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FOOD SERVICE PRODUCTION SYSTEMS
FOR TRIPLER ARMY MEDICAL CENTER, HAWAII

by

Bernard L. Gore, Jr.
Captain, MSC

Problem Solving Paper Submitted in Partial
Fulfillment of the Requirements for
Residency Completion, TAMC

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This study is primarily a literature review to determine which of three general categories of food production (the Conventional System, the Convenience System, and the Cook/freeze system) would be best to include in the major renovation plans of Tripler Army Medical Center. After comparing the systems, the author applies a simple decision matrix, and determines that the "Cook/freeze" system is best.					
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CHAPTER I

INTRODUCTION

Background Information

Tripler Army Medical Center provides medical care for approximately 379,000 people. This figure constitutes about one quarter of the state of Hawaii population. This includes active duty military (all services), dependents, retirees, Public Health, National Geodetic Survey personnel, Veterans, and citizens of American Samoa and the Trust Territories.

The facility is basically a 1,000 bed structure with the capacity of expansion to 1,500 beds. Presently about 530 beds are maintained for the present workload. The expansion capability is maintained.

The average daily census is about 450. There are about 2,000 clinical visits per day. The Food Service Division prepares and serves about 1,800 meals per day. This total is approximately divided into the following categories: breakfast 400, dinner 1,000, supper 400. This total reflects the workload for both patients and staff.

Tripler Army Medical Center is presently in the pre-concept phase of a 130 million dollar renovation and reconstruction project which is planned to be completed between 1983 and 1987. The food production area will be renovated. This has resulted in the command desire to evaluate numerous food production systems.

Statement of the Problem

To determine the best food production system for inclusion in the renovation and construction plans for Tripler Army Medical Center, Hawaii.

Research Methodology

A literature review was conducted to collect information pertaining to food production systems. This process included indepth research into three general categories of food production. The three systems were: the Conventional System, the Convenience System, and the Cook/freeze System.

Objectives

The goal of this study was to evaluate the three previously mentioned systems of food production and recommend

the most effective system that can be included in the planning process for the new TAMC facility. Intermediate objectives were to:

1. Define the three food production systems.
2. Analyze and compare the three food production systems.

Criteria

Criteria for evaluation were derived from current literature and unique military requirements and limitations. The system should be flexible enough to provide for 1,500 inpatients and supportive staff. The system should generate a product which has consistent, high quality and satisfies ² patients' needs. The system should be efficient and resources should be properly utilized (labor, material, time).³ The system must also be responsive to the unique diet menu demands of the hospital. The system should be flexible enough to respond to logistical delays which could result due to the hospital's location.

Limitations

In order to meet academic requirements, a time limitation of 15 April 1978 is placed on this study. The

recommended system will be directly applicable to Tripler Army Medical Center. Exact costs of equipment requirements and equipment cost comparison are non-existent for this particular study.

Assumptions

It is assumed that the three systems are available for implementation and that they meet all state, federal and military requirements for safety, environmental hygiene and sanitation. It is also assumed that the same food delivery (transportation) techniques will be used in each system.

Definitions

Conventional System.--"on premise production of food, either centralized in a main kitchen or decentralized in ward kitchens . . . prior to each meal . . . do not primarily use convenience foods."¹

Convenience Systems.--"usually connotes a food item that is purchased in a prepared state, needing little more preparation than reconstitution and garnishment."²

Cook/freeze System.--"foods are slightly undercooked, to allow for further cooking during reconstitution, and packed hot into molds. Foods are blast-frozen, sealed into polyethylene bags, and placed in storage."³

Selected Literature Review

Throughout all current literature, which is available for health care administrators, there are numerous articles pertaining to the food service systems. The emphasis of this review was to evaluate the three major systems. This review is therefore a macro presentation of material which has been written about the subject.

It is not the intent of this paper to recommend or evaluate a system as complex and debatable as that which is presently being implemented at Walter Reed Army Medical Center. This particular system is one of the many types of systems that make up the "Cook/Freeze System" category. Evaluation of these micro systems will not be conducted because,

the cost effectiveness of these systems will not be proved for several years. But the concept already demonstrates innovative approaches to food handling and labor/space savings. Many more plans are in the offering for the food service of the new Walter Reed Medical Facility.⁴

On many occasions, new equipment and production systems are purchased as a result of intrigue and impulse. Obviously, this is poor decision making. Normally, the purpose for purchasing equipment or a whole new system should be; to result in some form of financial savings.

These savings would result from cost comparison over existing equipment or over no equipment at all.

A convenient formula exists for comparing/measuring the financial advantage. This formula compares the cost and savings.⁵

$$\frac{A+B}{C+D+E+F+G-H} = \text{more than 1 if the equipment (by) is economical}$$

A = Savings of labor over life of equipment (10 years) estimate.

B = Savings in product over life of equipment (10 years) estimate.

C = Cost of buying equipment (Cost of borrowing money is part of this).

D = Cost of equipment installation.

E = Cost of utilities for life of equipment (10 years) estimate).

F = Cost of maintenance for life of equipment (10 years) estimate.

G = Interest on C+D total if money was placed in bank and compounded for 10 years.

H = Probable turn-in value of equipment at end of 10 years (10%?)

Payroll costs are historically a major problem in American hospital, food service departments. Absenteeism and employee turnover have been well above that of other sections of the hospital. Fortunately, this is not a

problem at Tripler. The unique work ethic that exists among civilian employees in the state of Hawaii has contributed to the hospital's ability to maintain the lowest absenteeism and turnover rate within Health Services Command. Because of this situation, these normally important items will not be considered in evaluating different systems.

A major consideration which must be addressed before evaluation of the three major systems is the food quality.

Quality as defined in its broadest sense, includes criteria such as taste, variety, availability, texture, sanitation, consistency and regional preferences.⁶

Because of management's concern for consumer satisfaction,

It is not unusual to find hospitals deciding to undertake a ready foods (conventional) program over a convenience foods system, even through the economics are unfavorable.⁷

Management's concern is not unfounded.

If food service is good, there are only faint voices of praise from patients and personnel. If food service is bad, however, the echoes of criticism reverberate among hospital corridors.⁸

In recent years, the effects of rising wages, rapidly increasing costs of unprocessed foods and materials, and building/renovation costs have strained the budgetary purse strings of many hospitals. Any evaluation of the hospital food service system must take into consideration two primary functional areas. These are food preparation and food delivery. Both areas make up the full system.

Food preparation involves all activities connected with product development, quality control, purchasing, storage, portioning and holding for service (delivery).⁹

Service (delivery) involves all activities associated with tray assembly, tray transport, service temperature maintenance, and delivery to patients.¹⁰

The three systems that this research paper evaluates are compared with each other as full systems and no delivery methods are evaluated in depth. It is therefore logical to assume that the means of food delivery will be the same for all three.

Solution Approach

In view of the presented problem, and after review of the literature, a recommended solution will be proposed.

The major segments of the evaluation of the three food service systems are:

1. Food quality.
2. Application for unique military requirements.
3. Application for unique diet/menu requirements.
4. Efficient utilization of resources.
5. Cost per meal comparison.
6. Evaluation of the three systems.

Since this study is being conducted well in advance of the actual construction and equipment purchase date (1982), a macro evaluation of the three systems will aid in identifying the process for which equipment will eventually be purchased for.

Footnotes

¹CPT Wolf J. Rinke. "Three Major Systems Reviewed and Evaluated," Hospitals, J.A.H.A. 50 (February 16, 1976); 73.

²Ibid.

³Ibid., p. 76.

⁴Institution/Volume Feeding, "Army Marches Toward Kitchen Innovation at Walter Reed Hospital" v. 78 (April 1976): 72, 95-97.

⁵Arthur Avery, "When Your Dream," Food Management 11 (December 1976): 63-39.

⁶Glenn H. Koogler, "Analysis of a Decision Framework for Prepared Food Systems," Hospitals J.A.H.A. 51 (February 16, 1977): 95-97.

⁷Ibid.

⁸Jerome A. Koncel, "Food Service Has a Vital Role in Overall Hospital Operations," Hospitals J.A.H.A. 51 (August 16, 1977): 111-114.

⁹Catherine Miller Goldberg, "Conventional, Convenience, or Ready Service," Hospitals J.A.H.A. 48 (April 16, 1974): 80-83.

¹⁰Ibid.

CHAPTER II

DISCUSSION

Food Quality

Numerous studies have been conducted which evaluate the quality of food that different production systems provide for the consumer.

One study conducted at the Hospital for Women, Leeds, England, surveyed 150 patients. This survey was taken in order to evaluate the difference between a Conventional System, Conventional with choice, and a Cook/Freeze System the results were (See Figure 1):¹

	<u>Conventional</u>	<u>Conventional w/choice</u>	<u>Cook/Freeze</u>
Good Quality	45	78	75
Food Hot Enough	80	78	90
Appetizing in Appearance	64	90	88
Sufficient Variety	60	90	88
Small Servings	20	15	25
Disliked	57	30	37

(NOTE: The above numbers are not required to add up to 150).

Figure 1

The results of this survey indicate that there are no major differences between cook/freeze and conventional products.

In addition, an analysis of food nutrition was conducted and this study indicated that:

Because the cook/freeze system is more readily controlled than in a conventional method of large scale food production, increased nutrient retention is possible.²

Bacteriological implications have a significant effect on food quality. The longer food is maintained between the temperature of 68°F to 122°, the greater the opportunity for rapid bacteriological growth. Freezing immediately after production reduces the time when food would be susceptible to contamination.

Convenience foods are prepared in accordance with the contractor's guideline and standards. These may either excel, equal, or be less than those the hospital requires. Nutritional value in these foods is not usually shown on the packaged goods and even if provided, it is difficult to verify. The production process of convenience food is an external operation which the administrator/manager has no control over.

Theoretically, since conventional and cook/freeze foods are prepared completely on the premises under continual supervision, the degree of quality is identical. In practice, cook/freeze foods have the edge, because there are only a few operations underway at one time, the supervision can be more effective. Since several weeks requirements of an item are prepared at one time, conformity is ensured.³

Another study conducted at Hennepin County General Hospital in Minneapolis, evaluated the feasibility of implementing convenience foods the following results of the study are paraphrased:⁴

1.consistently high quality that convenience foods promise cannot be achieved.
2.acceptance ... deteriorated as the taste and feel associated with these items developed.
3. Transportation time and delivery distance are two important factors there is no way of determining fluctuations in temperature to which the product is subjected to.
4.fewer servings than the amount stated in the manufacturer's specifications.
5.complaints increased steadily as soon as customers found out that convenience foods were used.
6.convinced that all the inherent disadvantages of a total convenience food system are positive arguments for a ready food system (conventional as cook/freeze).

It is apparent that there are significant differences in the quality of food that each system provides. The major variance between the systems is caused by the consumer and administrator reaction to convenience foods.

Good quality appears to be about equal for the Conventional and Cook/freeze System. These two appear to be superior to the Convenience System.

Application For Unique Military Requirements

Tripler Army Medical Center (TAMC) has some unique mission requirements and geographical complications which will have an effect on the production demands the Food Service Division must fulfill.

Since TAMC is on an island, over two thousand miles from the continental United States, all food items must be either shipped or flown to the state. Therefore, the transportation of raw foods can be interrupted or stopped by union strikes (long shoremen) and by some form of armed conflict (war).

The latter item, armed conflict, has another impact on the food production requirements. TAMC is the only major medical facility in the Pacific Theater. As such, this facility must maintain an expansion capability which would increase production requirements three to four times.

Thus, the present output of 1,800 meals per day, may have to increase to more than 5,400 meals per day.

These limiting factors would affect the three food production systems. The Cook/freeze System would be most responsive. The frozen food inventory can be expanded to provide a 15-30 day inventory and there would also be an inventory of raw foods for input. The Conventional System would also be responsive but to a lesser degree. There would be no inventory of finished, frozen foods. There would however, be a controllable inventory of raw food for input into the system. The convenience foods would be the least desirable. The majority of these items would be procured from local vendors and food could be scarce in the civilian community. There would be no control over raw food input and the system would only be responsive during normal periods of time when there are no problems with transportation. The expansion capabilities of the Convenience System would also be uncontrollable by TAMC Food Service management.

Application For Unique Diet Menu Requirements

Menu planning is a major task which all food service managers must content with. Usually this activity is short

term production forecasting. It consists of calculating the amounts of food needed to prepare each meal. Food selections by patients and staff for a period of 30 days are maintained and reconciled for the total number of meals served. The averages are updated using a moving average of the last ten, thirty day periods. This forecasting is used for planning everything from food procurement to production planning.⁵

In TAMC, the menu is based upon this same 30 day cycle, but selection is minimal due to the Army/Navy supply system. As a result of this supply process, a hotel/restaurant menu cannot be used. This form of menu could be adopted with both the cook/freeze and convenience system. It cannot be used with the present conventional system.

When making a menu decision, it should be noted that the hotel/restaurant menu is most compatible with frozen preplates, whereas conventional menus impose no definite restrictions for a prepared food program.⁶

Although it would appear that a Convenience System could be responsive to the special menu needs of a hospital, this has not been so. Throughout most of the industry, and especially Hawaii, there are not enough convenience foods suitable for modified diets. This is compounded by

the lack of accurate information on nutritional content of convenience foods.

On-site production of food products is usually considered to be more responsive to the hospital's needs because it can be tailored to support the changing categories of patients.

Special recipes, regional taste preferences, degree of cooking, and food handling are all controlled by the producing institution in cook/freeze operations (also conventional). when using convenience foods, these factors are controlled by an outsider and often are judged to be inferior to the custom production possible by an in house program.⁷

There are some disadvantages to the cook/freeze system. The major problem affecting the unique menu requirements is the necessity to rewrite all recipes. Foods that are cooked, then frozen, then reheated via microwave tend to cook some more during reheating. This can cause food starch breakdown.

All items that have to be reheated must be slightly undercooked to prevent being overcooked or overdone after microwaving.⁸

Unique diet/menu requirements can be fulfilled by the Conventional System, and with recipe modification by the Cook/freeze System. Although producers of the

convenience food products say that they can meet the special menu requirements of hospitals, this fact has not been satisfactorily proven. Lack of flexibility and questionable nutritional quality tend to make the Convenience System least desirable.

Efficient Utilization of Resources

Efficient utilization of resources is a complicated subject when evaluating the three production systems. Since the new system will be installed during the TAMC renovation process, there will be a considerable investment in new, updated equipment. This monetary allocation will be appropriated by congress as part of the total construction/renovation project. Since this amount does not have to be prorated over subsequent years, it will not be considered as part of the operating costs. Efficiency will be judged by evaluating the operational performance once either system is functioning.

In the past five years, food service administrators in many large hospitals have switched to cook/freeze and cook chill methods of food preparation in an effort to contain costs. The major reason for the switch to these systems is the need to obtain better utilization of time and people. By using these methods of food

preparation, food service administrators believe that they have eliminated the concentrated rush periods that are associated with conventional systems.⁹

The size of a facility has an effect on the amount of efficiency that any system can generate. This is especially true for Cook/freezer Systems.

Savings realized from these innovative systems occur mainly in hospitals with more than 200 beds.¹⁰

As previously stated, employees, turnover, motivation, and productivity are not problems at TAMC. This is probably due to the high wage grade ratings that these personnel receive. Other health care facilities in both the public and private sector are not as fortunate as Tripler. Because of personnel problems they have been forced to increase the usage of convenience foods.

The main advantage of Convenience System are quite obvious. Even though food costs are much higher than Conventional or Cook/freezer Systems, this is offset by decreased operating costs. These decreased costs result from lower labor requirements and, in non government facilities, the prorated cost of equipment purchase, maintenance, and operation.

Studies have been conducted to evaluate the efficiency of the Convenience System.

Block found in a survey of 26 hospitals.... that although 41 percent more meals per employee were served in convenience food hospitals, the 8 percent decrease in labor costs was not high enough to offset the 29 percent increase in food costs, which resulted in an overall increase in operating costs of 6 percent for hospitals using convenience food systems.¹¹

The Convenience System eliminates management's concern with, keeping to a minimum, the time between production and delivery to patient especially when compared to the conventional system. In addition, it should eliminate the production process altogether.

Personnel, purchasing, equipment, and space requirements are reduced under such a system and the need for general sanitation and pot washing personnel is reduced or eliminated.¹²

The Conventional System has many inefficiencies when compared to both the Convenience and Cook/freeze System. Some of these would be increased space requirements, food waste (both raw and processed), and utilization of employees.

The Cook/freeze System is not as inefficient as the Conventional System, but there would still be higher labor expenses when compared to the Convenience System

costs. These labor costs would probably be less than the total operating increase attributed to the Convenience System. Due to the type of production, employees would be more effectively utilized with peak workload requirements eliminated and distributed evenly over the entire work day.

Cost Per Meal Comparison

The three systems under consideration have been evaluated in at least two documented studies and in both of these studies the results were the same.

One study, conducted by the dietary consultant to Stephens - Bangs Associates, Inc., showed the following (Figure 2):¹³

	<u>CONVENTIONAL</u>	<u>CONVENIENCE</u>	<u>READY (COOK/FREEZE)</u>
Food (Per Meal)	\$0.571	\$0.697	\$0.560
Labor (Per Meal)	1.173	0.892	0.960
Freezing (Per Meal)	0.000	0.000	0.010
TOTAL	<u>\$1.744</u>	<u>\$1.589</u>	<u>\$1.530</u>

(These figures do not include the cost of additional equipment).

Figure 2

The hospital that this study was based upon is a 400 bed general hospital. At the time of the evaluation a Conventional System was in use. Food, labor and equipment costs of the present system were compared to the expected present costs of the other two systems.

Another study was conducted by the Research Department of the Cornell University School of Hotel Administration. Factors considered by the study were comparative costs for food, labor, capital investment, menu variety, food quality, inventory control, and purchasing.

Dollar comparisons were based upon the data of a 350 bed facility that would soon expand to 850 beds. The results of the study were (See Figure 3):¹⁴

	CONVENTIONAL	CONVENIENCE	READY (COOK/FREEZER)
Food	\$0.464	\$0.595	\$0.455
Labor	0.476	0.423	0.429
Freezing	0.000	0.000	0.010
Pantry Reheating	<u>0.000</u>	<u>0.026</u>	<u>0.026</u>
Cost Per Meal	\$0.940	\$1.044	\$0.920
Difference Per Meal Based on Conventional	0.000	+ .104	- .020

Figure 3

Both studies indicate that the Cook/freeze System produces the cheapest meal. Although the studies conflict in evaluating the differences between Conventional and Convenience Systems, the study methods were similar. This variation is partially the result of the additional "pantry reheating" item of evaluation.

In both studies the food costs for the Convenience System were considerably greater than the other systems. This occurs because:

Convenience foods have the greatest per portion cost because the cost includes not only the food itself, but the manufacturer's labor costs, overhead, packaging costs, operating expenses and profit.¹⁵

Further evaluation of the data indicates that:

Combining all factors, convenience foods have the greatest raw cost and ready foods the least; conventional foods have the greatest waste factor and convenience foods the least, and convenience foods have the greatest overall cost and ready foods (cook/freeze) the least.¹⁶

Evaluation of the Three Systems

In evaluating the three systems, the application of a decision matrix (See Figure 4) will provide a visual tool which enhances interpretation and understanding of all

previous information. The matrix will also enable each criteria to have a weighted value. This weighted value will provide a point rating of 1 to 3 for each of the systems. The best system or systems will receive a rating of 1 and the other system or systems will be rated 2 or 3. Criteria with a * will receive double ratings.

	<u>CONVENTIONAL</u>	<u>CONVENIENCE</u>	<u>COOK/FREEZE</u>
Food Quality	1	2	1
*Application for Unique Military Requirements	2 2	3 3	1 1
Application for Unique Diet/Menu Requirements	1	3	2
Efficient Utilization of Resources	3	1	2
*Cost Per Meal Comparison	2 <u>2</u>	2 <u>2</u>	1 <u>1</u>
TOTAL RATING	13	16	9

Figure 4

The decision matrix indicates that the Cook/freeze System satisfies the criteria to a greater degree than other systems. This is especially true when considering the two doubled rated criteria.

Footnotes

¹Janice Millross, "Consequences of a Switch to Cook/freeze," Hospitals J.A.H.A. 48 (September 1, 1974): 118.

²Ibid., p. 124.

³Paul Hysen, "'Ready' Foods May Provide Ready Savings," Modern Hospital, (June 1971): 97.

⁴Eulalia Harder, "Convenience Foods Decision," Hospitals J.A.H.A. 47 (January 1, 1973): 78-79.

⁵Arthur C. Avery, "Food Service," Hospitals J.A.H.A. 46 (April 1, 1972): 93.

⁶Glen Koogler, "Analysis of Decision Framework for Prepared Food Systems," Hospitals J.A.H.A. 51 (February 16, 1977): 96.

⁷Ibid.

⁸Arthur H. Ricklen, "Microwave System Reduces Costs, Improves Meals," Hospitals J.A.H.A. 49 (December 1, 1975): 49.

⁹Jerome A. Koncel, "Food Service Has Vital Role in Overall Hospital Operations," Hospitals J.A.H.A. 51 (August 16, 1977): 114.

¹⁰Ibid.

¹¹Wolf J. Rinke, "Three Major Systems Reviewed and Evaluated," Hospitals J.A.H.A. 50 (February 16, 1976): 75.

¹²Catherine M. Goldberg, "Conventional, Convenience, or Ready Food Service," Hospitals J.A.H.A. 48 (April 16, 1974): 81-82.

¹³Ibid., p. 82.

¹⁴Paul Hysen, "Ready Foods May Provide Ready Savings," Modern Hospital, (June 1971): 96.

¹⁵Ibid., p. 95.

¹⁶Ibid., p. 96.

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CHAPTER III

CONCLUSION AND RECOMMENDATION

After reading the previous evaluation of the three systems it is obvious the Cook/freeze System appears to be the best food production system for inclusion in the renovation and construction plans for Tripler Army Medical Center, Hawaii.

It is therefore recommended that the U. S. Army Health Facility Planning Agency select this system. Selection of this process will require future research in order to determine the best type of Cook/freeze System. This micro evaluation should consider all modern equipment, to include future equipment which may be developed within the next three years.

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