Systems

The primary purpose of the nutrition program was to design appropriate ways for the delivery of food which would enable older persons to enjoy palatable meals that supply essential nutrients needed to maintain good health. The variety of food and preparation methods available should permit foodservice facilities to prepare

food to meet almost any nutritional need. Management preference, operational costs, regional food preferences, and the physical design of the foodservice delivery system dictate which system or systems will be used in health care food delivery programs (7). Despite the differing methods of food preparation and delivery required by each system, all shared the same functions of storage, preparation, cooking, serving, and clean-up. Each required space for these activities, including office (circulation) and staff facilities (7).

Foodservice Systems

A need existed to gather comparative information on the four different types of food systems used in Title VII Nutrition Programs. Sheridan (7) described conventional or traditional, convenience or efficiency, ready and commissary as the four types of systems used in food preparation and delivery in health care institutions. Rinke (8) reviewed and evaluated the conventional, convenience, and automated systems. Unklesbay, Knicherman, and Cremer (10) have described four basic foodservice systems: conventional, commissary, ready prepared, and assembly serve. For the purpose of this study, the investigator identified conventional, convenience, ready, and commissary as the four major types of food systems used in the Elderly Nutri-

tion Program. Many studies were found in the review of literature that identified the advantages and disadvantages of the different types of foodservice systems.

The conventional foodservice system was defined as one in which there is an on-premise production of food, either centralized or decentralized (5). Decentralized service means the distribution of bulk quantities of food in sufficient amount to serve a given number of clients in one center (5). Centralized service means serving the individual portions of food onto the trays that have been assembled and set up at some central point in or close to the kitchen and distributed to the individual sites (5). High transportation cost, delivery equipment cost, limited menus, and loss of nutritional value were cited as disadvantages of the conventional decentralized systems (14). Other arguments against the system included uneven work distribution and high labor costs (5). The principal advantage of conventional centralized system was the assurance of high quality food items (5).

Convenience system was defined as one in which foods were received in a frozen, chilled or at room temperature that can be held for varying periods of time (5,7). Only the "finishing processes" such as tempering (thawing) and rethermalizing, portioning, and merchandising the food

for service were required on premises (5). Minimal investment in equipment and labor cost saving were cited as advantages of this system. Karmensky (15) cited the convenience system as an effective, efficient and economical food system. An increase in labor efficiency was reported in a California school district which converted from conventional to convenience system (33). Rainsford (34) also reported that labor costs were generally reduced and employee production increased in using the convenience system. Rainsford (34) cited better portion control, minimal leftover, and less waste with the convenience system. Client's taste preference, availability of acceptable food items, and lack of nutritional analysis were identified as some of the disadvantages (34). Studies have also found that more than 14 percent of the total foodservice labor needs must be eliminated to offset the cost of the total convenience food system (7).

Ready system was defined as a food system in which on-premise, mass preparation of foods, either frozen, or held at a chilled temperature until needed, and reconstituted on demand. Studies found that the ready food system improved the quality of the meals, increased the productivity of foodservice employees, and decreased food and labor cost (56). Disadvantages of this system

included the initial equipment investment, supervisory needs, and training in proper use of all equipment (7,56,57). Koogler and Nicholanro (38) also reported the labor costs of the ready food system were higher than convenience. Handling of food items should be monitored to control microbial quality (5).

The commissary system was defined as a system in which food preparation was done in a large production kitchen, usually with sophisticated, automated equipment (5,7). Food preparation may be either the conventional system or the ready system (7). Delivery of the food may be either in bulk or portioned. Productivity was high in the commissary system (5). Good quality food items, savings in large volume purchasing, and space saving features were cited as advantages of the system (5,7). Duplication of personnel and equipment was eliminated (5). Costs of the foodservice operation was easier to obtain and more accurate than proration of these costs (5). The initial capital outlay was a disadvantage of this system (7). Transportation costs and problems (length of time food held, maintaining safe temperature and truck maintenance) were also cited as disadvantages (5).

Careful considerations of the facilities foodservice requirements was an important factor in the

decision-making process. An economical, efficient food-service system was only possible when all users of the system were involved in the planning process.

Meal Costs

Montag (6) described four methods of obtaining total food costs. The four methods were the recipe method, requisition method, inventory method, and record of purchased method. A principal advantage for recipe and requisition methods was that consumption was matched with production, resulting in a daily food cost. The inventory method was effective if a running record was kept of purchases classified by commodity groups. The purchased method provided at least a working knowledge of the cost of food. A sound record-keeping system was essential in controlling food costs. The food cost reports were useful to compare actual food cost to desired food cost per meal or to industry averages (6). Factors that contributed to food costs variation were the region of the country, availability of donated foods, size of foodservice operation, time of year, type of commissary, and the amount of preparation time and use of convenience foods (5).

In January 1978, Congress appropriated \$2,000,000 for the establishment of a three year national demonstration and research program of nutrition for older people, to be

conducted by the Administration on Aging under the Title IV (research and development) provisions of the Older American Act (4). Thirty-two individual demonstration and research projects were funded throughout the nation to determine the cost of the nutrition program in various types of operations. Bechill and Wolgamot (4) found that meal costs ranged an average of \$0.86 in Emmett, Idaho to \$4.62 for meals prepared in Detroit. Results of the study indicated that catered (commissary) and site-prepared meals (conventional) cost about the same in urban areas (4). The profit in catered meals was offset by lower raw food costs through mass purchases. Comparison of meal cost showed that raw food costs were similar in rural and urban projects. Staff costs for site prepared meals were higher in urban areas, making total meal cost higher for urban than rural prepared meals. The pilot study reported that of the four least expensive meal services, three were rural and one urban. Eight site prepared meals and two catered prepared meals were listed among the ten least expensive. Large scale service of 12,000 meals per month resulted in Chicago having the lowest cost for a catered prepared meal. Cost of the other urban area (New York) was low because the center was operated in an existing facility that incurred minimum

serving costs. There was little difference in total cost of site-prepared meals as compared with catered meals. School-served meals involved higher administrative costs than other meals. Inefficient staff utilization increased meal costs when sites were not operated as often as five days a week and when fewer than 100 meals were served daily (4).

The federal guidelines (2) established the Title VII Nutrition Program with similar meal requirements and goals as the school feeding program. Both programs were designed to provide a hot meal five days a week to specific age groups of people. The foodservice facilities required for the school lunch program and Title VII were similar in structure (9). Both programs were designed to meet nutritional needs of a specific age group. The meal patterns of both programs were designed to meet one-third of the Recommended Dietary Allowance for a specific age group (2). Kahle (10) pointed out that most school feeding facilities were not being fully utilized and that it was cost efficient to combine the two programs. The two programs have been combined in some states (9). Recent studies have not been conducted in the national nutrition programs to determine which type of delivery system can

produce the best quality meal at minimal cost. Descriptive studies exist which described the various advantage and disadvantage of alternate food delivery system for school lunch program (12,13).

Operational costs of an individual unit kitchen were compared with those of prepacked foodservice system in a school lunch study by Dobbins (11). The food cost were found to be lower in the individual unit. Harper and Jansen (12) found that food costs did not differ appreciably for any school using on-site preparation service (conventional), central preparation hot bulk delivery (conventional), and central kitchen preparation-chilled preportioned delivery (commissary). The food cost accounted for 45 to 50 percent of the total meal cost. Frozen preportioned systems (convenience) had higher food costs than did the other systems. The food cost for frozen preportioned system accounted for 69 percent of the cost of the total meal.

Payne, et al (13) showed little difference in food costs existed between school-operated as on-site or central preparation systems for schools located in the same geographic region. Schools in the south had lower food costs than schools located in the north. School foodservice operated by contract management firms had the same

food costs as did school operated facilities. Preplated meals were 62 percent higher because the meal cost contained the cost of the food, preparation, serving container, transportation and profit. The advantage in cost of the preplate systems was the low labor cost, overhead, and facilities requirement.

A statistical review of the overall growth and performance of the network Title III and Title VII Nutrition Program revealed that in fiscal year 1974 food costs were 54 percent of the total meal cost (16). Total food costs for fiscal year 1976 were 52 percent, and 51 percent for fiscal year 1977 (16). The national average for the cost of a Type A lunch in 1970 was 62.2 cents (13). This cost included 35.8 cents for food (13). Cronan (17) suggested a range of 55 to 65 percent of the income dollars be spent for food in school lunch programs.

In a survey conducted by the Senate Select Committee on Nutrition and Human Needs, Title VII Project directors spent about 70 percent of their budget on food, 15 percent on administration and 15 percent for supportive service (18). Spending did not differ markedly between rural and urban projects (18).

Labor Costs

Payne et al (13) conducted a study of alternate food systems in the school lunch program. Results showed that labor costs were the most extreme source of variations in the cost of a school lunch mainly due to regional wage scale and fringe benefits differences. The study concluded that some schools using commercial preplate meals and school operated satellite systems had a dual advantage in that productivity was higher and the workers in these systems fall below minimum hour requirements for high fringe benefits (i.e. less total dollars spent) (13). Payne et al (13) reported more than one receiving satellite school was needed for school operated production kitchen to obtain increased labor productivity advantages. Results showed that a la carte sales (i.e. other than Type A sales) were an important factor in labor costs and productivity and must be considered in overall comparison of systems.

Payne et al (13) found that contract management and commercially supplied preplated systems were competitive alternatives to school managed and operated systems. The inclusion of the profit element did not necessarily result in higher total costs.

Although commercially supplied preplated meals resulted in a higher food cost, the inclusion of built-in labor, supplies and services allow offsetting decreases in school expenses bringing the average meal costs in line

with other systems studied. Equipment investments for this system although not computed were expected to be less since no investment in equipment was required (13). Contract management and commercially supplied preplated systems were favorably comparable in costs to school operated systems. This favorable cost position was the result of labor economies associated with large automated food preparation facilities and tighter managerial control.

Payne et al (13) concluded that labor efficiency was further improved by use of preplated meals satellite system over bulk-delivery system. Kroener and Donaldson (19) observed that labor time per meal decreased as the number of meals prepared increased.

Harper and Jansen (12) found that central preparation leads to reduced time to prepare a meal. These studies did not pinpoint the cause, however reduction in the number of employees and increased supervision were considered to be responsible.

National survey of Title VII programs reported 31 percent of the total meal cost was for labor (18). Rural project staff cost ranged twice as high as those in urban projects (excluding Detroit) (4). Staff costs were divided among: meals, administration, outreach, transportation, research, evaluation, and others. Comparison

of rural and urban site-prepared meals showed urban projects allocated a larger percentage of staff costs to meal preparation. In school based projects, allocation to meal preparation was low but administrative costs were high (4).

Harper and Jansen (12) conducted studies on labor requirements and costs for alternate delivery systems. The supervisory function and cost did not differ significantly between systems on a per meal basis. The total labor requirements showed that on-site preparation and service had higher requirements than frozen preportioned delivery. On-site preparation and service had the highest total labor requirement per meal. This difference can be attributed to the minimal labor required in rethermalizing, serving, and cleaning in frozen preportioned delivery.

Although the foodservice industry employs more people than any other, the industry ranks as one of the lowest in production per man-hour. Kotschevar (22) reported that the food production workers productivity is 45 percent. The remaining 55 percent was wasted or idle (20). Desirable productivity was 80 to 85 percent (22).

Facility and Equipment Costs

Many feeding operations do not consider the cost of facilities. The cost of renovation or additions

can contribute greatly to the cost of the foodservice system. Using average cost of space and equipment figures, Payne et al (13) concluded that the equivalent annual cost per meal for on-site kitchens was \$0.12 cents; for hot bulk delivery - \$0.11 cents; and for preplate systems - \$0.09 cents (13). Harper and Jansen (12) collected data on different preparation and serving sites to better understand how facility requirements varied with the food delivery systems. Results showed the average cost of space for on-site preparation and service, central preparation-hot bulk delivery, and frozen preportioned foodservice system ranged between \$45-50 per square foot (12). Central preparation chilled-preportioned foodservice system's cost were \$32.50 per square foot for central kitchen and \$68.50 per square foot for satellite kitchen (12). The lower cost of the space required for the central kitchen was the result of larger facilities and the use of lower priced space, especially in the storage and receiving areas.

The study by Harper and Jansen (12) also indicated little difference in cost per square foot for the finish food preparation between on-site preparation and service and central preparation-chilled preportioned-hot bulk delivery. The finish cost of space for the central preparation area of chilled preportioned delivery system

was lower due to cost efficiency in larger size equipment and fewer service connections. The central preparation facility in central preparation-chilled preportioned delivery had higher equipment to space costs due to the larger size of these facilities. The low ratio of equipment to space costs for the satellite kitchens in central preparation-chilled preportioned delivery indicated the minimal equipment required to reheat and serve chilled preportioned meals. Similar figures were expected for the frozen preportioned delivery system.

Harper and Jansen (12) showed that the frozen preportioned foodservice system required the least amount of space and cost per meal served. Central preparation-hot bulk delivery required the most. The true annual cost of school facilities and equipment, and the assessing of the true cost of miscellaneous operating expenses were rarely used in calculating the cost of the school lunch program.

Miscellaneous Costs

Another factor which affected meal cost was the type of serving utensils used. The trend toward the use of disposable ware has been increasing each year. Although findings indicated an economic advantage in using permanent ware, colleges, hospitals, restaurants, and schools were

choosing disposables. Some of the reasons included eliminating the supervisory responsibilities in the dish area, reduction in noise, and saving from retirement of ware due to pilferage or accidental loss. Other reasons for selecting disposable ware may be lack of dishwashing facilities or space limitations which dictated that dishwashing not be done on the premise (22).

A study by Laventhol et al (24) showed that use of disposable serving and eating utensils cost \$0.066 cents per meal compared to permanent ware cost of \$0.019 cents per meal. Montag et al (23) found that disposable ware cost \$0.04 cents per student versus \$0.01 cents per student for permanent ware in the schools. The cost of the disposable ware can vary greatly, depending on quality (23).

Many feeding programs failed to include or inaccurately allocated other miscellaneous costs to the meal (12). Miscellaneous costs which were not included consisted of operating expenses, administrative expenses, and non-food inventory. Miscellaneous operating expenses included laundry, trash removal, exterminator, transportation, utilities, and repair and maintenance. Miscellaneous administrative expenses included accounting, computer operations, training, professional-technical service, rentals, printing, miscellaneous purchased service, and insurance.

A study by the Food and Nutrition Service (25) reported that the miscellaneous data varied between \$0.08 cents and \$0.12 cents per meal for on-site preparation and service, when compared to central preparation-hot bulk delivery. Miscellaneous costs in central preparation were low compared to other systems because the cost of disposable serving and eating utensils was not included (25).

Microbiological Study of Systems

Unklesbay et al (26) designed a reference base which delineated food product flow and presented the status of microbial quality and safety of foods served within foodservice systems. The researchers identified nine areas requiring monitoring within foodservice operations (24). The type of foodservice system adopted influenced the number of areas requiring precise monitoring in a particular foodservice operation. Food procurement, storage, packaging, pre-processing, heat processing, storage following heat processing, heat processing of pre-cooked menu items, product distribution, and service of food were described as the areas requiring considerable managerial competency (26). Longrel (27) and Silverman et al (28) have described specific techniques that must be considered in the safety of food items in the different

types of foodservice systems. Toumi et al (29) and Rowley et al (3) have described procedures for safe handling of food items during various stages of the food production operation.

Energy Conservation in Foodservice Systems

Unklesbay and Unklesbay (32) developed an energy accounting system to assess energy requirements for preparing chicken entrees in four types of foodservice systems. They concluded that without extensive data from applications of the computerized energy accounting model, comparisons cannot be made among alternate systems. They reported large variations in British Thermal Unit expended per weight of chicken menu item processed for service. Application of the energy-accounting on a wide scale was recommended so that statistical comparisons can be made among alternate foodservice systems. Other energy related factors to consider when choosing a system were transportation cost of bulk-food items (14) and delivery of purchased food to production area (5).

CHAPTER II - PLAN OF PROCEDURE

The primary purpose of this research was to determine the cost of the four major foodservice systems used in Title VII Nutrition Programs. A two part questionnaire was developed by the investigator (Appendix B). Questions pertaining to funding, number of meals, type of system used, raw food costs, commodity usage, other related cost data, and factors related to foodservice systems selectivity were included in the questionnaire. The other purpose of the study was to design representative models of foodservice for semi-conventional decentralized service (one central kitchen) and for semi-conventional decentralized service (two preparation sites) for a project with 18 centers serving 1200 meals in Tarrant County.

Selection of Subjects

The proposed sample included all nutrition project directors in the state of Texas. The names of nutrition project directors were compiled from the list from the Governor's Committee on Aging as of February, 1978. Questionnaires were mailed to each of sixty-four nutrition projects in the state of Texas. Each project director was in charge of the total foodservice operation

at the nutrition center. Some nutrition projects were assisted in the foodservice operation by a consulting, part-time or full-time dietitian or nutritionist. The nutritionist or dietitian assisted the project director in the foodservice operation when one was on the staff of the nutrition center.

Design of the Questionnaires

The questionnaires consisted of two parts. Part I of the questionnaire consisted of cost data information related to delivery of meals to senior citizen centers. The sections of the questionnaire included funding sources, meal numbers, type of system, cost of raw food and commodities, supplies cost, labor cost, overhead costs, food cost information, use of convenience food data, and catered cost information. Project directors were requested to submit all cost data information for April, May, and June, 1978. Part II of the questionnaire addressed questions to the project directors and/or nutritionist to survey their interest in future system selection. Information about the persons and/or factors that influenced the decision on selection of food system was also included.

The questionnaire was reviewed and evaluated by five project directors before it was submitted to the testing project sites. The questionnaire was revised

according to the recommendations of these project directors.

A letter of introduction and explanation of the purpose of the study accompanied the questionnaire (Appendix A and B). Each participant was assured that the financial information would be held in confidence. The questionnaires were coded and the code number recorded in order to determine if the returns were inclusive of all food delivery systems. The participants were asked to return the questionnaire within three weeks of date of receipt. In an attempt to secure more data, the investigator contacted several project directors at meetings and by telephone.

Statistical Analysis

Data were collected and analyzed using descriptive statistic. Statistical techniques used in this study were based on procedures in Dixon and Massey (35). Eight foodservice systems were outlined in the questionnaires to give the respondents adequate information to determine which type of foodservice systems they were using. The investigator recoded the eight foodservice systems as follows: Conventional centralized service, conventional decentralized service, semi-conventional centralized, and semi-conventional decentralized to conventional; commissary-

central project operated, and commissary central-kitchen-catered to commissary; convenience assembly serve to convenience; food factory to ready. The input format provided for thirty variables.

The investigator evaluated the feasibility and cost of two alternate foodservice systems. The investigator evaluated the kitchen facilities in all of the existing senior centers as well as other potential production sites. Physical facility requirements were determined for the foodservice operation according to planning assumptions outlined in Appendix C, page 10. Budgeting allowances, personnel needs and equipment needs for this foodservice operation were also determined (Appendix C).

CHAPTER III - DISCUSSION OF FINDINGS WITH PRESENTATION OF DATA

The major purpose of this study was to determine the cost of the four major foodservice systems used in Title VII Nutrition Programs. Data was collected and analyzed using descriptive statistic.

Distribution and Rate of Return of Questionnaires

Questionnaires were mailed to each of the sixty-four project directors in Texas. Responses were received from twenty-seven project directors (36 percent of sample). Two questionnaires were not used because the project directors stated the programs were not in full operation. One project director returned the questionnaire unanswered. One questionnaire was discarded because of inadequate information. Data from twenty-three questionnaires were analyzed.

Distribution of Funding Sources

Funding sources and daily participation (meal numbers) for each of the twenty-three nutrition programs were determined (Table 1). Data on nutrition programs with a large daily participation were not available.

TABLE 1

SUMMARY OF FUNDING SOURCES AND PARTICIPATION OF
NUTRITION PROGRAMS USED IN SURVEY
APRIL, MAY, JUNE, 1978

Program	Funding Sources		Average Daily Meal Participation	
	Title VII	Others	Congregate	Home Delivered
A	\$37864.	\$ 3815.	375	36
B	56536.	14434.	479	46
C	14460.	3595.	1001	200
D	13036.	1774.	95	10
E	8002.	4070.	70	7
F	54626.	44464.	134	5
G	113225.	15646.	809	80
H	15174.	6892.	111	5
I	16184.	6903.	109	7
J	161395.	12960.	324	13
K	7757.	1467.	102	11
L	25000.	4000.	153	10
M	64877.	5054.	519	0
N	98262.	12400.	708	55
O	144600.	15923.	808	80
P	181000.	8000.	1100	110
Q	98262.	2213.	533	62
R	37617.	11580.	293	10
S	21610.	7842.	147	20
T	119184.	111416.	70	5
U	-	-	85	8
V	16347.	3553.	72	7
Total	1,288,671. (1583119)	294,448		
	81%	19%		

Federal funding for the average program cost per meal was 80 percent (2). The additional 20 percent was funded by local sources (2). The number of meals funded for each nutrition program was based on the percentage of the number of older people in the county (36). Data on respondent's funding sources compared with the 80-20 ratio funding as established by the federal government (Table 1).

Distribution of Foodservice Systems in Survey Area

The majority of the projects in the survey area used the conventional system or a variation of the conventional system. Of the total number of nutrition programs included in the survey, 60.9 percent used the conventional system or some variation thereof (Table 2). The commissary foodservice system or variations of this system was reported by 39.1 percent of the respondents (Table 2).

Meal Costs

The average meal cost for the responding nutrition programs was investigated in the present study. The number of responses to this question was twenty-three. Meal costs ranged from \$0.50 to \$1.71 with a mean meal cost of \$1.08. Meal cost included the cost of raw food

TABLE 2

FOODSERVICE SYSTEMS USED IN ELDERLY
NUTRITION PROGRAMS IN TEXAS

Type of System	Number Respondents	Percentage
Conventional	14	60.9
Convenience	0	0.0
Ready Food	0	0.0
Commissary	9	39.1
Total	23	100.0

purchased per meal and the cost of commodities furnished by the United States Department of Agriculture (USDA), labor and other related costs. In another survey (18) meal cost for the state of Texas was reported as \$1.29.

The respondents were asked to report actual food costs. Data on food costs from respondents were not adequate to determine raw food costs.

The mean for the meal cost for the fourteen nutrition programs using the conventional systems and/or variation of this system was 0.93 with a standard deviation of 0.2. The mean for the eight nutrition programs using commissary and/or variation of this system was 1.34 with a standard deviation of 0.34 (Table 3). Meal cost does vary among foodservice systems in Title VII Nutrition programs. Project directors reported lower meal costs in the conventional system or variation of this system. Meal cost for four nutrition programs included the cost of preparation, disposable ware, storage, transportation, and profit. Lough et al (58) reported no significant differences in total meal cost among on-site preparation and service (conventional), central preparation-hot bulk delivery (conventional), central preparation-chilled preportioned delivery (conventional), and frozen preportioned delivery (convenience).

TABLE 3

MEAN AND STANDARD DEVIATION OF MEAL COST
BY TYPE OF FOODSERVICE SYSTEM

Type	Mean	Standard Deviation
Conventional (14)	.93	.27
Commissary (8)	1.34	.34

Sources of Labor

The percentage of labor cost for the nutrition program was lower because other sources of labor were used in Title VII programs. Volunteer staff were a large source of labor for the nutrition programs (Table 4). Comprehensive Employment Training Program (CETA-Paid) employees were another source of labor used in the Title VII programs. In many nutrition programs, volunteers and CETA-paid employees were used to perform high labor costs duties such as distributing food ingredients and prepared foods, and the serving of the meal (36). Some nutrition programs in this survey also reported that food production was performed by an all volunteer staff except foodservice managers. The cost of labor was a major consideration in foodservice operations (38). The cost of labor in relation to other costs in foodservice operations has increased in recent years, demonstrating the need to choose a food system that maximizes efficiency in the utilization of all personnel (40). West et al (5) reported labor costs for a commercial operations as 40 to 50 percent. A national survey in 1977 showed labor cost for the Nutrition Program for elderly was 33 percent (16).

TABLE 4

SOURCES OF LABOR COSTS - TITLE VII NUTRITION
PROGRAMS IN SURVEY AREA

Type of Systems	Respondents							
	Volunteer		CETA Paid		Title VII		Other	
	Respondents		Respondents		Respondents		Respondents	
	No.	Percent	No.	Percent	No.	Percent	No.	Percent
Conventional	3	75.0	8	66.7	14	66.7	1	33.3
Commissary	1	25.0	4	33.3	7	33.3	2	66.7
	4	100.0	12	100.0	21	100.0	3	100.0

Responses to Food Cost Information

The survey revealed that 100 percent of the nutrition programs used standardized recipes. Precosting of standardized recipes disclosed whether a given menu item was within the desired budget (22). It was reported that 75 percent of the respondents did calculate the cost of their recipes and 25 percent did not compute this cost.

In response to the question which method of obtaining food cost do you use, 30.0 percent of the project directors used the recipe method; 5.0 percent used the requisition method; 30.0 employed the inventory method; and 35.0 employed the record of purchases method. Montag (6) reported that the record of purchase method was the least effective method of obtaining food costs.

Use of Convenience Food

Many foodservice operations have found that the use of convenience foods have lowered the cost of labor (12,34). Table 5 illustrated the use of convenience food by respondents in the present survey. Rainsford (34) reported that the use of precooked frozen entrees have increased rapidly during the past several years. Kahle (6) indicated that schools used 6.8 percent.

TABLE 5

USE OF CONVENIENCE FOOD ITEMS BY
PARTICIPATING NUTRITION PROGRAMS

Items	Frequencies of Use							
	100 Percent		Appro. 75%		Appro. 50%		Appro. 25%	
	No.	Percentage	No.	Percentage	No.	Percentage	No.	Percentage
Extended Meats	1	4.3	2	8.7	4	17.4	7	30.4
Whole Meats	1	4.3	2	8.7	5	21.7	7	30.4
Salads	1	4.3	1	4.3	1	4.3	12	52.2
Desserts	1	4.3	2	8.7	2	8.7	11	47.8

Food Preparation Selectivity Factors

Seven respondents (30.4 percent) indicated that the foodservice system was built into the operation when they assumed the position as project director. Six project directors (26.1 percent) reported that the foodservice system was recommended by the Governor's Committee on Aging. Three respondents reported that the foodservice system was recommended by the project director. Three project directors reported that the system used was based on previous experience with system. Only one respondent indicated that the system was chosen based on merits of the system by another person. Three project directors did not respond to the question.

Ten respondents (43.5 percent) were totally satisfied with their present system. Eight project directors (34.5 percent) were partially satisfied. Three respondents (13.0 percent) were somewhat dissatisfied with the present system.

In response to the question, "Are you in the process of analysis for possible or probable change", ten project directors (43.5 percent) indicated "yes" and ten respondents indicated "no". Three project directors did not respond.

Koogler and Nicholanco (39) outlined a framework for evaluating and making decisions concerning a foodservice system. Six respondents (26.1 percent) indicated that they had adequate information to make a satisfactory selection. Six project directors reported that they felt inadequate information was available to make a satisfactory selection. Eleven did not respond to question.

Fifteen respondents (65.2) were interested in a comparative study of food systems. Only two respondents indicated a comparative study would not be useful in decision making.

Twenty-two respondents (95.0 percent) indicated they would prefer the conventional system or variations of this system. Only one respondent indicated that the commissary-catered foodservice system was preferred over the present system.

Cost Data-Foodservice Operation of Senior Citizens Centers, Inc.

The present foodservice operation consisted of a contract with ARA for food production and food delivery. Food was prepared at Texas Christian University and Tarrant County Junior College central kitchen facilities. There were eighteen centers currently serving the senior citi-

zens of Tarrant County (Appendix C, page 13). The investigator visited each site to evaluate the kitchen facilities and to determine the potential of each center to produce meals for eight other centers.

The investigator concluded that it was not feasible to establish a food production operation in any of the centers. Ownership of the centers by other agencies, location of the sites, and lack of available kitchen space were the factors contributing to rejection of any one of the eighteen centers as future food production operations.

The investigator selected the semi-conventional decentralized foodservice system as the most efficient and economical system for the nutrition program in Tarrant County. This decision was based on the findings of this study that meal costs were lower and a high degree of system satisfaction was indicated by the project directors using the conventional system and variations of the system.

The advantages and disadvantages of our existing foodservice operation and the future operation were outlined in Appendix C p. 39 . The preliminary cost estimates of \$12,025.00 included renovation of the existing facility, architectural and engineering fees, bonds, legal fees,

taxes and insurance, and transfer of commodity food items (Appendix C, p. 37). Based on projection for the next twelve months, the investigator concluded that the proposed foodservice operation would cost \$703.00 more than the current operations at Texas Christian University and Tarrant County Junior College (Appendix C, p. 40).

Supply Costs, Labor Costs and Overhead Costs

A representative sample of the four systems was not available to determine differences in supply costs, labor costs, and overhead cost. Respondents indicated numerous variations in the sources of funding for these costs. There was no significant difference in labor costs, supply costs and overhead costs between the nutrition projects using the conventional system and variations thereof and the commissary system and variations thereof.

CHAPTER IV - SUMMARY AND CONCLUSIONS

The overall purpose of the present study was to determine the cost of the four major foodservice systems used in Title VII Nutrition Programs, both rural and urban in the state of Texas.

A questionnaire designed for the study was sent to each of the sixty-four project directors in Texas. The forms were returned by twenty-seven project directors. Twenty-three questionnaires contained adequate information for use in the study.

Descriptive statistics were applied in the statistical analysis. Cost data information reported included funding sources, meal numbers, labor costs, cost of raw food and commodities, supply costs, overhead costs. Project directors completed cost data information for April, May, June, 1978. Data was analyzed to determine types of system used, satisfaction with present systems, and persons or factors that influenced the selection of a foodservice system. The majority of the project directors reported the use of the conventional system and/or variation of this system.

Meal cost ranged from \$0.50 to \$1.71 with mean

meal cost of \$1.08. There was a significant difference between meal cost for the conventional system versus the commissary system.

Among the systems, there was no significant difference in labor costs, supply costs, and overhead costs. Due to lack of uniformity in the sources of funding for some cost factors, considerable variations in these costs were obtained.

Three-fourths of the project directors indicated that community support was available to offset certain cost factors. Supply costs and overhead costs were paid for by the community in a majority of the nutrition programs.

The survey revealed that the respondents did calculate the cost of standardized recipes. There was a trend in increased use of certain convenience food items.

Foodservice system selection was influenced by outside factors or persons. Many project directors indicated the system was already built into the operation. Respondents indicated they were generally satisfied with the present system but would be interested in additional information to aid in evaluating foodservice systems for future change.

From this research, the investigator outlined

the following conclusions and recommendations.

1. Although the questionnaire was evaluated by five project directors, the reliability of the questionnaire could have been enhanced by administering the instrument to a larger or more representative sample.
2. Variables in future studies should be reduced.
3. Foodservice systems selections should be emphasized to those individuals involved to identify problem areas.
4. Variations in funding sources and degree of local support inhibit accurate determination of labor cost, supply cost and overhead cost.
5. Additional studies should be conducted in the Title VII program to determine food acceptability and more accurate cost data.
6. The results of this study should be made available to decision makers involved in all levels of the nutrition programs who are interested in expanding or modernizing their programs.

APPENDICES

TEXAS WOMAN'S UNIVERSITY

DENTON, TEXAS 76204

COLLEGE OF NUTRITION, TEXTILES,
AND HUMAN DEVELOPMENTBox 23975, TWU STATION
PHONE (817) 382-8821

July 24, 1978

Dear Project Director:

The common goal in feeding participants in Title VII programs is to provide quality food that meets nutritional standards at the lowest possible cost. Every mass feeding operation is experiencing the effects of spiraling labor and food cost, as well as a growing shortage of both skilled and unskilled labor.

There is a need to determine some general food cost information in the Title VII programs as they are related to the type of food service use. Conventional-centralized service, conventional-decentralized, semi-conventional centralized, semi-conventional decentralized, commissary-central kitchen - project operated, commissary-central kitchen catered, convenience-assembly serve, and the food factory are available for delivery and service of food.

The purpose of the enclosed study is to determine and compare costs as they relate to these systems. A second purpose is to develop a handbook for use for projects to assist in deciding on a cost efficient system.

As a graduate student in Nutrition and Food Sciences at The Texas Woman's University, I am developing some statistical data related to cost information and management decision making in food systems selection for Title VII programs.

The attached questionnaire is being mailed to all projects in Texas. Your assistance in compiling this information would be greatly appreciated. The questionnaire is quite detailed due to the many variables in determining meal cost. However, the information should be most useful to existing projects and new projects in Texas and throughout the nation. The information will be strictly confidential.

Please complete and return as soon as possible, and please be sure that every question has been answered. Return may be made by simply folding the page so that the addressee's name appears on the outside, and then either stapling or taping together.

Most sincerely,


Joice R. Carter, R. D.

JRC:jg

If you would like a copy of the completed data, please sign below and return to me.

QUESTIONNAIRE

Please complete for *April, May, and June 1978*

A. Resources

Title VII Funds \$ _____

Other \$ _____

B. Congregate Meals Number _____

Home Delivered Meals Number _____

Total Meals Served _____

Total Meals Delivered _____

No. of Serving Days _____

No. of Serving Sites _____

C. Conventional centralized service _____

Conventional decentralized service _____

Semi-conventional centralized service _____

Semi-conventional decentralized service _____

Commissary - central kitchen project operated _____

Commissary - central kitchen - catered _____

Convenience (assembly serve) _____

Food factory _____

D. Cost of Raw Food _____ Per Meal

Cost of USDA Commodities _____ Per Meal

E. Supplies: Cost

Consumables - Center _____

Consumables - Kitchen _____

Maintenance & Repair _____

F. Labor Cost:

	<u>Staff No.</u>	<u>Salary/Hr.</u>	<u>No. Hrs.</u>	<u>Volunteer</u>	<u>CETA</u>	<u>Title VII Paid</u>	<u>Other</u>
Administration	_____	_____	_____	_____	_____	_____	_____
Accounting	_____	_____	_____	_____	_____	_____	_____
Director Food Serv.	_____	_____	_____	_____	_____	_____	_____
Chef	_____	_____	_____	_____	_____	_____	_____
Head Cook	_____	_____	_____	_____	_____	_____	_____
Other Cooks	_____	_____	_____	_____	_____	_____	_____
Other (baker, butcher, etc.)	_____	_____	_____	_____	_____	_____	_____
Dishwasher	_____	_____	_____	_____	_____	_____	_____
Truck Drivers	_____	_____	_____	_____	_____	_____	_____
Secretary	_____	_____	_____	_____	_____	_____	_____
Fringe (percentage)	_____	_____	_____	_____	_____	_____	_____

G. Assigned Overhead

Electrical	\$ _____
Water, Sewage, Garbage	\$ _____
Telephone	\$ _____
Kitchen Maint.	\$ _____
Truck Operations	\$ _____
Fuel	\$ _____
Oil	\$ _____
Maintenance	\$ _____
Insurance	\$ _____
Kitchen rental (if any)	\$ _____
USDA Transportation, storage, handling	\$ _____
Loss Facts	\$ _____
Depreciation - Equip.	\$ _____
Depreciation - Truck	\$ _____

H. Food Cost Information

Do you use standardized recipes? Yes _____ No _____

Do you cost your recipes? Yes _____ No _____

Is purchasing centrally controlled? Yes _____ No _____

Which method of obtaining food
cost do you use?

Recipe method _____

Requisition method _____

Inventory method _____

Record of purchases method _____

Use of convenience food 100%	<u>All</u>	<u>Approx. 75%</u>	<u>Approx. 50%</u>	<u>Approx. 25%</u>
------------------------------	------------	--------------------	--------------------	--------------------

Entrees

Extended Meat	_____	_____	_____	_____
Whole Meat	_____	_____	_____	_____

Salads

Desserts

If meals are catered, complete the following:

- A. Cost of meal from caterer \$ _____ per meal. Is this cost dependent on a certain number of total meals served? _____
If so, please supply breakdown.

- B. Cost of Home-delivered meal \$ _____

Please indicate the cost of these items if not included in above:

1. Raw food \$ _____
2. Labor \$ _____
3. Transportation \$ _____
4. Dietitian's service \$ _____
(Menu planning & analysis;
Consumer education)
5. Consumables \$ _____
6. Handling & Transportation
of commodities \$ _____
7. Accounting related
to USDA commodities \$ _____
8. Bulk food containers \$ _____
9. Insurance \$ _____
10. Condiments (salt,
pepper, catsup) \$ _____

Food Preparation Selectivity - How was system decision reached?

- _____ Already built in
- _____ Recommended by Project Director
- _____ Recommended by Governor's Committee on Aging
- _____ Selection based on previous experience with system
- _____ Convinced of merits of system by another
- _____ Other - Please Specify _____

System satisfaction

- _____ Totally satisfied _____ Somewhat dissatisfied
- _____ Partially satisfied _____ Totally dissatisfied

Are you in the process of food system analysis for possible or probable change? _____ Yes _____ No

If yes, do you feel you have adequate information available from which to make a satisfactory selection? _____ Yes _____ No

Would you consider a comparative study of food systems an aid in decision making? _____ Yes _____ No

If you were choosing a system now, what food system would you choose?

Who and/or what would influence you most in your decision?

Please indicate your experience level.

Years of dietetic experience _____ specify no.

Years of food service management _____ specify no.

DEFINITION OF TERMS

C.

Conventional Decentralized Service

This system includes a butcher shop, bake shop, vegetable preparation area, kitchen with direct production people, and service and clean-up personnel. Food of all type is purchased raw and processed on the premises shortly before serving. Decentralized service means the distribution of bulk quantities of food in sufficient amount to serve a given number of clients in one center. Food is transported in heated or refrigerated containers and trucks. Food is served to the client at each center from the bulk containers (1).

Conventional Centralized Service

This system includes a butcher shop, bake shop, vegetable preparation area, kitchen with direct production people, and service and clean-up personnel. Food of all type is purchased raw and processed on the premises shortly before serving. Centralized service means serving the individual portions of food onto the trays that have been assembled and set up at some central point in or close to the kitchen. The completed trays are then distributed to the individual centers (1).

Semi-Conventional Central Service

This system is one in which the butcher and bake shop are eliminated and the system minimizes food preparation through purchasing pre-portioned meat cuts, frozen vegetables, and desserts, and some prepared salads. Thus, only direct production, service, and clean-up personnel are required. Centralized service means serving the individual portions of food onto the trays that have been assembled and set up at some central point in or close to the kitchen. The completed trays are then distributed to the individual centers (1).

Semi-Conventional Decentralized Service

This system is one in which the butcher and bake shop are eliminated and the system minimizes food preparation through purchasing pre-portioned meat cuts, frozen vegetables, and desserts, and some prepared salads. Thus, only direct production, service, and clean-up personnel are required. Decentralized service means the distribution of bulk quantities of food in sufficient amount to serve a given number of clients in one center. Food is transported in heated or refrigerated containers and trucks. Food is served to the client at each center from the bulk container (1).

Commissary - Central Kitchen Project Operated

This system has centralized food procurement and production functions with distribution of prepared menu items to several remote areas for final preparation and service. The food production center and service areas are located in separate facilities (1).

Commissary - Central Kitchen - Catered

This system has a large production kitchen, usually equipped with sophisticated, automatic equipment. Food preparation and delivery are contracted by the nutrition site with a professional food management company (1).

Convenience (Assembly Serve)

This system is the one in which completely prepared foods are purchased from the food processing industry (purveyor prepared foods). Only the "finishing" processes as tempering (thawing) or rethermalizing, portioning and merchandising the food for service, are required on premises. This concept of foodservice is also known as "total convenience" and "minimal cooking" (1).

Food Factory

This foodservice system is one in which foods are prepared on the premises, then frozen immediately and held for use at some later time. Food is massed produced for chilling or freezing. The plated meals are delivered to individual centers and rethermalized (1).

Recipe Method

The Recipe Method is based on determining the total cost of food in terms of indirect and direct issues to serving areas. Indirect issues are defined as menu items produced in the main kitchen and sent to the various units for consumption, e.g., beef stew, gelatin salads, and cooked cereal. The standardized recipe is the key to this method, since it is the recipe that sets the cost of the food produced. Direct issues are food items, e.g., tea, catsup, salt, and sugar, which are sent directly from the storeroom to the various serving areas, such as patient floors and cafeteria serving areas. The cost of food items issued from the storeroom directly to the serving areas plus the food cost of menu items produced in the main kitchen for each serving area results in the total cost of food (2).

Requisition Method

The Requisition Method essentially involves the pricing of daily requisitions of items used. By adding total direct purchases (a supply of food is sent from the receiving area directly to the preparation units without going through the process of being received and issued from a storeroom)

to the total value of the storeroom requisitions, the food cost for each day can be determined. The resulting formula is:

$$\begin{aligned} & \text{storeroom issues for the day} \\ & + \text{direct purchases for the day} \\ & = \text{gross cost of food for the day (2).} \end{aligned}$$

Inventory Method

The formula for the Inventory Method of determining food costs is:

$$\begin{aligned} & \text{beginning inventory} \\ & + \text{food purchases} \\ & = \text{total available} \\ & - \text{closing inventory} \\ & = \text{gross cost of food consumed during period.} \end{aligned}$$

The cost of food purchases during the month is added to the total value of inventory at the beginning of the month; from this total, the value of inventory at the end of the month is deducted to give the gross cost of food used. This cost, divided by total meals, gives the raw food cost per meal served each month. This method is particularly effective if a perpetual inventory is kept of purchases classified by commodity groups (2).

Record of Purchases Method

The Record of Purchases Method is one phase of the Inventory Method. The most important documents for calculation of food costs are the invoices for delivered food items. A simple tabulation of the invoices gives the cost of purchases for the specified time period. Under this method, it is possible to obtain the total cost of food used according to a pre-determined classification. A columnar sheet is usually used on which the costs of food items delivered daily are broken down according to various commodity group headings. This record is simple to maintain, but is, of course, an approximation of the cost of food used in any given period, as the total reflects only the cost of food received (2).

REFERENCES CITED

1. West, B.B., Woods, L., Harper, V., Shugart, G., Food Service in Institutions, 5th Edition. New York: John Wiley & Sons, Inc., 1977.
2. Montag, Geraldine, "Obtaining Meaningful Cost Information in Dietary Department." Journal American Dietetic Association, 67:50, July 1975.

APPENDIX C

SECTION II

TITLE VII DIETARY SERVICE
PLANNING GUIDE - TARRANT COUNTY
SENIOR CITIZENS PROGRAM

THE WRITTEN PROGRAM COST DATA FOR
CONSTRUCTION OF CENTRAL KITCHEN

Planning Assumptions

- A. Overall goal of the nutrition program for the elderly is to provide nourishing and appetizing meals that meet 1/3 RDA for persons 60 years and older as efficiently and economically as possible.
- B. The number of meals is based on average of 1165 meals per day. This number is based on the number of meals per day allocated by the Title VII Grant from the Governor's Committee on Aging. Food for 925 meals is delivered to the centers in bulk-containers. Food for 250 home-bound elderly is packed in three compartment aluminum containers and delivered to homes.
- C. A non-selective 6-week cycle menu is used for all clients. Menus are analyzed by the investigator and approved by Governor's Committee on Aging. The menu pattern consists of 3 oz. meat or meat substitute, $2\frac{1}{2}$ c. vegetables, 1 slice bread, 1 teaspoon butter, $\frac{1}{2}$ c. dessert and $\frac{1}{2}$ pint of milk.
- D. Food will be packed in stainless steel pan and placed

in insulated containers. Home delivered meals will be packed in 3-compartment aluminum containers and packed in specially insulated containers.

E. An assembly line system will be used to set up meals for home delivery.

F. A centralized dishwashing system will be used.

G. Term storage for refrigerator food will be based on 5-day requirement and dry storage will cover a 30-day period. Storage cost will be compared on the commodity items; cost of construction of adequate storage to handle commodities versus cost of contract storage of these items.

H. The number of dietary personnel required will be based on the type of service and the total number of meals to be served daily. Layout and equipment will be considered in providing space for work areas, offices, toilets, and lavatory facilities.

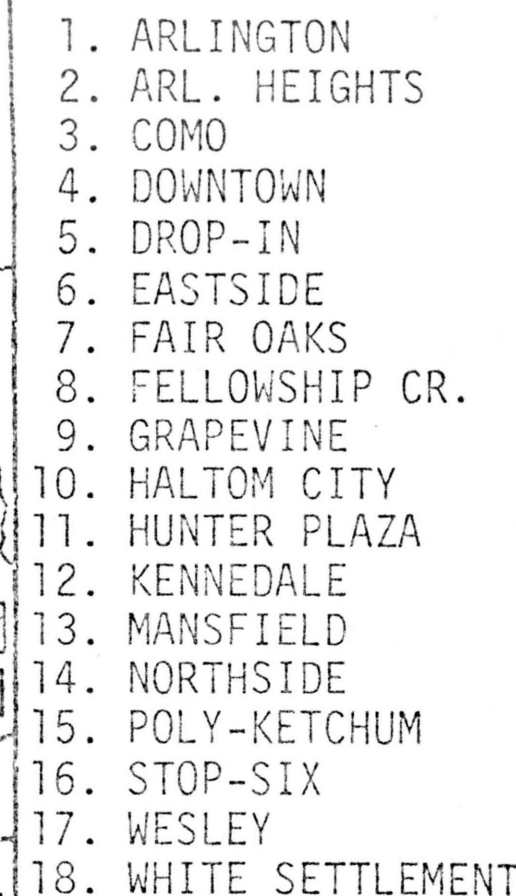
Many foodservice directors believe that modern foodservice systems are the most promising means of combating the many problems they face - low productivity, increasing labor cost, shortage of labor, and poor food quality (5). This section will evaluate in terms of feasibility and cost two alternate foodservice systems

for Tarrant County Senior Citizens Program.

Review and Evaluations - Remodeling and Equipping Two
Representative Semi-Conventional Decentralized Systems

There are eighteen centers currently serving the senior citizens of Tarrant County (Appendix C, p. 13). The investigator visited each site to evaluate the kitchen facilities available and determine the potential of each of the centers to serve eight other centers.

Based on observation, the investigator concluded that it was not possible to establish a food production operation in any of the centers. Ownership of the centers, location, and available kitchen space were some of the factors contributing to rejection of the various centers as future food production sites.



19. TRI-ETHNIC
20. WOTH HEIGHTS

REPRESENTATIVE MODEL -
SEMI CONVENTIONAL DECENTRALIZED
FOODSERVICE SYSTEM - NUTRITION PROGRAM
TARRANT COUNTY
FEBRUARY 1979

The space allocation for the facility was determined (Appendix C, p. 15). The cost of constructing a new facility was \$55.00 a square foot (Appendix C, p. 16). The nutrition program was not financially able to build a new structure.

The best alternative was to renovate an existing facility for food production. The investigator evaluated two locations in a centrally located part of Tarrant County.

SPACE ALLOCATION - REQUIREMENT* - SQUARE FEET

Receiving Area	200
Dry Storage	1300
Paper Storage	500
Linen Storage	100
Refrigerator Storage	350
Freezer Storage	1000
Salad and Dessert Area	300
Main Cooking Area	1250
Pot Washing	300
Office	400
Men's Washroom	200
Ladies' Washroom	200
Total	6100 Square Feet

*(References 42,47,53)

PRELIMINARY COST ESTIMATE - NEW CONSTRUCTION*

Construction - 6100 Square Feet

Production Kitchen

6100 Square Feet
55.00

\$335,000

*(References - 59)

Representative Model - Semi-Conventional Decentralized Foodservice

The investigator selected the semi-conventional decentralized foodservice system as the most efficient and economical system for the nutrition program in Tarrant County. This decision was based on the findings of this study that meal costs were lower and a high degree of system satisfaction was indicated by the project directors using the conventional system and variations of this system.

Site Analysis

The subject site is located at the northeast corner of May and Devitt Street. The site measures 8200 square feet. The site slopes to the north slightly allowing for adequate drainage. May and Devitt are asphalt covered streets with concrete curb and gutters.

Electricity, gas, water, sanitary sewer, and telephone service are available and in service at the site. Fire and police protection are provided by the city of Fort Worth and are considered to be adequate.

The subject site fronts on May Street with concrete curb cut for ingress and egress to the site. May Street is a relatively short street which comes to a

dead end at Berry Street on the north. Berry Street intersects all of the major North-South thoroughfares in the southern portion of the city making access to other areas of the city convenient. Overall visibility, accessibility, parking, and locational attributes of the site are considered good.

The exterior dimensions of the building are 100 feet x 80 feet. The building was built in 1970. The building is centrally air-conditioned and heated. The building has four pedestrian entrances and two truck doors. One of these doors is located at recessed truck well and the other door is located at ground level. A general description of the construction is as follows:

Foundation

Reinforced 4" concrete slab foundation over a sand fill, and a 6 Mill Polyethylene film over 6 inches of gravel. Perimeter beams are one foot wide.

Exterior Walls

Double brick walls with a 6" cavity between. Portions of the exterior are glazed brick for decorative purposes. Over the pedestrian entrances are brick and plaster canopies supported by brick columns. Galvanized rain gutters are located at the roof line and are coupled to downspouts for water run off.

Roof	Built up roof. 2½" gypsum deck on ½" gypsum board. The roof is supported by steel I beams and webb boists on 6" columns located 25' o.c.
Interior Walls and Finish	Painted plywood on 2" x 4" wooden studs 24" o.c. in warehouse areas. Office areas have paneled wainscot and wallpaper. Bathrooms in the warehouse areas have ceramic tile wainscoting. The kitchen area also has ceramic wainscot.
Flooring	The floor of the south 4000 square foot area is exposed concrete. The remaining warehouse area has a vinyl tile floor over concrete slab. The office area in the center lease space has carpeting and terrazo floor covering in the office area.
Ceiling	The ceiling of the south 4000 square foot area is exposed webb joist. The remaining 20,000 square feet of building has suspended acoustical tile with 3" batt insulation.
Doors	There are seven overhead doors on the west wall of the building, which are 8' x 7'. There are seven, glass in aluminum framed, doors on the west wall of the building. The pedestrian doors at the rear or east wall are 1 hour metal fire doors in metal thresholds. Interior doors are hollow core wooden doors.
Plumbing and Electricity	All plumbing and electrical is assumed to be installed in accordance with both national and city codes. All of the building with the exception of

Plumbing and
Electricity, cont.

the south 4000 square feet is centrally air-conditioned and heated. Plumbing consists of 9 toilets, 10 lavatories, 3 hot water heaters and 1 bath tub. There are overhead steam lines and water lines.

Other Features

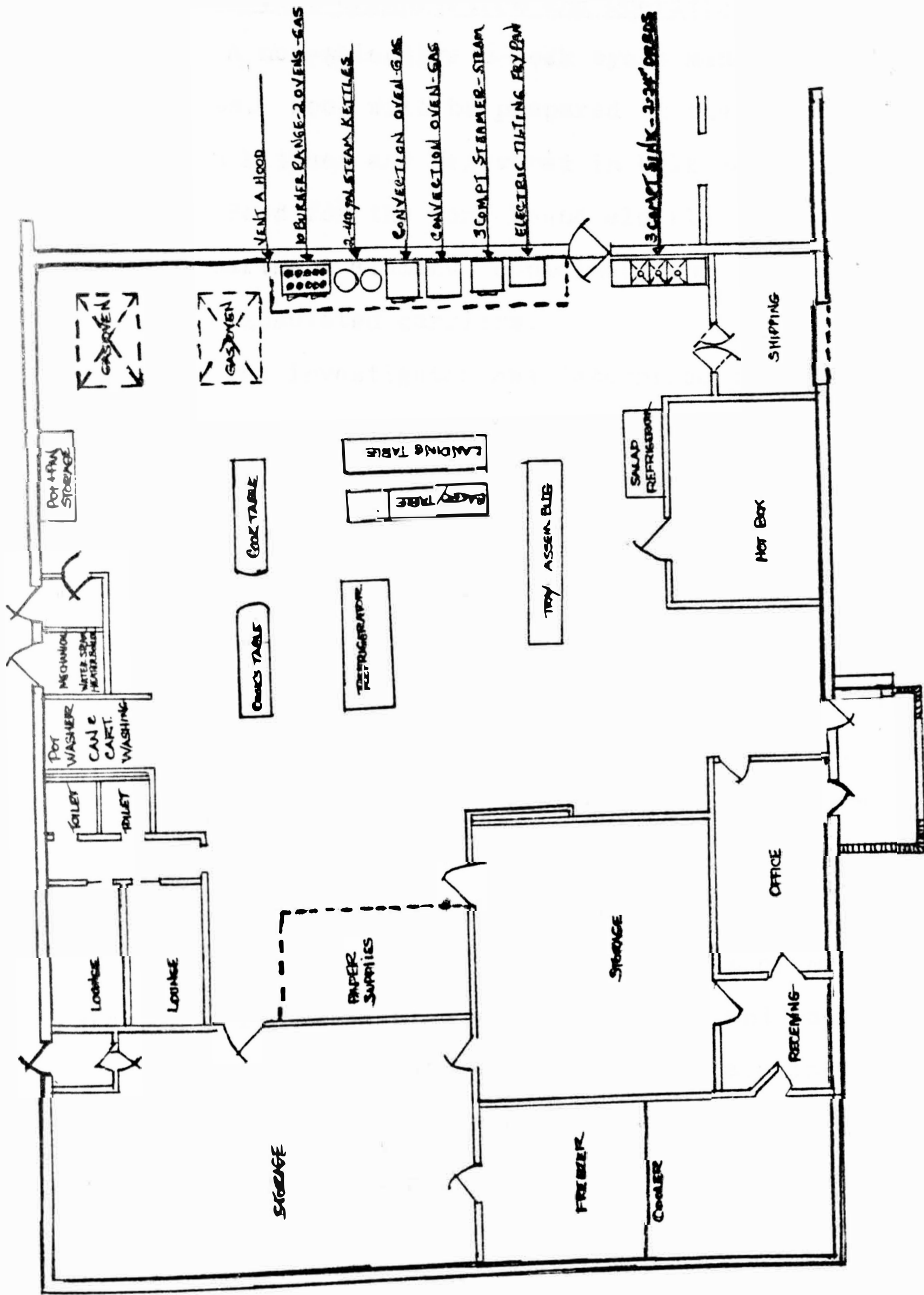
ADT automatic fire and burglar alarm system throughout the building, an automatic water system for landscaped areas, and concrete parking area. There are three refrigerated, walk in cooler rooms. Two are 16' x 36' and the third is 16' x 48'. The largest cooler room has an area 16' x 14' which is a freezer vault.

SPACE ALLOCATION FACILITY

3201 MAY STREET - FORT WORTH*

Receiving Area	250
Dry Storage	3000 *
Paper Storage	300
Linen Storage	100
Cooler Storage	500
Refrigerator Storage	450
Freezer Storage	1000 *
Salad and Dessert Area	300
Main Cooking Area	1200
Pot Washing	300
Office	400
Men's Washroom	200
Ladies Washroom	200
	8200 Square Feet

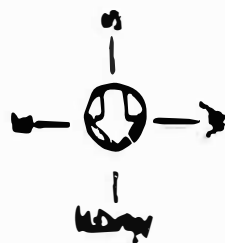
* All commodities (dry and frozen storage) items will be stored at subject site. (References 42,47,53)



99'-11"

LAYOUT OF CENTRAL KITCHEN

FLOOR PLAN
SCALE 1/8" = 1' - 0"



Dietetic Service Organization and Operation

A non-selective 6-week cycle menu is used for all clients. Food will be prepared in the central production kitchen and delivered in bulk containers to centers. Food for the home bound elderly is packed in three compartment aluminum containers and delivered to centers in insulated carriers.

The investigator has determined that convenience foods were used approximately 75 percent of the time in 1978. Based on previous use, dry and frozen storage will be planned for this percentage of convenience use. USDA commodities will be stored in the facility and will be planned in menus as often as possible.

The foodservice manager will be responsible for purchasing food. Canned food items will be purchased and delivered once a month. Frozen and fresh food items will be purchased and delivered weekly. Bread and milk will be purchased and delivered twice a week.

The food preparation will consist of meat preparation unit, vegetables and salad unit, and cooking-baking unit. A small dining area will be available for personnel. Assembly line for home-delivered meals will be available. The pot washing will be located convenient

to preparation and baking units. Traffic patterns will be minimum in the area. Mobile carts will be used to transport clean and dirty utensils to pot washing.

All disposable serving equipment will be provided to centers on as needed basis. All bulk containers will be returned to central kitchen for sanitizing.

Organization of Foodservice

The management of the foodservice for Senior Citizens Centers, Inc. (SCCI) is contracted from ARA on a cost plus fee type of contract. Senior Citizens Centers, Inc. is responsible for lease agreement, building and equipment maintenance. ARA Foodservice is responsible for the overall operation of the foodservice. The Senior Citizens Center, Inc.'s nutritionist is responsible for close surveillance of the food production operation and develops all plans pertaining to the foodservice. The nutritionist works cooperatively with the ARA manager at the production site as well as the District Manager.

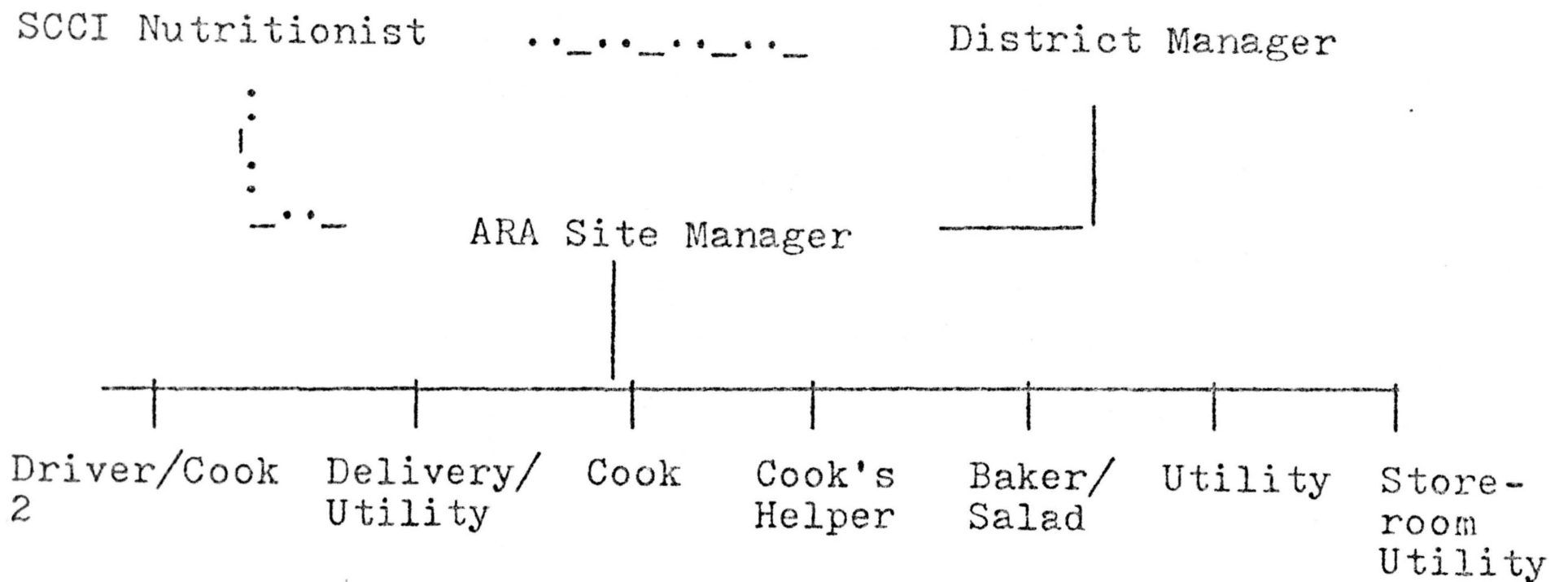
Purchasing of food and supplies are the responsibility of ARA foodservice. ARA foodservice will recruit, train and supervise all personnel. Record-keeping will be coordinated between the ARA manager and the dietitian.

A policy and procedure manual will be available to define the standard for a smooth working relationship between ARA and Senior Citizens Centers, Inc.

The organization chart usually is constructed on the basis of the line of authority. Solid lines connecting the various positions denotes direct supervision.

FIGURE 1

ORGANIZATION CHART FOR SENIOR CITIZENS
CENTERS, INC. FOODSERVICE



Denotes:

_____ Direct responsibility

..... Denotes authority to ensure performance in accordance with cost plus fee management contract.

JOB DESCRIPTION

SCCI March 1976

JOB TITLE: Dietitian/Nutritional Services Coordinator

JOB SUMMARY: Plans and supervises the nutritional activities of the agency with emphasis on the nutritional aspects of client care.

DUTIES: Prepares menus and does nutritional analysis of menus for use in senior citizens centers. Checks and evaluates food as prepared and served with attention to such items as modified diet preparation, service techniques, and sanitation.

Writes and develops project plans for food-service delivery, central kitchen, and all other plans associated with the central kitchen. Provides surveillance of foodservice production and delivery system for quality, sanitation, and acceptability.

Participates in developing monitoring and evaluation systems for the project.

Monitors and coordinates shopping assistance and nutritional education programs conducted by centers.

Advises and participates in the formulation of Agency policies and standards relating to nutrition education and shopping assistance and food preparation. Evaluates the dietary service for compliance with certification and licensing standards.

Monitors and coordinates meals-on-wheels. Maintains all files on MOW clients.

Provides technical information on a regular basis to Agency's center staff on nutrition and consumer education for program planning purposes.

Establishes frequent non-Agency relations with personnel in nutritional service organizations

for the purpose of obtaining resource information.

Maintains close working relations with ARA nutritionist and nutritionist on The Governor's Committee on Aging in the provision of these services.

Keeps necessary monthly records and makes written reports as required.

Communicates with medical and other para-professionals in the community.

Supervises food storage and lunchroom facilities within Agency.

Makes routine operational decisions regarding food purchasing and service.

Outlines and participates in in-service educational programs of the Agency.

Prepares food order and arranges delivery to centers with on-site preparation.

JOB REQUIREMENTS: B. S. Food and Nutrition - Registered Dietitian. Two years experience in nutrition, home management and with older persons.

JOB DESCRIPTION

SCCI March 1979

JOB TITLE:

Foodservice Manager

JOB SUMMARY:

Supervises the foodservice production for the Agency.

DUTIES:

Supervise approved standards for food preparation and service.

Assist dietitian in planning menus.

Purchase food and other supplies. Assure that all products meet specifications.

Plan and supervise food production and service; sanitation and safety procedures.

Plan and supervise special functions.

Maintain records for budget and cost control.

Plan and supervise staffing needs of the dietetic department.

Advise and direct employees in their work performance.

Train and instruct employees in proper dietary practices and procedures.

Practice supervisory techniques that promote and maintain harmonious cooperation and satisfactory results from employees. Maintain and promote personnel relations; handle inquiries and problems of employees, interpret and apply administrative policies.

JOB REQUIREMENTS:

The person must be qualified on the basis of experience; or be a graduate of a foodservice supervision course approved for membership in the Hospital Institution and Educational Foodservice Society; or have an associate degree in foodservice administration, food management, or institution management; or completed an approved dietetic technician program.

JOB DESCRIPTION

SCCI March 1979

JOB TITLE:

Cook

JOB SUMMARY:

Under the supervision of the manager, the cook is responsible for preparation of food for participants and personnel.

DUTIES:

Prepare all assigned food items on menu using standardized recipes.

Assist foodservice manager in preparation food production schedule.

Usually assume the duties of foodservice supervisor in his absence.

Develop and standardize new recipes.

Instruct other personnel involved in food preparation.

Check equipment and cooking area to assure high standards of sanitation and safety requirements.

Requisition food and supplies from store-room daily.

Maintain proper records on all requisitions and submit reports to foodservice manager daily.

Schedule food production to assure good quality food items.

Perform other duties as assigned.

JOB REQUIREMENT:

Must have two to three years experience or on-the-job training in food preparation, and general kitchen management.

JOB DESCRIPTION

SCCI March 1979

JOB TITLE:

Baker/Salad

JOB SUMMARY:

Under supervision of foodservice manager, the Baker/Salad person is responsible for preparation of all baked items and salad items.

DUTIES:

Prepare salad ingredients and necessary salad dressings under proper sanitary conditions in desired quantities for noon meals and other special functions.

Prepare all desserts and hot breads for noon meals and special functions.

Write requests for food and supplies.

Maintain records on all requisitions and submits daily to the foodservice manager.

Keep work area and equipment clean and in order.

Use standardized recipes and portion control.

Perform related duties as assigned.

JOB REQUIREMENTS:

Two to three years experience or on-the-job training in the principles of preparation for baked products and salad items.

JOB DESCRIPTION

SCCI March 1979

JOB TITLE:

Cook's Helper

JOB SUMMARY:

Assist the cook in preparation of all food items for participants and personnel. Relieve the cook when the cook is not on duty.

DUTIES:

Prepare assigned food items for noon meal.

Relieve the cook of simple routine duties.

Assist in cleaning and maintenance of all equipment.

Perform duties of driver/utility, baker/salad when necessary.

Assist in set-up for tray-line assembly of home-delivered meals.

Perform other duties as assigned.

JOB REQUIREMENTS:

Kitchen experience is essential. On-the-job training after one year is acceptable.

JOB DESCRIPTION

SCCI March 1979

JOB TITLE:

Driver/Cook

JOB SUMMARY:

Assist in the preparation of food for participants and personnel. Responsible for the delivery of all food items to assigned centers.

DUTIES:

Prepare assigned food items for noon meal.

Responsible for delivery of food items to assigned centers.

Assist in care and maintenance of equipment.

Assist in the packaging of meals for Meals on Wheels.

Deliver other food items and supplies to center.

Assist in assembly of food for home-delivered meals.

Maintain all work areas and equipment in clean and sanitary condition.

Obtain food items from refrigerator and storeroom.

Open cans and cartons for cooks.

Assure that delivery vouchers are signed by center directors.

Perform related duties as assigned.

JOB REQUIREMENTS:

Kitchen experience desirable - can be trained on the job. Must have a valid driver's license and a safe driving record for last five years.

JOB DESCRIPTION

SCCI March 1979

JOB TITLE: Driver/Utility

JOB SUMMARY: Assist in cleaning and maintenance of building and equipment; responsible for the delivery of all food items to assigned centers.

DUTIES: Responsible for delivery of food items to assigned centers.

Assure that delivery vouchers are properly signed by center director.

Clean equipment, work areas, pots and pans and floor as assigned.

Collect soiled food carriers and return them to dishwashing area.

Portion food items for home delivered meals.

Assist in assembly of food for home delivered meals.

JOB REQUIREMENTS: Kitchen experience desirable. Can be trained on-the-job. Must have a valid driver's license and a safe driving record for last five years.

JOB DESCRIPTION

SCCI March 1979

JOB TITLE: Storeroom/Utility

JOB SUMMARY: Receive all supplies and equipment for the foodservice. Organize and maintain storage area.

DUTIES:

- Store all supplies including USDA commodities.
- Assure that all supplies are not damaged. Report damaged items to supervisor.
- Issue supplies using proper forms.
- Organize and maintain adequate supplies.
- Maintain safe and sanitary conditions in storage area.
- Take a physical inventory as needed.
- Perform other clerical duties.
- May relieve cook's helper and driver/utility worker.
- Assist in cleaning and sanitizing of all equipment.
- Assist in general housekeeping of all foodservice areas.

JOB REQUIREMENTS: Six months to a year of storeroom experience required.

JOB DESCRIPTION

SCCI March 1979

JOB TITLE:

Utility

JOB SUMMARY:

Perform all duties related to the sanitation of pots and pans, and storage areas. Responsible for cleaning of walls, floors, windows in foodservice operations.

DUTIES:

Responsible for daily cleaning of all cooking equipment.

Wash pots, pans and food carriers.

Perform preparation of food items for cooks and baker/salad worker.

Inspect all work areas daily and submit reports to foodservice supervisor.

Clean all walls, floors and windows in the operation.

Inspect dishmachine and report any problems to the foodservice manager.

Perform other duties as assigned.

JOB REQUIREMENTS:

Kitchen experience is preferable - on-the-job training can be given.

COST SHEET 1
PRELIMINARY COST ESTIMATE
FEBRUARY, 1979

Renovation	\$ 10,000.00
Architectural and Engineering Fees*	0.00
Bonds	1,000.00
Legal Fees*	0.00
Taxes and Insurance* During Construction	0.00
Security Hook-Up	75.00
Transfer USDA Commodities	<u>950.00</u>
Total	\$ 12,025.00

*These fees will be paid for by the landlord and ARA
Foodservice Company and also one month free rent.

SENIOR CITIZENS CENTERS, INC.

CAN:

- ... Grow
- ... Reduce Costs
- ... Serve more meals to the Senior Citizens
- ... Increase your control

THROUGH:

- ... Simplifying the operation
- ... Reducing dollars in labor cost and commodity storage
- ... Applying those dollars to other areas,
- ... which, makes the food service more cost effective

<u>EXISTING</u>	<u>POTENTIAL</u>	<u>RESULTS</u>
Two unit managers	• One unit manager	• Continuity of management
Labor cost controls	• Increased productivity	• Reduce duplication of efforts and hours
Limited expansion of service from TCU & TCJC	• Expansion of service to more customers	• Free standing facility would enable potential of service to more customers
Storage paid for commodities	• Store commodities in free standing facility	• Monies spent for storage could be used toward rent of free standing facility
Purchasing in two locations	• Centralized purchasing	• Control of product cost and space utilization
Equipment purchases expensed as received	• Amortize equipment and remodeling for five yrs.	• Equal costs for remodeling and equipment purchases
Two different production areas and personnel	• One production site	• Continuity of product and service
Limited opportunity for other income	• To receive a percent of additional sales	• Offset overhead expenses; hold costs down

It is through the expansion of your programs that we can present the following projections:

	<u>PROPOSED</u>	<u>CURRENT</u>	<u>± DIFFERENCE</u>
LABOR	\$110,424	\$120,576	(\$10,152)
FOOD	247,401	247,401	-0-
COMMODITY STORAGE	-0-	13,000	(\$13,000)
RENT/UTILITIES (TCU & TCJC)	-0-	20,020	(\$20,020)
NEW FACILITY RENT	15,000	-0-	15,000
UTILITIES (New facility)	15,000	-0-	15,000
EQUIPMENT	13,000	-0-	13,000
ADMINISTRATIVE EXPENSE	<u>24,276</u>	<u>23,400</u>	<u>876</u>
TOTAL	\$425,101	\$424,398	\$ 703



ARA FOOD SERVICES CO

3403 EAST CARPENTER FREEWAY WEST IRVING TEXAS 75062 (214) 438-2646

October 19, 1978

Ms. Joice Carter
Senior Citizens Inc.
Box 2567
Fort Worth, Texas 76102

Subject: Preliminary Budget for Tarrant County Nutrition Program
Covering February 1979 through January 1980

Dear Ms. Carter:

Attached is a budget which identifies the cost you could expect for operating a free standing facility. This budget does not address utilities, rent, capital expenditures or small wares cost.

Joice, if you need a budget for the capital expenditures for the kitchen, let me know and I will have our facilities planning group work one up.

Sincerely,

Henry McEwin
District Manager

A handwritten signature in cursive script that reads "Henry McEwin".

HM:bk

Enclosure

COST SHEET 3

PROJECTED BUDGET

TARRANT COUNTY NUTRITION PROGRAM

Assumptions:

1100 meals per day
 255 days of operation
 2 weeks vacation for employees
 5 holidays
 Food cost assumes no commodities
 Food cost assumes 7.5% inflation
 Labor cost based on \$2.95 minimum

Food Costs:

1100 meals per day
 x 255 days
 280,500 total meals
 x .68 food cost per meal
 \$190,740

Labor Cost:

1 Manager										\$13,000
2 Drivers/Cooks	X	4.25	X	80	X	54	=			\$18,360
1 Driver/Utility	X	3.95	X	40	X	54	=			\$ 8,532
1 Cook	X	4.25	X	40	X	54	=			\$ 9,180
1 Cook's Helper	X	3.95	X	40	X	54	=			\$ 8,532
1 Baker/Salad	X	4.25	X	40	X	54	=			\$ 9,180
2 Utility	X	2.95	X	80	X	54	=			\$12,744
										<u>\$79,528</u>
Fringe									79,528 X .18 =	14,315
										<u>\$93,843</u>

Direct Cost:

Cleaning Supplies	.015 x 280,500	\$ 4,207
Paper & Plastic	.085 x 280,500	23,842
Office Supplies		150
Postage Expense		260
Taxes and Licenses		250
General Insurance		1,050
Telephone		500
Auto Allowance	\$20 x 52	1,040
Vehicle Operation	\$75 x 52	3,900
Vehicle Amortization	3 @ 1976	5,928
Repair and Maintenance		1,750
Pest Control	\$75 x 12	900
Trash Removal	\$150 x 12	1,800
Replacements (Expendable Equipment)		3,500
Uniforms and Laundry		3,500
Training and Sick leave		3,500
		\$ 56,077

Recap of Cost

Food	\$190,740	50.9%
Labor	93,843	25.1
Direct	56,077	15.0
	\$340,660	91.0%
Admin. Cost	18,717	5.0%
Sub Total Cost	\$359,377	96.0%
ARA Fee	14,974	4.0%
	\$374,351	100.0%

REFERENCES

1. Population Division, United States Bureau of Census: Current Population Reports Series P-25. Number 401, 404, 407, 409, July 1, 1970.
2. United States Code Congressional and Administrative News. Pl L. 92-258, 92nd Congress-Second Session-1972.
3. Williamson, B. J.: Tomorrow's system-the food factory today. J. Am. Dietet. A. 66:499, 1975.
4. U. S. Department of Health, Education, and Welfare Social and Rehabilitation Service, Administration on Aging: The program highlights of research and development nutrition projects funded under Title IV of the older Americans Act of 1965. DHEW Publication No. (SRS) 73-20236, 1971.
5. West, B. B., Woods, L., Harper, V., Shugart, G.: Food Service in Institutions, 5th Edition. New York: John Wiley & sons, Inc., 1977.
6. Montag, Geraldine: Obtaining meaningful cost information in dietary department. J. Am. Dietet. A. 67: 50, 1975.
7. Sheridan, J. F.: Planning foodservice facilities for health care institutions. Dietetic Currents, 5:2, 1978.
8. Rinke, W. J.: Three Major systems reviewed and evaluated. Food Service 50:73, 1976.
9. Kahle, W. L.: Foodservice on a budget. Boston: Cahners Books, 1974.
10. U. S. Department of Health, Education, and Welfare Office of Human Development Services. Administration on Aging: National Growth and Performance Review: A Review of National Growth-Title VII Nutrition Program, 1978.
11. Dobbins, F. W.: A lunchroom in every school. School & College Food Management. 6:23, 1970.

12. Harper, J. M., Jansen, G. R.: Pilot study to assess, audit, and evaluate food delivery systems used in school foodservice. Final report. U. S. Dept. of Agric. Food and Nutr. Service Contract No. 12-35-600-183. Dept. of Agri. and Chem. Engin. and Food Sci. and Nutr., Colo. State Univ. Fort Collins, 1976.
13. Payne, N. E., Dungan, A. L., Cole, D. L.: The economics of alternate school feedings systems. Department of Agriculture Economics, Cornell University, May, 1973.
14. Egmond, D. V.: School Foodservice. Westport, A. V. Publishing Co., 1974.
15. Karmensky, R.: Converting your present system: School and College Food Management. 5:36, 1969.
16. U. S. Department of Health, Education and Welfare. Office of Human Development Administration on Aging. Information Memorandum A.O.A. 1M-78-41, August 7, 1978.
17. Cronan, M. L.: The school lunch. Peora: Charles A. Bennett Company, Inc., 1972.
18. Keebler, N.: Congress urged to keep nutrition projects separate from Area Agency on Aging. Older American Reports. 2(1): 4, 1978.
19. Kroener, V. and Donaldson, B.: Labor time in Type A school lunch program in Wisconsin. J. Home Econ. 50:451, 1978.
20. Anon.: Don Busler's \$5.5 million super kitchen. Food Mgt. 10(5): 37, 1975.
21. Searing, O. L.: Build, build, build! Food Mgt. 8 (12): 39, 1973.
22. Kotchevar, Lendal H.: Quantity food production. Berkley: McCutchan Publishing Corp., 1977.
23. Montag, Geraldine, McMillen, Frances, Henry, Regina: Cost of using permanent vs. disposable ware. J. Am. Dietet. A. 70:377, 1978.

24. Laventhol, Krekstein, Horwath and Horwath: Special cost study conducted at the Del Crest High School, Midwest City, Oklahoma. Special Report to the Permanent Ware Institute. Chicago, Ill. 1969.
25. Food and Nutr. Serv., USDA School Food Service Financial Management Handbook for Univorm Accounting. U. S. Dept. of Agric. Washington, D. C., 1973.
26. Unklesbay, N., Maxcy, R., Knickrehm, M., Stevenson, K., Cremer, M., and Matthews, M.: Food service systems: product flow and microbial quality and safety of foods. NC-120 Regional Research Bull. No. 245. Columbus, Mo. Univ. of Missouri, 1977.
27. Longree, L.: Quantity Food Sanitation. 2nd. ed. New York: John Wiley & Sons, Inc., 1972.
28. Silverman, G., Powers, E. M., Carpenter, D. F., Rowley, D. B.: Microbiological evaluation of the foodservice system at Travis Air Force Base. Food Sciences Laboratory, United States Army. Natick Development Center, Natick Mass Technical Report 75-110-Fsl, 1975.
29. Toumi, S., Matthews, M. E. and Marth, E. H.: Temperature and microbial flora of refrigerated ground beef gravy subjected to holding and reheating as might occur in a school foodservice operation. J. Milk Food Technol. 37(9): 457, 1974.
30. Rowley, D. B., Tuomy, J. M. and Wescott, D. E.: Fort Lewis Experiment: Application of food technology and engineering to central preparation food laboratory. United States Army. Natick Laboratories, Natick Mass. Technical Report 75-46-fl. 1972.
31. Bryan, J. L.: What the sanitarian should know about clostridium perfringens foodborne illnesses. J. Milk Food Technol. 32:381, 1969.
32. Unklesbay, N. and Unklesbay, K.: Energy expended in alternate foodservice systems for chicken menu items. J. Am. Dietet. A. 73:20, 1978.
33. The Aluminum Association: The School Lunch Revolution: How to Improve School Feeding and Reduce Costs. New York: 1971.

34. Rainsford, P.: A Study Comparing the Financial, Managerial, and Reconstitution Differences between Conventional and Convenience Foodservice Systems Utilized by Selected Colleges, Universities. Doctoral Dissertation, Cornell University, 1974.
35. Dixon, W. J., Massey, F. J.: Introduction to Statistical Analysis. New York: McGraw-Hill Co. 1969.
36. Office of the Governor Committee on Aging: The Older Texan. 4(2) March-April, 1978.
37. Keiser, J. R.: Analyzing labor costs. Cornell H. R. A. Quarterly, May, 1974.
38. Koogler, G. H., Nicholanco, S. Analysis of a decision framework for prepared food systems. Hospitals (J.A.H.A.) 51:95. 1977.
39. Stokes, J. W.: Foodservice in Industry and Institutions. 3rd. Edition. Dubuque: Wm. C. Brown Co., 1973.
40. Kazarian, E. A.: Work Analysis and Design for Hotels, Restaurants and Institutions. 2nd. Edition. Westport: AVI Publishing Co., Inc., 1974.
41. Kotschevar, L. H., Terrell, M. E.: Foodservice Planning: Layout and Equipment. New York: John Wiley Books, 1956.
42. Friese, J. C.: Equipment + Design = Foodservice: Equipment in Foodservice: Wilkerson, J. Editor: Guide to Foodservice Management. Chicago: Institutions/Volume/Feeding Magazine, 1972.
43. Prokasch, S. C.: Industrial Engineering Principles Sharpen Foodservice Design and Layout: Wilkinson, J. Editor: Guide to Foodservice Management. Chicago: Institutions/Volume/Feeding Magazine, 1972.
44. Kazarian, E. A.: Foodservice Facilities Planning, 1st. Edition. Westport: The AVI Publishing Co, 1973.
45. Jernigan, A. K., Ross, L. N.: Foodservice Equipment: Selection, Arrangement and Use. Ames: The Iowa State University Press, 1974.

46. Montag, G. M.: Development of overall and detailed layout. Selected papers from Food Administration Conference, Work Design-Equipment and Layout. July 20-23, 1966, p. 12-20.
47. Wilkinson, J. Editor: The Anatomy of Foodservice Design 1. Boston: Cahners Books, 1975.
48. Building Codes Electrical Ordinance No. 6245 Fort Worth, Effective Oct. 5, 1970.
49. Robb and Brenner, Inc. Architects: Facilities Cost Estimating Procedures: Prepared for Colorado State University, Fort Collins, Colo., Dec., 1975.
50. Buchanan, R. D., Adams, S., Armstrong, R. A., Machart, P., Cleveland, R. E., Crabtree, S., Vargo, E. A., Kozeluh, L. W., Avery, A. C.: The Anatomy of Foodservice Design 1. Wilkinson, J. Editor: Boston: Cahners, 1975.
51. Guide to Energy Conservation for Foodservice. Federal Energy Administration, U. S. Government Printing Office, Washington, D. C., 1975.
52. Paper Cup and Container Institute: The Manual of Paper Food Service for Restaurants and Institutions. New York.
53. United States Department of Agricultural Food and Nutrition Service: Planning School Service Facilities.
54. Building Code Ordinance No. 6374. City of Fort Worth Vol. 1, Effective Oct. 5, 1970.
55. Muther, R.: Practical Plant Layout. New York: McGraw-Hill Co., Inc. 1955.
56. Pinhert, M. S.: The Ready Food System for Health Care Facilities. Boston: Cahnner's Books, 1974.
57. Beyer, C. E.: A hospital converts to ready foods, Cornell H. R. A. Quarterly. 12:39, 1971.
58. Lough, J. B.: Harper, J. M., Jansen, G. R., Shigetomi, C. T., Anderson, J.: Pilot study to evaluate food delivery systems used in school lunch programs IV. Meal Costs School Foodservice Research Review. 2(1) L 23, 1978.
59. Godfrey, R. B.: Building Construction Cost Data. 36th Edition. Westport: Means Co., Inc. 1978.