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**AN EVALUATION OF THE
NEW "MULTI-RESTAURANT" FOOD
SERVICE SYSTEM FOR THE MARINE CORPS**

- M. Davis
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July 1980

UNITED STATES ARMY
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20. Abstract (cont'd)

both from surveys and as reflected by a 30% increase in attendance, and also substantial improvement in worker attitudes towards their jobs.

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PREFACE

During FY77-78, the US Army Natick Research and Development Command (NARADCOM)* conducted an investigation of Marine Corps garrison food service systems under Task 03, Project Number 1L162724AH99A, Analysis and Design of Military Feeding Systems, of the DoD Food Research, Development, Testing, and Engineering Program. The individual Military Service Requirement (MSR) Identification was USMC 7-1, Marine Corps Garrison Systems Analysis and Design. The purpose of this project was to define, develop, and evaluate significant improvements to the existing Marine Corps garrison food service system as represented by food service operations at the Marine Corps Air Ground Combat Center (MCAGCC) at Twentynine Palms, CA. In particular, the primary objectives of the study were to increase consumer attendance and acceptance (and thus, utilization) at the enlisted dining facilities while remaining within existing cost and operational constraints.

The initial studies, which commenced at MCAGCC Twentynine Palms, CA in October 1976, and continued through July 1977, examined all aspects of the existing food service system in sufficient detail to determine the major problem areas requiring improvement, and to establish a baseline against which proposed solutions to these problems could be compared and evaluated.

The new improved garrison food service system which resulted from the above evaluation began operation in June 1978. In order to allow the new system to reach steady-state conditions, data were collected from September to December 1978. This report contains an analysis of that improved garrison food service system as tested at MCAGCC Twentynine Palms, CA and recommendations relative to any further implementation of the concept to other Marine Corps installations.

A project of this scope cannot be conducted without a great deal of assistance and cooperation from a large number of individuals. Specifically, the authors would like to thank MAJ Wade A. Robinson, Food Service Officer, MCAGCC Twentynine Palms, for his continued support and tireless effort throughout the entire project; MGYSGT J. Young, Base Food Technician and the entire MCAGCC Twentynine Palms Food Service Staff including GYSGT Conway, GYSGT Williams and GYSGT Yost, all of whose cooperation and individual effort played an integral part in the total success of the new system; BG H. Glasgow, Commanding General, MCAGCC Twentynine Palms, COL Bouldin, Chief of Staff, COL Hallissey, Assistant Chief of Staff G-4, and LTC Loveless, Supply Officer, for their continued personal interest and support for the project; Mr. Robert Porter of the Construction Engineering Research Laboratory (CERL) for his efforts in designing the decor concepts for each of the facilities; MAJ Daniel Ardoin and the Marine Corps West Coast Food Management Team, Mr. Gerald Darsch of the Food Engineering Laboratory (FEL) NARADCOM, and Mr. Frank DeAmicis, all of whose food service expertise and long hours during the crucial startup phase contributed much to the rapid acceptance of the new concept by the troops; LTC H. Johnson and MAJ B. Lewis of the Services Division, Headquarters Marine Corps, for their continued assistance; Ms. Patricia Prell and Mr. David Corfield, both of the Food

*Renamed US Army Natick Research and Development Laboratories (NLABS) in FY81.

Engineering Laboratory, NARADCOM for their efforts in menu design and equipment specifications, respectively; Ms. Judy Sundell of the Operations Research and Systems Analysis Office (OR/SA) at these Laboratories for her assistance in editing this report; Ms. Lianne LaRhette also of the OR/SA Office whose exceptional secretarial skills and patience through the numerous rewrites made the publication of this report possible; and finally, to all the Marines at MCAGCC Twentynine Palms who participated in the numerous consumer attitude, food acceptance, and dietary habits surveys.

TABLE OF CONTENTS

	Page
PREFACE	1
LIST OF FIGURES	5
LIST OF TABLES	7
SECTION I. INTRODUCTION	11
SECTION II. EXECUTIVE PRECIS	14
SECTION III. THE "MULTI-RESTAURANT" FOOD SERVICE SYSTEM - AN OVERVIEW	27
A. INTRODUCTION	27
B. DEVELOPMENT OF THE "MULTI-RESTAURANT" CONCEPT	27
C. SERVICE LINE ALTERNATIVES	34
D. MENU	36
SECTION IV. THE "MULTI-RESTAURANT" FOOD SERVICE SYSTEM - A DETAILED EVALUATION Mark M. Davis and Philip Brandler	46
A. ATTENDANCE PATTERNS	46
Contributed and authored by:	Linda Birnbaum, Operations Research and Systems Analysis Office, US Army Natick R&D Command
B. CONSUMER ATTITUDES	54
Contributed and authored by:	William Wilkinson & Herbert Meiselman, Behavioral Sciences Division, US Army Natick R&D Command
C. FOOD SERVICE WORKER OPINIONS	71
Contributed and authored by:	Lawrence Symington & Herbert Meiselman, Behavioral Sciences Division, US Army Natick R&D Command

TABLE OF CONTENTS (cont'd)

	Page
D. LABOR UTILIZATION AND PRODUCTIVITY	71
Contributed and authored by:	Brian Bissonnette & Mark Davis, Operations Research and Systems Analysis Office, US Army Natick R&D Command
E. SYSTEM COST ANALYSIS	95
Contributed and authored by:	Brian Bissonnette & Mark Davis, Operations Research and Systems Analysis Office, US Army Natick R&D Command
REFERENCES	104
APPENDICES:	
A. Methodology for Consumer Attitude Survey and Customer Opinion Survey Instrument	105
B. Survey Supplement	125
C. Phase I Interviewed Protocol	133
D. Phase II Interviewed Protocol	137
E. Statistical Analysis of Food Service Worker Survey	141
F. Work Sampling Data Collection Procedures	143
G. Calculation of Productivity Measures	149

LIST OF FIGURES

	Page
Figure 1. Location Map of MCAGCC Twentynine Palms, CA	11
Figure 2. Map of the Main Base MCGACC Twentynine Palms, CA	12
Figure 3. MCAGCC Twentynine Palms Organization Chart	13
Figure 4. MCAGCC Twentynine Palms Guide to Good Eating	15
Figure 5. Dining Facility Attendance Rates	17
Figure 6. Consumer Rating of MCB Twentynine Palms Food Service System Versus Other Marine Corps Food Service Systems Previously Experienced	18
Figure 7. Post Test Cooks' Comparison of New and Pre-Test Dining Facilities at MCAGCC Twentynine Palms	22
Figure 8. Attendance Rates on Twentynine Palms in Half-Hour Intervals	28
Figure 9. Marine Corps Base Twentynine Palms Types of Dining Outlets	30
Figure 10. Layout of Typical Two Restaurant Dining Facility	31
Figure 11. Layout of Dining Facility with Carousel Serving Line	31
Figure 12. Typical Dining Area	32
Figure 13. Typical Dining Area	32
Figure 14. Carousel Serving Line	34
Figure 15. Mobile Food Service Unit	36
Figure 16. Dining Facility Attendance Rates	48
Figure 17. Percent Participation by Dining Hall for H&S Battalion	50
Figure 18. Percent Participation by Dining Hall for 3rd Tanks	50
Figure 19. Average Participation Rates by Meal by Unit	51

LIST OF FIGURES (cont'd)

	Page
Figure 20. Dining Facility Participation Rates by Unit (DH 6)	52
Figure 21. Dining Facility Participation Rates by Unit (DH 2)	52
Figure 22. Overall Personnel Performance by Job Category	89
Figure 23. Overall Personnel Performance by Dining Facility	90
Figure 24. Overall Personnel Performance – Old and New Systems	93
Figure F-1. Form Used for Work Sampling Data Collection	145

LIST OF TABLES

	Page
Table 1. Proportion of Total Survey Sample Rating the Worst Ten Areas of Concern in the Dining Halls Positively Neutral, or Negatively Before and After Innovations	20
Table 2. Cooks' Response to Open-Ended Questions Concerning Positive and Negative Aspects of Their Dining Facilities	21
Table 3. Percentage of Pre-Test SIK Attendance Rates for 12 Eating Locations	28
Table 4. SIK Consumer Rating of Specialty Menus	29
Table 5. Summary Evaluation of Alternative Serving Line Configurations	35
Table 6. Short Order Menu	37
Table 7. 12-Day Cyclic Menu Twentynine Palms, California – Lunch	39
Table 8. 12-Day Cyclic Menu Twentynine Palms, California – Supper	41
Table 9. Steak House Menu	43
Table 10. Italian Menu	44
Table 11. Barbeque Menu	45
Table 12. Long Term Attendance Rates	49
Table 13. Demographic Characteristics of the Pre- and Post-Innovation Samples	57
Table 14. Proportion of Total Survey Sample Indicating Subjective Importance of Various Factors in Food Choice Before and After Innovations	58
Table 15. Proportion of Total Weekly Meals Consumed in the Dining Facilities for Each Major Meal Type Before and After Innovations	58
Table 16. Five Major Reasons for Nonattendance at the Dining Halls Cited by the Greatest Proportion of Total Survey Sample Before and After Innovations	59

LIST OF TABLES (cont'd)

	Page
Table 17. Proportion of Survey Sample Indicating Dining Facility Hours are "OK AS IS" for each Major Meal Before and After Innovations	60
Table 18. Outlet Reportedly Attended Most Frequently and Four Most Often Cited Reasons for that Attendance	61
Table 19. Proportion of Total Survey Sample Giving Overall Rating to the Twentynine Palms Dining Facilities in Comparison to Other Military Dining Halls Before and After Innovations	62
Table 20. Proportion of Total Survey Sample Rating the Worst Tent Areas of Concern in the Dining Halls Positively, Neutral, or Negatively Before and After Innovations	63
Table 21. Proportion of Total Survey Sample Rating the Ten Worst Physical Attributes of the Dining Halls Positively Neutral, or Negatively Before and After Innovations	65
Table 22. The Weighted Averages of the Longest and Shortest Waits for Food Reported by Dining Outlet	66
Table 23. Mean Ratings Given by the Interview Sample Comparing Twentynine Palms to Other Military Bases on Various Issues of Food Service Before and After Using the Scales Below:	67
Table 24. Proportion of Total Survey Sample Rating the Seven Worst Attributes of the Dining Hall Food at Twentynine Palms as "Often" or "Always" Present Before and After Innovations	68
Table 25. Proportion of Total Survey Sample Indicating that Variety of Offerings is Adequate for Weekday and Weekend Meals and During the Course of a Month Before and After Innovations	69
Table 26. Overall Rank Order Preference for the Various Food Service Outlets at Twentynine Palms Following Innovations	70
Table 27. Mean Ratings for the Various Food Service Outlets at Twentynine Palms on Several Attributes After Innovations Using the Following Scale	72
Table 28. Distribution of Military Food Service Workers Interviewed	73

LIST OF TABLES (cont'd)

	Page
Table 29. Food Service Worker Opinion of Military Service	74
Table 30. Food Service Worker Mean Response to Three Scales of the Job Description Index (JDI) at MCAGCC Twentynine Palms and Three Air Force Bases	76
Table 31. Food Service Worker Comparison of Present Dining Facility With Others in Which They Have Worked (Percent of Responses)	77
Table 32. Food Service Worker Comparison of Post-Test and Pre-Test Dining Facilities (Percent of Responses)	78
Table 33. Food Service Worker Opinion of Customer Attitude (Percent of Responses)	80
Table 34. Pre-Test Cooks' Responses Concerning Positive and Negative Aspects of Their Dining Facilities (Percent of Responses)	81
Table 35. Post-Test Cooks' Responses Concerning Positive and Negative Aspects of Their Dining Facilities (Percent of Responses)	83
Table 36. Actual Staffing Levels	85
Table 37. Meals Per Manhour	92
Table 38. Average Percent of Time Observed at Work Functions Old vs. New System - All Days	94
Table 39. Productivity Comparisons Between Old and New Systems	94
Table 40. Total Dining Facility O&M Costs - New Improved System	96
Table 41. Cost Per Ration for Each Dining Facility - New Improved System	97
Table 42. Total Operating Costs for New Improved System	98
Table 43. Total Operating Cost for the Previous Conventional Food Service System in 1977 and 1978 Dollars (Two Dining Facilities)	99

LIST OF TABLES (cont'd)

	Page
Table 44. Total Projected Operating Costs for the Previous Conventional System with Four Dining Facilities	100
Table 45. Total Annual Cost Comparison Between the Conventional and Improved Systems	101
Table 46. Comparative Cost Per Ration for Conventional and Improved Systems	102
Table 47. Analysis of Investment Costs for MCAGCC, Twentynine Palms	103
Table E-1. Food Service Worker Survey Statistical Analyses	141
Table F-1 Detailed Job Definitions	142
Table F-2 Detailed Task Definitions	143
Table G-1. Average Total Manhours and Productive Manhours by Worker Category	151
Table G-2. Sample Size (Number of Observations)	152
Table G-3. Degree of Accuracy(s) of Productivity Measures with 95% Confidence	152
Table G-4. Percent of Time Observed at Work Functions by Dining Facility and Worker Category	153
Table G-5. Percent Time Observed at Work Functions by Dining Facility Average and Worker Category Average	154

AN EVALUATION OF THE NEW "MULTI-RESTAURANT" FOOD SERVICE SYSTEM FOR THE MARINE CORPS

SECTION I

INTRODUCTION

The site selected by Headquarters, Marine Corps (HQMC) for conducting the system research and design, and then testing and evaluating the resulting new "Multi-Restaurant" food service system was the Marine Corps Air Ground Combat Center (MCAGCC) Twentynine Palms, California, which is located in the high desert about 140 miles east of Los Angeles (see Figure 1). MCAGCC Twentynine Palms is the largest (in area) Marine Corps installation in the world. In fact, all of the remaining Marine Corps bases could be placed inside of it and only take up 80% of its area.

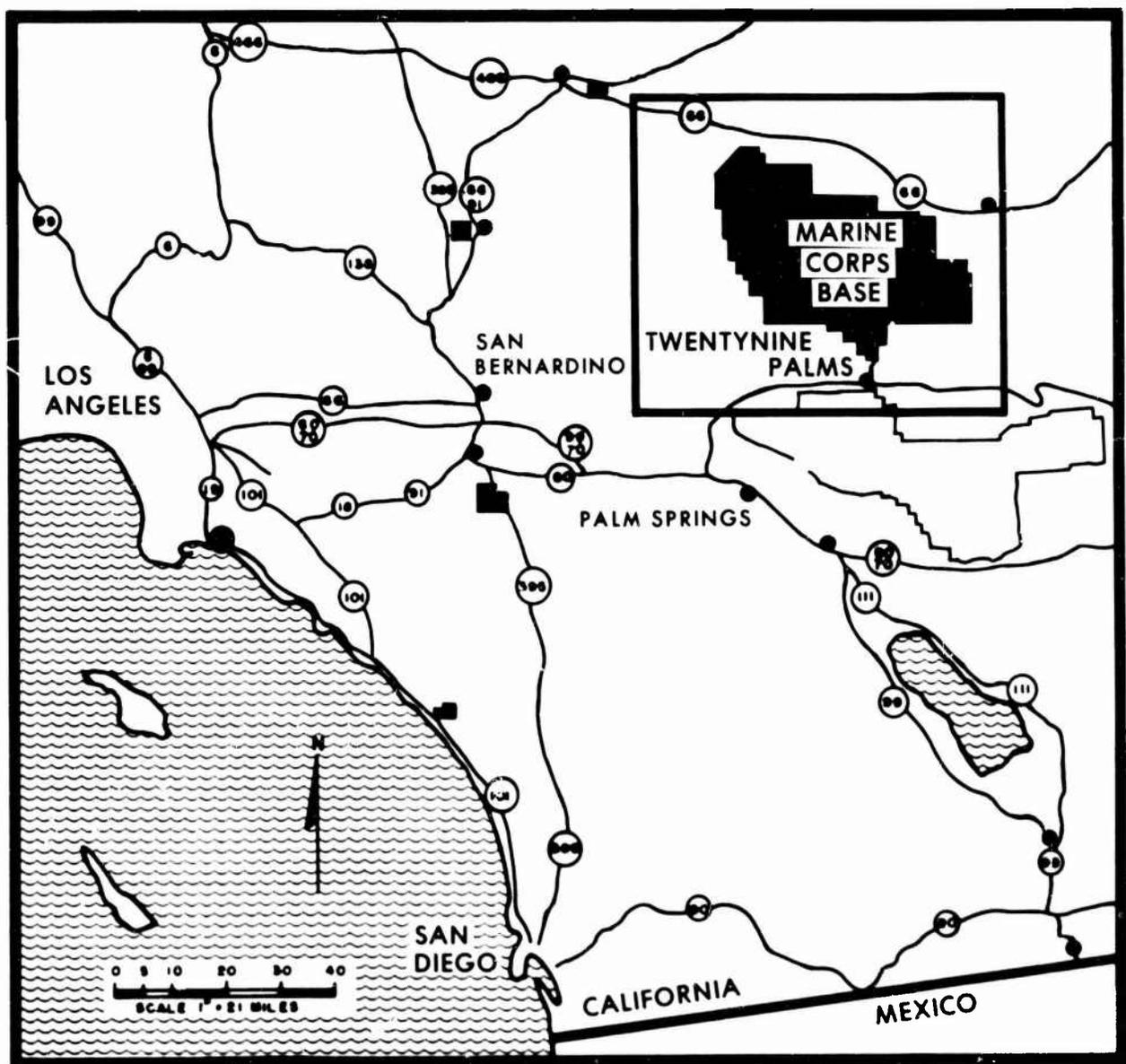


FIGURE 1: LOCATION MAP OF MCAGCC TWENTYNINE PALMS, CA

While the vast majority of the base is uninhabited desert which is used primarily for tactical field exercises, this study concerned itself with the "main base" area where all of the troops stationed at MCAGCC Twentynine Palms are garrisoned (see Figure 2). At the time of the test, the population at the base was approximately 7000 military personnel not including civilians and dependents.

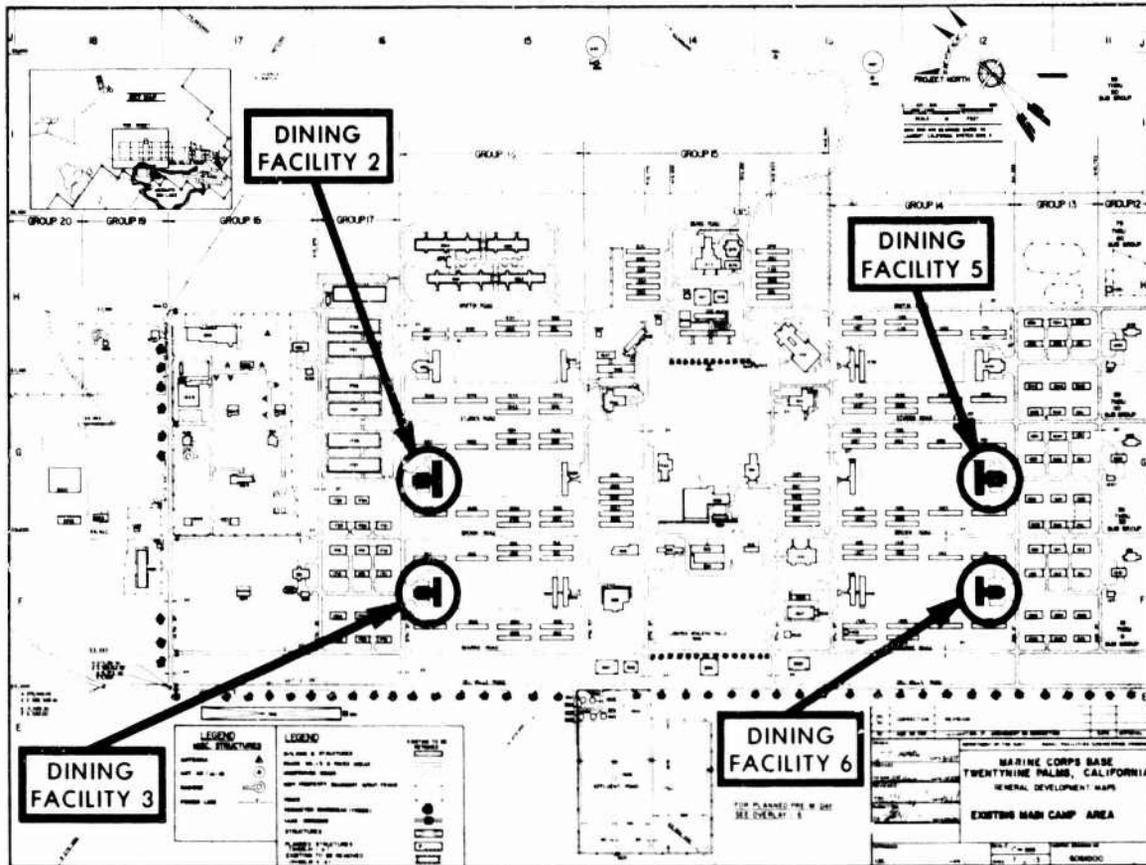


FIGURE 2: MAP OF THE MAIN BASE MCAGCC TWENTYNINE PALMS

The primary mission of the base is to provide a site for the training of personnel in air-ground combat. The purpose of the majority of personnel stationed there is to participate in and support the field exercises that are continually being conducted. In addition, the Marine Corps Communications and Electronics School (MCCES) is located on the main base.

Figure 3 shows the overall organizational chart for MCAGCC Twentynine Palms. It is important to note that while the food service office is part of the base support activities, each dining facility is the responsibility of the unit to which it is assigned. Consequently, the food service office is concerned with providing subsistence to the dining facilities and consolidating reports and financial-statements for HQMC. All personnel and administrative matters are handled by the units to which the facilities are assigned. The food service office consists of a food service officer, a food technician (senior NCO), several clerks (military), a secretary, and a civilian who oversees the indirect supply requirements for the facilities (e.g., dishware, flatware, soaps, cleaners, etc.).

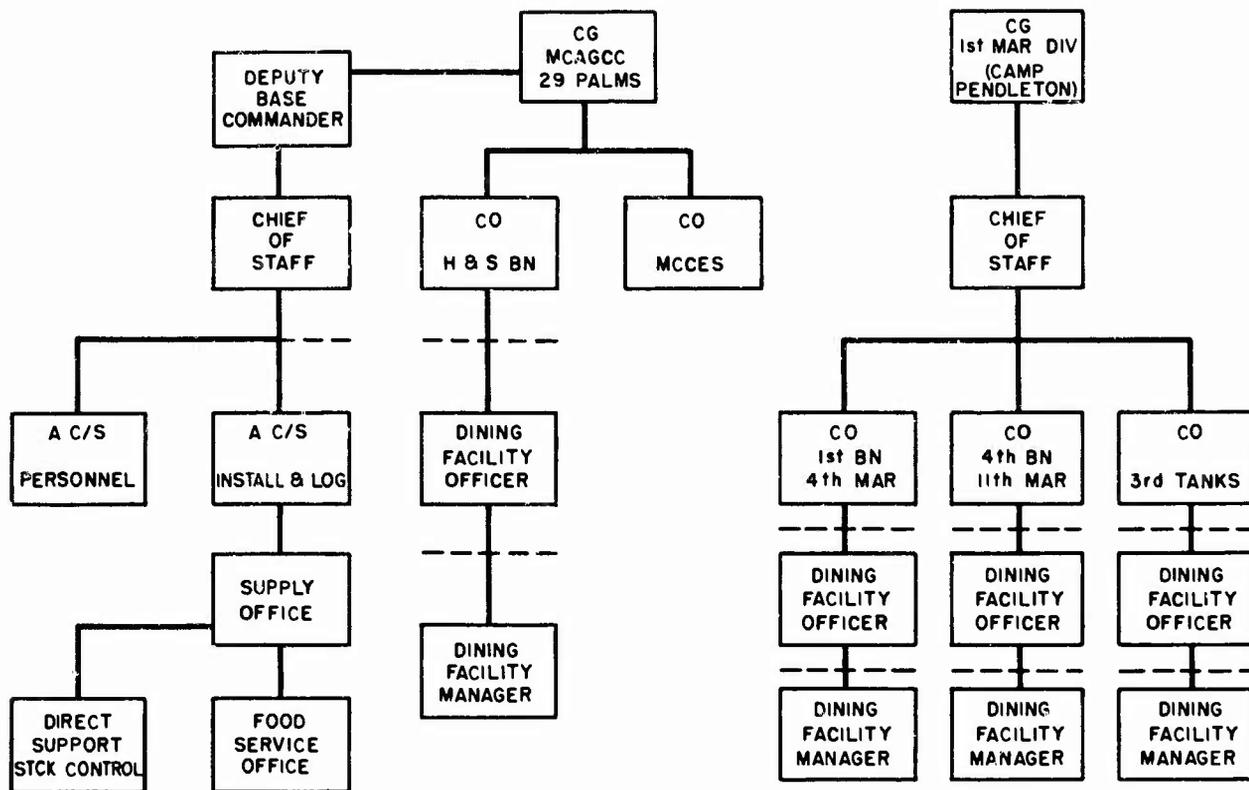


FIGURE 3: MCAGCC TWENTYNINE PALMS ORGANIZATIONAL CHART

Each dining facility has a manager (senior NCO) who is responsible for the overall operation of the facility. In addition, there is a dining facility officer who is responsible for reviewing and approving all financial reports that are sent to the food service office. All administrative and personnel matters are handled through the dining facility officer. There is a storeroom man in charge of subsistence. There is also a subsistence clerk who assists in the preparation and completion of required reports. The cooks are usually divided into two watches (shifts) with the chief cook (shift leader) on each watch reporting to the dining facility manager. Messcooks are assigned to perform all the sanitation functions and to assist in the serving of the food. Messcooks are unskilled personnel who are assigned to the dining facility for up to 30 days. These individuals have neither training nor interest in food service and return to their original units when their tours of duty are completed.

SECTION II

EXECUTIVE PRECIS

The major objective of this project was to design and test a garrison food service system which would significantly improve the attendance and acceptance of Marine Corps enlisted customers in appropriated fund dining facilities. It was determined from consumer surveys at both MCAGCC Twentynine Palms as well as other military installations that the new food service system, in order to increase customer attendance and acceptance, should offer its customers a choice of outlets with a variety of menus similar to those available at the more popular commercial restaurants.¹⁻³

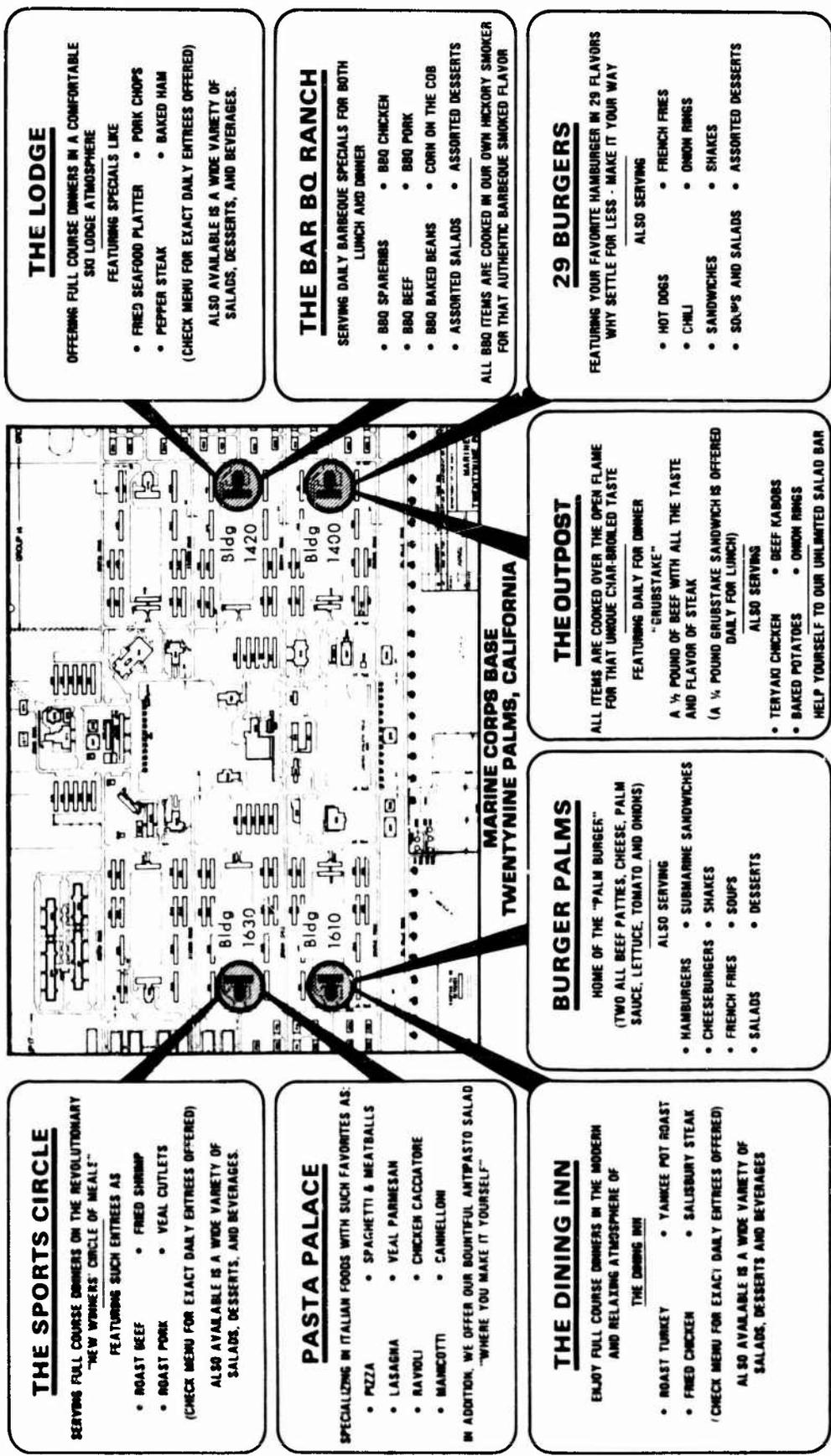
In order to test this concept, a new improved system, consisting of multiple food outlets, was designed and incorporated into four existing dining facilities at MCAGCC Twentynine Palms. Each facility was converted into two distinct food outlets offering different types of food service which are similar to those a young serviceman would patronize as a civilian (Figure 4). Three of these outlets serve a high preference, 12-day cycle, A-ration menu; two offered a short order menu; and the remaining three provided specialty menus (Italian, steak, and barbecue). Each of the latter five menus was relatively constant and also consisted of high preference food items. This complex of eight food outlets was supplemented by a mobile food service unit which served short order type meals at remote areas such as the Rifle Range during lunch, and in the barracks area in the later evening periods.

Each of the elements that comprise this new system was designed to address and satisfy an identified customer desire in an efficient manner. Basically, this multi-restaurant concept seeks to satisfy the military customers' demand for variety by offering a choice of outlets which serve different types of menus in uniquely designed dining areas. This total system concept has proven very successful in university, commercial, and industrial applications, such as the University of California at Los Angeles, The World Trade Center in New York City, and the Quincy Market complex in Boston. The scope of the concept is broad; it provides for a choice of outlets with different associated themes and decors, a choice of food service type, a choice of dining hours, and a choice of items at any particular outlet. Moreover, all menus are designed to meet the highest level of stated consumer preference (as determined by food preference surveys) as well as to implement new food product technology in order to satisfy the consumers' desires in a cost efficient manner.

¹M. Davis, P. Brandler, G. Eccleston, B. Bissonnette, W. Wilkinson, L. Symington, and M. Berman, "An Evaluation of the Conventional Marine Corps Garrison Food Service System at Marine Corps Base, Twentynine Palms, CA", Technical Report, NATICK/TR-79/039, US Army Natick Research & Development Command, Natick, MA, October 1979.

²D. Leitch, R. Byrne, G. Hertweck, "An Analysis of Consumer Evaluations of Proposed Changes in a Food Service System", Technical Report, NATICK/TR-74/40-OR/SA, Operations Research and Systems Analysis Office, US Army Natick Laboratories, Natick, MA, August 1973. (AD A782 984)

³L. Branch and H. Meiselman, "The Consumer Opinions of the Food Service System: The 1973 Travis Air Force Base Survey", Technical Report, NATICK/TR-73/52-PR, Pioneering Research Laboratory, US Army Natick Laboratories, Natick, MA, May 1973. (AD A763 156)



THE SPORTS CIRCLE

SERVING FULL COURSE DINNERS ON THE REVOLUTIONARY "WE 'W' WINNERS' CIRCLE OF MEALS"
 FEATURING SUCH ENTREES AS
 • ROAST BEEF • FRIED SHRIMP
 • ROAST PORK • VEAL CUTLETS
 (CHECK MENU FOR EXACT DAILY ENTREES OFFERED)
 ALSO AVAILABLE IS A WIDE VARIETY OF SALADS, DESSERTS, AND BEVERAGES.

PASTA PALACE

SPECIALIZING IN ITALIAN FOODS WITH SUCH FAVORITES AS:
 • PIZZA • SPAGHETTI & MEATBALLS
 • LASAGNA • VEAL PARMESAN
 • RAVIOLI • CHICKEN CACCIAOTORE
 • MANICOTTI • CANNELLONI
 IN ADDITION, WE OFFER OUR BOUNTIFUL ANTIPASTO SALAD "WHERE YOU MAKE IT YOURSELF!"

THE DINING INN

ENJOY FULL COURSE DINNERS IN THE MODERN AND RELAXING ATMOSPHERE OF THE DINING INN
 • ROAST TURKEY • YAMKEE POT ROAST
 • FRIED CHICKEN • SALISBURY STEAK
 (CHECK MENU FOR EXACT DAILY ENTREES OFFERED)
 ALSO AVAILABLE IS A WIDE VARIETY OF SALADS, DESSERTS AND BEVERAGES

BURGER PALMS

HOME OF THE "PALM BURGER"
 (TWO ALL BEEF PATTIES, CHEESE, PALM SAUCE, LETTUCE, TOMATO AND ONIONS)
 ALSO SERVING
 • HAMBURGERS • SUBMARINE SANDWICHES
 • CHEESEBURGERS • SHAKES
 • FRENCH FRIES • SOUPS
 • SALADS • DESSERTS

THE OUTPOST

ALL ITEMS ARE COOKED OVER THE OPEN FLAME FOR THAT UNIQUE CHAR-BROILED TASTE
 FEATURING DAILY FOR DINNER "GRUBSTAKE"
 A 1/2 POUND OF BEEF WITH ALL THE TASTE AND FLAVOR OF STEAK
 (A 1/4 POUND GRUBSTAKE SANDWICH IS OFFERED DAILY FOR LUNCH)
 ALSO SERVING
 • TERYARD CHICKEN • BEEF KABOBS
 • BAKED POTATOES • ONION RINGS
 HELP YOURSELF TO OUR UNLIMITED SALAD BAR

MARINE CORPS BASE TWENTYNINE PALMS, CALIFORNIA

THE LODGE

OFFERING FULL COURSE DINNERS IN A COMFORTABLE SKI LODGE ATMOSPHERE
 FEATURING SPECIALS LIKE
 • FRIED SEAFOOD PLATTER • PORK CHOPS
 • PEPPER STEAK • BAKED HAM
 (CHECK MENU FOR EXACT DAILY ENTREES OFFERED)
 ALSO AVAILABLE IS A WIDE VARIETY OF SALADS, DESSERTS, AND BEVERAGES.

THE BAR BQ RANCH

SERVING DAILY BARBECUE SPECIALS FOR BOTH LUNCH AND DINNER
 • BBQ SPARERIBS • BBQ CHICKEN
 • BBQ BEEF • BBQ PORK
 • BBQ BAKED BEANS • CORN ON THE COB
 • ASSORTED SALADS • ASSORTED DESSERTS
 ALL BBQ ITEMS ARE COOKED IN OUR OWN HICKORY SMOKER FOR THAT AUTHENTIC BARBECUE SMOKED FLAVOR

29 BURGERS

FEATURING YOUR FAVORITE HAMBURGER IN 29 FLAVORS WHY SETTLE FOR LESS - MAKE IT YOUR WAY
 ALSO SERVING
 • HOT DOGS • FRENCH FRIES
 • CHILI • ONION RINGS
 • SANDWICHES • SHAKES
 • SOUPS AND SALADS • ASSORTED DESSERTS

FIGURE 4: MCAGCC TWENTYNINE PALMS GUIDE TO GOOD EATING

The new improved food service system commenced operations at MCAGCC Twentynine Palms, CA on 19 June 1978. Substantial data were collected after the start up period (September to November 1978) to evaluate the performance of the new improved system relative to the conventional food service system that previously existed. The major purpose of this report is to quantify and analyze the results of implementing the multi-restaurant food service concept at MCAGCC Twentynine Palms specifically, and throughout the Marine Corps, in general. Of particular interest, in comparing the new improved system with the previous existing conventional system, were consumer attendance, consumer attitudes, worker opinions, labor utilization and productivity, and system costs. A summary of the findings in each of these areas follows.

A. ATTENDANCE RATES

Attendance rates under the multi-restaurant concept increased by 29.7% (Oct-Dec 1978 vs Oct-Dec 1977) over the former system (see Figure 5). During this period, the new concept was fully operational and steady-state eating patterns were established. An increase in attendance rates of this magnitude represents a major accomplishment in improving military food service. These quantitative results demonstrate the success possible with a food service system that offers its customers a choice of different food service outlets at several locations when coupled with a variety of high preference menus and increased hours of service. This new concept was such a contrast to the old system, where personnel were assigned to eat in only one dining facility that provided standard military food service, that customer attendance increased significantly from the very start of the test, even in spite of a shift to tropic hours during June, July, and August which tended to adversely affect attendance. Any increase in customer attendance is difficult to achieve in food service operations. An increase of this magnitude in a commercial or institutional food service concept would be considered a significant accomplishment which would result in an expedited company-wide implementation plan.

Although the actual attendance increase was substantial, additional increases could have been realized if existing constraints in scheduling food service personnel could have been removed. For example, if cooks' work hours could have been scheduled individually rather than by watches, staggered shifts could have been established that would have permitted the specialty outlets to remain open longer hours in the evening, resulting in additional customers.

While attendance improved dramatically, the acceptance of the free flow concept (i.e., no restrictions as to where to eat) by the units at MCAGCC Twentynine Palms, CA was mixed. Members of some units distributed their patronage in a somewhat uniform manner over all available facilities, while other units tended to concentrate their patronage on a single dining facility as if they had been allowed to eat in only that facility. This result was not unexpected, as it was reasonable to assume that a customer's choice of which A-ration or short order facilities to eat at would be based on the relative location to either work site or barracks (this hypothesis was verified by the consumer survey), as well as on the fact that the tradition of the assigned dining facility is difficult to overcome.

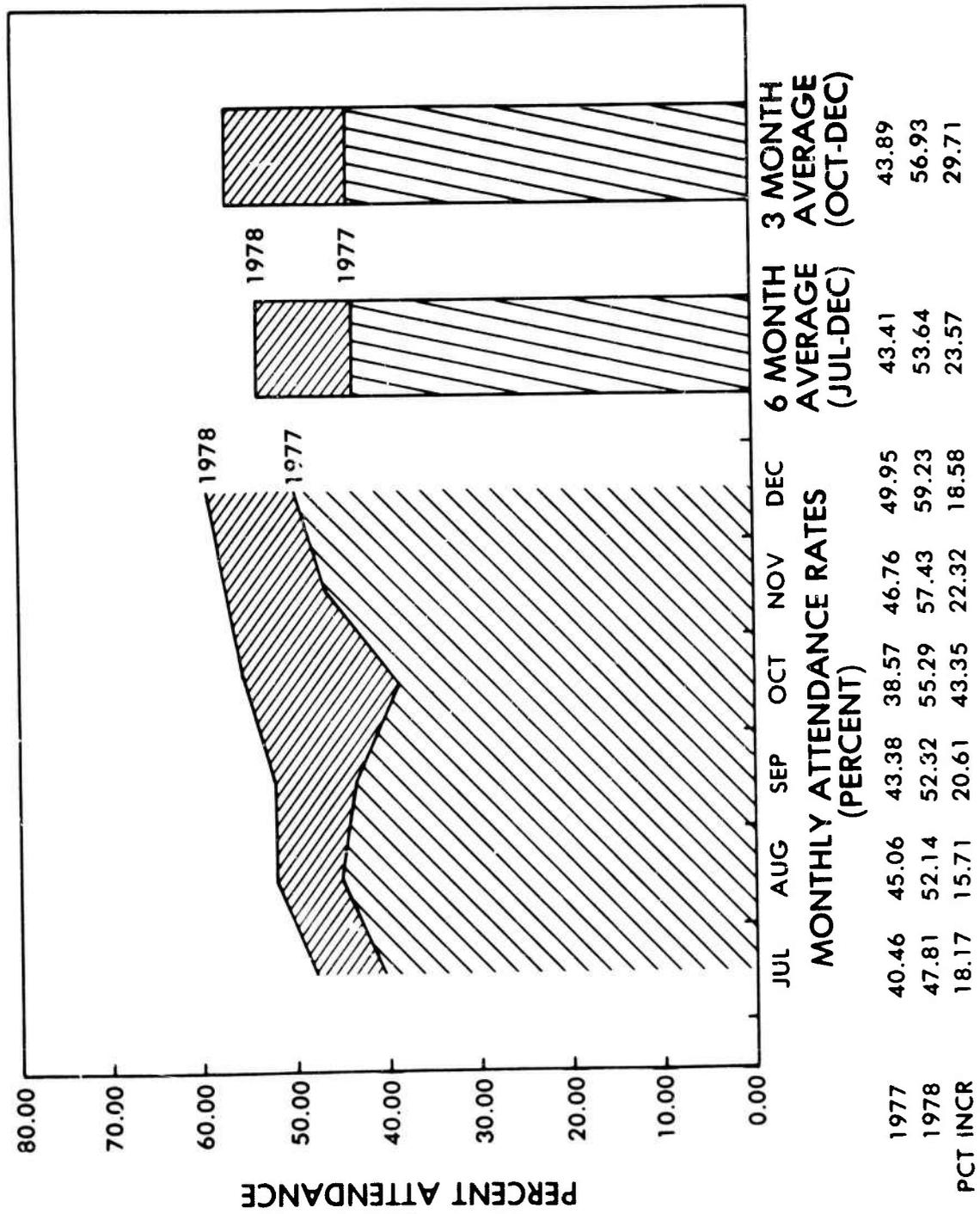


FIGURE 5: DINING FACILITY ATTENDANCE RATES

The free flow concept definitely had much more application to the specialty outlets, because these outlets appeared to draw their patronage more evenly from all the units on the base. This fact was further substantiated by analyzing participation rates for the different menus which demonstrated that about one-third of the lunch and dinner meals served were provided by the specialty facilities. In fact, the relatively even distribution of participation rates over the different menu types indicated the success of the mix of facilities provided at MCAGCC Twentynine Palms.

Nethertheless, the physical location of a dining facility appeared to be of primary importance in influencing customer attendance patterns, that is the more convenient the location, the more likely customers are to attend. This observation directly conflicts with the existing concept of consolidating small dining facilities into larger, centrally located ones, if attendance rates are a matter of concern.

B. CONSUMER ATTITUDES

The enlisted respondents sampled showed a considerable and significant improvement in opinions and attitudes toward the new food service system over those of a similar group sampled prior to the innovations. As seen in Figure 6, the customer's perceived judgement of the

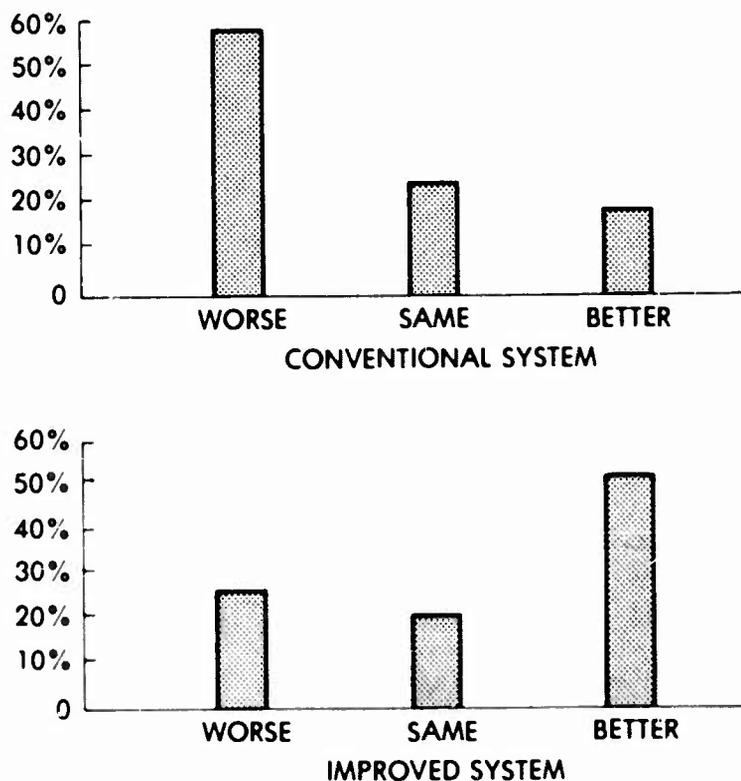


FIGURE 6: CONSUMER RATING OF MCAGCC TWENTYNINE PALMS FOOD SERVICE SYSTEM VERSUS OTHER MARINE CORPS FOOD SERVICE SYSTEMS PREVIOUSLY EXPERIENCED

new system as compared to other Marine Corps food service systems improved substantially from the pre-test evaluation with the mean rating increasing 55% from 2.2 to 3.4 on a scale of one (much worse) to five (much better).

Those areas of concern in the dining facilities originally rated as being highly unsatisfactory by the pre-test survey sample all showed significant improvement (Table 1). The area of concern showing the largest improvement in positive ratings (43% percentage points) was "general dining facility environment", one of the areas most conspicuously improved by renovations. The three areas originally rated most unsatisfactory -- "speed of service or lines," "variety of short order food," and "quality of food" -- showed an average relative increase in positive ratings of more than 100%.

In comparison to the pre-test sample, significantly larger proportions of the post-test sample indicated that variety was "not enough" for short order foods, for meats, for starches, and for desserts, both within meals (intrameal variety), and from day to day during the course of a month (intermeal variety). The food itself was perceived by the post-test sample as significantly less "tasteless or bland," "greasy," "cold," "tough," "dried out," and "fatty" than by the pre-test sample.

There was a significant increase in satisfaction from pre- to post-test measures concerning serving hours for all but the weekend evening meal and with closing hours for all but weekday and weekend breakfast meals.

The top two specialty outlets -- the Outpost and the Bar BQ Ranch -- were both preferred to the highest ranked A-rating (Dining Inn) or short order (Burger Palms) outlets. The Outpost, the overall favorite, received the highest rating of all nine outlets (including the mobile unit) on four of the six attributes rated by the post-test respondents food quality, food quantity, general environment, and food variety.

Finally, the reason cited most often for frequency of attendance at a dining facility was physical proximity to work, followed by physical proximity to residence.

C. FOOD SERVICE WORKER OPINIONS

Marine Corps food service workers interviewed after implementation of the new multi-restaurant system at MCAGCC Twentynine Palms reported significantly higher levels of job satisfaction and opinions of the food service system than did cooks interviewed before. Post-test cooks' scores on the Job Description Index (a job satisfaction instrument) were higher. Post-test cooks rated the new food service system dining facilities as better than those existing previously at MCAGCC Twentynine Palms (Figure 7). Post-test cooks also perceived the customers as having a higher level of satisfaction than before the renovations. In addition, post-test cooks made many more positive and fewer negative comments (in response to open-ended questions) about the food service system than did pre-test cooks (Table 2). The most frequent positive comments about the new system concerned the atmosphere/decor, cooperation and morale among cooks, equipment, ease of work for the cooks, food variety, and food quality. Cooks in Dining Facility 2 also commented favorably on the speed of service

Table 1. Proportion of Total Survey Sample Rating the Worst Ten Areas of Concern in the Dining Facilities Positively Neutral, or Negatively Before and After Innovations^{1, 2}

Area or Topic	Positive		Rating Neutral		Negative	
	Before	After	Before	After	Before	After
1. Speed of Service or Lines	0.17	0.29	0.14	0.28	0.69	0.42
2. Variety of the Short Order Food	0.15	0.33	0.24	0.34	0.60	0.32
3. Quality of Food	0.17	0.38	0.25	0.32	0.58	0.30
4. Service by Dining Facility Personnel	0.17	0.32	0.31	0.37	0.51	0.31
5. Quantity of Food	0.26	0.39	0.23	0.28	0.51	0.33
6. Monotony of Same Facility	0.10	0.21	0.42	0.45	0.48	0.34
7. General Dining Facility Environment	0.19	0.62	0.35	0.27	0.46	0.11
8. Hours of Operation	0.34	0.44	0.24	0.34	0.42	0.22
9. Variety of Regular Weekday Meal	0.25	0.34	0.36	0.36	0.40	0.28
10. Variety of Regular Weekend Meal	0.22	0.35	0.40	0.37	0.38	0.28

¹ N Before = 597; N After = 451

² All Negative and Positive Before versus After differences significant at 0.01 level using ANOVA with Newman-Keuls procedure.

Table 2. Cooks' Responses to Open-Ended Questions Concerning Positive and Negative Aspects of Their Dining Facilities

Positive Aspects

Pre-Test (N = 50)		Post-Test (N = 69)	
Management-Worker Relations	20%	Atmosphere/Decor	49%
Cooks Morale	18%	Cooks Morale	17%
Food Quality	11%	Nothing Negative	19%
Atmosphere/Decor	7%	Good Equipment	16%
		Ease of Cook's Job	16%
		Speed of Service	14%
		Food Variety	13%
		Food Quality	12%

**Post-Test Dining Facility 2
(N = 24)**

Management-Worker Relations	21%
Circle Serve	17%

Negative Aspects

Pre-Test (N = 50)		Post-Test N = 69)	
Hours	56%	Hours	46%
Supervision	29%	Nothing Positive	16%
No Time Off	27%	Need More Cooks	19%
Need More Cooks	20%	Same Preparation	17%
Old Equipment	15%	Each Day	
Training	13%	Demand Unpredictable	13%
Cooks Morale	13%		
Outdated Decor	9%		
Nothing Positive	27%		

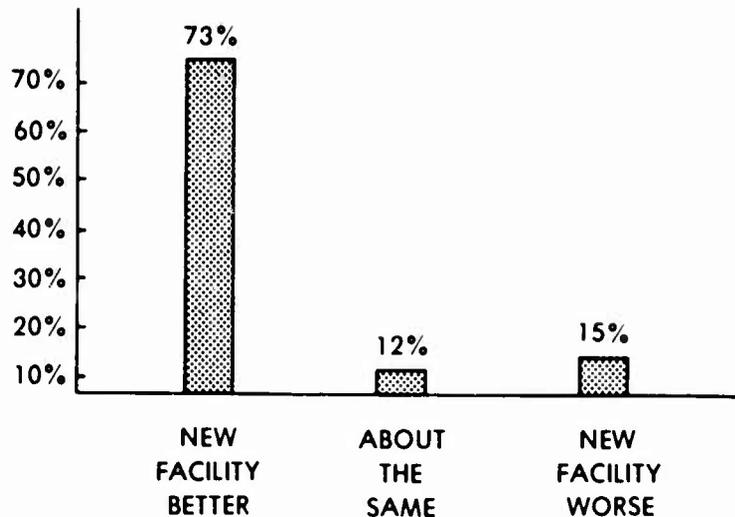


FIGURE 7: POST-TEST COOKS' COMPARISON OF NEW AND PRE-TEST DINING FACILITIES AT MCAGCC TWENTYNINE PALMS

provided the customer in that facility, good management/worker relations, and the carousel serving line. The major complaint of post-test cooks about the new system concerned the long working hours. Putting this into perspective, however, the percent of pre-test cooks with this same complaint was higher. Other negative comments included (a) a need for more cooks, (b) the boredom experienced in preparing the same items each day in facilities with a constant rather than a cyclic menu, and (c) the difficulty encountered in predicting customer demand on any given day. These last two areas could be corrected by, (a) rotating cooks among the different dining facilities to allow them to maintain job proficiency, and (b) using headcount statistics to obtain improved accuracy in forecasting customer demand.

D. LABOR UTILIZATION AND PRODUCTIVITY

Labor utilization and productivity were analyzed to determine the work requirements of the new multi-restaurant concept relative to the conventional food service system. No additional food service personnel were added to the existing workforce in order to support the new system (that is, staffing levels were based upon existing Marine Corps standards).

The lower percentage of productive time (54.4%) for all food service workers under the new system in comparison to the previous conventional system (63.3%) and other military installations (67.8% at Travis AFB, 63.4% at McGuire AFB) suggests that the staffing levels were too high. An alternate interpretation of these data is that the number of meals served could be substantially increased without increasing the present workforce. Therefore, any increases in customer attendance resulting from the implementation of the multi-restaurant concept would not necessitate any additional cooks (that is, the new system can be implemented within the existing workforce constraints).

Similarly, the low productivity (1.92 meals per manhour) can be attributed to the relatively low utilization rate of the dining facilities (in comparison to their rated capacities), the large amounts of untrained messcook labor as well as the requirement to maintain a training base in the Fleet Marine Force (FMF) units. Differences in productivity among the dining facilities indicate possible discrepancies in staffing levels between the facilities relative to the work loads and number of meals served. This indicates the need for the base food service office to have more control over the assignment of cooks to the dining facilities. Finally, staffing levels should be adjusted downward on weekends to allow for the lower utilization rates during these periods.

E. SYSTEM COSTS ANALYSIS

The multi-restaurant concept was implemented at MCAGCC Twentynine Palms, CA at a cost of \$795,547, which is less than \$200,000 per dining facility or \$100,000 per outlet. This amount is substantially less than the cost to renovate many other dining facilities at other installations under the conventional food service system (for example, the enlisted dining facility at the Marine Barracks, Washington, DC, was renovated at a cost of over \$500,000). This lower cost resulted from the fact that unlike previous food service modernization projects which concentrated solely on modernizing and renovating the physical structure of the dining facilities, the multi-restaurant concept attempts to take full advantage of existing dining facility configurations (for example, the accented beams at MCAGCC in lieu of a more expensive suspended ceiling), thereby reducing renovation costs and thus permitting additional dollars to be spent on system design, specialized equipment (for example, the barbeque smoker and the carousel serving line), and improved seating and decor packages for the dining areas.

The increase in the number of meals served resulting from the increase in customer attendance at the dining facilities was the sole source of the incremental operating costs of \$626,000 annually under the multi-restaurant concept. This amount represents an increase of 15.5% over the conventional system. It is important to note that these incremental operating costs are divided between raw food costs (2/3) and an increase in mess cook requirements (1/3) to support the additional meals fed, and, therefore, do not adversely affect the operating budget at an installation. Of great significance, however, is that due to the higher participation rates over the conventional system, the total cost per ration in the new system is approximately 10% less (\$7.676 per ration under the new system vs. \$8.498 per ration under the old system).

F. SYSTEM IMPLEMENTATION

As a result of the huge success experienced by this new food service concept, an implementation plan has been requested by HQMC. The purpose of this plan will be to provide other Marine Corps installations with recommendations for improving their individual food service operations. Recommendations will be based upon the test results experienced at MCAGCC Twentynine Palms. Since no two Marine Corps installations are alike, data collection visits will be made to four additional Marine Corps installations (MCB Camp Pendleton, CA; MCAS EI Toro and MCAS(H) Santa Ana, CA; MCB Camp Lejeune, NC; and MCDEC, Quantico, VA) to determine what facets of the multi-restaurant concept can be adopted for each specific location and to suggest improvements that could be made to upgrade each food service operation.

The recommendations and implementation plans for each of these installations will be published in a separate report.

Post Script:

The multi-restaurant concept discussed in this report details the system and the experiences and results of its utilization during 1977. It was anticipated that some of the aspects of the situation at MCAGCC Twentynine Palms, CA would change, resulting in the need to reevaluate menus and serving schedules periodically in order to maintain a concept which would be responsive to those who utilize its services. While it has been the case that since the conclusion of the test phase of this concept, changes have been made, it has not necessarily been the case that responsiveness to identified customer desires has always been the motivating force.

Expanded serving hours, a valid consumer-oriented feature of the multi-restaurant concept, is no longer a reality at the MCAGCC Twentynine Palms. The limitations of the Marine Corps two-watch system, cyclical shortages of food service personnel, and various unit requirements for specific meal hours, even though free-flow is permitted, seem to bear most heavily in this area. Of specific concern to the military managers at Twentynine Palms is the probability that there would be a shortage of supervisory personnel in dining facilities with expanded hours, the possible loss of accountability for subsistence during periods of little or no supervision and storeroom manning, and the opportunity presented customers to have a fourth meal.

Until May 1979, the Mobile Unit, an essential element of the expanded service provided by the new concept, provided fast food service at lunchtime in duty areas, and at dinnertime in the barracks area. The obvious success of this service, however, resulted in the imposition of severe limitations on the operating hours and location of the Mobile Unit, because it might be taking too much business away from non-appropriated fund activities on the base. This concern regarding the utilization of the Mobile unit was, however, secondary to the suspected existence of a fourth-meal problem, and operating limits were imposed primarily for that reason.

Further, the multi-restaurant concept currently faces a new challenge. Personnel desiring an extra meal or snack, will soon be able to satisfy their needs at a new non-appropriated fund fast food outlet, to be located on the base and scheduled to open in the October-December 1980 time frame. Such things as fried chicken, tacos, pizza, and hamburgers and hotdogs will be available. The base population will, therefore, have an additional food service option available, which may take customers from the appropriated fund food service operation. To respond, the food service officer surveyed customer desires, and the results indicated that an expanded menu was needed in the Pasta Palace in the form of a new range of Italian style sandwiches including pizza burgers. He is also expanding the present twelve-day, high-preference, A-ration menu to 21 days, in an attempt to respond to the desires of customers who want more variety.

With respect to the latter point, it should be noted that even though variety is implicit to the multi-restaurant concept with its three specialty houses, two short-order and three A ration facilities, many of the young enlisted personnel fail to avail themselves of this variety,

because they eat exclusively not only in the same facility, but in the same serving line. This may be due to the fact that the traditional Marine Corps approach to food service is to assign unit personnel to a specific unit dining facility. Education, therefore, and not menu cycle expansion may cure the complaint.

Nevertheless, menu expansion is being addressed in a number of ways. A German meal, new varieties of chicken, lamb dishes, and corned beef have been added to the A-ration menu. In addition, spareribs, previously available only in the BBQ Ranch, and Italian meal, previously only available in the Pasta Palace, and grilled steak, previously only available in the Outpost Steakhouse, are now part of the A-ration menu. These latter changes result from the aforementioned fact that personnel do not seem to rotate amongst the four facilities. Entree combinations are also more varied due to the lengthened cycle. Meatloaf, for example, can now appear paired with a number of different entrees, rather than the same one each time.

To reduce kitchen workload, some variety, however, was eliminated. Lunches in the Pasta Palace feature more sandwich items, which can be prepared by servers on the serving line, in place of full course Italian meals. Some variety was eliminated from daily breakfasts, and the new menu calls, instead, for variety from one day to the next.

A major barrier to the optimal application of the multi-restaurant concept in the Marine Corps is the lack of a central management structure, which would place the base food service officer in charge of the entire base food service system. Dining facility officers at Twentynine Palms continue to open or close facilities based only on the desires and needs of their units without prior coordination with the food service officer. It should be noted that the justification for such unit control relates to unit deployment requirements. It is felt, however, that both central management and unit deployment requirements could be accommodated to the benefit of current operations. Centralizing management is not enough; it must be coupled with trained management — trained in the basics of effective management, operation, and control of food service facilities, as well as the implementation of the multi-restaurant concept.

Marine Corps dining facility manager positions are not always filled with food service management qualified personnel. Generally, rank defines the job a Marine in the food service field holds, but enlisted rank may have been earned primarily through military skills and proficiencies, or for technical skills in food preparation rather than ability and training in food service management. In other instances, attrition of more senior personnel may have pushed a highly proficient cook, who is relatively junior in rank, into a management position for which he is not qualified by experience, training, rank, or inclination. Development of management skills through an effective training program, then, is essential for Marine Corps food service personnel, particularly of rank E-4 and above, to provide them with the skills needed to operate a multi-restaurant concept or any other food service configuration. This will preclude the problem of having incumbents in managerial positions barely muddling through.

In summary, since the initiation of the multi-restaurant concept, dining facility hours have been shortened, the use of the mobile feeding unit has been limited, the introduction of a nonappropriated fund fast food outlet which will compete for dining facility customers is

scheduled, and menus have been modified supposedly to respond to customer desires for added variety. Any suggestion that all this has enhanced the operation is controversial at best. Moreover, to achieve the full potential of the concept requires a customer populace educated to the options presented by the multi-restaurant system, a management cadre possessing the skills to operate it, and a more centralized management structure to optimize use of the assets of the system. Indications are that these requirements at best are only marginally addressed at present.

SECTION III

THE IMPROVED FOOD SERVICE SYSTEM — AN OVERVIEW

A. INTRODUCTION

The development of the new food service system that was tested at MCAGCC Twentynine Palms was based on the central motivating theme of improving customer attendance and acceptance. Each of the elements that comprise this new system was designed to address and satisfy an identified customer desire in an efficient, cost-effective manner. The bulk of this report is devoted to the detailed analysis of the operations and efficiency of the new food service system that was tested at MCAGCC Twentynine Palms and to the response of its patrons. This section, however, presents an overview of the new system and how it was designed to satisfy both consumer needs and desires as well as to meet operational requirements and regulations.

B. THE DEVELOPMENT OF THE MULTI-RESTAURANT CONCEPT

The approach taken in evaluating the existing system and addressing the program objectives was that of a total systems analysis of all the individual aspects of the appropriated fund food service operation as well as their interactions. In this section, however, only those aspects of the system design and analysis which resulted in the development of the specific multi-restaurant concept that was tested at MCAGCC Twentynine Palms, will be emphasized.

As has been noted, MCAGCC Twentynine Palms is located in a remote area of the southern California desert far removed from the normal food service competition that other institutional food service operations would face in a more densely populated area. The only choices available to the enlisted Marines stationed at Twentynine Palms are the enlisted dining facilities, the NCO Club, and the various base exchange outlets (the enlisted dining facilities at Twentynine Palms prior to the implementation of any suggested improvements were comprised of two large units).

Initial efforts focused on a determination of the eating habits of the consumer population. In order to accomplish this task, a statistical sample of the enlisted population was monitored via a diary to determine its patterns of eating behavior. As Table 3 indicates, despite the fact that enlisted personnel on Subsistence-In-King (SIK) were entitled to eat at no cost in the dining facilities, they took advantage of their entitlement only approximately 45% of the time. For an additional 30% of the time, they chose to pay out of their own pocket to eat at other facilities, located on and/or off base. Finally, approximately 25% of the time they skipped eating meals completely. Data regarding the time of the day that the customer chose to eat was also obtained in order to determine the most desirable operating hours (Figure 8). As consumer survey data and this latter figure indicated, extended hours, particularly for the dinner meal were most desirable and, therefore, were provided under this concept of food service by keeping a short order facility open until 2200 and by locating the mobile unit in the Bachelor Enlisted Quarters (BEQ) area until that time as well.

Table 3. Percentage of Pre-Test SIK Attendance Rates for 12 Eating Locations

Dining Halls	45.1
Home	10.1
Restaurants	6.8
Bowling Alley	4.4
Vending Machines	2.1
Enlisted Men's (EM) Club	1.7
7 Day Store	1.2
"Dog House"	1.2
Recreation Center Snack Bar	1.0
Staff Non-Commissioned Officer's (SNCO) Club	0.9
Golf Course Snack Bar	0.1
Baskin Robbins	<u>0.0</u>
Total	74.6
Meals Skipped	25.4

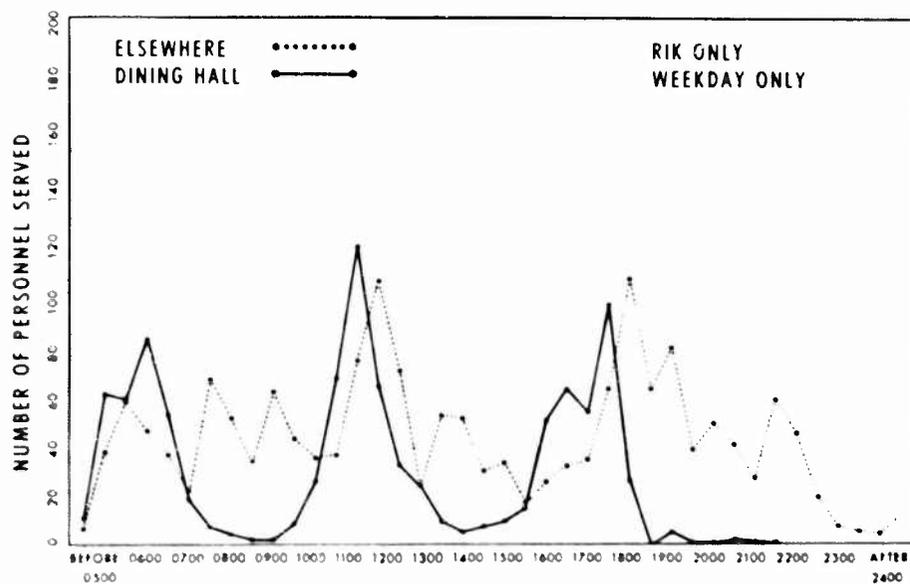


FIGURE 8: ATTENDANCE RATES AT 29 PALMS IN HALF HOUR INTERVALS

Critical to any successful food service operation in an institutional setting is a determination of the consumers' dissatisfactions with the present system and a determination of their preferences and desires for a new system. By considering those areas which generate the most consumer concern, funds can be invested in correcting those aspects of the system which most dissatisfy the customer. The seven worst areas of consumer concern at MCAGCC Twentynine Palms were: (1) speed of service or long lines, (2) variety of food, (3) quality of food, (4) service by dining facility personnel, (5) quantity of food, (6) the monotony of the same facility (at the time, each unit was specifically assigned to eat at a designated enlisted dining facility), and (7) the general dining facility environment. In addition, as Table 4 indicates, an attempt was also made to determine which specialty menus were most desired by the enlisted customer. The mean rating in the second column relates to the average response by the consumer sample on a five-point hedonic scale ranging from 1, Like Extremely, to 5, Dislike Extremely.

Table 4. SIK Consumer Rating of Specialty Menus

Specialty Menu	Mean Rating	Negative Ratings (in %)
Steak House	1.83	2.5
Barbecue	2.20	0.0
Italian	2.45	10.8
Deli-Service	2.65	11.7
Seafood	2.78	16.7
Mexican	2.99	18.3

As can be noted, in Table 4, the Steak House, Barbeque, and Italian menus ranked highest on the average and also generated the lowest percentage of negative ratings.

The solution to the problem posed by the Marine Corps food service system at MCAGCC Twentynine Palms was developed around the multi-restaurant concept. This approach seeks to satisfy the military customer's demand for variety by offering a choice of outlets which serve different types of menus in uniquely designed dining areas. This total system concept has proven highly successful in university, commercial, and industrial applications such as the University of California at Los Angeles, the World Trade Center in New York City, and the Quincy Market complex in Boston. The scope of the concept is broad, providing a choice of outlets with different associated themes and decors, a choice of types of food service, a choice of dining hours, a choice of menu from outlet to outlet, and a choice of items at any particular meal in any particular outlet. Moreover, all menus are designed to meet the highest level of stated consumer preference (as determined by food preference surveys) as well as to implement new food product technology in order to satisfy the consumer's desires in a cost efficient manner. As Figure 9 indicates, the new food service system at MCAGCC Twentynine Palms consists of four enlisted dining facilities each of which houses two individual

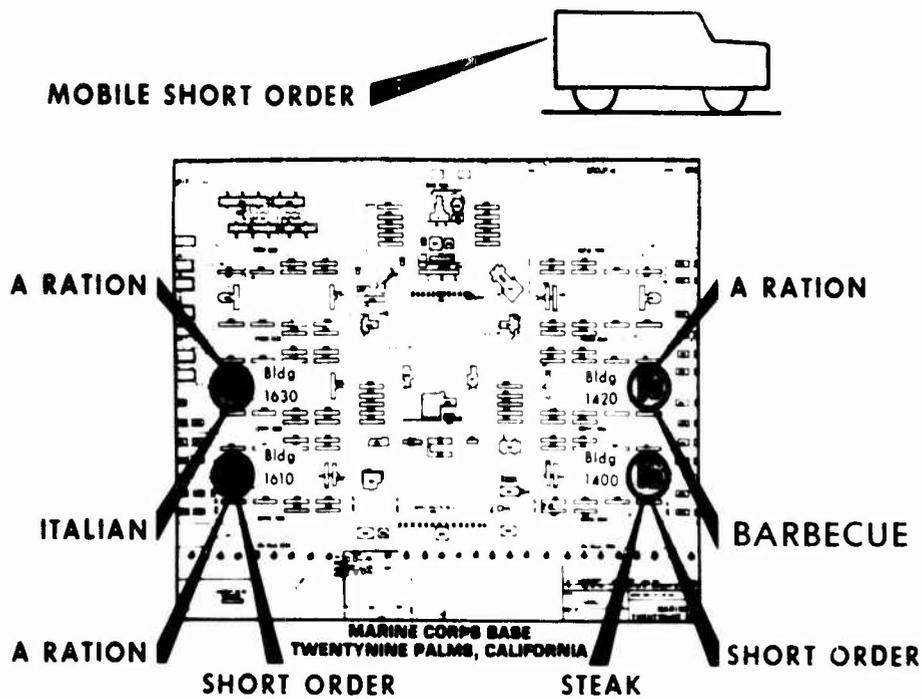
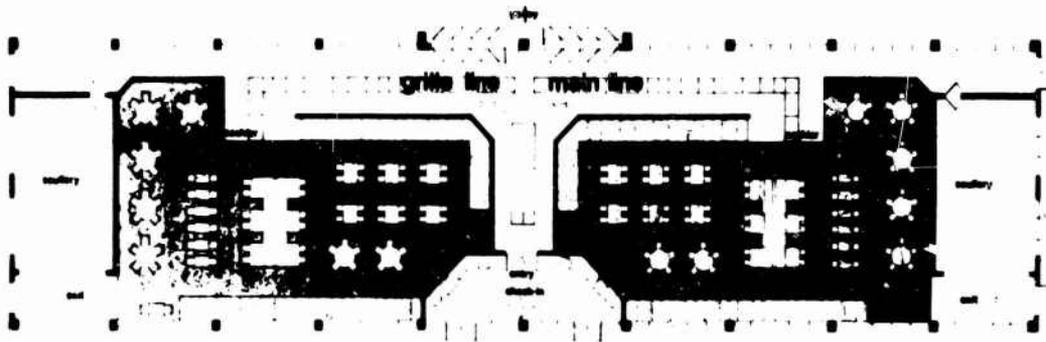


FIGURE 9: MCAGCC TWENTYNINE PALMS TYPES OF DINING OUTLETS

restaurants. This complex of eight restaurants is supplemented by a mobile food service unit serving hamburger type meals. As can be seen in Figure 9, the complex consists of three A-ration facilities (each serving a high preference, 12-day menu cycle), two short order facilities, an Italian restaurant, a Steak House, and a Barbecue House (each of which serve a relatively constant menu).

The Steak House, in particular, posed a difficult problem. It was clearly the most desired food service outlet that could be considered for implementation at MCAGCC Twentynine Palms. However, the price of steak was too prohibitive to offer it on a daily basis and still remain within necessary food cost budget guidelines. The solution was to introduce a restructured steak developed at the US Army Natick Research and Development Command (NARADCOM)

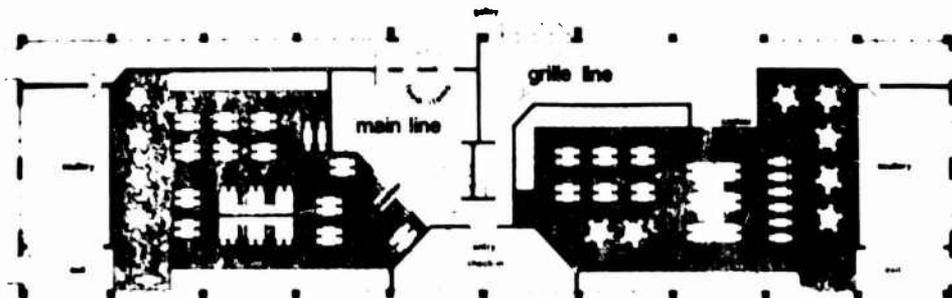


29 palms - building 5



4

FIGURE 10: LAYOUT OF TYPICAL TWO RESTAURANT DINING FACILITY



29 palms - building 2



2

FIGURE 11: LAYOUT OF DINING FACILITY WITH CAROUSEL SERVING LINE



FIGURE 12: TYPICAL DINING AREA



FIGURE 13: TYPICAL DINING AREA

which resembles whole muscle steak in texture and flavor, but costs considerably less. This restructured meat permitted the Steak House to serve a steak-like item on a daily basis while still remaining within the daily ration allowance.

As mentioned previously, only three specialty restaurants were available at MCAGCC Twentynine Palms. It was realized, however, that there were other specialty menus which could prove to be highly desirable, at least on a cyclic basis, to the customers. As a result, the A-ration facilities periodically provide specialty dinner meals including Oriental, Mexican, and soul food dinners. In addition, the short order facilities make every effort to present, on a regular basis, a deli-type sandwiches to supplement the standard menu of hamburgers, hot dogs, chili, etc.

In general, the environmental setting in which the food is served and consumed can have a tremendous impact on the success of an institution's success in merchandising its food service facilities. At MCAGCC Twentynine Palms, the consumers were initially surveyed to determine those aspects of their existing dining facilities which most distracted and upset them, and which, therefore, prevented them from fully enjoying their dining experiences. The responses in many cases were overlapping, but they did provide a broad general outline of those areas which should be addressed in renovating the facilities. Specifically, the six worst physical attributes of the then existing dining facilities in order of response by the patrons were: (1) insect infestation (flies), (2) crowding, (3) unpleasantness of view, (4) noise, (5) lack of beauty, and (6) lack of color. In analyzing those aspects of the existing facilities which would contribute to such responses, the drabness of the exteriors, the failure to separate the serving and queuing areas from the dining areas, the failure to conceal the exposed piping, the barn-like aspect of the large facility, the use of industrial type lighting, and the severe regimentation and close packing of tables and chairs (all four-man tables in yellow plastic with four seats rigidly attached, aligned in straight rows) were noted. The overall impression yielded almost a prison-like atmosphere.

The approach taken in renovating the facilities was to (1) divide each large barn-like facility into two separate dining areas or restaurants (Figures 10 and 11), (2) separate the noisy kitchen from the serving area by closing off the area between the two with a wall containing doors and refrigerated and heated pass through cabinets, (3) erect a noise-reducing six-foot-high partition to separate the serving areas from the dining areas, (4) provide a full range of seating choices including large banquettes, four-man tables, two-man tables, and six-man circular tables, as well as individual booths suitable for two to four patrons along the walls, and (5) provide double-doored entrance and exit foyers supplemented by electric insect control devices to cut down on flies and sand. In addition, colorful carpeting, hanging banners, assorted pictures and associated decorative wall hangings as well as new colorful draperies were also incorporated. Finally, a soffit was created to enclose all exposed piping. Figures 12 and 13 give some typical views of the new dining facilities. In order to enhance and underscore the feeling of variety, different decor themes were utilized in each of the eight dining facilities. These decor themes included: (1) sports pub, (2) old southwest saloon, (3) Early American tavern, (4) ski lodge, (5) continental, (6) contemporary, and (7) geometric patterns.

C. SERVING LINE ALTERNATIVES

To address the consumers' complaint regarding long lines in the dining facilities, three different concepts of serving line configuration were introduced into the improved food service system. Table 5 presents a summary evaluation of the four alternative serving line configurations which were considered in this analysis. The linear configuration refers to the standard cafeteria line wherein the customer proceeds through a queue that files past a line of servers or self-service areas in sequence. The multiple server configuration is a very common commercial approach to food service wherein the customers form a queue in front of a server or a number of servers and the server assembles the order from several supply ovens. The circular configuration refers to a carousel serving line (Figure 14) wherein the customer goes



FIGURE 14: CAROUSEL SERVING LINE

to a serving position on the perimeter of the circular serving line and the food rotates past him. Finally, the scatter system refers to a system wherein a series of serving islands are

Table 5. Summary Evaluation of Alternative Serving Line Configurations

Performance Factor	Customer Through-Put	Serving Line Configuration								
		Linear	Multiple					Circular		
			3	4	5	6	7	8'	12'	Scatter
Average time in system (minutes)	200	2.0	5.7	3.4	2.5	2.0	2.0	2.0	2.0	2.0
	300	2.0	14.0	7.1	4.7	3.4	2.7	2.0	2.0	2.3
	400	2.2	45.2	14	8.1	5.6	4.3	2.0	2.0	3.4
Maximum time in system (minutes)	200	2.0	15.9	8.6	4.3	2.0	2.0	2.0	2.0	2.0
	300	2.0	30.1	19.3	12.9	8.6	5.5	2.0	2.0	3.2
	400	3.1	33.9	30	21.4	15.7	11.6	2.0	2.0	8.5
Average number in system	200	3.3	9.3	5.6	4.1	3.3	3.3	3.3	3.3	3.3
	300	4.9	30.7	17.5	11.5	8.4	6.7	4.9	4.9	5.5
	400	7.3	76.4	41	26.6	18.4	14.0	6.5	6.5	11.1
Maximum number in system	200	8.7	35.8	25.9	16.2	8.7	8.7	8.7	8.7	8.7
	300	12.9	67.8	58.0	48.3	38.6	28.8	12.9	12.9	19.2
	400	24.8	133.1	90.0	80.3	70.6	60.8	17.2	17.2	51.0
Maximum capacity (two hour service)		896	252	336	420	504	588	1008	1344	672
Food Service Personnel Required	200	3	3	4	5	6	7	2	2	3
	300	3-4	3	4	5	6	7	2	2-3	3-4
	400	4	3	4	5	6	7	2	3	4

set up and the customer can proceed from one island to another in any order he wishes even eliminating some stations (this is in distinction to the linear system where the customer must proceed in sequence past every station).

As can be seen from Table 5, with respect to the performance factors listed, the circular carousel configuration is the most efficient. Due to the expense of the unit, however, only one of the eight outlets at MCAGCC Twentynine Palms has the circular serving line concept. The other seven outlets all have a standard linear configuration. Some consideration was given to testing a scatter system. However, the fact that this system has extremely large space requirements, as well as its expense and its theoretical poor performance relative to the linear configuration, militated against its use. The mobile unit offering take out service (Figure 15) uses multiple serving concept due to the constraints of its operation. That is, the nature of the setup of the mobile unit requires that the server assemble the order while the customers queue up to be served.



FIGURE 15: MOBILE FOOD SERVICE UNIT

D. MENU

The usual method of interjecting variety into a food service operation is through the menu. At MCAGCC Twentynine Palms three approaches to menu variety were taken. First, the menu varies from outlet to outlet. This was considered to be the primary method of interjecting food variety into the food service system since the dining facilities are in relative proximity (within walking distance) and choice of dining facilities is permitted.

As has been mentioned previously, two of the facilities offer short order food service including such items as submarine sandwiches, hamburgers, cheeseburgers, hot dogs, chili dogs, and other sandwich type foods as well as milk shakes, an assortment of beverages, salads, desserts, and soups. The menu for the short order outlets is shown in Table 6. The mobile food service unit also offers short order foods, but its menu is much more limited than those in the facilities due to the space constraints within the unit. The mobile unit's menu, in fact, is limited to hamburgers, cheeseburgers, hot dogs, french fries, and some related salads, desserts, and beverages.

Table 6. Short Order Menu

Hot Soup Kettle W/CROUTONS and/or Crackers

Group 1

Chicken Noodle Soup
Vegetable Soup
Tomato Soup
Turkey Rice Soup
Beef Rice Soup
Manhattan Clam Chowder

Group 2

Beef Barley Soup
Minestone Soup
Bean Soup
Cream of Potato Soup
Cream of Mushroom Soup
Corn Chowder

Sandwich

Constant and Every Day

Hamburgers
Chili Size
Cheeseburgers
Frankfurters
Submarine Sandwich
Sloppy Joe Sandwich
Chili con Carne

Rotate (Select One From Group Each Day)

Ham and Cheese Sandwich
Fishwich or Cheese Fishwich
Grilled Cheese
Hot Roast Beef on Seeded Bun (oven roast)
Ham Sandwich on Seeded Bun
Sliced Roast Turkey Sandwich

Side Orders

Boston Baked Beans
French Fried Potatoes
French Fried Onion Rings

Salads and Desserts

Use Salads and Desserts of adjoining dining facility

Three of the dining outlets offer A-ration cafeteria service with a high preference, twelve-day cyclic menu consisting of a choice of two entrees and a selection of salads, starches, vegetables, desserts, and beverages. The twelve-day menu cycle is shown in Tables 7 and 8. Even though the menu cycle is the same for each of the three facilities, the starting points

are staggered. Finally, three of the outlets offer specialty menus including a steak house menu, an Italian menu, and a barbeque menu. These menus are presented in Tables 8 through 10.

The second approach used to interject menu variety into the system was to offer a choice of menu items at each meal. Careful review of the menus in Tables 7 through 11, shows that a minimum of two entree items are offered as well as choices in each of the other course categories. Finally, the third approach was to vary the menu in each of the dining facilities from day-to-day in the event that for one reason or another a patron chooses to continuously patronize a single dining facility outlet. It was expected, however, that this particular behavior pattern would be rare. As a review of the menus will show, with the exception of the mobile food service unit, the barbeque, and the steak house concepts, the daily menu varies from day-to-day with the longest cycle being the twelve-day menu cycle in the A-ration facilities.

Table 7. 12-Day Cyclic Menu Twentynine Palms, California

LUNCH

DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6
Chicken Fried Beef Patti Turkey Pot Pie	Baked Meat Loaf Tomato Gravy Savory Baked Chicken	Breaded Pork Chop (reformed) Hot Turkey Sandwich	Polish Sausage w/Sauerkraut Braised Beef & Noodles	Breaded Veal Cutlets Creole Shrimp	Frankfurters w/Cheese and Bacon Barbecued Beef Cubes
Mashed Potatoes French Fried Potatoes	Oven Browned Potatoes Mashed Potatoes	Mashed Potatoes Candied Sweet Potatoes	Parsley Buttered Potatoes	Franconia Potatoes Steamed Rice	Hot Potato Salad Steamed Rice
Ginger Glazed Carrots Buttered Green Beans	Parsley Buttered Cauliflower Peas w/Mushrooms	Buttered Spinach Buttered Mixed Vegetables	Carrots Normandie Buttered French Style Green Beans	Sauteed Corn Beets in Orange Lemon Sauce	Baked Beans Buttered Peas Parsley Buttered Carrots
Assorted Breads	Hot Nut Muffin	Assorted Breads	Hot Corn Muffin	Pan Rolls	Assorted Breads
Jellied Fruit Cocktail Salad Tossed Green Salad	Garden Vegetable Salad Mixed Fruit Salad	Cottage Cheese & Peach Salad Jellied Pear Salad	Jellied Banana Salad Tossed Vegetable Salad	Cottage Cheese & Pear Salad Jellied Spiced Peach Salad	Jellied Orange salad Tossed Lettuce, Cucumber & Tomato Salad Cottage Cheese & Peach Salad
Cottage Cheese Garden Salad Cole Slaw	Creamy Fruit Dressing Frijole Salad	Cole Slaw Spring Salad	Cold Potato Salad Cottage Cheese & Sliced Tomato	Cucumber & Sour Cream Lettuce Salad	Cottage Cheese & Peach Salad Three Bean Salad
Coconut Cream Pie Marble Cake	Cottage Cheese & Sliced Pineapple Boston Cream Pie Chocolate Cover Frosting	Lemon Meringue Pie Devil's Food Cake	Peach Pie Peanut Butter Cake	Pineapple Chiffon Pie Chocolate Macaroon Cake	Chocolate Cream Pie Yellow Cake
Chocolate Chip Fudge Frosting Butterscotch Brownies Blackberry Pie	Strawberry Shortcake w/Whipped Topping Apple Pie Bread Pudding Whipped Topping	Chocolate Butter Cream Frosting Angel Food Cake Marshmallow Frosting Vanilla Cream Pudding	Peanut Butter Cream Frosting Cherry Crisp Oatmeal Cookies	Butter Cream Frosting Spice Cake Brown Sugar Frosting Dutch Apple Pie	Mocha Frosting Crunchy Apple Crisp Butterscotch Pudding

Table 7. 12-Day Cyclic Menu Twentynine Palms, California (cont'd)

LUNCH

	DAY 7	DAY 8	DAY 9	DAY 10	Day 11	DAY 12
	Hot Roast Beef Sandwich	Meatballs Stroganoff	Chili Macaroni	Barbecued Ham Steak	Pork Slices Creole (reformed)	Swedish Meatballs
	Newport Fried Chicken	Oven Fried Fish	Grilled Bratwurst	Beef Stew (reformed)	Braised Liver w/Onions	French Fried Fish Sticks
	Mashed Potatoes	Buttered Noodles	Scalloped Potatoes	Parsley Buttered Potatoes	Mexican Rice	Buttered Noodles
	Rice Pilaf	French Fried Potatoes	Buttered Noodles	Buttered Noodles	Mashed Potatoes	Cottage Fried Potatoes
	Buttered Lima Beans	Cauliflower Au Gratin	Buttered Green Beans	Buttered Spinach w/Lemon	Buttered Peas & Carrots	Stewed Tomatoes
	Buttered Whole Grain Corn	Buttered Mixed Vegetables	Buttered Cabbage	Mexican Corn	Southern Style Greens	Buttered Succotash
	Assorted Breads	Clover Leaf Rolls	Assorted Breads	Pan Rolls	Corn Bread	Assorted Bread
	Golden Glow Salad	Jellied Pineapple, Pear & Banana Salad	Chef's Salad	Cottage Cheese	Italian Style Chef's Salad	Spring Salad
	Chef's Salad	Tossed Green Salad	Cottage Cheese & Apricot	Vegetable Cole Slaw w/Creamy Dressing	Jellied Pear Salad	Jellied Banana Salad
	Cottage Cheese & Sliced Tomato Waldorf Salad	Sliced Cucumber & Onion Salad	Jellied Fruit Cocktail Salad	Garden Vegetable Salad	Cottage Cheese & Pineapple	Peach & Cottage Cheese Salad
		Cottage Cheese & Garden Salad	Macaroni Salad	Mixed Fruit Salad	Cole Slaw w/Creamy Dressing	Carrott & Raisin Salad
			German Style Tomato Salad			
	Blueberry Pie	White Cake	Cherry Pie	Banana Cake	Apple Pie	Strawberry Chiffon Pie
	Cheesecake w/Cherry Pumpkin Pie	Chocolate Fudge Frosting	Chocolate Cake	Banana Cream Filling	Maple Nut Cake	Gingerbread
		French Apple Pie	Fluffy Frosting	Vanilla Cream Pie	Mocha Butter Cream Frosting	Lemon Sauce
	Chocolate Cream Cake	"Chinese" Coconut Pie	Fruit Bars	Strawberry Shortcake w/Whipped Topping	Chocolate Pudding	Pecan Pie
		Pineapple Upside Down Cake	Applesauce Cake	Brownies	Chevy Nut Bars	Chocolate Chip Cookies
		French Cream Frosting	French Cream Frosting			

Table 8. 12-Day Cyclic Menu Twentynine Palms, California

SUPPER

DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6
Roast Pork Brown Gravy Swiss Steak w/Brown Gravy	Mexican - Spanish Night Burritos (Froz) Enchiladas Beef (Froz) Beef Tamarites (Froz) Tacos	Yankee Pot Roast Lemon Wedges Tarter Sauce Chipper Perch	Oven Fried Chicken Grilled Ham Slices	Grilled Pork Chops Chicken Fried Steak	Roast Beef a Jus Natural Pan Gravy Fried Fish Fried Scallops Fried Oysters Tarter Sauce Lemon Wedges
Mashed Potatoes Steamed Rice	Spanish Rice	Mashed Potatoes Franconia Potatoes	Tossed Green Rice Baked Macaroni & Cheese	Potatoes O'Brien Mashed Potatoes	Mashed Potatoes French Fried Potatoes
Blackeye Peas & Bacon	Refried Beans	Buttered Asparagus	Buttered Peas	Buttered Corn on the Cob	Buttered Mixed Vegetables
Buttered Mixed Vegetables Chilled Applesauce	Buttered Whole Corn		Lyonnaise Wax Beans	Southern Style Greens	Buttered Broccoli
Butterflake Rolls	Hash Puppies		Texas Toast	Corn Bread	Corn Bread
Jellied Fruit Cocktail Salad	Garden Vegetable Salad	Cottage Cheese & Peach Salad	Jellied Banana Salad	Cottage Cheese & Pear Salad	Jellied Orange Salad
Tossed Green Salad	Mixed Fruit Salad	Jellied Pear Salad	Tossed V egetable Salad	Jellied Spiced Peach Salad	Tossed Lettuce, Cucum- ber & Tomato Salad
Cottage Cheese Garden Salad	Creamy Fruit Dressing	Cole Slaw w/Vinegar Dressing	Cold Potato Salad	Cucumber & Sour Cream	Cottage Cheese & Peach Salad
Cole Slaw	Frijole Salad	Spring Salad	Cottage Cheese & Sliced Tomato	Lettuce Salad	Three Bean Salad
Coconut Cream Pie Marble Cake	Cottage Cheese & Sliced Pineapple	Lemon Meringue Pie Devil's Food Cake	Peach Pie Peanut Butter Cake	Pineapple Chiffon Pie Chocolate Macaroon Cake	Chocolate Cream Pie Yellow Cake
Chocolate Chip Fudge Frosting Butterscotch Brownies Blackberry Pie	Boston Cream Pie Chocolate Cover Frosting Strawberry Shortcake w/Whipped Topping Apple Pie Bread Pudding	Chocolate Butter Cream Frosting Angel Food Cake Marshmallow Frosting Vanilla Cream Pudding	Peanut Butter Cream Frosting Cherry Crisp Oatmeal Cookies	Butter Cream Frosting Spice Cake Brown Sugar Frosting	Mocha Frosting Crunchy Apple Crisp Butterscotch Pudding Dutch Apple Pie

Table 8. 12-Day Cyclic Menu Twentynine Palms, California (cont'd)

SUPPER

DAY 7	DAY 8	DAY 9	DAY 10	DAY 11	DAY 12
Baked Ham Pineapple Sauce Roast Turkey Turkey Gravy Cranberry Sauce	Oriental Night Sweet & Sour Pork Egg Rolls Sukiyaki	Roast Fresh Pork Ham Applesauce Ginger Pot Roast	Salisbury Steak Mushroom Gravy Southern Fried Chicken Natural Pan Gravy	Newport Fried Chicken Fried Shrimp Roast Round of Beef Natural Pan Gravy	Stuffed Pork Chops Pepper Steak
Corn Bread Dressing Mashed Potatoes Southern Style Sweet Potatoes	Steamed or Fried Rice Chow Mein Noodles	Oven Glo Potatoes Corn Pudding Mashed Potatoes	Potatoes Au Gratin Steamed Rice	Baked Potato Mashed Potatoes	Rissole Potatoes Lyonnaise Rice
Green Beans	Tempura Vegetables	Broccoli Polonaise	Green Beans	Louisiana Style Smothered Squash Southern Style Green Beans	Creamed Style Corn
Harvard Beets			Peas, Corn, & Celery		Peas
Parkerhouse Rolls Golden Glow Salad	Tossed Green Salad	Baking Powder Biscuits Chef's Salad	Hot Blueberry Muffins Cottage Cheese	Baking Powder Biscuits Italian Style Chef's Salad	Parkerhouse Rolls Spring Salad
Chef's Salad	Jellied Pineapple, Pear & Banana Salad Sliced Cucumber & Onion Salad Cottage Cheese & Garden Salad	Cottage Cheese & Apricot Jellied Fruit Cocktail Salad Macaroni Salad	Vegetable Cole Slaw w/Creamy Dressing Garden Vegetable Salad Mixed Fruit Salad	Jellied Pear Salad Cottage Cheese & Pineapple Potato Salad	Jellied Banana Salad Peach & Cottage Cheese Salad Carrot & Raisin Salad
Blueberry Pie Cheese Cake w/Cherry	White Cake Chocolate Fudge Frosting French Apple Pie	German Style Tomato Salad Cherry Pie Chocolate Cake	Banana Cake Banana Cream Filling	Cole Slaw w/Creamy Dressing Apple Pie Maple Nut Cake	Strawberry Chiffon Pie Gingerbread
Pumpkin Pie	Fluffy Frosting	Vanilla Cream Pie	Vanilla Cream Pie	Mocha Butter Cream Frosting Chocolate Pudding	Lemon Sauce Pecan Pie
Chocolate Cream Cake	"Chinese" Coconut Pie Pineapple Upside Down Cake	Fruit Bars Applesauce Cake French Cream Frosting	Strawberry Shortcake w/Whipped Topping Brownies	Chevy Nut Bars	Chocolate Chip Cookies

Table 9. Steak House Menu

Lunch:

Steak Sandwich 4 oz (reformed)
Chopped Beef Steak, 8 oz
Teriyaki Chicken, ¼
Beef Kabobs (reformed)
Steamed Rice
French Fries
Onion Rings
Baked Potatoes
Buttered Corn or Corn on the Cob
Buttered Peas
Buttered Green Beans
Hot Dinner Rolls

Dinner:

Beef Steak (reformed), 7 oz (spec - 5 oz)
Chopped Beef Steak, 8 oz
Teriyaki Chicken, ¼
Beef Kabobs (reformed)
Steamed Rice
French Fries
Onion Rings
Baked Potatoes
Buttered Corn or Corn on the Cob
Buttered Peas
Buttered Green Beans
Hot Dinner Rolls

Salad Bar:

A. Select appropriate tossed salad ingredients, served separately so patron can build salad with personal touch. Include everyday: Carrots (¼-in. slice), celery (¼-in. slice), cucumbers (sliced), endive, escarole, or romaine (torn), head lettuce (torn), green, or ripe olives (chopped or sliced), dry or (sliced or whole) green onions, cherry - jalapeno or (strips) sweet peppers, (sticks) dill, sweet or mixed pickles, radishes (optional), cherry or (quartered) tomatoes, chick peas.

Occasionally include:

Croutons
Corn Relish

B. Cottage Cheese

Use Standard A ration desserts

Table 10. Italian Menu

Lunch:

- Cheese Ravioli (frozen) rotate
- or Beef Ravioli (frozen)
- Spaghetti
- Meat Sauce (for ravioli, spaghetti, and manicotti)
- Assorted Pizzas
- Cheese Manicotti (frozen) rotate
- or Beef Manicotti (frozen)
- Cannonball Sandwich rotate
- or Italian Sausage Submarine
- Veal Cutlet Sandwich
- Italian Submarine Sandwich
- or Baked Italian Sausage rotate
- or Italian Beef and Pepper Sandwich
- French Fries
- Toasted Garlic Bread

Select two of each of the following and rotate for maximum variety:

- "Italian Style" Green Beans
- Green Beans Nicoise
- Egg Plant Parmesan or Zucchini Parmesan
- Club Spinach

Dinner:

- Cheese Ravioli (frozen) rotate
- or Beef Ravioli (frozen)
- Cheese Manicotti (frozen) rotate
- or Beef Manicotti (frozen)
- Meat Sauce (for ravioli and manicotti)
- Spaghetti w/Meatballs
- Assorted Pizzas
- Baked Lasagna
- Veal Parmesan (reformed cutlet)
- Chicken Cacciatore
- Spaghetti
- French Fries
- Toasted Garlic Bread

Table 11. Barbecue Menu

Barbecued Beef
Barbecued Pork
Barbecued Spareribs
Barbecued Chicken, ¼
Barbecued Beef Sandwich
Barbecued Pork Sandwich
French Fries
Barbecued Baked Beans

Corn on the Cob

Vegetables:

Same as A-ration except when specialty meals served

Texas Toast

Salads and desserts from Cyclic A-Menu

SECTION IV

THE MULTI-RESTAURANT FOOD SERVICE SYSTEM – A DETAILED EVALUATION

In order to examine the actual operating characteristics of the new multi-restaurant food service system that was tested at MCAGCC Twentynine Palms measurements were made on a broad range of parameters. The total systems approach permits a thorough and complete evaluation of the new concept within the Marine Corps environment. The parameters that were measured in establishing the various performance levels of this new system were: (1) consumer attendance patterns, (2) consumer attitudes, (3) food service worker opinions, (4) labor utilization and productivity, and (5) systems costs. The detailed results of each of these system characteristics are presented in this section.

A. ATTENDANCE PATTERNS

INTRODUCTION

One of the most indicative parameters of customer acceptance of a food service system is how often they utilize it; that is, the more customers like a concept the more often they will patronize it. Attendance rates are also good parameters to evaluate a system from the viewpoint that they are not, unlike total meals served, dependent upon troop strength which can (and in this instance did) significantly vary between the observation periods of the pre-test and post-test systems.

A primary objective, therefore, of the improved food service program conducted at MCAGCC, Twentynine Palms was to increase the attendance rates of the SIK personnel in the enlisted dining facilities. Attendance rates as defined here are the total number of rations served to SIK personnel divided by the total number of SIK personnel authorized to eat in the dining facilities over a given time period.

To measure the effects of the new multi-restaurant concept on attendance, comparisons were made with attendance rates for the same months in 1977 when the standard Marine Corps food service system was in operation. An additional analysis was performed to determine the effects of the free flow concept by measuring the participation rates of each of the major units stationed at MCAGCC at each of the four dining facilities. Participation rates among the different types of meals served were also analyzed as indications of customer preferences for each of the different types of menus offered.

RESULTS

Overall Attendance Rates

Attendance rates were obtained for a six-month period (1 July 1978 – 31 December 1978), during which the new system was operational. For comparison purposes, attendance rates during this period are compared with attendance rates for the old system for the same six months of the previous year (1 July 1977 – 31 December 1977). It was assumed that

by analyzing the attendance rates over the same six-month period for both systems, the effects of cyclical variables such as extreme temperatures (120° in the summer) and holidays would be neutralized.

It is important to note that even though the new system was operational on 1 July 1978 (actual start of the system was on 19 June), improvements were constantly being introduced throughout the entire six months. For example, two of the dining outlets (Dining Facility 5: The Bar BQ Ranch and The Lodge) did not open until 10 July because of construction delays. In addition, the mobile unit was not delivered to the base until August, and then after a month's operation had to be returned for modifications. Consequently, the mobile unit did not become fully operational on a continuous basis until 15 November.

In addition, commencing 15 October, the short order outlets in Dining Facilities 3 and 6 incorporated late evening hours; that is, they were open until 2200 hours on week-night.

As illustrated in Figure 16, monthly attendance rates at the enlisted dining facilities increased substantially with the commencement of the new system and steadily increased as additional improvements, such as the mobile unit (end of August) and extended meal hours (mid October), were introduced. The percent increases in attendance over the pre-test, standard system range from a low of 15.7% in August to a high of 43.4% during the month of October. A comparison of the six-month average attendance rates for the two systems shows an overall increase in attendance from 43.4% under the pre-test system to 53.6% under the new concept or represents a 23.8% overall increase.

The system, in fact, did not begin to reach a steady-state condition until the fourth month of operation. This transient effect is attributed to the fact that initially, the new food service system was viewed by the customer as a novelty, and, as a result, participation vacillated between the different types of new menus as customers experimented with the system.

A more accurate measure of the impact of the new system on attendance, therefore, is to look only at the last three months in which the entire improved system with all its facets was fully operational and compare the attendance rates for this period with the same three months of the previous year under the pre-test system. As seen in Figure 16, the average attendance rate for the last three months in the new system was 56.9% which is up from 43.9% under the pre-test system yielding an overall increase of 29.7% over the pre-test system.

The average long term attendance rate of the new system (Table 12) still showed a substantial increase of 31.2% over the pre-test system during the same time period. From Table 12, it appears that the post-test attendance rate levels off at about 59% (as compared to an average attendance rate of 45% for the pre-test system).

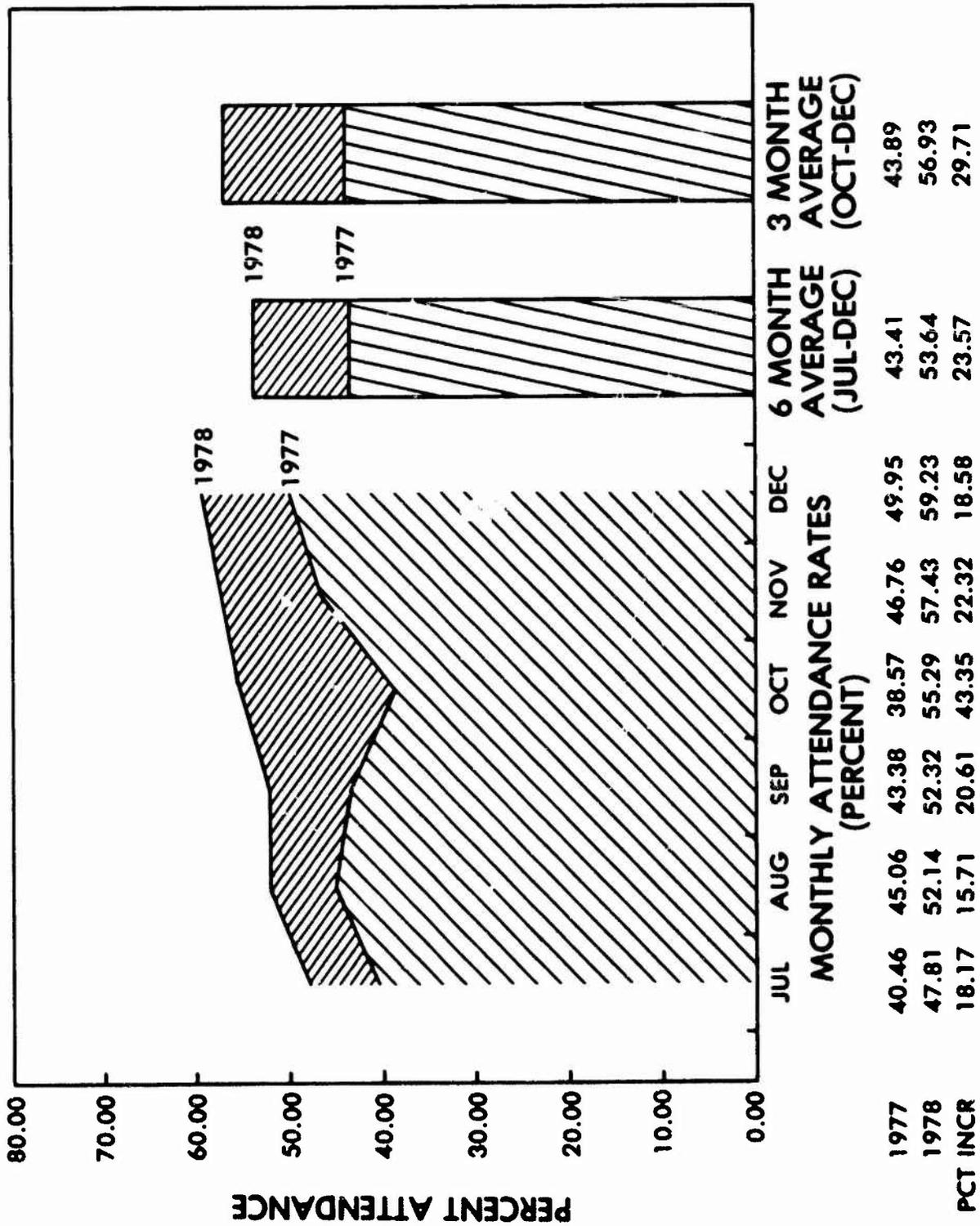


FIGURE 16: DINING FACILITY ATTENDANCE RATES

Table 12. Long Term Attendance Rates of New System

	Attendance Rates		
	Pre-Test (1978)	Post-Test (1979)	% Increase
January	45.1%	58.8%	30.4%
February	45.6%	68.2%	49.6%
March	45.4%	53.0%	16.7%
April	44.5%	57.3%	28.8%
Average	45.2%	59.3%	31.2%

Participation Rates Among Dining Facilities By Unit

As stated earlier, one of the concepts that was introduced into the new food service system was the idea of free-flow, that is enlisted personnel permitted to eat wherever desired rather than only in an assigned facility. The inclusion of free-flow is the key to the success of the multi-restaurant concept since it is the multiplicity of outlets that yields the variety desired by the customer.

The creation of specialty outlets necessitates the implementation of the free-flow idea in order to permit access by all personnel. In addition, restricting dining to only those facilities with their constant menus would lead to an intolerable boredom factor for those so assigned.

The acceptance of the free flow concept by the units at MCAGCC, Twentynine Palms was mixed. As Figure 17 indicates, members of H&S Battalion distributed their patronage in a somewhat uniform manner over all of the available facilities while the members of the 3rd Tank Battalion (see Figure 18) seemed to have concentrated their patronage in Dining Facility 3. The average participation, as shown in Figure 19 for all units, indicated that somewhat over 65% of the meals eaten by the average unit were consumed in one dining facility with the next most frequented facility accounting for less than 20%.

When looked at from the point of view of the dining facility (that is, what percentage of a dining facility's customers are drawn from each of the available units) a similar range of participation rates are indicated. As demonstrated in Figure 20, Dining Facility 6 containing the steak house specialty restaurant, The Outpost, drew its patronage from all the units on base in a somewhat uniform distribution. On the other hand, Dining Facility 2, as indicated in Figure 21, drew the vast majority of its customers from a single unit.

The fact that all units did not choose to eat in all of the available facilities an equal proportion of the time or that any one facility did not draw patronage from all other units an equal proportion of the time does not compromise the relative success of the free flow concept. As mentioned previously, there were three A ration facilities available, all serving the same menu cycle as well as two fixed and one mobile facility offering short order meals which would naturally result in patronage decisions for those particular facilities to be based

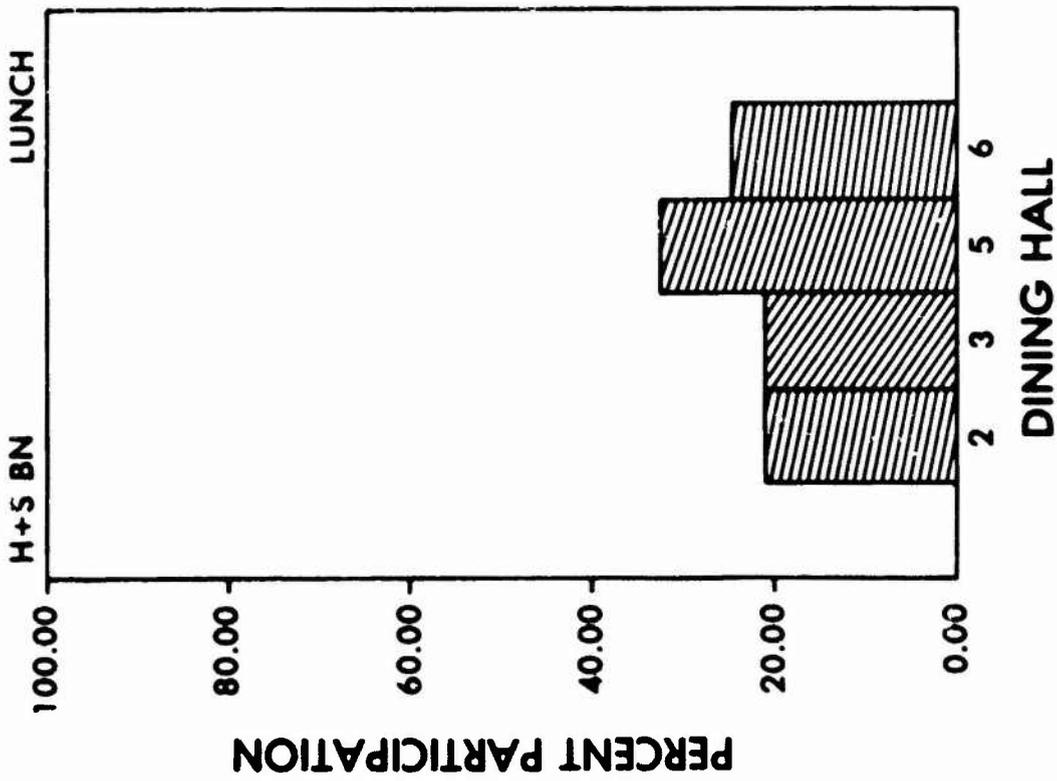


FIGURE 17: PERCENT PARTICIPATION BY DINING HALL FOR H+S BATTALION

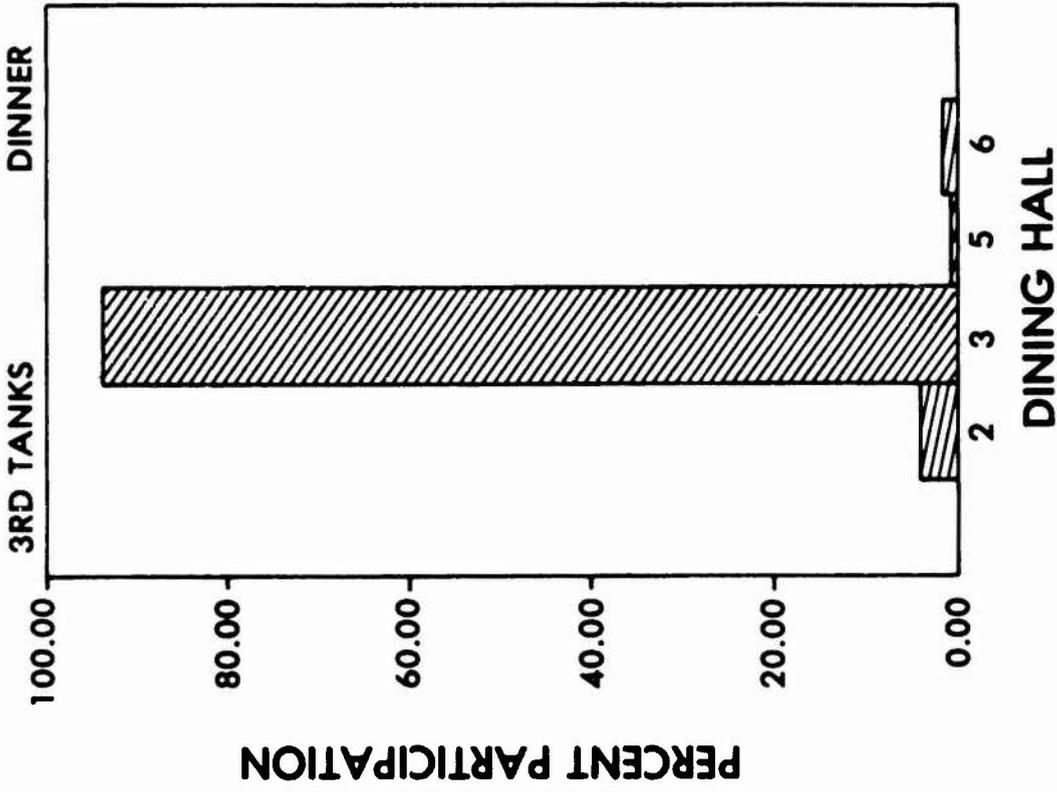


FIGURE 18: PERCENT PARTICIPATION BY DINING HALL FOR 3RD TANKS

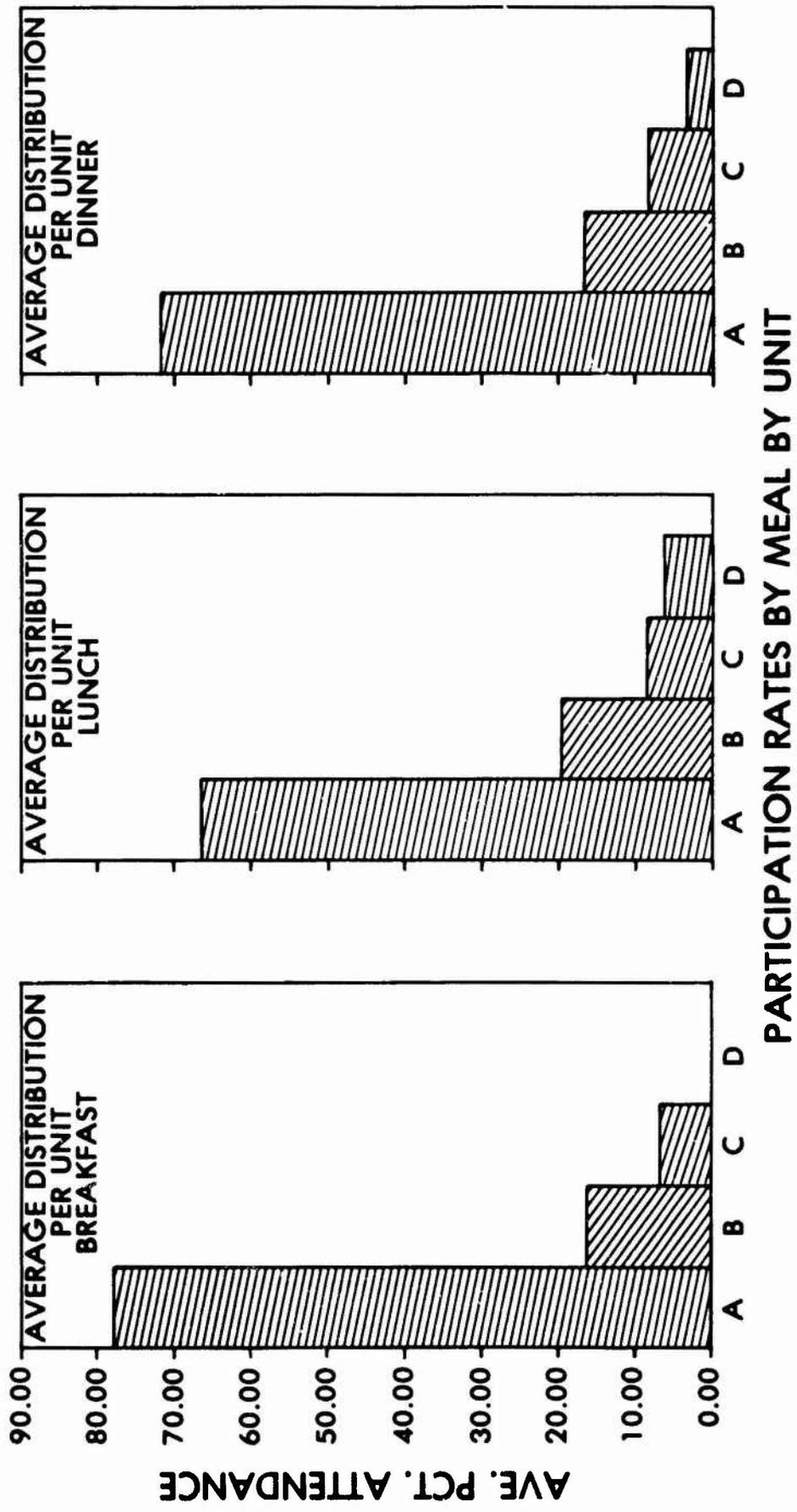


FIGURE 19: AVERAGE PARTICIPATION BY MEAL BY UNIT

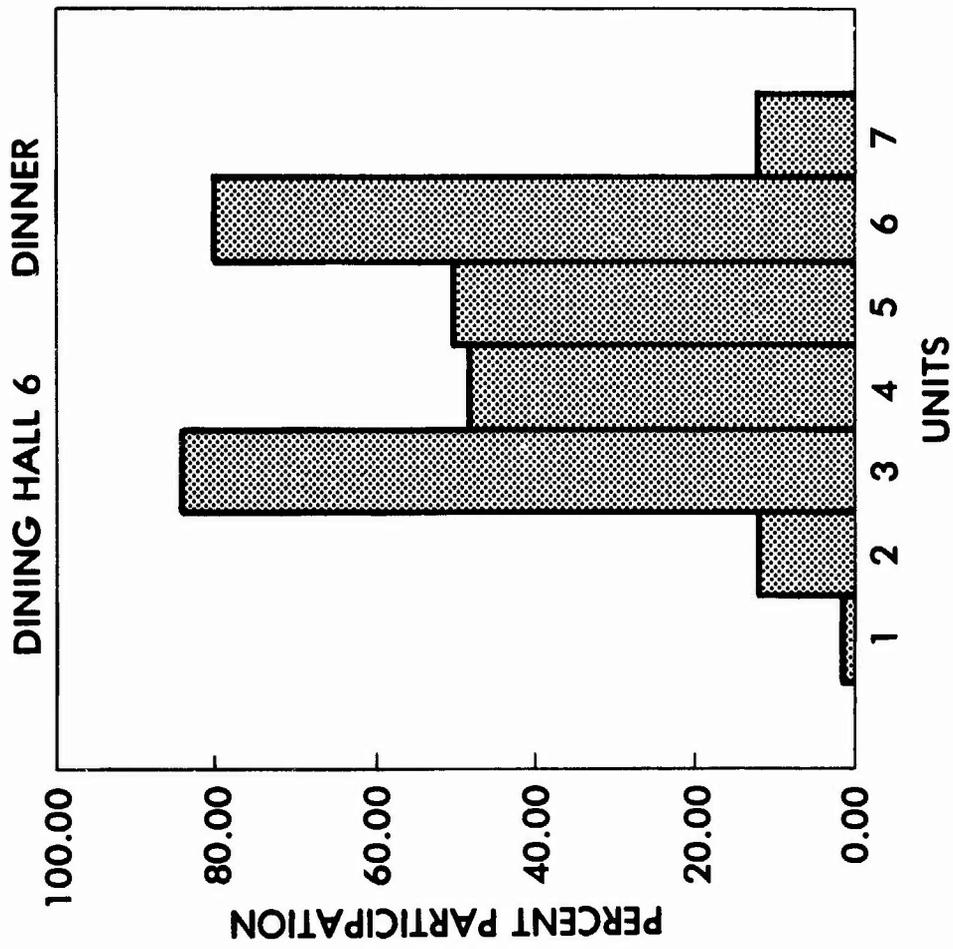


FIGURE 20: DINING FACILITY PARTICIPATION RATES BY UNIT (DH 6)

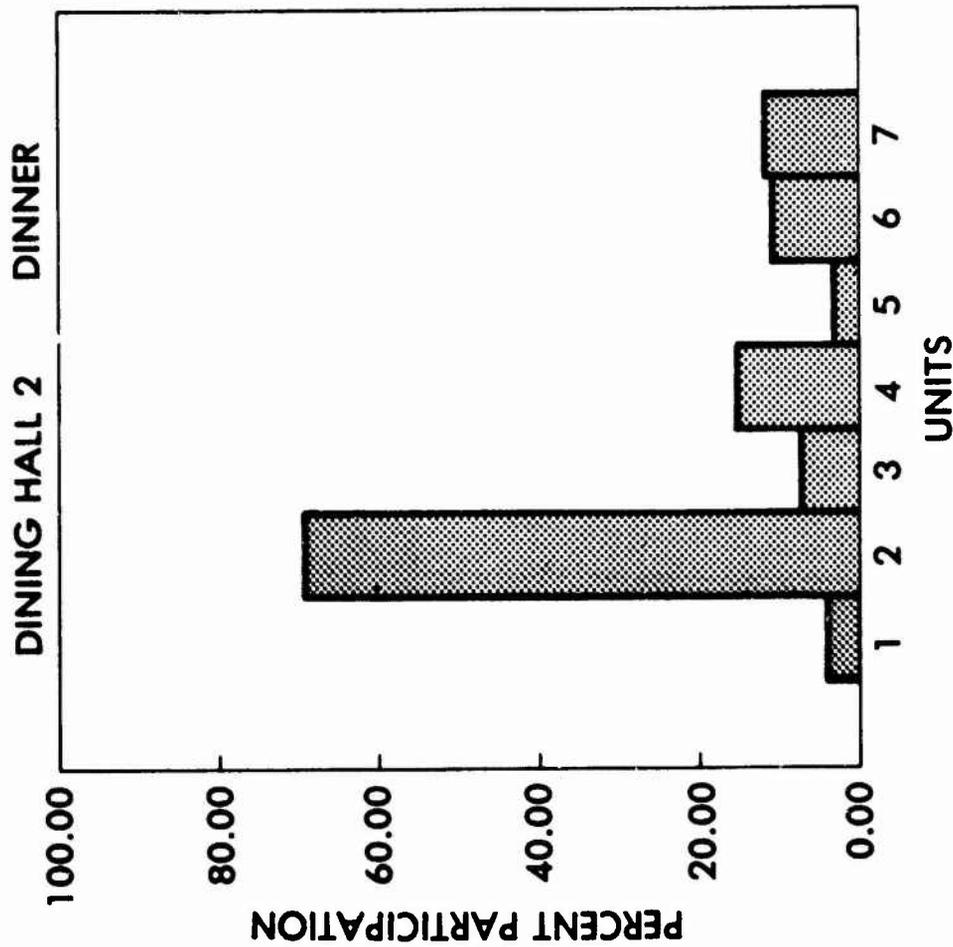


FIGURE 21: DINING FACILITY PARTICIPATION RATES BY UNIT (DH 2)

primarily on their locations relative to either work or living quarters. That is, if an individual desired to eat an A-ration or short order type meal, he would generally attend that facility that is most convenient to him. To add further support to the importance of convenience, data showed that in all instances (Figure 19) the second most frequented facility for all units was the other dining facility on the same side of the base as that most frequented. In other words, the approximately 8/10 of a mile from one pair of dining facilities on one side of the base to the other side definitely acted as a deterrent. On the other hand, the specialty houses are likelier to draw customers more uniformly from all of the units on the base, as indicated in Figure 20 for Dining Facility 6.

It must also be remembered that there is a long tradition in the Marine Corps of maintaining unit integrity and morale through eating in assigned unit dining facilities. This long standing tradition and associated behavior pattern is difficult to overcome, particularly when unit commanders choose to continue such policies. These factors would particularly influence C&E School student personnel, because many of them are transients from other bases where the assignment to a dining facility is the accepted practice. In addition, during lunch periods the school's students are dismissed in formation and march over by class to the closest dining facility, Dining Facility 2. In summary, then, it may be anticipated that at bases where dining facilities are grouped in closer proximity to each other or in situations wherein a dining facility is capable of providing three or four serving lines (offering specialty, short order, and A-ration menus) that the free flow concept would, in fact, be more successful than at MCAGCC Twentynine Palms.

Participation Rates By Type of Menu

An analysis of participation rates by each of the different types of menus offered in the new system was performed as an indication of customer preferences among those particular menus offered in the new system, that is, A-Ration, Specialty, and Short-Order. Participation rates here are defined as the ratio of the number of meals served of each type of menu relative to the total number of meals served for all menus. Participation rates were calculated from actual headcount sheets in conjunction with individuals using customer counters.

As was previously noted, throughout the first five months of the new system's operation, major changes, such as the incorporation of late evening hours on the short-order lines and the introduction of the mobile unit on base, were instituted. These changes primarily involved the short order service, and had a definite impact in increasing the participation in this menu category.

Other system changes occurred, such as reverting from desert hours back to normal operating hours in September and the influx of cooler weather in fall, and could have had a confounding effect on the participation rates for all three menu types.

As mentioned earlier, the new concept did not reach a steady state condition for four months. Therefore, based on a three-month average over the latter part of the data collection period (October through December), participation rates for each of the different types of menus were as follows:

	Lunch	Dinner
A-Ration	43.25%	37.84%
Short-Order	20.79%	30.37%
Specialty	<u>35.96%</u>	<u>31.79%</u>
	100.00%	100.00%

The lower participation rate for the short order menu can partially be attributed to the fact that despite the extended hours for the short order menu, there were only 2½ facilities (counting the mobile unit as half a facility) serving this menu, while there were three A-ration and three specialty facilities.

One very significant point that the data brings out is the fact that the specialty restaurant concept was very successful, providing about one-third of the lunch/dinner-type meals. There had been some concern initially that since these specialty restaurants provide a relatively constant menu day in and day out that the troops would become bored with them and cease to patronize them, but this has not been the case.

In summary then, the mix of facilities developed at MCAGCC Twentynine Palms proved highly successful with respect to distributing the patronage in a fairly balanced manner. The fact that the A-ration menu seems to enjoy a somewhat higher participation rate than the other two menu types is not unexpected. First, two of the A-ration facilities are on the school side of the base where a higher density of potential patrons exists. Also, the A-ration facilities, by virtue of their cyclic menu, do offer more day to day variety than the other two menu types.

B. CONSUMER ATTITUDES

In support of the general effort by the Operations Research and Systems Analysis Office to upgrade the quality of base food service at MCAGCC, Twentynine Palms, the Behavioral Sciences Division of the Food Sciences Laboratory at NARADCOM was given the task of monitoring the general attitudes and opinions of the enlisted consumer toward the food service system, as well as the demonstrated food habits of the enlisted consumer throughout the course of the study. An initial assessment of then current consumer attitudes, opinions, and habits was made in November 1976 employing two overlapping instruments: (1) the Consumer Opinions of Food Service Systems (COFSS) survey form, and (2) an especially designed face-to-face interview with the goals of (a) identifying the problem areas most significant to the consumer and most in need of modification – a diagnostic interview, and (b) establishing baseline data against which to measure the effects of the programmed modifications at each major stage of implementation – an evaluative interview.

Based on the diagnostic data, major changes in the food service system were instituted. These changes, as mentioned previously, included the creation of specialty outlets, the renovation of all the dining facilities, and the purchase of a mobile food service truck. In September

1978, after several months of exposure to these changes, another sample of enlisted dining facility consumers was administered using similar surveys and interviews. The results of this survey were then compared with the initial baseline data to assess the actual effects of the various system changes upon consumer opinion and eating behavior. The methodology used in designing the sampling plan and a detailed description of the survey instrument given to the consumers is presented in Appendices A through D.

RESULTS

Demographic Characteristics of Survey Sample

Prior to the innovations, face-to-face interviews were administered to 201 individuals which constituted 5.2% of the total base enlisted population. Of these 201 people, 120 or 59.7%, were authorized to subsist at government expense (SKI status), and the remaining 81 or 40.3% were authorized to receive separate rations (COMRATS).

Prior to the system innovations, the 201 interviewees together with 396 other enlisted personnel, also completed the COFSS survey. Thus the COFSS survey was administered to a total of 597 (or 15%) individuals or 15.5% of the total base enlisted population. Furthermore, the survey group was comprised of 60.5% SIK's and 39.5% COMRATS. For both the 15% total sample and the 5% interview subsample, then, the obtained distribution by ration status before innovations slightly overrepresented the actual COMRAT population of 33% at the expense of the SIK population by some 7% — ideally it would be 67%. Following the innovations, face-to-face interviews were administered to 186 personnel of which 74.7% were SIK with the remaining 25.3% receiving COMRATS. The post-innovation COFSS survey and Survey Supplement insert were completed by 451 personnel, including the 186 interviewees. Of the total 451, 72.9% were SIKs, and the remaining 27.1% were on COMRATS.

Thus, the post-innovation survey sample and interview subsample both overrepresented the actual SIK population of 67% at the expense of the COMRATS population to very nearly the same degree (7%) that the COMRATS group was overrepresented in the pre-innovation samples. Although the 7% overrepresentation of COMRATS personnel in the pre-innovation sample was not intentional, the shift to overrepresentation of SIKs in the post-innovation sample was indeed deliberate. Whereas the primary interest in the pre-innovation measures was to obtain an overview of the food habits and attitudes of the entire population, the principal point of interest for the post-innovation measures focused on the appropriated fund dining facilities where the experimental innovations occurred. Since these dining facilities are patronized primarily by SIK personnel, it was decided to slightly oversample that population so as to increase the number of respondents in the sample who were likely to have valid opinions on the effects of the experimental innovation.

A check of the stratification by rank revealed that 72% of the pre-innovation sample and 79% of the post-innovation sample fell into the E-1, 2, 3, 4 category, with 28% of the pre-innovation people and 21% of the post-innovation personnel falling into the E-5, 6, 7, 8, 9 category. For both measurement samples, then, the stratification by rank was reasonably close to the 80-20% split characteristic of the population as a whole.

As shown in Table 13, the pre- and post-innovation samples were extremely similar in terms of the demographic variables measured by both the survey and the interview instruments, except of course for the differing proportions of COMRATS vs. SIK respondents mentioned above. Because of the proportional change in COMBATS or SIK, the difference in Percent Married between the pre- and post-samples was expected given the close correlation between marital status and ration status in the Marine Corps.

There were no other notable or significant differences between the pre- and post-innovation samples on such variables as age, time in service, grade, race, sex, education, or place of residence. There was also reasonable concordance — that is, no significant difference between the survey and interview measures for all cases in which both instruments addressed the same demographic issue.

Results of Consumer Interviews and Surveys

Food Habits

Eating habits can be potentially determined by a number of factors that vary in importance with the individual or subject population of individuals. Table 14 shows the rank order (from most important to least important) of factors rated by the enlisted survey sample at MCAGCC Twentynine Palms as being important both before and after the system innovations. Of special note are the top three factors which all pertain to the food served: That is, your liking of the food, food appearance, and food variety in descending order. It is also interesting that food cost and the number of calories in the food appeared to be the factors of least subjective importance. Only 11.4% of the pre-innovation survey respondents and 8.2% of the post-innovation respondents reported being on a diet, which helps to explain the lack of attention to calories. Since SIK's obtain their meals in the dining facilities free of charge and troops on COMRATS pay a flat meal rate, it is not surprising that food cost was of low importance, as well. The only factor to shift ordinal position from pre- to post-measures was the nutritional value of food, which was rated relatively higher in importance prior to the innovations. Perhaps the increase in available food variety following the system innovations stimulated greater awareness of and attention to food compatibility and/or the relative familiarity of various foods. In any case, the slight shift in factor ratings from pre- to post-innovation measures was not statistically significant.

The proportion of total weekly meals consumed in the dining facilities for each major meal during the week and again on weekends was calculated from the responses to a pair of questions in the COFSS survey for both the pre-innovation and post-innovation samples. As shown in Table 15, respondents reported some increase in attendance for all three meals on both weekdays and weekends from pre- to post-measures. Although the increase in breakfast attendance was very slight, the reported increases for both the midday and evening meals were more substantial, however, only the increase in weekday lunches was statistically significant ($F(1,639) = 13.52$ $p < 0.001$). It is worthy to note that data previously collected at Shaw AFB, SC has shown that self-report measures of meal frequency and dining facility attendance similar to those used here tend to be highly inaccurate. When self-report measures at Shaw were compared with actual facts, airmen who attended at least one meal in a dining facility

Table 13. Demographic Characteristics of the Pre- and Post-Innovation Samples*

	Pre-Innovation	Post-Innovation
Mean Age (in years)	21.78 (21.59)	21.34 (21.24)
Mean Time in Service (years)	3.84 (3.29)	3.06 (2.68)
Median Grade	E-3	E-3
Percent Married (not separated)	40.6 (36.5)	28.0 (22.0)
Percent Receiving COMRATS	39.5 (40.3)	27.1 (25.3)
Percent Planning Marine Career	23.0 (23.0)	12.4 (16.7)
Percent Uncertain of Career	29.0 (25.0)	27.1 (26.3)
Percent "Like" Marines	55.1	37.2
Percent "Dislike" Marines	28.3	36.0
Percent Neutral	16.7	26.8
Percent Caucasian	81.1	79.1
Percent Black	10.9	11.9
Percent Oriental	0.7	0.7
Percent Female	3.7	3.2
Percent High School Graduates	90.5	93.4
Percent Living on Base	75.7	79.1

*Survey data are shown above in each column and interview data are shown below in parentheses.

Table 14. Proportion of Total Survey Sample Indicating Subjective Importance of Various Factors in Food Choice Before and After Innovations*

Factor	Proportion Saying "Of Major Importance"	
	Before Innovations	After Innovations
Your Liking of Food	0.794	0.791
Food Appearance	0.782	0.789
Food Variety	0.695	0.677
Nutritional Value of Food	0.513	0.529
Compatibility with Other Foods	0.479	0.548
Familiarity with Food	0.462	0.530
Number of Calories in Food	0.343	0.320
Food Cost	0.285	0.295

*N Before = 597; N After = 451

Table 15. Proportion of Total Weekly Meals Consumed in the Dining Facilities for Each Major Meal Type Before and After Innovations*

Meal	Before Innovations	After Innovations
Breakfast		
Weekdays	0.680	0.719
Weekends	0.532	0.577
Mid-Day Meal		
Weekdays	0.583	0.709
Weekends	0.356	0.470
Evening Meal		
Weekdays	0.485	0.616
Weekends	0.434	0.520
After Evening		
Weekdays	0.271	0.338
Weekends	0.220	0.312

*N Before = 597; N After = 451

were found to consistently overestimate their own attendance rate. Airmen who had not attended any meals at all in the dining facility during the test period were the only ones for whom the self-report was at all accurate. The data in Table 15 should, therefore, be considered with some degree of skepticism.

There are, however, indications that the trend towards greater dining facility attendance after the innovations is as real as it is apparent. The COFSS survey provided respondents with a listing of potential reasons for nonattendance at the dining facilities, five of which emerged as the primary major deterrents to attendance for the pre-innovation sample. In all five cases, there was a significant decline in the proportion of the post-innovation sample indicating that these reasons were still major deterrents to attendance (see Table 16).

Table 16. Five Major Reasons for Nonattendance at the Dining Facilities Cited by the Greatest Proportion of Total Survey Sample Before and After Innovations^{a,b}

Reason	Proportion	
	Before	After
1. Quality of Food	0.55	0.35
2. Speed of Service or Lines	0.51	0.28
3. Quantity of Food	0.36	0.26
4. Variety of Short Order Food	0.32	0.19
5. Service by Dining Facility Personnel	0.28	0.20

^aN Before = 597; N After = 451

^bAll Before versus After differences significant at 0.01 Level using ANOVA with Newman-Keuls procedure.

Another perceived improvement from pre- to post-innovation measures that may have influenced attendance concerns hours of operation for the dining facilities. Table 17 shows the proportion of the survey sample who approved of the opening and closing hours for each major meal before and after innovations. There was a significant increase from pre- to post-measures in the number of respondents satisfied with the opening hours of all weekday meals and with the closing hours of lunch and dinner. Apparently, breakfast hours would need to be extended later into the morning for both weekday and weekend meals in order to please the remaining 40% of the sample. Weekend evening meals also seem to have been opened later than about 30% of the respondents preferred, as no significant improvement in this order was shown from pre- to post-measures.

Table 17. Proportion of Survey Sample Indicating Dining Facility Hours are "OK AS IS" for Each Major Meal Before and After Innovations^{a,b,a,b}

Meal	Opening Hours "OK"		Closing Hours "OK"			
	Before	After	Before	After		
Weekday						
Breakfast	0.615	**	0.734	0.517	0.607	
Midday	0.656	**	0.837	0.593	**	0.761
Evening	0.703	**	0.800	0.376	**	0.536
Weekend						
Breakfast	0.698	**	0.789	0.616		0.606
Midday	0.700	*	0.816	0.558	*	0.706
Evening	0.661	*	0.702	0.375	**	0.526

^aN Before = 597; N After = 451

^bBefore versus After differences significant at 0.05 level for single asterisk (*) comparisons and at 0.01 level for double asterisk (**) comparisons using ANOVA with Newman Keuls procedure.

Overall, 64.9% of the post-innovation interview sample indicated that a dining facility was indeed open when they preferred to eat, with the remaining 35.1% indicating some dissatisfaction with the hours. The majority of complaints concerning operating hours could be satisfied by implementing some type of sandwich service during the evening. Of the post-innovation survey sample, 88.2% said that they did get hungry at night after the dining facilities were closed, and 80.3% indicated a desire for additional sandwich service between 1900 and 2200 hours. (It should be noted that these comments were made prior to the initiation of extended hours in both dining facilities and the mobile unit).

When asked in the survey supplement to name the outlet at which they ate most often (for whatever reason), the greatest proportion of the respondents (27%) named The Outpost, followed respectively by the Bar BQ Ranch, Pasta Palace, Dining Inn, Burger Palms, and Sports Circle. When asked why it was that they ate at any given outlet most frequently, the reason cited most often was "close to where I work", followed by "close to where I live". the only other responses cited with more than trivial frequency were "food quality is good" and "menu includes foods I like to eat". Table 18 shows the nine outlets rank-ordered by reported frequency of attendance, with the proportion of respondents citing the four reasons given most often for that attendance.

Table 18. Outlet Reportedly Attended Most Frequently and Four Most Often Cited Reasons for That Attendance*

% Eating There Most Often	Outlet	Percentage Citing Reason for Attendance				Total % Accounted For
		Proximity Work	Proximity Residence	Like Menu	Food Quality Good	
27.0	The Outpost	41.2	16.5	12.4	10.3	80.4
14.6	Bar BQ Ranch	48.2	27.8	5.6	11.1	82.6
12.9	Pasta Palace	41.7	35.4	10.4	4.2	91.7
12.7	Dining Inn	37.0	32.6	8.7	4.4	82.6
12.1	Burger Palms	41.9	30.2	7.0	9.3	88.4
11.3	Sports Circle	39.0	29.3	2.4	2.4	73.2
5.9	29 Burgers	42.9	19.1	19.1	0.0	81.0
2.4	Lodge	37.5	12.5	12.5	12.5	75.0
1.1	Hamburger Hot Rod	25.0	50.0	0.0	0.0	75.0

*N = 448

Attitudes Toward the Dining Facilities

In general, there was a considerable and highly significant improvement in the attitudes of the respondents toward the dining facilities between pre- and post-innovation measures. Prior to the innovations, the dining facilities at Twentynine Palms were rated as "slightly worse than" other military dining facilities, all things considered. Following the innovations, the average rating by the sample improved significantly ($F(1,915) = 109.17, p < 0.001$) and more specifically, the mean rating increased from 2.2 to 3.4 on a five-point scale (see Table 19). Table 20 shows the ten areas of concern in the dining facilities originally rated worst by the pre-innovation survey sample, with the proportion of the survey sample responding positively, neutral, or negatively both before and after the innovations. In all ten cases there was a significant increase in positive responses and a correspondingly significant decrease in negative responses from pre- to post-innovation measures. The three areas originally rated worst — speed of service or lines, variety of short order food, and quality of food — all showed a decrease in negative ratings of about 30%. The area showing the largest improvement in positive rating (43%) was general dining facility environment, one of the areas most conspicuously improved by the innovations.

Table 19. Proportion of Total Survey Sample Giving Overall Ratings to the Twentynine Palms Dining Facilities in Comparison to Other Military Dining Halls Before and After Innovations^{a,b}

Twentynine Palms Is:	Proportion	
	Before	After
1. Much Worse Than Others	0.30	0.09
2. Slightly Worse Than Others	0.28	0.17
3. No Better or Worse Than Others	0.23	0.21
4. Slightly Better Than Others	0.13	0.31
5. Much Better Than Others	0.07	0.22
Mean Rating:	2.20 (Slightly Worse)	3.40 (No Better or Worse)

^aN Before = 597; N After = 347

^bAll Before versus After differences (except "No Better or Worse") significant at 0.01 level using ANOVA with Newman-Keuls procedure.

Table 20 Proportion of Total Survey Sample Rating the Worst Ten Areas of Concern in The Dining Halls Positively Neutral, or Negatively Before and After Innovations^{a,b}

Area or Topic	Positive		Rating Neutral		Negative	
	Before	After	Before	After	Before	After
1. Speed of Service or Lines	0.17	0.29	0.14	0.28	0.69	0.42
2. Variety of the Short Order Food	0.15	0.33	0.24	0.34	0.60	0.32
3. Quality of Food	0.17	0.38	0.25	0.32	0.58	0.30
4. Service by Dining Facility Personnel	0.17	0.32	0.31	0.37	0.51	0.31
5. Quantity of Food	0.26	0.39	0.23	0.28	0.51	0.33
6. Monotony of Same Facility	0.10	0.21	0.42	0.45	0.48	0.34
7. General Dining Facility Environment	0.19	0.62	0.35	0.27	0.46	0.11
8. Hours of Operation	0.34	0.44	0.24	0.34	0.42	0.22
9. Variety of Regular Weekday Meal	0.25	0.34	0.36	0.36	0.40	0.28
10. Variety of Regular Weekend Meal	0.22	0.35	0.40	0.37	0.38	0.28

^aN Before = 597; N After = 451

^bAll Negative and Positive Before versus After differences significant at 0.02 level using ANOVA with Newman-Keuls procedure.

As a result of the general improvements, ratings for the social conditions of the dining facilities improved significantly. The proportion of COFSS respondents who indicated that the feeling of privacy was often or always quite good increased from 0.077 to 0.170 ($F(1,903) = 63.28, p < 0.001$), the proportion who thought room conditions are often or always acceptable for related conversation went from 0.204 to 0.366 ($F(1,901) = 44.53, p < 0.001$), and the proportion indicating that there is often or always a friendly social atmosphere increased from 0.206 to 0.365 ($F(1,896) = 38.74, p < 0.001$).

The specific physical attributes of the dining environment that were originally rated worst by the pre-innovation sample are shown in Table 21, along with the proportion of respondents rating each attribute positively, negatively, or neutral both before and after innovations. In all ten cases, there was a significant decrease in negative ratings from pre- to post-innovation measures and a notable increase in positive ratings. All measurements were statistically significant except for exterior appearance, which, in fact, received the least and most belated attention during the renovation of the dining facilities. The attributes of beauty, colorfulness, and interior appearance all showed a decrease in negative ratings of nearly 40%.

Insect Infestation

The presence of flies in large and annoying numbers, which had lead the list as the worst area of concern showed a 30% drop in negative ratings from pre- to post-measurements — clear evidence that the problem has been effectively addressed.

Another major area of discontent that emerged from the pre-innovation measures as especially disturbing to the consumers at Twentynine Palms was waiting in long lines for food. When asked in the pre-innovation interview to estimate the average waiting time in minutes, the average response was 14.5 minutes. A derived estimate of usual waiting time, calculated from the survey data combining both the wait at the headcount station and the wait in the serving line, yielded 22.1 minutes before the innovations, which is 50% greater than the interview average for the same measure. Following the innovations, reported waiting time varied considerably from outlet to outlet.

When asked in the post-innovation interview to name the outlet where they had experienced the longest waits in line, 39.9% of the respondents named the Outpost, followed by 24.5% who said the Pasta Palace, and 9.8% who said Burger Palms. When asked the same question for the shortest waits in line, 23.1% named the Sports Circle, 18.9% the Pasta Palace, and 14.7% Burger Palms. Thus, the Pasta Palace and Burger Palms received second and third place ratings respectively for both the fastest and the slowest service. Table 22 shows the actual average waiting time reported for the outlet perceived by the interview respondent as having both the longest and the shortest total waiting time for food. Overall, the Sports Circle, with the second shortest long wait time and the shortest short wait time (certainly no surprise for the Sports Circle with its highly efficient carousel serving line format), the Dining Inn, and Burger Palms seem to emerge as the outlets with the speediest service.

Table 21. Proportion of Total Survey Sample Rating the Ten Worst Physical Attributes of The Dining Halls Positively Neutral, or Negatively Before and After Innovations^{a,b}

Attribute	Positive		Rating Neutral		Negative	
	Before	After	Before	After	Before	After
1. Insect Infestation	0.14	0.26	0.10	0.30	0.76	0.43
2. Crowding	0.10	0.20	0.18	0.30	0.72	0.50
3. Pleasantness of View	0.06	0.17	0.26	0.38	0.67	0.44
4. Noise	0.10	0.20	0.23	0.29	0.67	0.51
5. Beauty	0.05	0.22	0.34	0.56	0.61	0.22
6. Colorfulness	0.13	0.48	0.27	0.32	0.60	0.20
7. Roominess	0.16	0.40	0.27	0.35	0.57	0.25
8. Exterior Appearance	0.11	0.20	0.32	0.36	0.56	0.44
9. Interior Appearance	0.17	0.53	0.28	0.32	0.54	0.15
10. Sunniness	0.18	0.31	0.37	0.43	0.45	0.26

^aN Before = 597; N After = 451

^bAll Negative and Positive Before versus After differences (except Positive Exterior Appearance) significant at 0.01 level using ANOVA with Newman-Keuls procedure.

Table 22. The Weighted Averages of The Longest and Shortest Waits for Food Reported by Dining Outlet*

	Longest Wait (Minutes)	Weight	Weighted Mean	Shortest Wait (Minutes)	Weight
Sports Circle	12.78	(10)	4.65	2.19	(33)
Dinine Inn	17.67	(6)	6.83	3.00	(17)
Burger Palms	12.85	(14)	7.04	3.16	(21)
Pasta Palace	12.25	(35)	8.16	2.85	(27)
29 Burgers	15.00	(6)	8.33	4.33	(10)
Lodge	24.75	(4)	11.60	2.83	(6)
Bar BQ Ranch	23.18	(11)	12.21	2.92	(13)
The Outpost	18.49	(57)	15.86	4.33	(13)
Weighted Mean	<u>16.37</u>			<u>3.01</u>	
Weighted Grand Mean			9.76		

*N = 186

Obtaining an overall pre- post-innovation comparison for waiting time from the interview data was difficult because of changes in the nature of the question asked. However, if the average waiting time for the system as a whole is assumed to be the weighted mean of the longest and shortest waits, the post-innovation mean of 9.8 minutes shows considerable improvement over the pre-innovation mean of 14.5 minutes. The COFSS survey provided an even more direct comparison and showed a similar relative reduction of approximately four minutes in waiting time from 22.1 minutes before innovations to 18.1 minutes after.

Attitudes Toward the Dining Facility Food

From a total system viewpoint there were definite and significant improvements in the perceived quality of the food after the introduction of the multi-restaurant concept. Several of the interview questions both before and after the innovations asked the respondents to compare, on a seven-point scale, the food served in the dining facilities at Twentynine Palms to the food served at other military facilities in which they had eaten. As can be seen in Table 23, there was a significant improvement in mean ratings from pre- to post-innovation measurements for: (1) preparation and presentation of food, (2) quality of raw food used, (3) intermeal and intrameal variety, and (4) all things considered in general. There was also a similar reduction, although not statistically significant, in the perceived frequency with which interview respondents reported dining facilities running out of published menu items (see Table 23).

**Table 23. Mean Ratings Given by the Interview Sample* Comparing
Twentynine Palms to Other Military Bases on Various
Issues of Food Service Before and After
Innovations Using the Scales Below**

(Twentynine Palms is

Extremely Better	Moderately Better	Slightly Better	About the Same As	Slightly Worse	Moderately Worse	Extremely Worse
1	2	3	4	5	6	7

Than Other Military Dining Halls)

Mean Rating

	Before	After
1. All things considered in general	4.79	3.15
2. Preparation and presentation of food	4.67	3.35
3. Quality of raw food used	4.99	3.31
4. Variety of food within any given meal	4.43	2.82
5. Variety of food from day to day	4.47	3.01

(Twentynine Palms Runs Out of Items

Extremely More	Moderately More	Slightly More	About the Same As	Slightly Less	Moderately Less	Extremely Less
1	2	3	4	5	6	7

Often Than Other Military Dining Halls)

6. Running out of published menu items	3.42	4.40
--	------	------

*N Before = 172; N After = 186

Table 24, shows the seven specific negative attributes of the food originally rated the worst by the respondents sampled prior to the innovations. There was a significant reduction in the proportion of the survey respondents who rated each negative aspect as always or often present from pre- to post-innovation samples, except for the undercooked attribute which showed improvement, although not enough to be statistically significant.

Table 24. Proportion of Total Survey Sample Rating the Seven Worst Attributes of the Dining Facility Food at Twentynine Palms as "Often" or "Always" Present Before and After Innovations^{a,b}

Attribute	Proportion	
	Before	After
1. Tasteless or Bland	0.55	0.39
2. Greasy	0.54	0.42
3. Cold	0.54	0.43
4. Tough	0.51	0.35
5. Undercooked	0.47	0.40
6. Dried Out	0.44	0.33
7. Fatty	0.42	0.22

^aN Before = 597; N After = 451

^bAll Before versus After differences (except "Undercooked") significant at 0.01 level using ANOVA with Newman-Keuls procedure.

There was also considerable improvement in the variety of offerings, as perceived by the survey respondents, from pre- to post-innovation samples. In comparison to the pre-innovation sample, significantly larger proportions of the post-innovation sample indicated that variety was now enough for short order foods, meats, starches, desserts within meals on weekdays and weekends (intrameal variety) and for desserts from day to day during the course of a month (intermeal variety) (see Table 25). There was also a similar improvement for vegetable variety, significantly so within weekday meals and from day to day through the month, and nonsignificantly so in a statistical sense within weekend meals. Perceived variety did not change significantly in any respect for salads and beverages, a finding that was expected in view of the fact that the variety of these items remained substantially constant from pre- to post-measures.

Table 25. Proportion of Total Survey Sample Indicating that Variety of Offerings is Adequate for Weekday and Weekend Meals and During the Course of a Month Before and After Innovations^{a,b}

For:	Proportion Saying Variety "Now Enough"							
	Weekday		Weekend		During Month			
	Before	After	Before	After	Before	After	Before	After
1. Short Order	0.16	* 0.33	0.21	* 0.36	0.14	* 0.36	0.14	* 0.36
2. Meats	0.14	* 0.26	0.17	* 0.27	0.15	* 0.29	0.15	* 0.29
3. Starches	0.36	* 0.47	0.36	* 0.47	0.32	* 0.44	0.32	* 0.44
4. Vegetables	0.37	* 0.45	0.39	0.45	0.33	* 0.46	0.33	* 0.46
5. Salads	0.45	0.48	0.44	0.52	0.42	0.49	0.42	0.49
6. Beverages	0.57	0.54	0.60	0.55	0.56	0.55	0.56	0.55
7. Desserts	0.37	* 0.48	0.41	* 0.50	0.38	* 0.50	0.38	* 0.50

^aN Before = 597; N After = 451

^bBefore versus After differences significant at 0.01 level for asterisked (*) comparisons using ANOVA with Newman-Keuls procedure.

Relative Preferences Among the Outlets

The survey supplement asked respondents to rank-order their preferences for those outlets with which they were familiar. Table 26 shows the relative ordinal rank-order of the outlets in terms of either the mean or median rank awarded by the survey respondents. In this case the mean is obviously the more discriminant measure of central tendency and does not seriously misrepresent the various distributions of rank since the two bimodalities that do occur are either clustered tightly around the center (four and six for the Lodge) or concentrated at one and the same end (seven and nine for the mobile unit) of the distribution. When so ordered irrespective of category, that is, whether the outlet serves a specialty, an A-ration, or a short order meal – the top two specialty outlets, the Outpost and the Bar BQ Ranch, are both preferred to the highest ranked A-ration (Dining Inn) and short order (Burger Palms) outlets.

Table 26. Overall Rank-Order Preferences for the Various Food Service Outlets at Twentynine Palms Following Innovations

Relative Ordinal Rank		Outlet	Mean Scored Rank	Median Scored Rank	N
(Most Preferred)	1.0	The Outpost	2.36	1	256
	2.0	Bar BQ Ranch	3.60	3	241
	3.0	Dining Inn	3.89	3	212
	4.0	Burger Palms	4.07	4	231
	5.5	Pasta Palace	4.18	4	270
	5.5	29 Burgers	4.18	4	212
	7.0	Sports Circle	4.33	4	249
	8.0	Lodge	4.92	5	181
(Least Preferred)	9.0	Mobile Unit	5.39	6	156

Table 27 shows the relative rank-order within the three food service categories (specialty, A-rating, and short order) as determined by mean ratings on several attributes. The Outpost, obviously the overall favorite, received the highest rating of all nine outlets on four of the six attributes — food quality, food quantity, general environment, and food variety — as well as the second highest rating for courtesy of service. The high rating for food variety is somewhat puzzling in view of the rather limited menu served at The Outpost, with little or no change from day to day. It is quite possible, however, that the great popularity of The Outpost, due primarily to the nature and quality of the steak house type food served, became generalized so as to enhance the rating on an apparently irrelevant variable (that is, variety) creating a so-called halo effect. In fact, the second and third place ratings for food variety went to the Dining Inn and Sports Circle, respectively, both A-rating outlets with daily menu turnover and where greater food variety would naturally be expected. The highest rating for speed of service went to the Sports Circle, which employs a carousel serving line format specifically designed to reduce serving times to a minimum. The mobile unit received the highest rating for courtesy of service, and the second highest rating for speed of service, which was due to the convenience of take-out curb service.

C. FOOD SERVICE WORKER OPINIONS

Surveys and interviews were administered to military food service workers both before and after the implementation of the new food service system (in November 1977 and September 1978). In the case of Dining Facilities 2, 3, and 6 the post-test interview was conducted three months after the new system was in operation, and in the case of Dining Facility 5, two months after the new system was implemented.

METHODOLOGY

Pre-test Data Collection. Interviews were administered, on a one-to-one basis, to 24 cooks at Dining Facility 2 and to 26 cooks at Dining Facility 5 (see Table 28). These cooks were asked to rate their opinion of military service in general, to compare their present dining facility with others in which they had worked, to comment on the good and bad aspects of the existing food service system, and to recommend changes which they felt would lead to system improvement. In addition, each cook was asked to rate the customer attitude in his dining facility.

The cooks were also given the Job Description Index (JDI).⁴ The JDI is a standard paper and pencil instrument which measures job satisfaction in five areas (the work, the supervision, the co-workers on the job, opportunities for promotion, and pay). Each area is evaluated by responses to a list of adjectives and descriptive phrases.

⁴P. C. Smith, L. M. Kendall, and C. L. Hull, *The measurement of satisfaction in work and retirement*. Chicago: Rand McNally & Company, 1969.

Table 27. Mean Ratings for the Various Food Service Outlets at Twentynine Palms on Several Attributes After Innovations Using the Following Scale:

Outlet	Extremely Bad 1	Moderately Bad 2	Slightly Bad 3	Neutral 4	Slightly Good 5	Moderately Good 6	Extremely Good 7	N
	Attribute							
	Quality Food	Quantity Food	General Environment	Variety Food	Speed Service	Courtesy Service		
Specialty The Outpost	4.78	4.67	4.76	4.45	4.08	4.16		247
Bar BQ Ranch	4.05	4.09	4.50	3.83	4.02	3.73		238
Pasta Palace	3.55	4.02	4.34	3.61	4.06	3.98		265
A-Ration Dining Inn	4.47	4.27	4.45	4.26	4.03	3.98		198
Sports Circle	4.14	3.96	4.48	4.12	4.46	4.15		219
Lodge	3.99	3.89	4.30	3.87	3.95	3.94		168
Short Order 29 Burgers	4.33	4.33	4.43	4.03	3.90	4.04		198
Burger Palms	4.29	4.38	4.46	3.93	3.83	3.92		234
Mobile Unit (Hamburger Hot Rod)	4.11	4.11	4.25	3.69	4.13	4.54		145

Table 28. Distribution of Military Food Service Workers Interviewed

Pre-Test	E-1	E-2	E-3	E-4	E-5	E-6	E-7	Total
Dining Facility 2	4	10	4	3	2	0	1	24
Dining Facility 5	<u>3</u>	<u>10</u>	<u>5</u>	<u>4</u>	<u>3</u>	<u>1</u>	<u>0</u>	<u>26</u>
Total	5	20	9	7	5	1	1	50
Post-Test	E-1	E-2	E-3	E-4	E-5	E-6	E-7	Total
Dining Facility 2	0	4	11	5	2	1	1	24
Dining Facility 3	2	9	6	2	0	0	0	19
Dining Facility 5	2	5	7	1	0	0	0	15
Dining Facility 6	<u>0</u>	<u>4</u>	<u>6</u>	<u>1</u>	<u>0</u>	<u>1</u>	<u>0</u>	<u>11</u>
Total	4	22	30	9	2	2	1	69

Post-test Data Collection. Interviews were administered on a one-to-one basis to 24 cooks at Dining Facility 2, 19 cooks at Dining Facility 3, 15 cooks at Dining Facility 5, and 11 cooks at Dining Facility 6 (Table 28). These cooks were asked the same questions as the pre-test sample. In addition, cooks who were stationed at MCAGCC Twentynine Palms before the innovations were requested to compare the new food service system to the previously existing system. Post-test cooks were also administered the JDI.

RESULTS AND DISCUSSION

Enlisted Grade and Opinions of Military Service

As seen in Table 28 most of the cooks interviewed in both the pre- and post-tests were E-2's and E-3's. In the post-test Dining Facility 2 sample a disproportionate number of E-5's through E-7's were interviewed. The weighting of higher grades in this sub-sample might, in part, account for higher ratings of various aspects of the food system.

The responses of both pre- and post-test samples concerning their feelings about military service are shown in Table 29. The mean pre-test response of all cooks interviewed was just to the satisfied side of neutral (4.22 on a seven-point scale), and that of the post-test sample was virtually at neutral (3.99 on a seven-point scale). This apparent small difference between pre- and post-test opinion of all cooks is not statistically significant.^a The difference between the pre-test Dining Facility 2 (4.87) and Dining Facility 5 (3.62) mean ratings of opinion of military service is statistically different.^b

^aSuperscript letters refer to statistical tests of significance provided in Appendix E.

**Table 29. Food Service Worker Opinion of Military Service
(Percent of Responses)**

	Dislike Very Much 1	Dislike Moder- ately 2	Dislike Slightly 3	Neither Like nor Dislike 4	Like Slightly 5	Like Moder- ately 6	Like Very Much 7	Mean
Pre-Test Cooks								
Dining Facility 2 (N = 24)	4%	21%	4%	8%	4%	33%	25%	4.87
Dining Facility 5 (N = 26)	23%	4%	27%	11%	8%	23%	4%	3.62
All Cooks (N = 50)	14%	12%	16%	10%	6%	28%	14%	4.22
	Dislike Very Much 1	Dislike Moder- ately 2	Dislike Slightly 3	Neither Like nor Dislike 4	Like Slightly 5	Like Moder- ately 6	Like Very Much 7	Mean
Post-Test Cooks								
Dining Facility 2 (N = 24)	4%	13%	17%	7%	21%	21%	17%	4.58
Dining Facility 3 (N = 19)	26%	11%	11%	16%	11%	26%	--	3.53
Dining Facility 5 (N = 15)	20%	13%	27%	7%	13%	7%	13%	3.53
Dining Facility 6 (N = 11)	9%	--	36%	9%	18%	27%	--	4.09
All Cooks (N = 69)	14%	10%	20%	10%	16%	20%	9%	3.99

Job Satisfaction

Each of the five areas of the JDI was evaluated by responses to a list of adjectives or descriptive phrases. For each scale, the range of possible scores is from 0 to 54.

Table 30 shows the mean responses of pre- and post-test cooks to the work, supervision, and co-worker scales. One would not anticipate pre- to post-test differences on the other two scales, pay and promotion; and, since such differences did not actually occur, the means are not included in the table. For comparison purposes, the table also provides the mean responses from a sample of military food service workers at three Air Force bases — Travis, Minot, and Homestead.⁵

First, combining responses for all cooks, the differences indicate that the post-test sample was more satisfied with work^c and supervision^d than the pre-test sample. Although it would also appear that post-test cooks were more satisfied with their co-workers, this pre-post difference was not statistically significant.

Second, examining changes occurring pre-post in Dining Facilities 2 and 5, Dining Facility 2 post-test cooks were more satisfied with their work^e and co-workers^f than were their pre-test counterparts. In the Dining Facility 5 samples, the only statistically significant pre-post difference showed post-test cooks being more satisfied with their supervisors.⁹

Third, comparing pre-test scores for all Twentynine Palms cooks to the Air Force data, the MCAGCC, Twentynine Palms pre-test scores in work^h and supervisionⁱ were significantly lower than the Air Force norms. On the other hand, the post-test scores for all cooks of MCAGCC are not significantly different from the Air Force norms.

Fourth, the post-test within dining facility comparisons are obviously more complex with four instead of two facilities being involved. Dining Facility 2 workers were more satisfied with their work than those in Dining Facility 3^j and 5.^k While Dining Facility 3 cooks gave lower ratings on the supervision scale than cooks in the three other facilities, the only statistically significant difference is between Dining Facilities 2 and 3.^l In the co-worker area, Dining Facility 2 cooks gave statistically higher satisfaction ratings than cooks in Dining Facilities 3^m and 5ⁿ (the smallness of the sample in Dining Facility 6 makes such a statistical comparison impossible). The ratings given satisfaction with co-workers by Dining Facility 3 cooks were lower than those given by cooks in Dining Facility 5.^o

Worker Comparison of Their Dining Facility With Others

Both pre- and post-test cooks were asked to compare their dining facilities to others in which they had worked (see Table 31). While the combined responses of the post-test sample had a higher mean than those of the pre-test sample, the difference is not statistically significant.

⁵ L. E. Symington and H. L. Meiselman. The food service worker and the Travis Air Force Base experimental food system: Worker opinion and job opinion and job satisfaction. U.S. Army Natick Laboratories, Technical Report, NATICK/TR-75-94-FSL, 1975. (AD A016 894)

Table 30. Food Service Worker Mean Responses to Three Scales of the Job Description Index (JDI) at MCAGCC Twentynine Palms and Three Air Force Bases*

Scale	Pre-Test Twentynine Palms			
	Dining Facility 2	Dining Facility 5	All Cooks	Three AFB's
Work	19.29	14.96	16.85	23.72
Supervision	36.67	20.15	27.38	38.89
Co-workers	30.29	29.41	29.79	34.98

Scale	Post-Test Twentynine Palms					
	Dining Facility 2	Dining Facility 3	Dining Facility 5	Dining Facility 6	All Cooks	Three AFB's
Work	25.24	17.93	18.73	23.00	21.52	23.72
Supervision	38.38	29.53	34.93	37.83	35.11	38.89
Co-workers	42.52	24.13	34.07	33.58	34.43	34.98

*0 = lowest satisfaction, 5 = highest satisfaction. Three Air Force Bases – Travis, Monot and Homestead AFB's (Symington and Meiselman, 1975).

**Table 31. Food Service Worker Comparison of Present Dining Facility
With Others in Which They Have Worked
(Percent of Responses)**

This Dining Facility is:

	Much Better 7	Moderately Better 6	Slightly Better 5	Neither Better Nor Worse 4	Slightly Worse 3	Moderately Worse 2	Much Worse 1	Mean
Pre-Test Cooks	7	6	5	4	3	2	1	
Dining Facility 2 (N = 15)	46%	13%	7%	21%	---	---	13%	5.33
Dining Facility 5 (N = 14)	14%	7%	---	7%	14%	29%	29%	3.00
All Cooks (N = 29)	31%	10%	3%	14%	7%	14%	21%	4.21

504,

This Dining Facility is:

	Much Better 7	Moderately Better 6	Slightly Better 5	Neither Better Nor Worse 4	Slightly Worse 3	Moderately Worse 2	Much Worse 1	Mean
Post-Test Cooks	7	6	5	4	3	2	1	
Dining Facility 2 (N = 15)	40%	20%	7%	13%	13%	7%	---	5.40
Dining Facility 3 (N = 3)	---	---	---	33%	33%	33%	---	3.00
Dining Facility 5 (N = 9)	33%	---	11%	11%	33%	---	11%	4.44
Dining Facility 6 (N = 2)	50%	---	---	---	50%	---	---	5.00
All Cooks (N = 29)	34%	10%	7%	14%	24%	7%	3%	4.83

Nevertheless, two-thirds of the post-test cooks felt that their facility was as good as, or better than, others in which they had worked, and 34% felt it was much better. In both the pre- and post-test samples, cooks in Dining Facility 2 were more positive about their facility than those in Dining Facility 5 (in the pre-test sample this difference was statistically significant,^p the post-test samples were too small for similar comparison).

Table 32 shows post-test workers' comparisons of their post-test dining facility to their pre-test Twentynine Palms dining facility. The combined mean responses of the cooks at all four facilities was 5.38 on a seven-point scale, with the newer facilities being rated between slightly and moderately better than before the change. The new facilities were rated better to some degree by 73% of the cooks. Consistent with the data presented in Table 31, cooks in Dining Facility 2 gave the highest ratings.

Table 32. Food Service Worker Comparison of Post-Test and Pre-Test Dining Facilities (Percent of Responses) *

Post-Test Dining Facility is:

	Much Better 7	Moder- ately Better 6	Slightly Better 5	Neither Better Nor Worse 4	Slightly Worse 3	Moder- ately Worse 2	Much Worse 1	Mean
Dining Facility 2 (N = 15)	40%	27%	20%	7%	--	--	7%	5.80
Dining Facility 3 (N = 18)	22%	17%	28%	11%	17%	6%	--	5.00
Dining Facility 5 (N = 14)	50%	7%	7%	21%	7%	---	7%	5.43
Dining Facility 6 (N = 11)	45%	9%	18%	9%	9%	9%	--	4.90
All Cooks (N = 50)	38%	16%	19%	12%	9%	3%	3%	5.38

*Ratings given only by those cooks who worked at Twentynine Palms prior to the change.

Worker Perception of Customer Satisfaction

Worker perceptions of customer opinion in their dining facilities probably reflect a combination of actual customer opinion and the cooks' own views of the facilities. The combined pre-test sample of cooks rated customer attitude on the negative side of neutral (3.45 on a seven-point scale). The post-test mean rating fell between "slightly good" and "moderately good" (5.10 on a seven-point scale). This difference is a statistically significant one.⁹ As in many of the previously reported ratings, Dining Facility 2 cooks had higher mean ratings than did Dining Facility 5 cooks within both the pre-test^r and post-test^s samples (see Table 33). The post-test Dining Facility 3 cooks also rated their customers' attitude higher than did cooks in Dining Facility 5.^t There were too few cooks surveyed in Dining Facility 6 for similar statistical comparisons to be made.

Worker Interview Data Concerning Positive and Negative Opinion of the Dining Facilities

Because of the sharp differences between the two pre-test dining facilities, data from the pre-test interviews are more easily comprehended when split into cooks' responses from Dining Facility 2 and 5, respectively (see Table 34). When asked in their interviews about the good aspects of their dining facility, 42% of the pre-test cooks in Dining Facility 2 said that there were good management/worker relations. Esprit de corps, or morale, among cooks was cited as a good aspect by 27% of those interviewed. Nineteen percent commented favorably on food quality, and 15% said that the atmosphere or decor was pleasant.

It should be noted here that while response percentages in the teens are probably not of concern in a forced choice answer situation, such percentages of response to open-ended interview questions like these are not trivial.

The lack of positive interview responses of the pre-test cooks in Dining Facility 5 reflected their lower opinion ratings and job satisfaction scores. The only positive response given by more than two cooks from Dining Facility 5 involved morale among co-workers (10% gave this answer).

There was a higher level of agreement among cooks from Dining Facility 2 and 5 concerning the negative aspects of the pre-renovation dining facilities. The most vigorous pre-test complaints centered around hours with 56% of the combined cooks complaining about the hours and 27% regretting the lack of time off or breaks. There was similar agreement that old inadequate equipment (15%), a lack of training (13%), and a lack of decor (9%) were problems.

The other negative aspects cited by the cooks seemed mainly to be related to Dining Facility 5. Fifty-two percent of cooks at the pre-test in Dining Facility 5 maintained that supervision was poor or that there was no support or positive reinforcement from supervisors; 20% of the cooks also commented that more cooks were needed and that esprit de corps among the cooks was low (13%). Finally, 52% of the cooks in Dining Facility 5 felt strongly enough about the negative aspects of their dining facility to state that there was **nothing** positive about it.

**Table 33. Food Service Worker Opinion of Customer Attitude
(Percent of Responses)**

Customer attitude is:

	Very Bad	Moder- ately Bad	Slightly Bad	Neither Good nor Bad	Slightly Good	Moder- ately Good	Very Good	Mean
Pre-Test Cooks	1	2	3	4	5	6	7	
Dining Facility 2 (N = 24)	12%	19%	4%	15%	19%	23%	8%	4.12
Dining Facility 5 (N = 26)	17%	35%	14%	24%	3%	3%	3%	2.86
All Cooks (N = 50)	15%	27%	9%	20%	11%	13%	5%	3.45

Customer attitude is:

	Very Bad	Moder- ately Bad	Slightly Bad	Neither Good nor Bad	Slightly Good	Moder- ately Good	Very Good	Mean
Post-Test Cooks	1	2	3	4	5	6	7	
Dining Facility 2 (N = 24)	---	8%	13%	8%	13%	50%	8%	5.08
Dining Facility 3 (N = 19)	---	---	11%	11%	26%	32%	21%	5.42
Dining Facility 5 (N = 15)	---	7%	7%	20%	47%	13%	7%	4.73
Dining Facility 6 (N = 0)	---	---	18%	18%	27%	9%	27%	5.09
All Cooks (N = 69)	---	4%	12%	13%	26%	30%	14%	5.10

Table 34. Pre-Test Cooks' Responses Concerning Positive and Negative Aspects of Their Dining Facilities (Percent of Responses)

Positive Aspects			
Dining Facilities			
	2 (N = 34)	5 (N = 36)	Combined (N = 50)
Management-worker relations	42%	---	20%
Cook morale	27%	10%	18%
Food quality	19%	3%	11%
Atmosphere/decor	15%	---	7%
Negative Aspects			
Dining Facilities			
	2 (N = 24)	5 (N = 26)	Combined (N = 50)
Hours	42%	69%	56%
Supervision	4%	52%	29%
No time off	27%	28%	27%
Need more cooks	8%	31%	20%
Old equipment	15%	14%	15%
Training	8%	17%	13%
Cook morale	---	24%	13%
Outdated decor	12%	7%	9%
Nothing Positive	---	52%	27%

The post-test sample of cooks was generally in more agreement than the pre-test sampled cooks concerning positive and negative aspects of their dining facilities, although a few exceptions will be pointed out (see Table 35). By far, the most frequent response volunteered as a good aspect involved decor/atmosphere, with 49% of the combined cooks citing this factor. Other positive responses with general agreement across dining facilities included cook cooperation and morale (17%), good equipment (16%), ease of the job for the cook (16%), food variety (13%), and food quality (12%).

Four positive aspects were disproportionately cited by cooks at Dining Facility 2. Two of these, speed of service (33%) and the circular serving unit (17%), relate directly to the new serving line in that facility and its contribution to the speed of customer flow. A third, good management/worker relations (21%), carried over from the pre-test opinions. The fourth, nothing negative about the facility, reflects the generally positive attitude of cooks at this location.

By far, the most frequent negative response of the combined post-test sample concerned the hours (46%). While this should certainly be of concern, note that the percent of cooks complaining about this has actually decreased in relation to the pre-test data (from 56%, or from 83% if the pre-test complaints about not having time off is added). While only a small percentage of cooks in Dining Facilities 2, 5, and 6 said that nothing was good about the renovated system, a larger group (32%) of cooks at Dining Facility 3 made this comment. Other bad aspects of the post-test facilities included nothing (19%), a need for more cooks (19%), preparing the same items each day (17%), and difficulty in predicting customer demand on a given day (13%). The second of these comments reflects the opinions of cooks in some of the specialty and short order facilities which have the relatively constant menus. In particular, the cooks in Dining Facility 6, a combination of specialty and a short order facility, indicated the largest percentage of this response. This particular comment, therefore, could be avoided, to a large extent, in the future by avoiding this particular combination of menus at one location.

D. LABOR UTILIZATION AND PRODUCTIVITY

INTRODUCTION

A work sampling study was performed at MCAGCC Twentynine Palms to examine the productivity level and various work activities of the food service personnel within the new multi-restaurant food service concept. The objective of this study was to determine how food service personnel in different job categories allocated their time on the job between various productive and non-productive functions and to compare these findings with the results of the work sampling study that was done on the previously existing food service system at MCAGCC Twentynine Palms. In addition to the overall analysis of the entire food service system, differences in manpower utilization among the four individual dining facilities were also analyzed. It should be emphasized that no special staffing guidelines were established by NARADCOM for the test of this improved garrison feeding system. Instead, normal Marine Corps staffing guidelines were applied. This approach permitted a determination of whether the additional food service patrons could be provided with the same level of service within the staffing constraints of the conventional system. All four dining facilities were included in the study.

Table 35. Post-Test Cooks' Responses Concerning Positive and Negative Aspects of Their Dining Facilities (Percent of Responses)

	Positive Aspects				
	Dining Facilities				
	2 (N = 24)	3 (N = 19)	5 (N = 15)	6 (N = 11)	Combined (N = 69)
Atmosphere/decor	42%	42%	80%	36%	49%
Cook morale	8%	21%	20%	27%	17%
Nothing Positive	38%	11%	13%	---	19%
Good equipment	13%	16%	20%	18%	16%
Ease of cook's job	13%	11%	13%	36%	16%
Speed of service	33%	5%	7%	---	14%
Food variety	13%	26%	---	9%	13%
Food quality	8%	16%	---	27%	12%
Management-worker relations	21%	---	---	---	7%
Circular Serving Unit	17%	---	---	---	6%
	Negative Aspects				
	Dining Facilities				
	2 (N = 34)	3 (N = 19)	5 (N = 15)	6 (N = 11)	Combined (N = 69)
Hours	25%	53%	33%	91%	46%
Nothing Negative	8%	32%	7%	18%	16%
Need more cooks	17%	26%	20%	9%	19%
Same preparation each day	17%	11%	13%	36%	17%
Demand unpredictable	8%	16%	20%	9%	13%

As part of this study, worker performance was evaluated by:

- (1) Hours of the work day
- (2) Days of the week
- (3) Type of day (weekday vs. weekend).

The results of this study were intended to:

- (1) Assess personnel performance
- (2) Determine if work schedules can be developed for more effective manpower utilization
- (3) Determine if any increase in manpower requirements exist as a result of the new food service system.

Food Service System Description

Each dining facility manager reports to the base food service officer on all matters pertaining to subsistence and finance. In all other matters, he reports to his unit commander. Each dining facility has the following supervisory positions for each watch (shift): one chief cook, one chief messcook, one chief baker, one cook in charge of salads, and one cook in charge of the storeroom. Actual personnel staffing levels for each dining facility are presented in Table 36.

The dining facilities are open for service during the hours shown below:

Monday–Friday

Dining Facility	Breakfast	Lunch	Dinner
2	0530–0730	1100–1300	1530–1730
3	0600–0800	1100–1500	1600–1800
5	0530–0730	1100–1300	1530–1730
6	No Breakfast	1100–1300	1600–2000
Mobile Unit	---	1100–1300 (Remote Feeding)	1800–2000 (Mainside)

Table 36. Actual Staffing Levels

	Dining Facility 2 Watch			Dining Facility 3 Watch			Dining Facility 5 Watch			Dining Facility 6 Watch		
	1	2	Total	1	2	Total	1	3	Total	1	3	Total
Supervisors			3			1			2			4
Chief Cooks	1	1	2	1	1	2	1	1	2	1	1	2
Chief Messcooks	1	1	2	1	1	2	1	1	2	1	1	2
Messcooks ^a			44			40			64			48
Bakers	3	2	5	2	2	4	1	1	2	3	2	5
Cooks ^b	12	11	23	11	11	22	10	11	21	10	10	20
Missing ^c			6			3			1			9
Total			85			74			94			90

^aMesscooks: Messcooks work both watches.

^bCooks: Includes all subsistence and storeroom personnel.

^cMissing: Includes all personnel on TAD, leave, unauthorized absence, in jail, night cooks (cooks who are assigned to work from 2000 to 0600), and personnel assigned to some place other than a dining facility.

Saturdays, Sundays and Holidays

Dining Facility	Breakfast Brunch	Dinner
2	0730-1030	1500-1700
6	0830-1130	1600-1800
3	0730-1030	1500-1700
5	0830-1130	1600-1800

NOTE: Only two dining facilities (3 and 5 or 2 and 6) are open on weekends. These facilities are open alternately, for two consecutive weekends to balance the work load for each watch (e.g., Dining Facilities 2 and 6 were open the weekend of 2 and 9 Sep and Dining Facilities 3 and 5 were open the following two weekends 16 and 23 Sep).

The work shifts for each dining facility are given below:

	Dining Facility 2			Dining Facility 3	
	Weekdays	Weekends		Weekdays	Weekends
1st Watch	0330-1300	0600-1830	1st Watch	0430-1300	0600-1830
2nd Watch	1030-1900	----	2nd Watch	1300-1930	----

	Dining Facility 5			Dining Facility 6	
	Weekdays	Weekends		Weekdays	Weekends
1st Watch	0400-1300	0700-1930	One Watch	0900-2130	0700-1930
2nd Watch	1230-1900	----			

METHODOLOGY

Work sampling consists of taking a large number of observations on individuals performing tasks in a work situation. The task being performed at each observation is recorded. From the ratio of the number of observations of workers performing a specific task to the total number of observations, one can infer the proportion of time that is actually spent on that particular activity. The larger the number of observations, the more accurate is the inference. Observations are usually made on a random basis to obtain statistically valid results without bias. However, in nonrepetitive situations, observations can be made on a systematic basis without introducing bias, provided the interval between observations is sufficiently small. This approach was used in this study to maximize the sample size in any given observation period.

Data Collection

Work sampling data for the post-test situation were collected over the four-week period, 18 September through 17 October 1978. Observations on worker activities were recorded at fifteen-minute intervals an equal number of times each hour of the working day in each dining facility. The purpose of this data collection schedule was to guarantee that:

- (1) A minimum number of observations were taken in any given job category to assure a specified level of accuracy.
- (2) All hours of the work day for each dining facility were equally represented, and
- (3) The number of observations for each day of the week were spread over four representative days so that a typical event would be averaged.

Observations were scheduled each hour of operation for each dining facility for every day of the week and were established at two- to three-hour intervals with one observer recording data. To assure as little bias as possible in the data, each observer was assigned on a random basis a set of observation periods at different dining facilities.

Work Category	Code
Dining Hall Supervisor	1
Cook	2
Baker	3
Messman	4

Detailed job definitions for these worker categories are provided in Appendix Table F-1.

The functions performed by the personnel were recorded as specified below. Detailed definitions of these task categories are provided in Appendix Table F-2. For purpose of analysis, these activities were arranged in the groups and subgroups outlined below:

Task Category	Code
Non-productive	1
Food preparation	2
Serving food	3
Sanitation	4
Supplies	5
Administrative	6
Supervisory	7
Training	8
Other	9

Detailed data collection procedures are presented in Appendix F. Detailed data analysis procedures are presented in Appendix G.

Assumptions

Several assumptions made during and after the data collection are listed below:

(1) Only those personnel actually in the dining facility were included in the data; those on leave, sick, or otherwise absent were omitted.

(2) If individuals worked beyond their scheduled time, their overtime work was included in the data collected.

(3) If an individual was stationed at his assigned work location and not productively engaged, he was recorded as actually performing his task because his presence was required at that location; for example, a server on the food line was required to be there throughout the meal whether or not there was anyone to serve.

RESULTS AND ANALYSIS

The data collected during the work sampling were analyzed across several dimensions to derive significant relationships relevant to the distribution of effort and the resultant relative productivity. The findings resulting from these analyses are discussed below. The major conclusion from these results is that despite the considerable variety, and new and novel features of the multi-restaurant complex at MCAGCC Twentynine Palms, personnel staffing levels established for standard Marine Corps dining facilities were more than adequate. That is, a relatively high percentage of time occupied by nonproductive tasks and the low productivity levels demonstrated during the test imply that either much larger numbers of customers could be served or that the staffing levels could be reduced to serve the same number of meals.

Overall Personnel Performance

Observations on the activities performed in the dining facilities were tabulated and summarized. Figure 22 graphically portrays the distribution of workload among the various job categories. As shown, nonproductive time for the combined workforce was 46%. In the individual dining facilities (see Figure 23), nonproductive time ranged from 36% to 56%. Average nonproductivity among food service personnel averaged (eliminating messcooks) was 43%, and ranged in the individual dining facilities from 41% to 44%. As Figure 22 further indicates, of the 54% of the combined workforces' time spent on productive tasks, 41% was allocated to direct work (preparation, serving, sanitation), with the remaining 13% allocated to indirect work (supply, administrative, etc.).

Sanitation, the primary responsibility of the messcooks, accounted for 29% of their time. Serving accounted for the next largest amount of the messcooks' productive time, 12%. As anticipated, the 47% nonproductive time for messcooks was the highest among all the job categories. As noted above, however, this was not much higher than nonproductivity for workers other than messcooks (43%).

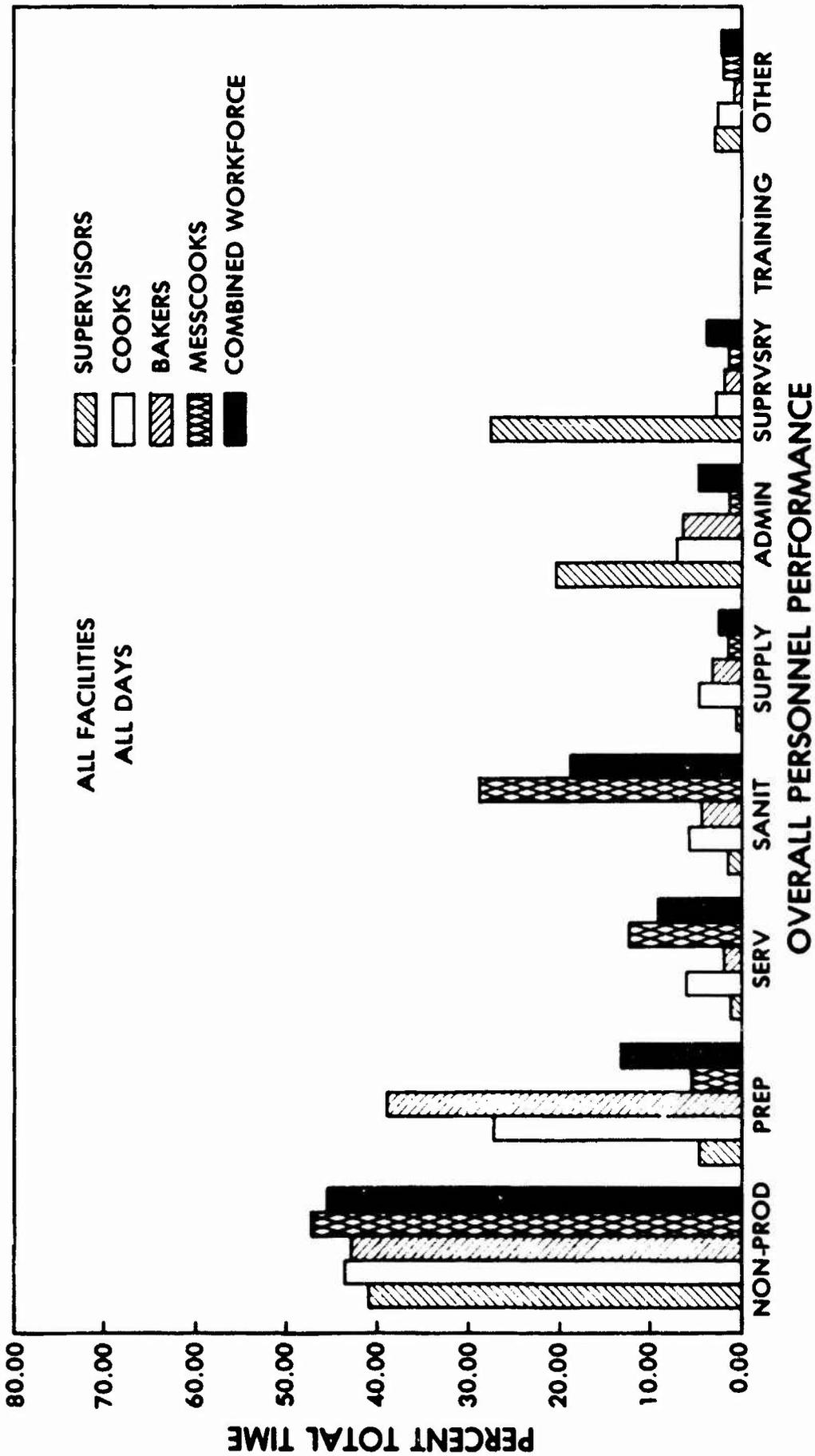


FIGURE 22: OVERALL PERSONNEL PERFORMANCE BY JOB CATEGORY

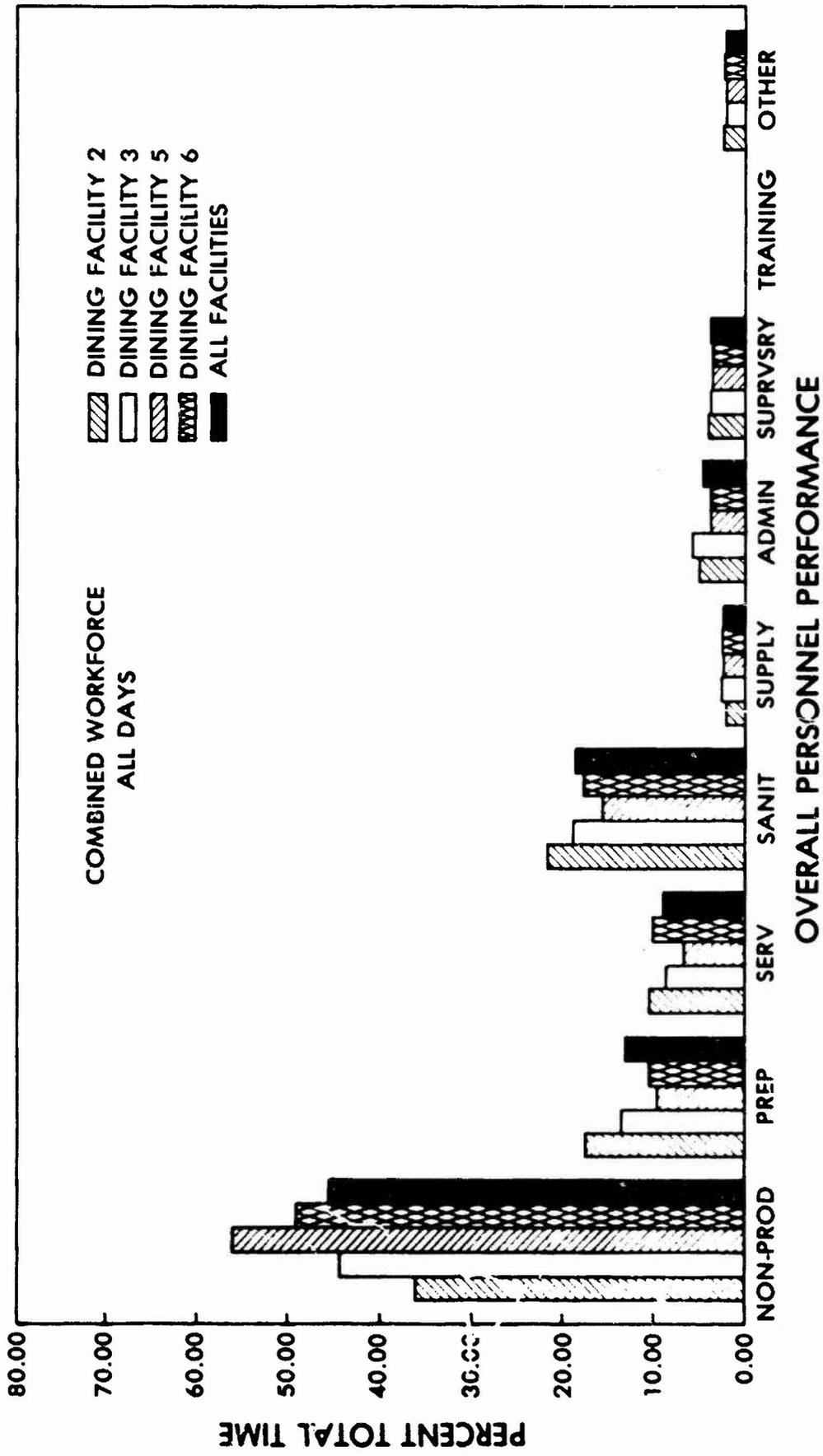


FIGURE 23: OVERALL PERSONNEL PERFORMANCE BY DINING FACILITY

Both cooks and bakers spent most of their productive time in food preparation activities consistent with their described duties. Although cooks spent less time in preparation than bakers, they still accounted for 60% of the total preparation time as there were a greater number of cooks than bakers.

As expected, supervisors spent the major part of their time, 47%, performing administrative and supervisory type functions. The amount spent on both of these activities was significantly lower on weekends as the managers were usually off at these times.

Figure 23 illustrates how the combined workforce within each dining facility allocated their time among the various work functions. As the graph shows, the workforce in each facility allocated approximately the same percentage of time to supply, administrative, supervision, and other miscellaneous activities. The differences in nonproductive time are attributed to the relative number of meals fed in each facility, for example, Dining Facility 2 has the lowest percent of nonproductivity because it served the largest number of meals. Another factor that affected nonproductivity and the distribution of time among the direct functions was the types of menu served. For example Dining Facility 2, serves two A-ration type menus which requires substantial amounts of labor, especially in preparation. In fact, only Dining Facility 2 had a sufficiently demanding combination of high headcounts and menu complexity to result in nonproductive levels equal to nonproductive levels at MCAGCC before the new system was inaugurated. All the other facilities had less demanding jobs, and therefore, higher nonproductive times.

Hour of the Day

Dining facility supervisors' activities varied significantly throughout the day, and as a result, their nonproductive time did not show any particular trend or pattern.

Cooks' and bakers' nonproductive times also do not appear to follow any trend or pattern. This seems reasonable since most of the cooks' and bakers' time is spent preparing food which is done independently of meal times. The fact that nonproductive time occurred somewhat uniformly over the workday is a further indication that the existing staff could serve a greater number of customers or could be reduced to an amount commensurate with the existing customer load.

On weekdays, messcooks were about 20% more nonproductive between 0900--1100 and 1400--1600 than at other times. (Note that these hours are just before the lunch and dinner meals). One reason for this pattern of nonproductivity time is that messmen performed most of the serving and all of the warewashing functions, and since neither is performed between meal hours, there is less work for the messmen to do at these times. In addition, messcooks worked the entire day (from 0500--1900) and were permitted to rest whenever possible.

Day of the Week

Nonproductive time was analyzed for each worker category for weekdays and weekends. On the average, all worker categories had a higher percentage of nonproductivity on the weekend days. This results from the fact that a smaller number of meals were fed on weekends and

the workforce was the same size as on weekdays. This particular situation could be eliminated by specifically arranging the worker schedules so that fewer workers are on duty during weekends. This would also have a positive influence on morale since, as odious as it is in doing necessary work when everyone else is off, it is even more so when an individual is on duty and not productively occupied.

Productivity

The accepted measurement of productivity in the food service industry is the number of meals a given system can produce per manhour of effort expended. The total manhours expended and the average number of meals served daily during the test at Twentynine Palms were calculated and are presented in Appendix G.

From the information contained in Appendix G, (manhours worked and average daily number of meals served) one can calculate the productivity measures for each worker category. Because of the large number of manhours expended by messcooks, it was decided to calculate meals per manhour as well as meals per productive manhour with and without messcooks.

Table 37 shows the number of meals served per manhour for each dining facility, with and without messcooks. Dining Facility 2 had the highest number of meals served per manhour in all areas, primarily due to the large proportion of meals served relative to the other dining facilities.

Table 37. Meals Per Manhour

	Dining Facility				Average
	2	3	5	6	
Combined Workforce					
Meals/Manhour	2.67	2.28	1.29	1.84	1.92
Meals/Productive Manhour	4.18	4.12	3.02	3.65	3.74
Without Messcooks					
Meals/Manhour	6.22	5.42	4.98	5.83	5.66
Meals/Productive Manhour	10.36	9.2	10.07	10.22	9.92

Comparison With Previous Food Service System

Overall Performance

As shown in Figure 24 nonproductive time increased overall from 36.4% in the old system to 45.6% in the new system with the largest increase occurring among messcooks. Messcooks'

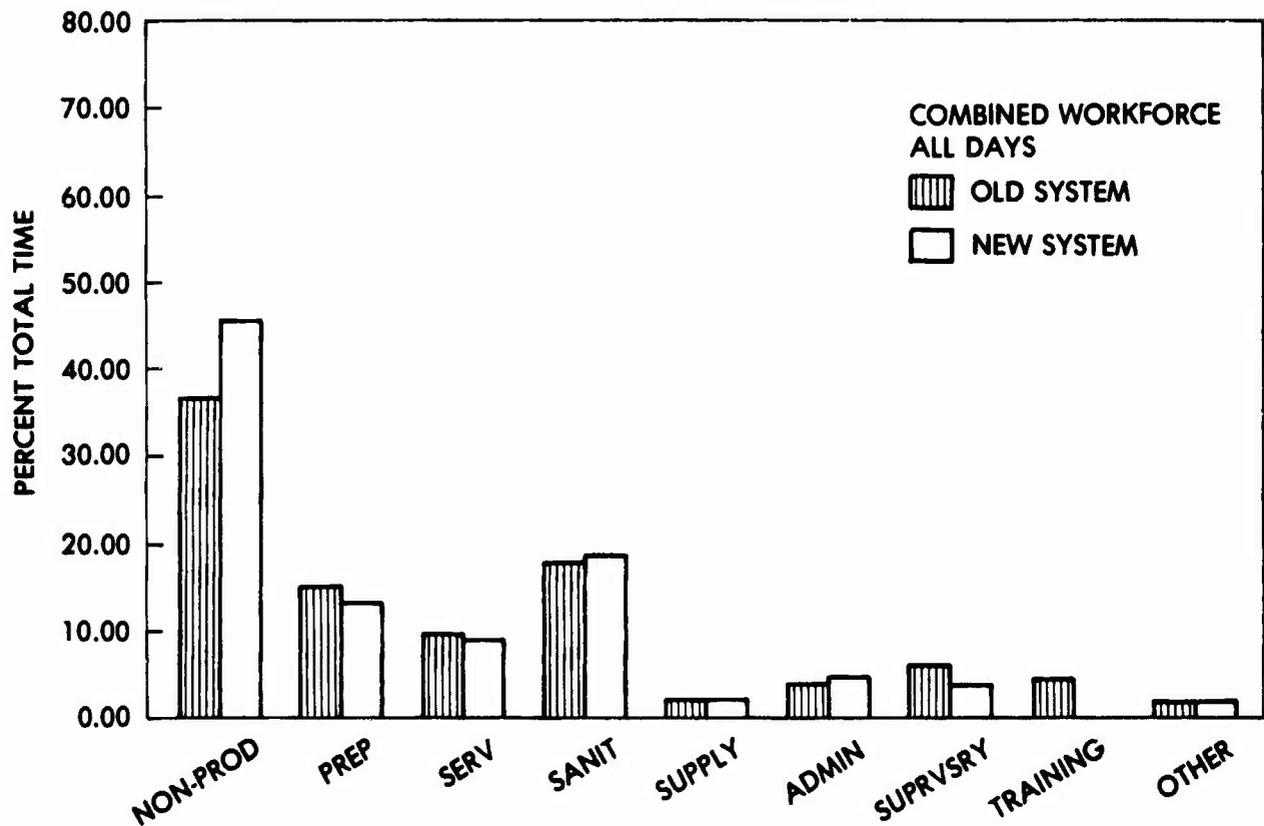


FIGURE 24: OVERALL PERSONNEL PERFORMANCE - OLD AND NEW SYSTEMS

nonproductive time (Table 38) increased from 35.7% to 47.4% which is probably due to the overstaffing of messcooks in some of the dining facilities. Nonproductive time for supervisors, cooks, and bakers also all increased about 6%. It should be noted, however, that cooks spent more time preparing food in the new system than in the old (21.8% vs 27.3%) which can be attributed to the increased variety of the menus offered. The conclusion that can be drawn is that despite both the considerable variety (and the increased food preparation time required to provide it), and also the new and novel features of the multi-restaurant complex system at MCAGCC Twentynine Palms, the personnel staffing levels, as established for standard Marine Corps dining facilities were more than adequate. Thus, either larger numbers of customers could have been served with the existing staff, or the staff could have been reduced and the same number of meals served, without burdening the workforce any more than would be the case in a conventional dining facility.

**Table 38. Average Percent of Time Observed at Work Functions
Old Versus New Systems -- All Days**

Worker Categories		Old System	New System
Supervisor	Productive	64.6	58.9
	Nonproductive	35.4	41.1
Cook	Productive	61.6	56.3
	Nonproductive	38.4	43.7
Baker	Productive	64.0	57.3
	Nonproductive	36.0	42.7
Messman	Productive	64.3	52.6
	Nonproductive	35.7	47.4
Overall	Productive	63.6	54.4
	Nonproductive	36.4	45.6

Productivity

Table 39 shows a comparison of meals per manhour between the old and new systems. As shown, productivity decreased in the new system in all instances. One reason for this is that additional locations were opened as a part of the new system. Because overall attendance rates increased and the average number of meals fed per day per location decreased, lower productivity levels were experienced. As each dining facility is rated well in excess of its current feeding levels, each could serve substantially more meals without a proportionate increase in the workforce, thereby increasing productivity. Alternately, the staffing levels could be reduced without adversely affecting the remaining workforce.

Table 39. Productivity Comparisons Between Old and New Systems

	Old	New
Combined Workforce		
Meals/Manhours	2.65	1.92
Without Messcooks		
Meals/Manhour	6.82	5.66

Conclusions and Recommendations

1. The overall percentage of productive time of 54.4% for all food service workers was significantly lower than that obtained for other military food service systems, such as 67.8% at Travis AFB, 63.4% at McGuire AFB, and 63.3% for the previous system suggesting that the total staffing levels as established for standard Marine Corps dining facilities are more than sufficient to implement the multi-restaurant concept.

2. The low productivity (1.92 meals/manhour) could also be attributed to overstaffing relative to customer headcounts.

3. All personnel spent a major portion of their productive time performing tasks which are reasonable and consistent with their respective duties.

4. Differences in productivity among dining facilities indicate possible discrepancies in staffing levels between dining facilities relative to work loads.

5. Staffing levels should be definitely adjusted downward on weekend schedules to reflect the lower utilization rates at these times.

E. SYSTEM COST ANALYSIS

Operating Costs

In evaluating any new concept, one of the most important factors for consideration is the cost of operation, and how it compares with that of the previously existing system. There are, however, several problems inherent in doing such a comparative cost analysis. Data are typically collected from two different time periods, (eighteen months apart in this case) often resulting in changes to both the size and characteristics of the system -- for example, MCAGCC Twentynine Palms increased its population substantially between these periods. Thus, in order to make a meaningful evaluation of the two systems, it was necessary to make several assumptions. These assumptions were:

(1) All costs are in constant FY78 dollars.

(2) The BDFA is \$3.134.

(3) The opening of two additional dining facilities was attributed primarily to the increase in the population of the base enlisted personnel; it was not a result of the new system. Thus, cost comparisons were made between the new system and projected costs of the old system as if it were operating with four dining facilities. All costs are presented in annualized amounts and are derived from actual data.

Estimated annual operating costs of the new improved system for each dining facility are presented in Table 40. As the total cost for each facility is significantly affected by the number of rations served, the cost per ration for each dining facility was also computed. These

Table 40. Total Dining Facility O&M Costs - New Improved System

	Dining Facility 2		Dining Facility 3		Dining Facility 5		Dining Facility 6	
	\$	% Total						
Direct Cost:								
Food	650,464	47.88	501,308	45.31	349,768	35.14	355,192	34.84
Food Service Labor	367,340	27.04	341,039	30.82	264,356	26.56	352,723	34.60
Messcook Labor*	217,117	15.98	172,904	15.63	297,714	29.92	226,089	22.17
Total Direct Cost:	1,234,921	90.90	1,015,251	91.76	911,838	91.62	934,004	91.61
Indirect Cost:								
Utilities	69,977	5.15	44,370	4.01	41,328	4.15	41,750	4.09
Maintenance	13,112	.97	9,320	.84	9,500	.95	9,936	.98
Supplies	18,248	1.34	15,260	1.38	10,328	1.05	11,636	1.14
Commissary Support	8,002	.59	8,003	.72	8,003	.80	8,003	.78
Transportation	489	.04	489	.04	489	.05	489	.05
Laundry Contract	13,734	1.01	13,734	1.25	13,734	1.38	13,734	1.35
Total Indirect Cost:	123,563	9.10	91,176	8.24	83,382	8.38	85,548	8.39
Total Cost:	1,358,484	100.00	1,106,427	100.00	995,220	100.00	1,019,552	100.00
Total Rations Served Annually:	212,784		164,768		109,468		120,124	

*Messcook labor includes cost of two chief messcooks.

costs per ration are presented in Table 41. As one would anticipate, as the number of rations served increases, both direct and indirect costs per ration decreases due to economies of scale. That this actually occurred is an indication of the fact that the facilities have similar operating characteristics.

Table 41. Cost Per Ration for Each Dining Facility – New Improved System

	Dining Facility 2	Dining Facility 3	Dining Facility 5	Dining Facility 6
Direct Cost:				
Food	\$3,057	\$3,043	\$3,195	\$2,957
Food Service Labor	1,726	2,070	2,415	2,936
Messcook Labor	1,020	1,049	2,720	1,882
Total Direct Cost:	\$5,803	\$6,162	\$8,330	\$7,775
Indirect Cost:				
Utilities	0.329	0.269	0.378	0.347
Maintenance	.062	.057	.087	.083
Supplies	.086	.093	.094	.097
Commissary Support	.038	.049	.073	.067
Transportation	.002	.003	.004	.004
Laundry Contract	.065	.083	.125	.114
Total Indirect Cost:	\$ 5.82	\$0.554	\$0.761	\$0.712
Total Cost:	\$6.385	\$6.716	\$9.091	\$8.487
Ration Served Annually	212,784	164,768	109,468	120,124

The most significant cost per ration difference occurred within the categories of food service labor (cooks) and messcook labor. As can be seen in Table 41, the extremely high labor costs in Dining Facilities 5 and 6 accounted for most of the differences in total costs per ration among the facilities. The high labor costs at these facilities (in comparison to these of the other facilities) were probably caused by a relative overstaffing for the number of meals that were served there (this fact highlights the necessity for providing the food service officer, under this new concept, with the authority to detail personnel from one dining facility to another in order to distribute labor to meet customer requirements). This explanation for high labor costs, however, assumes that all facilities provide the same customer service at their current utilization levels, for example, Dining Facility 2 may have lower labor costs per ration, but at the cost of slower service, such as longer waiting times.

It is interesting to note that the highest cost per ration for utilities occurred in Dining Facility 2, which also had the highest number of rations fed annually. Normally, utility costs per ration decrease as the utilization of the facility increases. One possible explanation for the increase in utility costs in Dining Facility 2 was that the electric carousel serving line was located in this facility and that two A-ration type menus were prepared here. Finally, the additional cost for food in Dining Facility 5 can be attributed to the high costs of the A-ration and Barbecue menus offered.

Table 42 presents the total operating costs for the new food service system. These costs include the support costs of the food service office. Again, because total costs are significantly affected by the number of rations served, the cost per ration served are also presented in Table 41.

Table 42. Total Operating Costs for New Improved System

	Total \$	\$ Per Ration	% Total
Direct Cost:			
Raw Food	1,902,789	3.134	40.83
Food Service Labor	1,460,403	2.405	31.33
Messcook Labor	913,824	1.505	19.61
Total Direct Cost	4,277,016	7.044	91.77
Indirect Cost:			
Utilities	197,425	0.325	4.24
Maintenance	41,868	.069	.90
Supplies	55,472	.091	1.19
Laundry (Contract)	54,936	.090	1.18
Commissary Support	32,012	.053	.68
Transportation	1,956	.004	.04
Total Indirect Cost	383,669	0.632	8.23
Total Cost	4,660,685	7.676	100.00
Man Days Fed	607,144		
BDFA	\$ 3.134		

Table 43 presents the total operating cost of the old food service system in '77 dollars as well as '78 dollars (both with two facilities). Raw food costs were calculated on the base population during the test for enlisted personnel, the average BDFA for 1978, and attendance rates under the old system. Labor costs were calculated using the previously observed staffing levels in the conventional system and current pay scales as furnished by HQMC. All indirect costs were derived from actual costs adjusted by established inflation indices as furnished by HQMC and the Bureau of Labor Statistics.

**Table 43. Total Operating Cost for the Previous Conventional Food Service System
in 1977 and 1978 Dollars
(Two Dining Facilities)**

	'77 Dollars	'78 Dollars
Direct Cost:		
Raw Food	1,268,930	1,370,376
Food Service Labor	889,236	920,000
Messcook Labor	551,616	588,222
Total Direct Cost	2,709,782	2,887,598
Indirect Cost:		
Utilities	112,452	127,700
Maintenance	34,600	36,897
Supplies	50,420	55,280
Laundry (Contract)	25,353	27,797
Commissary Support	20,428	21,784
Transportation	5,200	5,545
Total Indirect Cost	248,453	275,003
Total Cost	2,958,235	3,162,601
Man Days Fed	437,261	437,261
1978 Base Population	5,008	5,008

As stated earlier, the objective was to compare the costs of the new improved system with the costs of the previous conventional system. Thus, it was necessary to project the costs of the conventional system operating with four dining facilities (see Table 44).

Table 44. Total Projected Operating Costs for the Previous Conventional System with Four Dining Facilities

	Total Costs \$	% Total	Cost Per Ration \$
Direct Cost:			
Raw Food	1,487,851	36.88	3.134
Food Service Labor	1,460,403	36.20	3.076
Messcook Labor	714,548	17.71	1.505
	<hr/>	<hr/>	<hr/>
Total Direct Costs	3,662,802	90.79	7.715
Indirect Cost:			
Utilities	197,425	4.89	0.416
Maintenance	41,868	1.04	.088
Supplies	43,375	1.08	.091
Laundry	54,936	1.36	.116
Commissary Support	32,012	.79	.068
Transportation	1,956	.05	.004
	<hr/>	<hr/>	<hr/>
Total Indirect Costs	371,572	9.21	0.783
	<hr/>	<hr/>	<hr/>
Total Costs	4,034,374	100.00	8.498
	<hr/>		<hr/>
B DFA	\$3.134		
Man Days Fed	474,745		

The assumptions made in calculating these projected costs for the old system were as follows:

(1) The base population of enlisted personnel was 5008 in 1978. (This was based on an average obtained in 1978 for a representative three months).

(2) Attendance rates in the dining facilities were predicted on actual rates under the previous conventional system.

(3) The B DFA was \$3.134 (the same as for the new improved system).

(4) Indirect costs, such as supplies, were calculated from the new system costs and adjusted where appropriate for differences in attendance rates.

(5) Total food service labor costs were held constant in both systems, because the number of individuals assigned to a dining facility was based on field feeding requirements which exceeded garrison requirements in both situations.

Table 45. Total Annual Cost Comparison Between the Conventional and Improved Systems

	Conventional System		Improved System	
	\$	% Total	\$	% Total
Direct Cost:				
Raw Food	1,487,851	33.88	1,902,789	40.83
Food Service Labor	1,460,403	36.20	1,460,403	31.33
Messcook Labor	714,548	17.71	913,824	19.61
Total Direct Cost	3,662,802	90.79	4,277,016	91.77
Indirect Cost:				
Utilities	197,425	4.89	197,425	4.24
Maintenance	41,868	1.04	41,868	.90
Supplies	43,375	1.08	55,472	1.19
Laundry (Contract)	54,936	1.36	54,936	1.18
Commissary Support	32,012	.79	32,012	.68
Transportation	1,956	.05	1,956	.04
Total Indirect Cost	371,572	9.21	383,669	8.23
Total Cost	4,034,374		4,660,685	100.00
Man Days Fed	474,745		607,144	
BDFA (avg. for 3 mos.)	3.134		3.134	

(6) Messcook labor requirements were held constant on a per ration basis as they were assumed to vary directly with the number of rations served. Total costs for both the previous conventional and new improved food service systems are compared in Table 45. Costs per ration for each system are presented in Table 46.

Table 46. Comparative Cost Per Ration for Conventional and Improved Systems

	Conventional System \$	Improved System \$
Direct Cost:		
Raw Food	3.134	3.134
Labor	3.076	2.405
Messcook Labor	<u>1.505</u>	<u>1.505</u>
Total Direct Cost	7.715	7.044
Indirect Cost:		
Utilities	.416	.325
Maintenance	.088	.069
Supplies	.091	.091
Laundry (Contract)	.116	.091
Commissary Support	.068	.053
Transportation	<u>.004</u>	<u>.003</u>
Total Indirect Cost	.783	.632
Total Cost	<u>\$8.498</u>	<u>\$7.676</u>
Total Rations Annually	474,745	607,144
BDFA	3.134	3.134

Investment Costs

As seen in Table 47, substantial modernization and improvement costs were spent on the four facilities at MCAGCC, Twentynine Palms. However, it is important to emphasize here that a significant portion of these costs (84%) would have been incurred even if the conventional system had been retained as the dining facilities themselves were much in need of renovation and the equipment was antiquated and worn out.

Table 47. Analysis of Investment Costs for MCAGCC, Twentynine Palms

	Multi-Restaurant	Total
Equipment	\$ 77,455	\$275,270
Furnishings	24,430	24,430
Furniture	---	80,021
Construct & Renovation	---	186,002
Repairs	---	140,496
Equipment Installation	<u>25,135</u>	<u>89,328</u>
	\$127,020	\$795,547

Conclusions

The multi-restaurant concept was implemented at MCAGCC, Twentynine Palms, CA at a cost of \$795,547 or less than \$200,000 per dining facility, which is substantially less than the cost to renovate many dining facilities under the existing food service system, for example, the enlisted dining facility at the Marine Barracks, Washington, DC was renovated at a cost of over \$500,000. This lower cost results from the fact that unlike previous food service modernization projects which concentrated solely on modernizing and renovating the physical structure of the dining facilities, the multi-restaurant concept attempts to take full advantage of existing dining facility configurations, such as the accented beams at MCAGCC in lieu of a more expensive suspended ceiling, thereby reducing renovation costs and thus permitting additional dollars to be spent on system design, specialized equipment (such as, the barbecue smoker and the carousel serving line, and improved seating and decor packages for the dining areas.

As with any commercial food service operation, the dramatic increase in customer attendance (30%) such as that experienced at MCAGCC Twentynine Palms will result in substantial cost-per-meal reductions (labor costs per meal dropped 20%). This fact is especially true in military garrison operations that tend to be overstaffed (because of field feeding requirements), because an increase in customers does not necessitate any increase in labor. From this viewpoint, the multi-restaurant concept is a much more efficient operation than the conventional food service system in that more customers are fed with the same amount of labor.

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APPENDIX A
METHODOLOGY FOR CONSUMER ATTITUDE SURVEY AND
CONSUMER OPINION SURVEY INSTRUMENT

METHODOLOGY FOR CONSUMER ATTITUDE SURVEY

The sampling plan for both the pre-and post-innovation survey measures specified a 15% sample drawn from the base enlisted population and stratified by work unit, rank, and ration status, to whom the COFSS survey would be administered. Of this 15% sample, one third, constituting 5% of the base enlisted population, would also participate in the face-to-face interview in addition to completing the COFSS survey. Both the larger 15% sample and the smaller included 5% subsample were stratified in exactly the same way. The number of individuals in the sample chosen from any given work unit was proportional to the size of the work unit relative to the base as a whole -- for example, a unit containing 20% of the base enlisted personnel would contribute 20% of the 15% sample. To simplify the stratification by rank, the nine enlisted grades were divided into two categories: E-1,2,3,4 and E-5,6,7,8,9. Since the respective proportions of base personnel falling into each category was 80% and 20%, these same proportions were used to specify the ideal breakout of the proposed sample from within each unit. Finally, for each grade category within each work unit, the ideal sampling plan specified that 2/3 (67%) be authorized to subsist at government expense (RIK status) and that the remaining 1/3 (33%) be receiving separate rations (COMRATS), since those were the proportions of each ration status category occurring within the base enlisted population taken as a whole. The criterion characteristics of the ideal sample population, then, would match those of the base enlisted population, both taken as wholes, even though for any given unit, the 80-20% rank distribution and the 67-32% ration status distribution might or might not reflect the actual proportion of occurrence within that particular unit. Although normally considered relevant, marital status was not used in this study as a criterion variable for stratification because of its high correlation with ration status in the Marine Corps: Those personnel on separate rations are almost always married, those authorized to subsist at government expense almost never are.

For the 5% subsample interviewed either before or after the innovations, variable sized groups of four to five enlisted consumers per available interviewer were scheduled for each hour block so that each respondent could be personally interviewed on an individual basis for 10 to 15 minutes while the other respondents spent the remaining 45 minutes of the hour working on their COFSS surveys. The Consumer Opinions of Food Service Systems survey (COFSS), originally developed by Natick Laboratories in 1972 and updated in 1974, consists of 57 questions -- some with several parts -- covering a wide range of variables involved in food service. Each question has a limited set of possible responses, allowing for computer scoring of the survey booklets. A copy of the COFSS survey is included.

For the post-innovation measure, the COFSS survey was supplemented by an insert addressing relative preferences among the various new food service outlets, including reasons for attendance and/or non-attendance. In addition, the insert obtained subjective ratings on a number of critical attributes for each of the post-innovation outlets separately. A copy of the Survey Supplement is attached as Appendix B.

The pre-innovation interview instrument, tailored to the specific requirements of this project, consisted of five general sections dealing respectively with (a) the demographic characteristics of the respondents, (b) their current food habits, (c) their opinions of the dining

hall and its food, (d) their specialty food preferences, and (e) various comparisons to other military dining facilities. Most of the questions required either a very objective response from a logically exhaustive set of possibilities or a subjective rating confined to a seven-point scale with predetermined anchors printed on a card shown to the respondent at the appropriate time. A few of the questions, however, were designed to permit relatively open-ended responses, which were recorded as closely as possible by the interviewer and subjected to a content analysis at a later time. A copy of the pre-innovation interview protocol is attached as Appendix C.

The post-innovation interview instrument closely paralleled the pre-innovation interview, consisting of the same five general sections and many similar, if not identical, questions. The Food Habits section was changed substantially from pre- to post-innovation to reflect the shift from an extensive diagnostic orientation during the baseline data collection to a more intensive, evaluative orientation centering on the respective base dining facilities. The Comparison section was also enlarged substantially from pre- to post-innovation measures to permit direct comparisons of post- to pre-innovation attributes in addition to comparing both situations to an external reference. A copy of the post-innovation interview protocol is attached as Appendix D.

In most cases, the small groups receiving both the surveys and the interview either before or after the innovations were survey/interviewed in a briefing room near their collective work sites. Following a short introduction that included the purpose of the data collection effort, respondents were briefed on general procedures, instructed on some of the more complex items on the survey, and told to feel free to ask questions in the event of any uncertainty. In the instructions, the respondents were told to answer only those questions that they could and to leave blank any items for which they had insufficient familiarity with the dining facility to answer knowledgeably.

For the remaining 10% of the enlisted population who were to receive only the COFSS survey either before or after the innovations, mass survey sessions of 30 to 100 respondents each were scheduled in an unused dining hall. The mass session respondents received much the same instructions as those who were interviewed in small groups, except, of course, those pertaining specifically to the interview procedure.

CONSUMER'S OPINIONS OF FOOD SERVICE SYSTEMS

U. S. ARMY NATICK LABORATORIES

NOVEMBER 1974

Booklet Serial Number

In the grid to your right, please fill in the ovals corresponding with the Booklet Serial Number that is stamped directly above the numeric grid.

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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11. At how many installations (besides this one) have you been assigned where you ate regularly in the installation dining hall?

- 0 1 2-4 5-7 8 or more

12. Do you plan to REENLIST when your present enlistment ends? Darken the appropriate circle.

- Definitely yes
 Probably yes
 Undecided
 Probably no
 Definitely no
 No, retiring

13. What are your FEELINGS ABOUT THE MILITARY SERVICE? Darken the appropriate circle.

- | | | | | | | |
|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| Dislike
very much | Dislike
moderately | Dislike
a little | Neutral | Like
a little | Like
moderately | Like
very much |
| <input type="radio"/> |

14. Where were you raised? Darken the appropriate circle.

- In the country
 In a town or small city with less than 25,000 people
 In a city with more than 25,000, but less than 100,000 people
 In a large city with more than 100,000, but less than one million people
 In a very large city with over one million people
 In a suburb of a large or very large city

15. In what STATE were you raised? Darken the appropriate circle.

- | | |
|--|--|
| <input type="radio"/> 01 Alabama | <input type="radio"/> 28 Nevada |
| <input type="radio"/> 02 Alaska | <input type="radio"/> 29 New Hampshire |
| <input type="radio"/> 03 Arizona | <input type="radio"/> 30 New Jersey |
| <input type="radio"/> 04 Arkansas | <input type="radio"/> 31 New Mexico |
| <input type="radio"/> 05 California | <input type="radio"/> 32 New York |
| <input type="radio"/> 06 Colorado | <input type="radio"/> 33 North Carolina |
| <input type="radio"/> 07 Connecticut | <input type="radio"/> 34 North Dakota |
| <input type="radio"/> 08 Delaware | <input type="radio"/> 35 Ohio |
| <input type="radio"/> 09 Florida | <input type="radio"/> 36 Oklahoma |
| <input type="radio"/> 10 Georgia | <input type="radio"/> 37 Oregon |
| <input type="radio"/> 11 Hawaii | <input type="radio"/> 38 Pennsylvania |
| <input type="radio"/> 12 Idaho | <input type="radio"/> 39 Rhode Island |
| <input type="radio"/> 13 Illinois | <input type="radio"/> 40 South Carolina |
| <input type="radio"/> 14 Indiana | <input type="radio"/> 41 South Dakota |
| <input type="radio"/> 15 Iowa | <input type="radio"/> 42 Tennessee |
| <input type="radio"/> 16 Kansas | <input type="radio"/> 43 Texas |
| <input type="radio"/> 17 Kentucky | <input type="radio"/> 44 Utah |
| <input type="radio"/> 18 Louisiana | <input type="radio"/> 45 Vermont |
| <input type="radio"/> 19 Maine | <input type="radio"/> 46 Virginia |
| <input type="radio"/> 20 Maryland | <input type="radio"/> 47 Washington |
| <input type="radio"/> 21 Massachusetts | <input type="radio"/> 48 West Virginia |
| <input type="radio"/> 22 Michigan | <input type="radio"/> 49 Wisconsin |
| <input type="radio"/> 23 Minnesota | <input type="radio"/> 50 Wyoming |
| <input type="radio"/> 24 Mississippi | <input type="radio"/> 51 Washington D.C. |
| <input type="radio"/> 25 Missouri | <input type="radio"/> 52 Other U.S. territories or possessions (For example, Puerto Rico or Virgin Islands.) |
| <input type="radio"/> 26 Montana | <input type="radio"/> 53 Outside the U.S. or U.S. Territories or possessions. |
| <input type="radio"/> 27 Nebraska | |

16. Darken the circle which indicates your PRESENT GRADE.

- E-1
- E-2
- E-3
- E-4
- E-5
- E-6
- E-7
- E-8
- E-9
- Officer

17. Do you receive a SEPARATE RATIONS ALLOWANCE (money instead of free meals)?
Darken the appropriate circle.

- Yes
- No

18. What ONE TYPE OF COOKING were you raised on? Darken the appropriate circle.

- | | |
|---|--|
| <input type="radio"/> 01 Chinese | <input type="radio"/> 09 Jewish |
| <input type="radio"/> 02 English | <input type="radio"/> 10 Mexican |
| <input type="radio"/> 03 French | <input type="radio"/> 11 New England |
| <input type="radio"/> 04 General American Style | <input type="radio"/> 12 Polish (& Eastern Europe) |
| <input type="radio"/> 05 German | <input type="radio"/> 13 Soul |
| <input type="radio"/> 06 Greek | <input type="radio"/> 14 Southern |
| <input type="radio"/> 07 Italian | <input type="radio"/> 15 Spanish (not Mexican) |
| <input type="radio"/> 08 Japanese | <input type="radio"/> 16 Other (please specify _____) |

19. What TYPE OF COOKING OR SPECIALTY FOODS do you like best? Please darken the circles of your TOP THREE CHOICES.

- | | |
|---|--|
| <input type="radio"/> 01 Chinese | <input type="radio"/> 09 Jewish |
| <input type="radio"/> 02 English | <input type="radio"/> 10 Mexican |
| <input type="radio"/> 03 French | <input type="radio"/> 11 New England |
| <input type="radio"/> 04 General American Style | <input type="radio"/> 12 Polish (& Eastern Europe) |
| <input type="radio"/> 05 German | <input type="radio"/> 13 Soul |
| <input type="radio"/> 06 Greek | <input type="radio"/> 14 Southern |
| <input type="radio"/> 07 Italian | <input type="radio"/> 15 Spanish (not Mexican) |
| <input type="radio"/> 08 Japanese | <input type="radio"/> 16 Seafood |
| | <input type="radio"/> 17 Other (please specify _____) |

20. HOW MANY MEALS DO YOU EAT DURING A TYPICAL WEEK, REGARDLESS OF WHERE YOU EAT THEM? For each meal darken TWO circles, one to indicate how often you have that meal during typical weekdays (Monday through Friday) AND a second to indicate how often you have that meal during a typical weekend (Saturday and Sunday).

	Weekdays					Weekend	
	1	2	3	4	5	1	2
Breakfast	<input type="radio"/>						
Mid-day Meal	<input type="radio"/>						
Evening Meal	<input type="radio"/>						
After Evening	<input type="radio"/>						

21. HOW MANY MEALS DO YOU EAT AT YOUR DINING FACILITY DURING A TYPICAL WEEK?

For each meal darken TWO circles, one to indicate how often you have that meal during typical weekdays (Monday through Friday) AND a second to indicate how often you have that meal during a typical weekend (Saturday and Sunday).

	Weekdays					Weekend	
	1	2	3	4	5	1	2
Breakfast	<input type="radio"/>						
Mid-day Meal	<input type="radio"/>						
Evening Meal	<input type="radio"/>						
After Evening	<input type="radio"/>						

22. WHERE DO YOU EAT when you do not eat in the military dining facility? Indicate how often by filling in one circle in each line.

	Never	Less than once a week	1-3 times a week	4-7 times a week	8-14 times a week	15 or more times a week
a. Private residence (girlfriend's house, friend's or relative's house, your home, your barracks, bringing your food, etc.)	<input type="radio"/>					
b. Other installation facility (NCO Club, the exchange, etc.)	<input type="radio"/>					
c. Diner, snack bar, pizza parlor, or drive-in off the installation (or having it delivered)	<input type="radio"/>					
d. Bar or tavern (with alcoholic beverages) off the installation	<input type="radio"/>					
e. From vending machines	<input type="radio"/>					
f. From mobile snack or lunch trucks	<input type="radio"/>					
g. Other (write it below and indicate how often)	<input type="radio"/>					

23. Listed below are 14 GENERAL AREAS OF CONCERN. For each area indicate whether in your opinion it is very bad, moderately bad, neither bad nor good, moderately good, or very good for your dining facility.

Area or topic	Very Bad	Moderately Bad	Neither Bad Nor Good	Moderately Good	Very Good
a. Convenience of location	<input type="radio"/>				
b. General dining facility environment	<input type="radio"/>				
c. Degree of military atmosphere present	<input type="radio"/>				
d. Desirable eating companions	<input type="radio"/>				
e. Expense	<input type="radio"/>				
f. Hours of operation	<input type="radio"/>				
g. Monotony of same facility	<input type="radio"/>				
h. Quality of food	<input type="radio"/>				
i. Quantity of food	<input type="radio"/>				
j. Service by dining facility personnel	<input type="radio"/>				
k. Variety of the regular meal food (weekday only)	<input type="radio"/>				
l. Variety of the regular meal food (weekend only)	<input type="radio"/>				
m. Variety of the short order food	<input type="radio"/>				
n. Speed of service or lines	<input type="radio"/>				

24. For each of the same 14 general areas, indicate whether it is a major reason for your degree of NON-ATTENDANCE at the dining facility, a minor reason for your degree of non-attendance, or not related to your degree of non-attendance.

Area or topic	Major reason for non-attendance	Minor reason for non-attendance	Not related to non-attendance
a. Convenience of location	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. General dining facility environment	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c. Degree of military atmosphere present	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d. Desirable eating companions	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e. Expense	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
f. Hours of operation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
g. Monotony of same facility	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
h. Quality of food	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
i. Quantity of food	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
j. Service by dining facility personnel	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
k. Variety of the regular meal food (weekday only)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
l. Variety of the regular meal food (weekend only)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
m. Variety of the short order food	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
n. Speed of service or lines	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
o. Other (please specify _____)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

25. How would you rate this dining hall in comparison to other military dining halls in which you have eaten? This dining hall is: (Darken the appropriate circle.)

Much Worse	Slightly Worse	No Better or Worse	Slightly Better	Much Better
<input type="radio"/>				

26. If you have a REGULARLY SCHEDULED ACTIVITY which keeps you from attending the dining facility at certain times, indicate how many meals per week you do not attend because of this activity. (Indicate "zero meals not attended" if you have no such activity.)

Meals not attended:	0	1	2-4	5	6-7	8-10	More than 10
	<input type="radio"/>						

27. Concerning the degree of **MILITARY ATMOSPHERE** which you feel exists in your dining facility at the present time, indicate whether you feel there should be **MORE** or **LESS** military atmosphere in the future.

A Lot More <input type="radio"/>	A Little More <input type="radio"/>	About the Same <input type="radio"/>	A Little Less <input type="radio"/>	A Lot Less <input type="radio"/>
--	---	--	---	--

28. Indicate approximately how many minutes it takes you to travel from your:

	1-5 min	6-10 min	11-15 min	16-20 min	21-25 min	26-30 min	Over 30 min
a. Job site to dining facility	<input type="radio"/>						
b. Living area to dining facility	<input type="radio"/>						

29. Is your dining facility ever:

	Never	Sometimes	Often	Always
a. Too cold	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. Too warm	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c. Stuffy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d. Smoky	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e. Full of steam	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
f. Full of unpleasant food odors	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

30. How often do you find:

	Never	Sometimes	Often	Always
a. Inappropriate or missing silverware	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. Not enough condiments (ketchup, etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c. Serving line has run out of items	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

31. For each pair of items below, please indicate your opinion of THE GENERAL CONDITION OF YOUR DINING FACILITY by darkening the circle which comes closest to describing your feelings.

		Extremely	Moderately	Neutral	Moderately	Extremely	
a.	Clean kitchen area	<input type="radio"/>	Dirty kitchen area				
b.	Insect infested	<input type="radio"/>	Insect free				
c.	Clean serving counters	<input type="radio"/>	Dirty serving counters				
d.	Dirty dispensing devices	<input type="radio"/>	Clean dispensing devices				
e.	Dirty silverware	<input type="radio"/>	Clean silverware				
f.	Clean trays	<input type="radio"/>	Dirty trays				
g.	Clean dishes and glasses	<input type="radio"/>	Dirty dishes and glasses				
h.	Dirty floors	<input type="radio"/>	Clean floors				
i.	Dirty tables and chairs	<input type="radio"/>	Clean tables and chairs				
j.	Brightly lighted	<input type="radio"/>	Dimly lighted				
k.	Sunny	<input type="radio"/>	Lacking in sunlight				
l.	Quiet	<input type="radio"/>	Noisy				
m.	Crowded	<input type="radio"/>	Uncrowded				
n.	Roomy	<input type="radio"/>	Cramped				
o.	Pleasant view	<input type="radio"/>	Unpleasant view				
p.	Low number of safety hazards	<input type="radio"/>	High number of safety hazards				
q.	Unpleasant exterior appearance	<input type="radio"/>	Pleasant exterior appearance				
r.	Unpleasant interior appearance	<input type="radio"/>	Pleasant interior appearance				
s.	Colorful	<input type="radio"/>	Drab				
t.	Beautiful	<input type="radio"/>	Ugly				
u.	Relaxed	<input type="radio"/>	Tense				

32. Indicate your opinions about CONVENIENCES WITHIN YOUR DINING FACILITY.

- | | Extremely | Moderately | Neutral | Moderately | Extremely | | |
|----|---|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|---------------------------------------|
| a. | Convenient to enter & leave | <input type="radio"/> | Inconvenient to enter & leave |
| b. | Far from washroom | <input type="radio"/> | Close to washroom |
| c. | Inadequate table size for size of trays | <input type="radio"/> | Adequate table size for size of trays |

33. Indicate the TABLE SIZE you prefer:

- | | | | | |
|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| 2 persons | 4 persons | 6 persons | 8 persons | More than 8 persons |
| <input type="radio"/> |

34. Indicate your opinion about the following SOCIAL aspects of your dining facility.

- | | Never | Sometimes | Often | Always |
|---|-----------------------|-----------------------|-----------------------|-----------------------|
| The feeling of privacy is quite good in this dining hall | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Room conditions are acceptable for relaxed conversation | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| There is a friendly social atmosphere in this dining hall | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

35. Do you have MUSIC in your dining facility now? Yes No

36. What is your reaction to having MUSIC in the dining facilities:

- | | | | | |
|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| Very Acceptable | Mildly Acceptable | Neutral | Mildly Unacceptable | Very Unacceptable |
| <input type="radio"/> |

37. Indicate the THREE types of music you would most prefer in the dining facilities:

- Any type is fine
- Hard rock
- Soul
- Popular
- Rock and roll
- Jazz
- Instrumental
- Classical
- Country western
- Other (write it here) _____
- Do not want music

38. Does your dining facility use a SELF BUSSING system in which each person carries his own tray to the dishwashing area?

Yes No

39. Indicate how you do or would feel about having SELF BUSSING in the dining facilities:

Very Acceptable Mildly Acceptable Neutral Mildly Unacceptable Very Unacceptable

40. WHAT HOURS WOULD YOU LIKE THE DINING FACILITY OPEN? For each type of meal darken TWO circles, one to indicate your feeling about the time the dining hall opens AND the other to indicate your feeling about the time the dining hall closes.

	Opening			Closing		
	1 Hour Earlier	1/2 Hour Earlier	OK as Is	1 Hour Later	1/2 Hour Later	OK as Is
Weekday Breakfast	<input type="radio"/>					
Weekday Mid-day Meal	<input type="radio"/>					
Weekday Evening Meal	<input type="radio"/>					
Weekend Breakfast	<input type="radio"/>					
Weekend Mid-day Meal	<input type="radio"/>					
Weekend Evening Meal	<input type="radio"/>					

41. Is the food in your mess hall ever:

	Never	Sometimes	Often	Always
a. Overcooked	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. Undercooked	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c. Cold	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d. Tasteless or bland	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e. Burned	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
f. Dried out	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
g. Greasy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
h. Tough	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
i. Too spicy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
j. Raw	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
k. Still frozen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
l. Too salty	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
m. Full of gristle	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
n. Spoiled	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
o. Stale	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
p. Fatty	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

42. Other than times of dining, do you ever LEAVE your dining facility WITHOUT ENOUGH TO EAT?

NEVER SOMETIMES OFTEN ALWAYS

43. Do you serve yourself or do the dining facility personnel serve you the following items?

	SELF-SERVICE	SERVED BY OTHERS
a. Short order items	<input type="radio"/>	<input type="radio"/>
b. Meat items	<input type="radio"/>	<input type="radio"/>
c. Starches (i.e., potatoes)	<input type="radio"/>	<input type="radio"/>
d. Vegetables	<input type="radio"/>	<input type="radio"/>
e. Salads	<input type="radio"/>	<input type="radio"/>
f. Beverages	<input type="radio"/>	<input type="radio"/>
g. Desserts	<input type="radio"/>	<input type="radio"/>

44. Are SECOND HELPINGS PERMITTED for the following items?

	Always	Sometimes	Never
a. Short order items	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. Meat items	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c. Starches (i.e., potatoes)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d. Vegetables	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e. Salads	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
f. Beverages	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
g. Desserts	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

45. For each of the following foods, indicate your opinion of the AMOUNT GIVEN IN ONE SERVING. Darken the circle under NA (Not Appropriate) if you have self-service and/or second helpings are permitted.

	Much Too Small	Slightly Too Small	Just Right	Slightly Too Large	Much Too Large	NA
a. Meat	<input type="radio"/>					
b. Starches	<input type="radio"/>					
c. Vegetables	<input type="radio"/>					
d. Dessert	<input type="radio"/>					

46. For each pair of items below, please describe the FOOD SERVICE WORKERS on the serving line in your dining facility.

	Extremely	Moderately	Neutral	Moderately	Extremely	
Clean	<input type="radio"/>	Dirty				
Unpleasant	<input type="radio"/>	Pleasant				
Well Trained	<input type="radio"/>	Poorly Trained				
Hard Working	<input type="radio"/>	Not Hard Working				
Provide Slow Service	<input type="radio"/>	Provide Fast Service				

47. Indicate your opinion about the ATTITUDES of the dining facility WORKERS to make your meal as pleasant as possible.

Very Poor	Average	Excellent
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

52. How long do you USUALLY have to WAIT in line at the headcount station TO GET ADMITTED for a meal?

- I never have to wait in line.
- I wait between one and five minutes.
- I wait between five and ten minutes.
- I wait between ten and fifteen minutes.
- I wait longer than fifteen minutes.

53. How long do you USUALLY have to WAIT IN THE SERVING LINE after the headcount before you get your food?

- I never have to wait in line.
- I wait between one and five minutes.
- I wait between five and ten minutes.
- I wait between ten and fifteen minutes.
- I wait longer than fifteen minutes.

54. How long do you USUALLY have to WAIT AT THE DISH WASHING AREA when self-bussing?

- I never have to wait in line.
- I wait between one and five minutes.
- I wait between five and ten minutes.
- I wait between ten and fifteen minutes.
- I wait longer than fifteen minutes.
- Not applicable; no self bussing.

55. For each of the following RULES FOR BEHAVIOR darken TWO circles, one to indicate whether or not the rule exists in your dining facility AND the other to indicate whether you want the rule, do not want it, or have no opinion about it.

	Does Rule Exist?		Do You Want the Rule?		
	Yes	No	Yes	No	No Opinion
a. Dress regulations	<input type="radio"/>				
b. Not allowing civilian guests	<input type="radio"/>				
c. Calling "at ease" when officer enters	<input type="radio"/>				
d. No smoking	<input type="radio"/>				
e. Officers and NCO's permitted to cut in line	<input type="radio"/>				
f. Separation of officers and NCO's from enlisted men	<input type="radio"/>				

56. How important are the following factors in influencing what foods you choose to eat?

	Of Major Importance	Of Minor Importance	Unimportant
Food Appearance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Food Variety	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Food Cost	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Familiarity With the Food	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Nutritional Value of the Food	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Number of Calories in the Food	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Your Liking of the Food	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
How Well the Food Goes With Other Foods You Choose	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

57. Are you currently on a diet?

Yes	No
<input type="radio"/>	<input type="radio"/>

APPENDIX B
SURVEY SUPPLEMENT

SURVEY SUPPLEMENT

Eating Preferences at MCGACC Twentynine Palms

1. MCB Twentynine Palms now offers nine (9) separate and distinct outlets for its base food service system. They are:

- _____ BAR BQ RANCH (D. H. 5, Bldg. 1420, left side; barbeque restaurant)
- _____ BURGER PALMS (D. H. 3, Bldg. 1610, left side; short order food)
- _____ DINING INN (D.H. 3, Bldg. 1610, right side; A-ration meal)
- _____ LODGE (D.H. 5, Bldg. 1420, right side; A-ration meal)
- _____ OUTPOST (D.H. 6, Bldg. 1400, right side; steak house)
- _____ HAMBURGER HOT ROD (mobile food service truck)
- _____ PASTA PALACE (D.H. 2, Bldg. 1630, right side; Italian restaurant)
- _____ SPORTS CIRCLE (D.H. 2, Bldg. 1630, left side; A-ration meal)
- _____ 29 BURGERS (D.H. 6, Bldg. 1400, left side; short order food)

Please rank-order your preferences for these 9 outlets by placing the number "1" in the blank next to the outlet above that you like the MOST (your #1 favorite), the number "2" next to your second most favorite, "3" next to your third, etc., with the number "9" going next to the outlet that you like the LEAST. If you are totally unfamiliar with an outlet, just leave it blank and end with a number less than "9".

2. Please circle the letter of the ONE outlet in which you eat MOST often:
- a. BAR BQ RANCH (D.H. 5, Bldg. 1420, left side; barbeque restaurant)
 - b. BURGER PALMS (D.H. 3, Bldg. 1610, left side; short order food)
 - c. DINING INN (D.H. 3, Bldg. 1610, right side; A-ration meal)
 - d. LODGE (D.H. 5, Bldg. 1420, right side; A-ration meal)
 - e. OUTPOST (D.H. 6, Bldg. 1400, right side; steak house)
 - f. HAMBURGER HOT ROD (mobile food service truck)
 - g. PASTA PALACE (D.H. 2, Bldg. 1630, right side; Italian restaurant)
 - h. SPORTS CIRCLE (D.H. 2, Bldg. 1630, left side; A-ration meal)
 - i. 29 BURGERS (D.H. 6, Bldg. 1400, left side; short order food)

3. Why is it that you eat MOST often in the outlet that you just indicated?
Please circle the letter of the ONE response that best describes your primary reason for eating there:

- a. Close to where I work
- b. Close to where I live
- c. Hours are convenient
- d. Food quality is good
- e. Portion size is good
- f. Variety of food is good
- g. Menu includes foods I like to eat
- h. My friends eat there
- i. Decor appeals to me
- j. General atmosphere is agreeable
- k. Service is quick/efficient
- l. Sanitation is good
- m. Other (Please write in) _____

4. Please circle the letter of the ONE outlet in which you eat LEAST often:

- a. BAR BQ RANCH (D.H. 5, Bldg. 1420, left side; barbeque restaurant)
- b. BURGER PALMS (D.H. 3, Bldg. 1610, left side; short order food)
- c. DINING INN (D.H. 3, Bldg. 1610, right side; A-ration meal)
- d. LODGE (D.H. 5, Bldg. 1420, right side; A-ration meal)
- e. OUTPOST (D.H. 6, Bldg. 1400, right side; steak house)
- f. HAMBURGER HOT ROD (mobile food service truck)
- g. PASTA PALACE (D.H. 2, Bldg. 1630, right side; Italian restaurant)
- h. SPORTS CIRCLE (D.H. 2, Bldg. 1630, left side; A-ration meal)
- i. 29 BURGERS (D.H. 6, Bldg. 1400, left side; short order food)

5. Why is it that you eat LEAST often in the outlet that you just indicated?
Please circle the letter of the ONE response that best describes your primary reason for NOT eating there:

- a. Too far from where I work
- b. Too far from where I live
- c. Hours are inconvenient
- d. Food quality is poor
- e. Portion size is poor
- f. Variety of food is poor
- g. Menu does not include foods I like to eat
- h. My friends don't eat there
- i. Decor does not appeal to me
- j. General atmosphere is disagreeable
- k. Service is slow/sloppy
- l. Sanitation is poor
- m. Other (Please write in) _____

6. Each of the 9 food service outlets listed below is followed by a number of scaled questions. Please rate each outlet with which you feel at all familiar. If you are totally unfamiliar with an outlet, then bypass those particular scales. Please circle the number that best describes each attribute using the following scale:

Extremely Bad	Moderately Bad	Slightly Bad	Neutral	Slightly Good	Moderately Good	Extremely Good
1	2	3	4	5	6	7

THE BAR BQ RANCH (D.H. 5, Bldg. 1420, left side; barbeque restaurant)

a. Quality of food	1	2	3	4	5	6	7
b. Quantity of food	1	2	3	4	5	6	7
c. General dining facility environment	1	2	3	4	5	6	7
d. Variety of food	1	2	3	4	5	6	7
e. Speed of service or lines	1	2	3	4	5	6	7
f. Courtesy/efficiency of service by dining facility personnel	1	2	3	4	5	6	7

Extremely Bad	Moderately Bad	Slightly Bad	Neutral	Slightly Good	Moderately Good	Extremely Good
1	2	3	4	5	6	7

BURGER PALMS (D.H. 3, Bldg. 1610, left side; short order food)

a. Quality of food				1	2	3	4	5	6	7
b. Quantity of food				1	2	3	4	5	6	7
c. General dining facility environment				1	2	3	4	5	6	7
d. Variety of food				1	2	3	4	5	6	7
e. Speed of service or lines				1	2	3	4	5	6	7
f. Courtesy/efficiency of service by dining facility personnel				1	2	3	4	5	6	7

THE DINING INN (D.H. 3, Bldg. 1610, right side; A-ration meal)

a. Quality of food				1	2	3	4	5	6	7
b. Quantity of food				1	2	3	4	5	6	7
c. General dining facility environment				1	2	3	4	5	6	7
d. Variety of food				1	2	3	4	5	6	7
e. Speed of service or lines				1	2	3	4	5	6	7
f. Courtesy/efficiency of service by dining facility personnel				1	2	3	4	5	6	7

THE LODGE (D.H. 5, Bldg. 1420, right side; A-ration meal)

a. Quality of food				1	2	3	4	5	6	7
b. Quantity of food				1	2	3	4	5	6	7
c. General dining facility environment				1	2	3	4	5	6	7
d. Variety of food				1	2	3	4	5	6	7
e. Speed of service or lines				1	2	3	4	5	6	7
f. Courtesy/efficiency of service by dining facility personnel				1	2	3	4	5	6	7

Extremely Bad	Moderately Bad	Slightly Bad	Neutral	Slightly Good	Moderately Good	Extremely Good
1	2	3	4	5	6	7

THE OUTPOST (D.H. 6, Bldg. 1400, right side; steak house)

a. Quality of food	1	2	3	4	5	6	7
b. Quantity of food	1	2	3	4	5	6	7
c. General dining facility environment	1	2	3	4	5	6	7
d. Variety of food	1	2	3	4	5	6	7
e. Speed of service or lines	1	2	3	4	5	6	7
f. Courtesy/efficiency of service by dining facility personnel	1	2	3	4	5	6	7

HAMBURGER HOT ROD (mobile food service truck)

a. Quality of food	1	2	3	4	5	6	7
b. Quantity of food	1	2	3	4	5	6	7
c. General dining facility environment	1	2	3	4	5	6	7
d. Variety of food	1	2	3	4	5	6	7
e. Speed of service or lines	1	2	3	4	5	6	7
f. Courtesy/efficiency of service by dining facility personnel	1	2	3	4	5	6	7

PASTA PALACE (D.H. 2, Bldg. 1630, right side; Italian restaurant)

a. Quality of food	1	2	3	4	5	6	7
b. Quantity of food	1	2	3	4	5	6	7
c. General dining facility environment	1	2	3	4	5	6	7
d. Variety of food	1	2	3	4	5	6	7
e. Speed of service or lines	1	2	3	4	5	6	7
f. Courtesy/efficiency of service by dining facility personnel	1	2	3	4	5	6	7

Extremely Bad	Moderately Bad	Slightly Bad	Neutral	Slightly Good	Moderately Good	Extremely Good
1	2	3	4	5	6	7

THE SPORTS CIRCLE (D.H. 2, Bldg. 1630, left side; A-ration meal)

a. Quality of food	1	2	3	4	5	6	7
b. Quantity of food	1	2	3	4	5	6	7
c. General dining facility environment	1	2	3	4	5	6	7
d. Variety of food	1	2	3	4	5	6	7
e. Speed of service or lines	1	2	3	4	5	6	7
f. Courtesy/efficiency of service by dining facility personnel	1	2	3	4	5	6	7

29 BURGERS (D.H. 6, Bldg. 1400, left side; short order food)

a. Quality of food	1	2	3	4	5	6	7
b. Quantity of food	1	2	3	4	5	6	7
c. General dining facility environment	1	2	3	4	5	6	7
d. Variety of food	1	2	3	4	5	6	7
e. Speed of service or lines	1	2	3	4	5	6	7
f. Courtesy/efficiency of service by dining facility personnel	1	2	3	4	5	6	7

7. Do you find that you get hungry at night after the dining facilities have closed? Please circle the appropriate response.

YES

NO

8. Do you feel that the current operating hours of the dining facilities are adequate, or would you like to see some facilities serving hamburger or other sandwich type meals from 1900 to 2200 hours at night? Please circle the letter of the ONE choice that best expresses your opinion.

a. Adequate as is.

b. Desire additional sandwich service between 1900 and 2200 hours.

9. In general, how would you rate the food service system at Twentynine Palms in comparison to other military bases where you've eaten, all things considered? Please circle the number of the appropriate response.

Much
Worse

1

Slightly
Worse

2

No Better
or Worse

3

Slightly
Better

4

Much
Better

5

APPENDIX C
PHASE I INTERVIEWED PROTOCOL

PHASE 1 INTERVIEWED PROTOCOL FOR TWENTYNINE PALMS MARINE BASE

(Enter Subject's survey I.D. Number.)

DEMOGRAPHIC SECTION -- For ALL respondents:

1. Are you currently receiving a subsistence allowance, or do you have a meal pass? (meal pass-0; subsistence allowance-1)
2. Unit (No numeric score) -- Dining hall code
3. Age (How old are you, to the nearest year?).
4. Time in Service (How long have you been in the Marines, to the nearest year?).
 5. 0-10 years: Are you planning to make a career of the Marines? (no-0; yes-1; uncertain-2)

Over 10 years: (Automatically enter "1".)
6. Are you married and currently living with your spouse? (no-0; yes-1)

FOOD HABITS SECTION -- For ALL respondents:

7. During each of the past seven days, where did you eat breakfast, lunch, and dinner, starting with (breakfast) (lunch) today and working backward for 21 meals?

— = skip	FI = fast food in
BA = bowling alley	FO = fast food out
BB = brown bag	HO = home (barracks)
BX = base exchange cafe	OH = friend's or relative's house
CL = club	SR = sit-down restaurant
DS = school dining hall	VM = vending machine
DC = consolidated dining hall	?? = can't recall

8. 0-4 meals in D.H.: Have you eaten at least 5 or more meals in either of the dining halls since you've been stationed here at Twentynine Palms? (no-0; yes-1)

5 or more meals in D.H.: (Automatically enter "1".)

9. DISCRETIONARY: I see that you seem to eat a lot of (meal) at (location). Why is that?

10. DISCRETIONARY: I see that you seem to have skipped (meal) a couple of times during the past week. Do you consistently skip that meal? (no-0; yes-1; sometimes-2)

1 or 2: 11. Why?

(If Question 9 is not asked, automatically enter "X" for Question 9.)

(If Question 10 is not asked, automatically enter "" and "X" for Questions 10 and 11 respectively.)

12. Would you call the past seven days "typical" for you? (no-0; yes-1)

R.I.K.s ONLY:

13. If you were receiving a subsistence allowance, would you eat in the dining hall any more often or less often than you do now? (no-0; less-1; more-2)

1 or 2: 14. That must mean that you would eat somewhere else more (less) often. Where would that be?

CRITIQUE (BITCH) SECTION -- For ALL respondents:

15. What is the main reason that you don't eat in the dining hall more often than you do? (If none, enter a "Z".)

16. If this were changed, would you eat in the dining hall more often? (no-0; yes-1)

17. Are there any other things that could be done or changed to get you to eat more meals in the dining hall? (If none, enter a "Z".)

18. How far away (in yards) would you estimate that the nearest dining hall on this base is located from your particular work site?
living site?

19. Do you consider that location convenient or inconvenient to your work site? living site? Please use this scale to answer. (Scale A)

20. How long do you typically have to wait (in minutes) from the time that you enter the dining hall until the time that you sit down at a table?

PREFERENCE SECTION -- For ALL respondents:

21. Would you prefer any of the following specialty menus to the general menu currently served? Please use this scale to answer. (Scale B)

- A. Steak House
 - B. Spaghetti Factory
 - C. Deli-service
 - D. Seafood
 - E. Mexican
 - F. Any other? Please specify.
-

COMPARISON SECTION — If answer to Question 8 was "NO," STOP; interview is now finished.

22. In general, how would you rate your dining hall in comparison to other military dining halls in which you've eaten, all things considered?
Please use this scale to answer. (Scale C)

Using this same scale, how does your dining hall compare to other military dining halls in which you've eaten with respect to:

23. The number of different foods available at a given meal?
24. The variety of foods offered day after day?
25. The quality of the raw food (meat, vegetables, etc.) used?
26. The preparation and presentation of the food?
27. Sometimes in a dining hall, a food that you are expecting to be available is not. In comparison to other dining halls in which you've eaten, how often has this been happening?
Please use this scale to answer. (Scale D)
-

Note: An "X" should be entered any time a question is not asked for any reason.
If a question is asked and, for whatever reason, not answered, a "Z" should be entered.

APPENDIX D
PHASE II INTERVIEWED PROTOCOL

PHASE II INTERVIEWED PROTOCOL FOR MCAGCC, TWENTYNINE PALMS

(Enter Subject's survey I.D. number.)

DEMOGRAPHIC SECTION -- For ALL respondents:

1. Are you currently receiving a subsistence allowance, or do you have a meal pass? (meal pass-0; subsistence allowance-1)
2. Unit (No numeric score) -- Dining hall code
3. Age (How old are you, to the nearest year.).
4. Time in Service (How long have you been in the Marines, to the nearest year?).
 5. 0-10 years: Are you planning to make a career of the Marines? (no-0; yes-1; uncertain-2)
- Over 10 years: (Automatically enter "1".)
6. Are you married and currently living with your spouse? (no-0; yes-1)

FOOD HABITS SECTION -- For ALL respondents:

7. Have you eaten at least 5 or more meals in any of the dining facilities since you've been stationed here at Twentynine Palms? (no-0; yes-1)
8. Have you eaten at:
 - A. THE BAR BQ RANCH? (no-0; yes-1)
Why/why not?
 - B. BURGER PALMS? (no-0; yes-1)
Why/why not?
 - C. THE DINING INN? (no-0; yes-1)
Why/why not?
 - D. THE LODGE? (no-0; yes-1)
Why/why not?
 - E. THE OUTPOST? (no-0; yes-1)
Why/why not?
 - F. HAMBURGER HOT ROD? (no-0; yes-1)
Why/why not?
 - G. THE PASTA PALACE? (no-0; yes-1)
Why/why not?
 - H. THE SPORTS CIRCLE? (no-0; yes-1)
Why/why not?
 - I. 29 BURGERS? (no-0; yes-1)
Why/why not?
9. Are you aware that you are free to eat at whichever base dining facility you prefer? (no-0; yes-1)

10. Is a dining facility open when you generally prefer to eat? (no-0; yes-1)

If NO ("0"): 11. When would you like to see a dining facility open?

12. Serving what type of food?

R.I.K.s ONLY:

13. If you were receiving a subsistence allowance, would you eat in the dining halls any more often or less often than you do now? (no-0; less-1; more-2)

1 or 2: 14. That must mean that you would eat somewhere else more (less) often. Where would that be?

CRITIQUE (BITCH) SECTION -- For ALL respondents:

15. What is the main reason that you don't eat in the dining hall more often than you do? (If none, enter a "Z".)

16. What other things could be done or changed to get you to eat more meals in the dining hall? (If none, enter a "Z".)

17. Do you consider the dining facility locations convenient or inconvenient to your work site? Please use this scale to answer. (Scale A)

18. If inconvenient (5, 6, or 7), ask why.

19. Do you consider the dining facility locations convenient or inconvenient to your living site? Please use this scale to answer. (Scale A)

20. If inconvenient (5, 6, or 7), ask why.

If answer to Question 7 was "NO," STOP; interview is now finished -----

21. At which outlet have you experienced the longest waits in line?

22. How long do you typically have to wait (in minutes) from the time that you enter the facility until the time that you sit down at the table at this particular outlet?

23. How often do you eat at this particular outlet (average per week)?

24. At which outlet have you experienced the shortest waits in line?

25. How long do you typically have to wait (in minutes) from the time that you enter the facility until the time that you sit down at the table at this particular outlet?

26. How often do you eat at this particular outlet (average per week)?

PREFERENCE SECTION -- If answer to Question 7 was "NO," OMIT this section.

27. How do you feel about having the regularly scheduled Mexican food night at the SPORTS CIRCLE, THE DINING INN, or THE LODGE instead of the usual menu? Please use this scale to answer. (Scale B)
28. How do you feel about having the regularly scheduled Oriental food night at the SPORTS CIRCLE, THE DINING INN, or THE LODGE instead of the usual menu? Please use this scale to answer. (Scale B)
29. Are there any other ethnic specialty nights that you like and would prefer? (If none, enter a "Z".)

COMPARISON SECTION -- If answer to Question 7 was "NO," OMIT this section.

30. In general, how would you rate the food service system at Twentynine Palms in comparison to other military bases where you've eaten, all things considered: Please use this scale to answer. (Scale C)

Using this same scale, how does base food service at Twentynine Palms compare to other military bases where you've eaten with respect to:

31. The number of different foods available at a given meal?
 32. Why? (Omit if "4".)
33. The variety of foods offered day after day?
 34. Why? (Omit if "4".)
35. The variety of eating outlets available?
 36. Why? (Omit if "4".)
37. The variety of decors available?
 38. Why? (Omit if "4".)
39. The quality of the raw food (meat, vegetables, etc.) used?
 40. Why? (Omit if "4".)
41. The preparation and presentation of the food?
 42. Why? (Omit if "4".)
43. Sometimes in a dining hall, a food that is published on the menu is not available for one reason or another. In comparison to other military bases where you've eaten, how often has this been happening here at Twentynine Palms. Please use this scale to answer. (Scale D)

Note: An "X" should be entered any time a question is not asked for any reason. If a question is asked and, for whatever reason, not answered, a "Z" should be entered.

APPENDIX E
STATISTICAL ANALYSIS OF FOOD SERVICE WORKER SURVEY

Table E-1. Food Service Worker Survey Statistical Analyses

- a)* Chi square = 4.30, 6 df, $p < 0.50$
- b) Chi square = 6.34, 2 df, $p < 0.05$
- c) Chi square = 6.50, 2 df, $p < 0.05$
- d) Chi square = 18.12, 3 df, $p < 0.001$
- e) Chi square = 4.84, 1 df, $p < 0.05$
- f) Chi square = 6.46, 1 df, $p < 0.02$
- g) Chi square = 11.38, 1 df, $p < 0.001$
- h) Chi square = 11.40, 2 df, $p < 0.01$
- i) Chi square = 25.20, 3 df, $p < 0.001$
- j) Chi square = 3.90, 1 df, $p < 0.05$
- k) Chi square = 4.63, 1 df, $p < 0.05$
- l) Chi square = 4.57, 1 df, $p < 0.05$
- m) Chi square = 12.86, 1 df, $p < 0.001$
- n) Chi square = 4.01, 1 df, $p < 0.05$
- o) Chi square = 5.00, 1 df, $p < 0.05$
- p) Chi square = 4.30, 1 df, $p < 0.05$
- q) Chi square = 31.87, 5 df, $p < 0.001$
- r) Chi square = 11.08, 2 df, $p < 0.01$
- s) Chi square = 5.52, 1 df, $p < 0.02$
- t) Chi square = 3.92, 1 df, $p < 0.05$

*Letters are referenced in text.

APPENDIX F
WORK SAMPLING DATA COLLECTION PROCEDURES

WORK SAMPLING DATA COLLECTION PROCEDURES

To facilitate data collection, each worker wore a pre-assigned, color-coded number, conspicuously displayed on his/her hat for the entire collection period. Each job category was assigned a color and a unique set of numbers. For example, supervisors' numbers were red and numbered 1-10.

The form shown in Figure F-1 was used to record the data that were collected. Before the beginning of each observation period, the observer recorded the dining facility number, date, and day of the week. In addition, the hat number of each person working during the period was noted at the top of each column. The time of each observation round was recorded in the left hand column (a 24-hour clock was used). Observations were recorded at fifteen-minute intervals. For each observation, two numbers were recorded, the first digit signifying the job category of the person being observed and the second representing the function being performed at that time. The data sheets were subsequently keypunched onto cards for analysis by computer.

Since the number of messcooks to be monitored in each facility was more than a single observer could monitor in an observation cycle, it was decided to monitor a sample of 20 messcooks on a random basis.

Table F-1. Detailed Job Definitions

1. **Dining Hall Supervisors:** A MS-1 military supervisor in charge of some phase of dining hall operations (Galley supervisor or Watch Captain).
2. **Military Cook:** A rated military person who performs cooking, or storeroom functions.
3. **Baker:** A rated military person who does baking functions.
4. **Military Mess Men:** A non-rated military person who performs clean up and utility functions.

Table F-2. Detailed Task Definitions

1. Non-Productive

- a. Designated Rest Break: Consists of those times that are for employee coffee breaks or other assigned rest periods.
- b. Idle: Consists of all nonproductive activities not defined elsewhere.
- c. Absent: Employee previously accounted for is not to be found on premises.
- d. Walking: Employee is walking from one area to another, or within an area without any apparent purpose.
- e. Conversing: Conversation between cooks on subjects of undetermined nature.

2. Food Preparation

- a. Prepares Meats and Vegetables for Cooking: Obtains ingredients. Opens food cans, boxes, and/or bags. Places raw or precooked items into appropriate cooking, heating, or serving containers. Cuts meats and vegetables. Mixes ingredients as required.
- b. Cooks Food in Kitchen: Selects proper temperature settings, monitors food being cooked or reconstituted, and seasons food as required. Includes preparing eggs, hot cakes, french toast, meats, and other items on the serving line grill. Removes ready food from cooking utensils and places in serving or replenishing containers.
- c. Prepares soups and gravies, salads and fruits, desserts, and bakery products: Includes all productive time required to prepare soups and gravies, salads, and fruits, desserts and bakery products and to transport to serving line or tables.
- d. Prepares Soups and Gravies: Obtains ingredients, opens soup containers and mixes ingredients for soups. Cooks, seasons, and pours into serving containers or individual portions.
- e. Prepares and Assembles Salads and Fruits: Obtains ingredients. Cuts and cleans lettuce, cabbage, tomatoes, onions, and other salad ingredients. Mixes all salads and/or places salads in bulk or individual portions.
- f. Prepares Bakery Products or Desserts: Obtains ingredients. Slices serving portions of cakes, pies, or other desserts. Includes preparing bulk or individual portions of puddings, custards.
- g. Prepares Cooking Utensils: Includes all productive time required for obtaining and prelocating pots, pans, spatulas, and other cooking implements in preparation for cooking.

- h. Prepares Flight Meals, Picnic Meals or Bag Lunches: Includes all functions performed in the Flight Galley.

3. Serving Food

- a. Serves Food: Cuts individual portions of meat on serving lines. Serves patrons in line. Serves eggs, hot cakes, french toast, steaks, hamburgers, hot dogs, and other items directly from the serving line grill.
- b. Sets Up, Replenishes, and Tears Down Serving Line: Includes all time required to place, replenish, and remove food from the serving line. Prepares utensils for serving line. Makes beverages. Refills milk coolers and beverage dispensers.
- c. Prepares and Assembles Cold Sandwiches: Prepares cold sandwiches on order for customers.
- d. Cooks Food to Order on Serving Line: Cooks items such as eggs, hamburgers, hot dogs, to customer order. (Note: when items are prepared on the line grill and placed in a serving container prior to being given to the customer, the task will be recorded in the preparation category).

4. Sanitation

- a. Cleans Utensils and Pots: Washes pots, pans, and other cooking utensils. Returns pots, pans, and utensils to proper locations or receptacles.
- b. Cleans Equipment: Cleans ranges, preparation tables, steam kettles, grills, mixers, deep fryers, ovens, vegetable and meat cutting machines, and other equipment.
- c. Cleans Kitchen: Sweeps and mops kitchen floor. Cleans refrigerator, freezer, and dry goods storage room. Empties garbage, cleans garbage cans, and garbage area.
- d. Personal Hygiene: Engaging in any activity that would comprise good sanitation practice, such as washing hands after preparing raw meat, fish, poultry.

5. Supplies

- a. Receives Supplies: Unloads all incoming supplies at the dock. Transports supplies to storage area. Uncrates, unpacks, and stores supplies in appropriate location. (Non-perishable/condiments in storeroom, and perishable items in refrigerator/chill room). Maintains inventories and receipts for incoming food and expendable supplies.
- b. Maintains Supplies: Repositions stored supplies to insure that longest stored items are used first. Inventories supplies after each meal, and when directed by food service supervisory personnel. Maintains supply records.

- c. **Issues Supplies:** Issues food supplies to senior cooks and records issues. Receives returned unused issues not used by cooks and annotates records indicating return. Buys out-of-stock items from other dining halls for immediate use.

6. Administrative

- a. **Prepares Correspondence, Records or Reports:** Drafts and types correspondence. Prepares various food control records. Maintains civilian employees personnel and pay records.
- b. **Telephone:** Answers telephone and pages personnel.
- c. **Menu Boards:** Changes menu boards for upcoming meals.

7. Supervisory

- a. **Monitors OJT Program:** Monitors the preparation of required forms by senior cooks and shift leaders. Gives and monitors OJT.
- t. **Inspects:** Inspects dining hall to assure cleanliness and maintenance of good sanitation practices.
- c. **Receives or Gives Supervision:** A Dining Hall Supervisor or Civilian Shift Leader gives instructions to another Dining Hall employee (other than OJT) or an employee receives instructions from a Dining Hall Supervisor or Civilian Shift Leader.

8. Training

All Training not received at the Dining Hall Site.

9. Other

- a. **All other Activities not designated above:** All productive time devoted to areas that have not been mentioned.
- b. **Cash Transaction:** Issue change funds to cashiers and receives monies collected during meal or collects cash for meals from customers on COMRATS.
- c. **Signature Headcount Monitoring:** Monitors signatures as men arrive in Dining Hall.

APPENDIX G
CALCULATION OF PRODUCTIVITY MEASURES

APPENDIX G

Productivity Related Calculations

1. Manhours for supervisors, cooks, and bakers were calculated by taking the total number of observations for each worker category (Appendix Table G-1) and dividing by four, since four observations were taken per hour, and then dividing by seven, since the data represent seven workdays, to get a daily average. Notice this average only includes those men who were observed in the dining facility and does not include workers who were not physically present, such as those personnel absent or assigned elsewhere.

2. The total messcook manhours expended per day is equal to the total number of messcooks assigned to each dining facility times the number of hours worked each day for the seven days, divided by seven to obtain a daily average. Thus, messcook manhours are calculated as follows:

$$\text{Dining Hall 2} = 5 (15.5) + 2 (12.5) = 102.5 (22) = 2255/7 = 322 \text{ manhours}$$

$$\text{Dining Hall 3} = 5 (15) + 2 (12.5) = 100 (20) = 2000/7 = 286 \text{ manhours}$$

$$\text{Dining Hall 5} = 5 (14.5) + 2 (11) = 94.5 (32) = 3024/7 = 432 \text{ manhours}$$

$$\text{Dining Hall 6} = 5 (12) + 2 (12) = 84 (24) = 2016/7 = 288 \text{ manhours}$$

The reason messcooks' manhours were calculated differently from the other worker categories, was because observations were made on only a random sample of messcooks.

Completing these calculations, Table G-1 gives the average total manhours as well as average productive manhours worked per day for each dining facility by each worker category. Productive manhours was taken to be the percent of productive time multiplied by the total manhours.

The average number of meals served daily in each dining facility, is given below. This average is based on a two-month period (September and October 1978), the same time frame the work sampling data was collected. The average number of meals served daily for each facility was as follows:

Dining Facility 2	1511
Dining Facility 3	1128
Dining Facility 5	754
Dining Facility 6	<u>773</u>
Total	4166

Table G-1. Average Total Manhours and Productive Manhours By Worker Category

	D.M. 2		D.M. 3		D.M. 5		D.H. 6		Total	
	Total	Productive	Total	Productive	Total	Productive	Total	Productive	Total	Productive
Supervisors	43.2	27.6	40.5	23.1	33.7	19.1	25.2	14.3	142.6	84.1
Cooks	164.9	98.6	146.0	86.6	104.7	48.6	92.9	52.6	508.5	286.4
Bakers	35.0	19.6	21.8	12.9	13.1	7.2	14.5	8.7	84.4	48.4
Messcooks	322.0	216.1	286.0	151.0	432.0	174.8	288.0	135.9	1428.0	677.8
Total	565.1	361.9	494.3	273.6	583.5	249.7	420.6	211.5	2163.5	1096.7

Table G-2. Sample Size (Number of Observations)

Dining Facility	Supervisors	Cooks	Bakers	Messcooks	Total
2	1210	4618	981	8329	15138
3	1093	3913	581	6488	12075
5	930	2890	365	7124	11309
6	706	2600	406	6464	10176
Total	3939	14021	2333	28405	48698

Table G-3. Degree of Accuracy (S) of Productivity Measures with 95% Confidence

	Supervisors	Cooks	Bakers	Messcooks	Total
Dining Facility 2	5.75	2.94	6.39	2.19	1.63
Dining Facility 3	6.05	3.20	8.30	2.48	1.82
Dining Facility 5	6.56	3.72	10.47	2.37	1.88
Dining Facility 6	7.53	3.92	9.93	2.48	1.98
All Facilities	3.19	1.69	4.14	1.19	0.91

$$S = \sqrt{\frac{4 P (1 - P)}{N}} \times 100$$

Where,

- S = degree of accuracy (%)
- N = sample size
- P = largest proportion of any work category

Table G-4. Percent Time Observed At Work Functions By Dining Facility and Worker Category

	ALL Days																																			
	Supervisors						Cooks						Bakers						Messmen																	
	2	3	5	6	2	3	2	3	5	6	2	3	2	3	5	6	2	3	2	3	5	6														
Non-Productive	36.20	43.00	43.33	43.34	40.23	40.71	53.53	43.42	44.14	40.96	44.93	40.15	32.89	47.21	59.53	52.80	1.66	5.03	5.38	8.92	31.70	26.99	22.73	25.08	41.18	37.52	36.44	38.42	9.21	4.82	3.50	3.36				
Preparation	.83	1.01	1.40	1.42	3.29	7.13	4.08	11.23	1.83	2.93	.27	1.72	17.10	11.41	8.77	11.14	1.16	.91	1.61	2.23	5.18	5.39	5.22	7.77	3.57	3.61	7.12	4.68	36.21	.96	1.06	1.97	1.84			
Serving	.33	.55	.54	.57	4.94	5.95	3.91	3.73	1.33	3.10	1.92	8.87	.73	1.05	.95	2.15	24.96	23.33	17.96	11.61	7.62	8.33	5.95	5.92	5.61	9.29	6.58	3.69	.73	1.05	.95	2.15				
Sanitation	32.73	23.42	25.05	29.04	2.64	3.22	3.32	1.58	1.63	2.07	2.19	1.48	1.33	1.05	.94	1.72	2.15	2.74	4.73	2.27	4.40	2.27	1.25	1.27	.71	.52	.55	.99	1.57	1.85	2.15	2.74				
Supply	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	Training	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
Administration	33.37	39.78	41.26	39.29	39.94	39.34	51.31	40.53	43.69	37.53	42.43	35.82	31.02	44.57	56.32	50.85	1.57	4.45	4.41	9.87	31.46	26.59	23.69	25.85	42.30	37.98	36.84	40.07	9.93	4.89	4.02	3.63				
Supervision	.78	1.08	1.07	1.49	3.35	7.51	4.42	11.80	2.15	3.15	.33	2.48	18.15	12.31	9.82	11.63	1.27	.84	1.34	2.98	5.34	5.55	5.12	2.50	3.41	4.04	7.89	4.61	36.47	.85	.71	2.11	2.25			
Other	.29	.60	.67	.74	5.37	6.17	4.12	3.72	1.14	3.60	1.97	10.99	.96	1.39	1.07	2.29	26.71	26.68	19.76	11.36	7.52	8.85	6.22	6.35	5.30	10.34	7.24	3.19	.96	1.39	1.07	2.29				
Training	34.05	24.40	25.90	32.40	2.99	3.87	4.07	1.73	1.39	2.70	2.63	1.77	1.10	.98	1.28	1.55	1.96	2.16	5.61	1.86	4.03	2.12	1.05	1.52	.63	.67	.66	1.06	1.52	1.60	2.30	2.99				
	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	Non-Productive	51.60	53.26	51.93	56.21	41.62	46.95	61.88	51.37	46.03	52.21	57.38	50.00	38.53	54.77	68.54	58.05			
Preparation	2.13	6.90	9.39	5.92	32.87	28.79	19.14	22.94	36.51	36.03	34.43	34.68	7.02	4.65	2.03	2.28	2.13	6.90	9.39	5.92	32.87	28.79	19.14	22.94	36.51	36.03	34.43	34.68	7.02	4.65	2.03	2.28				
Serving	1.06	.77	2.76	1.18	3.00	5.39	2.81	9.67	.53	2.21	.00	.00	13.89	8.82	5.82	9.82	1.06	.77	2.76	1.18	3.00	5.39	2.81	9.67	.53	2.21	.00	.00	.00	.00	.00	.00				
Sanitation	.53	1.15	2.76	2.37	4.37	4.68	5.61	5.77	4.23	2.21	3.28	4.84	35.43	25.80	19.71	23.12	.53	1.15	2.76	2.37	4.37	4.68	5.61	5.77	4.23	2.21	3.28	4.84	35.43	25.80	19.71	23.12				
Supply	.53	.38	.00	.00	2.87	4.96	3.14	3.75	2.12	1.47	1.64	4.03	1.31	2.08	1.55	.74	.53	.38	.00	.00	2.87	4.96	3.14	3.75	2.12	1.47	1.64	4.03	1.31	2.08	1.55	.74				
Administration	15.43	12.64	10.50	12.43	8.12	5.96	4.95	4.76	6.88	5.88	3.28	4.84	.06	.06	.64	1.77	15.43	12.64	10.50	12.43	8.12	5.96	4.95	4.76	6.88	5.88	3.28	4.84	.06	.06	.64	1.77				
Supervision	25.53	20.31	21.55	18.34	1.00	.28	.50	1.15	2.65	.00	.00	.81	2.03	11.25	.50	2.17	25.53	20.31	21.55	18.34	1.00	.28	.50	1.15	2.65	.00	.00	.81	2.03	11.25	.50	2.17				
Other	3.19	4.60	1.10	3.55	6.12	2.98	1.98	.58	1.06	.00	.00	.81	1.74	2.56	1.71	2.05	3.19	4.60	1.10	3.55	6.12	2.98	1.98	.58	1.06	.00	.00	.81	1.74	2.56	1.71	2.05				
Training	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	Training	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00		

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