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WORK MEASUREMENT EVALUATION OF FORT LEE CFPS OPERATIONS

by
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October 1978

UNITED STATES ARMY
NATICK RESEARCH and DEVELOPMENT COMMAND
NATICK, MASSACHUSETTS 01760

Operations Research/Systems Analysis Office

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An evaluation was conducted to assess labor requirements for operating a Central Food Preparation System (CFPS). Productive man-hours required in each element of the system were determined from an analysis of the distribution of workload among the different job categories. Regression models were fit to the work sampling data derived in the satellite dining halls as a basis for predicting staffing requirements for those facilities. Adequate models of this kind could not be obtained for the other elements of the CFPS considered. In

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general, the satellite dining halls appeared to be operating in an efficient manner, with fewer personnel than would be required in conventional dining hall operations. Also, from these data, it was observed that the "best" personnel utilization can be attained in a dining facility when serving approximately 1000 meals per day, with only marginal gains in increased productivity achieved at higher levels of headcounts.

PREFACE

Evaluation of the Central Food Preparation System at Fort Lee, Virginia was undertaken by the US Army Troop Support Agency between March and September 1978 to determine if the system could provide uniform high quality food service to the individual soldier while reducing the associated investment and operating costs. An essential aspect of this evaluation was to verify the staffing requirements for each element of the system based on an analysis of job content, labor requirements and personnel performance. This task was performed by the Operations Research and Systems Analysis Office, US Army Natick Research and Development Command under Military Service Requirement USA 8-2, Support to the Modern Army Food Service System, of the DoD Food RDT&Engineering program. A description of the methodology, analysis and results are presented in this report.

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SECTION I

EXECUTIVE SUMMARY

This evaluation was conducted to assess the labor requirements for operating a Central Food Preparation System (CFPS) in terms of personnel utilization, manpower and staffing. The specific objectives were to measure personnel performance; derive estimates of manpower requirements; determine the variations in workload for the different jobs; establish the work content of each job for defining skill levels and training requirements; and, to provide inputs to the economic analyses.

The approach to accomplishing these objectives was based on work sampling procedures. Data was collected in the Satellite Dining Facilities (SDF); the Central Food Preparation Activity (CFPA), which included the Central Food Preparation Facility (CFPF) and Ingredient Preparation Activity (IPA); and, in the warehousing and transportation sections of the Troop Issue Support Activity. All other elements of the CFPS in which the workloads were essentially unaffected by the level of operations were specifically excluded from consideration.

The time and resources available did not allow for a complete, detailed analysis of each and every satellite dining facility. Instead, the available facilities were categorized, based on historical headcount data, design capacities and staffing, and grouped into four equivalent dining facilities, under the assumption that all satellite dining facilities within a group are identical. Results and conclusions derived from the observed data, then, apply equally to all facilities comprising a single group.

The work sampling data was subsequently reduced and analyzed to determine any significant relationships pertaining to the distribution of effort, productivity, manpower, and staffing requirements; and, where feasible, mathematical models were derived by regression analysis for predicting staffing requirements.

On the whole, the satellite dining facilities seem to be operating in a fairly efficient and effective manner with fewer personnel than would be required in conventional dining halls. The CFPF support provided has apparently had some impact on the relative distribution of the workload, when compared to the results of similar evaluations done at other military installations, but the allocation of time to specific tasks in certain jobs is not altogether consistent with expectations for these positions, which could be important to the proper training of food service personnel for CFPF operations. It also appears that the more efficient staffing has contributed to increasing productivity to levels comparable to those achieved in some commercial and institutional facilities. Further improvements in productivity are possible, except for the constraints of existing scheduling policies and procedures.

An interesting result of the productivity analysis within the satellite dining facilities is that the "best" utilization of personnel is attained at about 1000 meals per day, given the appropriate serving capacity and staffing. Only marginal gains in increased productivity are obtained in larger facilities, at the risk of introducing other problems which counterbalance these benefits.

Results provided for the CFPF are inconclusive, for reasons of the high degree of variability in production levels experienced, in conjunction with a significant underutilization of available productive capacity, both labor and equipment. It is our opinion that present staffing levels can support at least twice the feeding requirements existing at the time this evaluation was undertaken, and that reductions can and should, be effected.

There is no reason to conclude that the operation of IPA or TISA is inadequate or inefficient, and no obvious discrepancies were noted.

SECTION II

INTRODUCTION

PURPOSE

This evaluation was conducted to assess the labor requirements for operating a Central Food Preparation System (CFPS), including the Satellite Dining Facilities (SDF), Central Food Preparation Activity (CFPA), and Troop Issue Support Activity (TISA), in terms of utilization of personnel, manpower and staffing. The specific objectives of the work measurement evaluation were as follows:

(a) To measure the performance, i.e., productive and nonproductive efforts, of personnel in each element of CFPS considered.

(b) To derive correlations between levels of productive activity and productive output to estimate manpower requirements.

(c) To determine the nature and extent of the variations in workloads for each job, necessary to develop the staffing requirements.

(d) To establish the relative importance of work content, i.e., functional tasks, in each of the different jobs as criteria for specifying skill level and training requirements.

(e) To provide a basis for developing the labor costs required as inputs to the economic analyses.

APPROACH

Work sampling was the method used for the measurement and quantitative appraisal of the total work situations necessary to accomplish these objectives. Following is a general description of the approach used.

a. Site Survey.

The site surveys were performed to obtain all of the information necessary to develop and implement the work sampling study. This included defining the activities and functions performed, determining the jobs and tasks at each location, personnel staffing and work schedules, job descriptions, and any other data required for this purpose.

b. Work Sampling Plan:

Work sampling is based on the principle that an adequate number of random samples, observed over a finite period of time, on properly selected jobs, will accurately reflect the characteristics of the total work force under similar conditions. This required careful development of the sampling schedule, such that the designated observation periods and intervals spanned all activities, functions and jobs under the variety of working conditions expected, and that the resulting samples were sufficiently large to provide the desired degree of accuracy in the data.

c. Data Collection Procedures:

Since the jobs and tasks varied widely between the different elements of the CFPS, separate data collection procedures were developed for each element. Job categories, both military and civilian, were delineated, and task categories describing all activities and functions performed on each job had to be completely defined. Then, data collection forms on which the sampling observations were systematically recorded and summarized were designed. Detailed instructions on the use of these forms were prepared, which included specifying unique computer compatible coding schemes for recording the data.

d. Training Program:

Data collection personnel were recruited and hired by the Troop Support Agency (TSA). The number of data collectors required was determined by the following parameters:

(1) The number and physical location of the facilities involved.

(2) The number of workers to be observed at each location.

(3) The duration of the sampling period.

(4) The sample size required and the frequency of observation, i.e., observation interval.

The responsibility for training the data collectors was that of the Operations Research and Systems Analysis Office (OR/SA), NARADCOM. The training program took approximately eight hours, and included formal classroom instruction on the purpose, methods and procedures of work sampling; objectives of the evaluation and utilization of the data collected; and a discussion of the data collection procedures

and use of the data forms. Subsequently, each person was provided a period of individualized training in actual data collection at one or more of the CFPS facilities. Onsite training was also provided at the beginning of each new phase of data collection to familiarize data collectors with any peculiarities of that element of the CFPS being observed.

e. Data Collection:

Data collection was conducted according to the established sampling plans and procedures. Supervision of the data collection was provided by NARADCOM personnel.

f. Data Reduction and Analysis:

After the work sampling data was validated, it was reduced and tabulated in such a way as to characterize productive and non-productive times for every job category by task, in each element of the CFPS. These data were subjected to appropriate statistical analysis to derive distributions and estimators for manpower and staffing requirements.

It should be recognized that this approach is limited in two important ways. First, the work sampling data is not pace-rated, which implies that the personnel were working at a uniform 100% efficiency. While this is probably an incorrect assumption, it was expected that when averaged over a large number of observations spanning a reasonable period of time, the effect any such errors as might derive from this source would become negligible. Also, it should be borne in mind that the results of the evaluation cannot be applied in situations that differ markedly from the conditions under which the work sampling was completed.

SECTION III

CONDUCT OF EVALUATION

SATELLITE DINING FACILITIES

The seven satellite dining facilities included in the work sampling varied in size and headcounts. The time and resources available for the work measurement evaluation did not permit a complete, detailed analysis in each and every facility. Thus, the facilities were categorized, based upon historical headcount data and design capacities and staffing, and grouped into four equivalent dining facilities, as follows:

SDF	DESIGN CAPACITY	ACTUAL HEADCOUNT	STAFFING	EQUIVALENT FACILITY
8400	500	$\simeq$ 500	24	A
8402	500	$\simeq$ 500	24	A
3701	300	$>$ 300	19	B
3024	300	$\simeq$ 300	15	C
3108	300	$\simeq$ 300	17	C
3118	300	$\simeq$ 300	16	C
9304	300	$<$ 300	14	D

The work sampled was then appropriately divided among the group of satellite dining facilities comprising an equivalent dining facility. This implicitly assumes that the satellite dining facilities within a group are essentially identical, and that the results and conclusions derived from the observed data for the total group applies to all of those facilities. It should be noted that some slight changes in headcounts and staffing in the satellite dining facilities occurred just prior to the start of work sampling, but did not require this plan to be altered.

Work sampling in the satellite dining facilities was conducted over an eight-week calendar period. The actual number of days each equivalent facility was surveyed is indicated below:

EQUIVALENT FACILITY	WEEKDAYS	WEEKENDS	WEEKS OF DATA
A	5	2	1
B	5	2	1
C	10	4	2
D	5	2	1

Data collection was performed in the satellite dining facilities for periods corresponding to one-half of the working day, as determined by the operating schedule of each dining facility:

	WEEKDAY PERIODS		WEEKEND PERIODS	
SDF	1st	2nd	1st	2nd
3024	0430-1215	1220-2000	0600-1300	1305-2000
3108	0430-1205	1210-1945	0600-1245	1250-1930
3118	0430-1215	1220-2000	0600-1245	1250-1930
3701	0400-1200	1205-2000	0600-1245	1250-1930
8400	0430-1215	1220-2000	0600-1300	1305-2000
8402	0345-1145	1150-1945	0600-1215	1220-1930
9304	0430-1145	1150-1900	0600-1215	1220-1900

The data collection periods were randomly designated throughout the eight weeks of work sampling in the satellite dining facilities, as shown in Appendix A, to balance day-to-day effects, variations in headcounts between pay periods, and other biasing factors.

Each person included in the evaluation was identified by worker category.

CODE	WORKER CATEGORY
1	Supervisor, Military
2	Supervisor, Civilian
3	Cook, Military
4	Cook, Civilian
5	Clerk, Military
6	Food Service Worker, Civilian

The functions performed by the personnel were recorded as specified below. Detailed definitions of the task categories are provided in Appendix B.

CODE	TASK CATEGORY
11	Prepares Food for Cooking
12	Cooks Food
13	Prepares Soups, Salads, Desserts, & Breads
14	Prepares Cooking Equipment
21	Serves on "A" Line
22	Replenish Serving Lines
23	Serves on Short Order Line
31	Cleans Kitchen
32	Cleans Dining Room
33	Cleans Serving Line
34	Dishwashing

CODE	TASK CATEGORY
41	Receives Supplies
42	Maintains Supplies
43	Issues Supplies
50	Supervision
60	Administrative
71	Scheduled Breaks
72	Absent
73	Idle
74	Forced Delay

To facilitate data collection, each worker wore a pre-assigned number, conspicuously displayed, for the duration of the evaluation. A cross-reference list identified the number with their job function, element of CFPS, grade, and work location, (e.g., 33, Military Cook, SDF, E4, 9304). Observations were recorded at five-minute intervals indicating the activity of each worker on the data forms provided, in accordance with the instructions provided during the training of data collectors. See Appendix B. The forms were submitted daily to the data collection supervisor for review and validation prior to coding for data reduction and analysis.

CENTRAL FOOD PREPARATION (CFPA)

The central food preparation activity included both the central food preparation facility (CFPF) and the ingredient preparation activity (IPA). These two areas were work sampled simultaneously over a two-week interval, ten working days, as indicated in Appendix A. The normally scheduled workday in the CFPF was from 0600 to 1700 hours, with the work force operating on three staggered shifts. In the IPA, the scheduled workday was from 0530 to 1400 hours daily.

Data collection procedures were essentially identical to those employed in the satellite dining facilities, excepting that worker and task categories were defined slightly differently to conform to the different functions and activities:

CODE	WORKER CATEGORY
1	Supervisor, Military
2	Supervisor, Civilian
3	Cook, Military
4	Cook, Civilian
5	Baker, Civilian
6	Food Service Worker, Civilian
7	Warehouseman
8	Administrative
9	Janitors

CODE	TASK CATEGORY
11	Ingredient Preparation
12	Entree Preparation
13	Dessert Preparation
21	Portioning
22	Packaging
23	Freezing
24	Packing
25	Storing
31	Sanitation, Equipment
32	Sanitation, Entree/Ingredient Preparation Spaces
33	Sanitation, Dessert Preparation Spaces
34	Sanitation, Storage/Other Spaces
41	Inventory/Maintenance
42	Shipping/Receiving
50	Supervision
60	Administrative
71	Scheduled Breaks
72	Absent
73	Idle

Detailed definitions of the task categories are included in Appendix C.

TROOP ISSUE SUPPORT ACTIVITY

The survey period for TISA was ten workdays with a shift duration of eight and one-half hours (0730-1600) per day according to the schedule in Appendix A. Data was collected simultaneously at two physical work locations, the perishable storage warehouse and the nonperishable storage warehouse, as well as providing for limited coverage of the transportation of ingredients and/or products to and from the CFPA and satellite dining facilities.

Observations were recorded at fifteen-minute intervals for the duration of the work sampling period. Otherwise, the data collection procedures were as already described for the satellite dining facilities and the CFPA. Worker and task categories, which are defined in detail in Appendix D, were as follows:

CODE	WORKER CATEGORY
1	Warehouseman, Foreman
2	Warehouseman
3	Motor Vehicle Operator

CODE	TASK CATEGORY
11	Receiving/CFPF
12	Receiving/IPA
13	Receiving/SDF
14	Receiving/Other
21	Warehouse Operation
31	Shipping, CFPF
32	Shipping, IPA
33	Shipping, SDF
34	Shipping, Other
41	Transportation/CFPF
42	Transportation/IPA
43	Transportation/SDF
50	Supervision
60	Administrative
71	Scheduled Breaks
72	Absent
73	Idle

SECTION IV

RESULTS AND OBSERVATIONS

The data collected during the work sampling were subsequently reduced and analyzed across several dimensions to derive significant relationships relevant to the distribution of effort, productivity, and manpower and staffing requirements. The findings resulting from these analyses are discussed for each separate element of the CFPS included in the work measurement.

SATELLITE DINING FACILITIES

Observations on the activities performed in the satellite dining facilities were tabulated and summarized in Table 1 to produce the distribution of workload among the various work functions, and estimates of the levels of productivity obtained during an average week of operation. The results are shown in terms of man-hours instead of the number of observations recorded to allow for more meaningful interpretation.

TABLE 1

DISTRIBUTION OF WORKLOAD BY WEEK

SATELLITE DINING FACILITIES

	A		B		C		D	
	M-HRS	%	M-HRS	%	M-HRS	%	M-HRS	%
Sanitation	415.84	34.78	325.09	34.72	266.75	38.29	266.49	37.04
Food Prep.	208.41	17.43	142.75	15.25	99.34	14.26	94.08	13.08
Serving	177.67	14.86	139.50	14.90	87.92	12.62	81.50	11.33
Administration	69.42	5.81	55.92	5.97	60.04	8.62	68.17	9.47
Supervision	36.83	3.08	25.42	2.72	21.63	3.11	29.92	4.16
Supply	18.93	1.58	15.42	1.65	11.33	1.63	11.91	1.66
Productive	927.10	77.55	704.10	75.21	547.01	78.52	552.07	76.73
Non-Prod.	268.42	22.45	232.09	24.79	149.60	21.48	167.41	23.27
Total	1195.52	100.00	936.19	100.00	696.61	100.00	719.48	100.00

A - 8400 and 8402
B - 3701
C - 3024, 3108, and 3118
D - 9304

A comparison of the distribution of workloads between dining facilities indicates that they are very similar in terms of the percentage of time allocated to the various functions. Consequently, the relative proportion of productive and nonproductive times, expressed as percentages of the total time expended, tends to be highly uniform over all dining facilities. Of course, the actual productive man-hours required increases with the headcounts supported by the dining facilities, which is reflected in the individual work functions as well.

The most labor intensive operation is sanitation, which includes cleaning the kitchen, dining room, serving lines and self-service areas, in addition to warewashing. Of the time spent in sanitation, about 44% was for warewashing, 27% cleaning the kitchen, and approximately 15% each in cleaning the serving line and self-service areas, and the dining room.

Food preparation was the second most labor-demanding operation, of which 41% was in preparing food for cooking, 36% in actually cooking the food, 19% for preparing soups, salads, desserts and breads and other items, and the remainder was spent in setting up and monitoring the cooking equipment.

The time required for serving was, on the average, split 55% on the "A" ration serving line, 11% on the short order line, and 34% in replenishing the serving lines. There is no consistent policy for offering short order service in the dining facilities, except that it is included only with the lunch meal. In some cases, the short order menu is available every day or every weekday, but in most instances, is offered just two days a week.

The remaining three work categories--administration, supervision, and supply--collectively accounted for 11-12% of the total man-hours observed in the satellite dining facilities.

Comparing the same data, averaged for all satellite dining facilities, Table 2, the differences in the distribution of the workload on weekdays versus weekends is evident. About 25% fewer man-hours labor is required on weekends than on weekdays.

TABLE 2

DISTRIBUTION OF WORKLOAD BY DAY

SATELLITE DINING FACILITIES

	WEEKDAY		WEEKEND		DIFFERENCE
	M-HRS	%	M-HRS	%	M-HRS
Sanitation	191.29	34.96	159.44	39.14	+ 31.85
Food Preparation	83.23	15.21	64.25	15.77	+ 18.98
Serving	75.18	13.74	55.36	13.59	+ 19.82
Administration	42.73	7.81	19.94	4.90	+ 22.79
Supervision	18.46	3.37	10.75	2.64	+ 7.71
Supply	9.55	1.75	4.92	1.21	+ 4.63
Productive	420.44	76.85	314.66	77.25	+ 105.78
Nonproductive	126.68	23.15	92.67	22.75	+ 34.01
Total	547.12	100.00	407.33	100.00	+ 139.79

Operating procedures and staffing policies in the satellite dining facilities explain a large proportion of these variations. For example, a military clerk, whose primary function is administration, does not routinely work on weekends. Also, since deliveries by the Troop Support Issue Activity and vendors are not normally made on weekends, the man-hours expended on supply functions are considerably less. Finally, headcounts are typically lower on weekends, which effectively reduces the labor requirements in the other functional work areas.

An examination of the distribution of the workload, averaged over all satellite dining facilities for a week, shown in Table 3, is also very revealing:

a. For the military supervisor, the greatest percentage of time is spent on administrative, 31%. Nonproductive time accounts 26% of their time, over half of which resulted from the supervisors being absent from the dining facilities. The supervisor spends only 21% of his time on supervisory duties.

b. Civilian supervisors are involved 36% of the time in food preparation, 19% on the serving lines, 16% at sanitation duties, and 14% is nonproductive time. In effect, they are senior cooks more so than supervisors, supervising requires little more than 5% of their time.

c. Military and civilian cook positions differ little with regard to the distribution of workload. About 28% of their time is for food preparation, 24% on the serving lines, and 6-8% for supply, supervision and administration. The exceptions are that civilian cooks spend relatively more time on sanitation functions, and military cooks show correspondingly greater nonproductive time. Thus, the workload, in productive man hours, is unbalanced in favor of the military cooks.

d. The military clerk expends 60% of his time on administrative duties. Occasionally, in the absence of other dining facility staff, the clerk may be pressed into service to perform other functions. Overall, they are nonproductive 26% of the time.

e. Sanitation is the primary responsibility of the food service worker, 58% of his time. The majority of the remaining time, slightly over 16% in food preparation and serving, was usually devoted in assisting with making of salads, portioning and plating dessert items, and in supporting the serving lines. The 24% nonproductive time was somewhat higher than for the other civilian workers, because of the high degree of variability in the daily workload.

f. Temporary military personnel were utilized on an ad hoc basis in satellite dining facilities 8400 and 8402, equivalent dining facility A, because of instabilities in the headcounts and workloads during initial startup operations. The temporary help was subsequently eliminated from these dining facilities, and these data are not pertinent to the work measurement evaluation.

TABLE 3

DISTRIBUTION OF WORKLOAD BY WORKER CATEGORY

SATELLITE DINING FACILITIES

		Military Supervisor	Civilian Supervisor	Military Cook	Civilian Cook	Military Clerk	Food Service Worker	Temporary Military
Sanitation	M-Hrs	16.92	25.42	101.70	99.33	1.46	1028.34	1.00
	%	5.18	15.60	15.96	21.60	1.03	57.92	2.30
Food Preparation	M-Hrs	20.75	57.87	176.87	127.13	2.76	155.87	3.33
	%	6.35	35.51	27.75	27.65	1.95	8.78	7.66
Serving	M-Hrs	18.84	31.59	151.67	113.37	6.74	130.88	33.50
	%	5.76	19.39	23.80	24.66	4.75	7.37	77.03
Administration	M-Hrs	102.67	11.75	25.13	12.71	84.83	16.38	0.08
	%	31.42	7.21	3.94	2.76	59.79	0.92	0.18
Supervision	M-Hrs	69.83	8.75	11.63	10.38	5.13	8.08	0.00
	%	21.37	5.37	1.82	2.26	3.62	0.46	0.00
Supply	M-Hrs	13.00	4.66	12.63	6.74	4.26	16.30	0.00
	%	3.98	2.86	1.98	1.47	3.00	0.92	0.00
Productive	M-Hrs	242.01	140.04	479.63	369.66	105.18	1355.85	37.91
	%	74.05	85.94	75.25	80.39	74.13	76.37	87.17
Non-Productive	M-Hrs	84.80	22.92	157.76	90.16	36.71	419.59	5.58
	%	25.95	14.06	24.75	19.61	25.87	23.63	12.83
Total	M-Hrs	326.81	162.96	637.39	459.82	141.89	1775.44	43.49
	%	100.00	100.00	100.00	100.00	100.00	100.00	100.00

The distribution of productive and nonproductive time by hour of the day is illustrated in Figure 1 for a typical satellite dining facility. Although the specific details may vary, this distribution generally describes the conditions for all of the facilities in any daily or weekly time period. The most important feature to note in Figure 1 is the unevenness of the distribution of the workload. The periodic depressions in the productive time curve indicate meal times for the dining facility employees, which are recorded as scheduled delays/nonproductive time. This figure represents a situation where fairly efficient staffing can be accomplished, within the constraints of existing personnel scheduling policies, i.e., continuous 8.5-hour shifts for five consecutive days. Nonproductive time, the difference between the total and productive time curves in Figure 1, could be decreased to some extent by employing part-time personnel or scheduling full-time personnel on split shifts.[1] The peak total time between the seventh and eleventh hours of operation result from shifts overlapping. Although it cannot be conclusively demonstrated from the work sampling data, it is believed that the higher productive time during this period is artificially induced by the availability of a larger number of personnel, probably working at less than normal efficiency. However, generally higher headcounts at lunch, to some extent, also contribute to this effect.

Measures of productivity in the equivalent dining facilities, defined as the ratio of output, meals served or headcount, to inputs, or total man hours expended, are provided in Table 4. Not surprisingly, productivity improves with higher headcounts, as reflected in comparison of the different sized dining facilities.

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[1] R. S. Smith, "Two-Phase Employee Scheduling Algorithm for Operations Having Variable Manpower Requirements with Application Involving Single and Composite Planning Cycles", Doctoral Dissertation, University of Massachusetts, February, 1975.

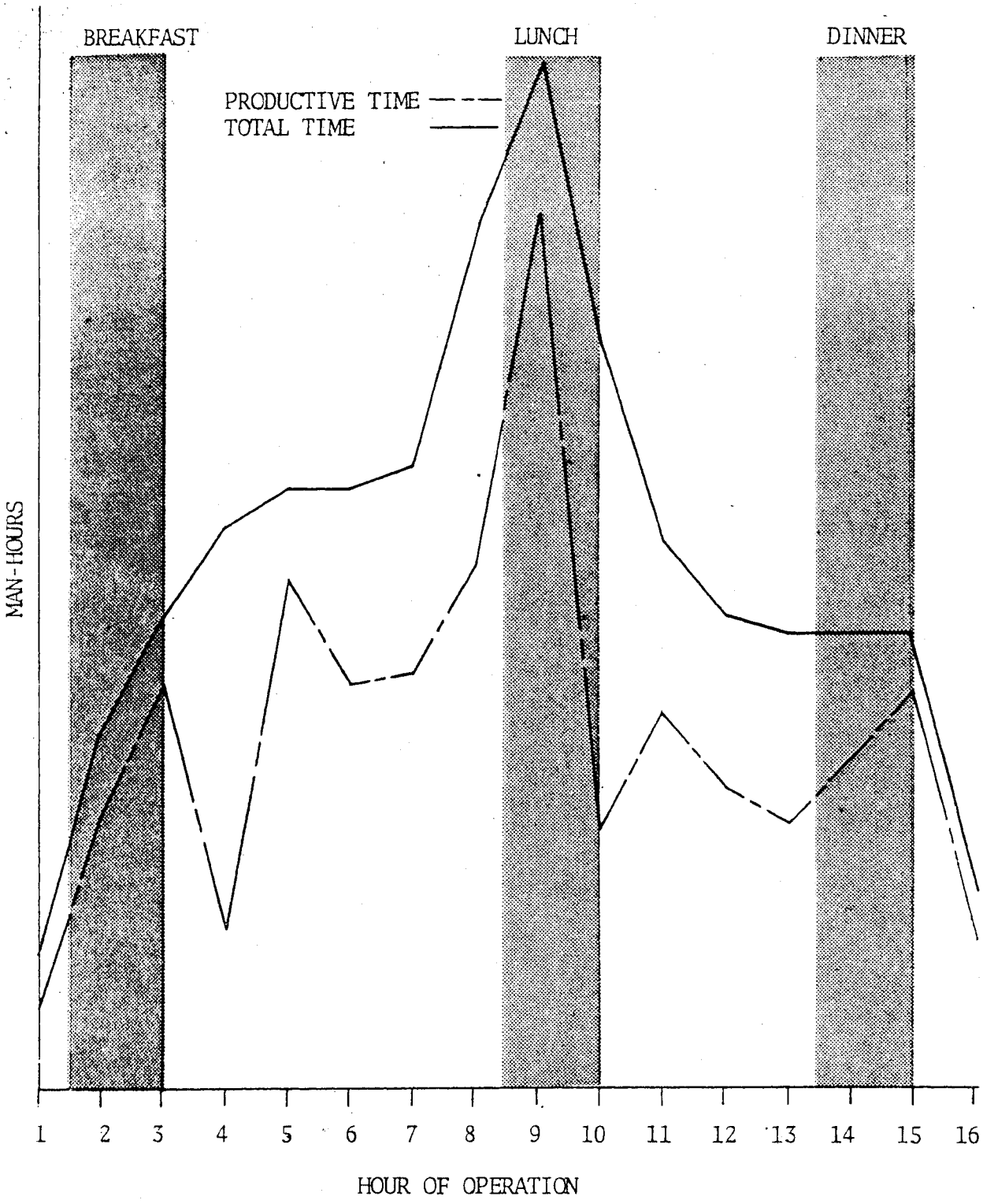

FIGURE 1: DISTRIBUTION OF WORKLOAD BY HOUR OF DAY FOR TYPICAL SATELLITE DINING FACILITY

TABLE 4

PRODUCTIVITY IN THE

SATELLITE DINING FACILITIES

EQUIVALENT DINING FACILITIES		TOTAL M-HRS	AVERAGE HEADCOUNT	MEALS/ M-HR
	Weekly	1195.52	9004	7.53
A	Weekdays	919.50	6928	7.53
	Weekends	276.02	2076	7.52
	Weekly	936.19	6871	7.34
B	Weekdays	728.59	5175	7.10
	Weekends	207.60	1696	8.17
	Weekly	696.61	3834	5.50
C	Weekdays	545.60	3015	5.53
	Weekends	151.01	819	5.42
	Weekly	719.48	2511	3.49
D	Weekdays	541.92	1815	3.35
	Weekends	177.56	696	3.92

These results suggest that the "best" utilization of personnel, in terms of productivity, is obtained when a dining facility is serving around 1000 meals per day, and is staffed accordingly. Further increases in productivity above this level of operation are only marginal.

It is clear from the preceding discussion that the labor requirements for the satellite dining facilities are related to, and increase with, the daily headcounts. Thus, this relationship was investigated and models subsequently derived by regression analysis which may be used to predict staffing requirements based on the anticipated number of meals served.

From a preliminary analysis of the work sampling data, it was observed that the productive man-hours by the military supervisor and clerk are not directly related to the headcounts. This follows, in that both positions are intended to perform primarily supervisory and/or administrative duties, on which headcounts have negligible effect within reasonable limits. But, the amount

of productive man-hours required for the remaining jobs was highly responsive to changing headcounts. Further, because the functions of the civilian supervisors and military and civilian cooks are so similar, their combined productive man-hours show a better relationship to daily headcount than if each job category was considered separately. Finally, it was determined that there was a higher correlation between productive man-hours and daily headcount if the weekday and weekend data were treated independently.

Thus, six models were developed and are presented in Table 5. These models predict the manpower requirements for cooks (worker categories 2, 3, and 4), food service workers (category 6) and the total for all job categories on weekends and weekdays. It is assumed that an individual provides 6.75 productive man-hours per day. This was derived by considering a work shift of 8.5 hours per day. Of this time, 0.5 hours is scheduled for meals and two fifteen-minute breaks are allowed. Ten percent of the remaining 7.5 hours is considered as an acceptable level of absent and idle time, which yields 6.75 hours of productive time. No adjustments were made in these models for time lost to annual or sick leave, training and field exercises, or any other causes. The results shown in Table 6 are estimated manpower requirements, which generally will be less than actual staffing, in practice, because of the inefficiencies in personnel scheduling policies and procedures.

TABLE 5

STAFFING MODELS

WORKER CATEGORY	WEEKDAYS	WEEKENDS
Total Staffing	$M = 7.8628 + 0.009H$*	$M = 6.5735 + 0.007H$
	$r^2 = 0.913$	$r^2 = 0.897$
Cooks	$M = 1.9174 + 0.0043H$	$M = 2.0339 + 0.0032H$
	$r^2 = 0.8784$	$r^2 = 0.9049$
Food Service Workers	$M = (0.8788)H^{0.3182}$	$M = (0.5991)H^{0.3618}$
	$r^2 = 0.872$	$r^2 = 0.885$

*M = Number of Personnel Required
H = Daily Headcount
r^2 = Coefficient of Determination

TABLE 6

STAFFING REQUIREMENTS

WEEKDAYS				WEEKENDS			
Headcount	Cooks	Food Service Workers	Total	Headcount	Cooks	Food Service Workers	Total
200-237	3	5	10	200-299	3	5	9
238-252	3	6	11	300-342	4	5	9
253-349	4	6	11	343-352	4	5	10
350-419	4	6	12	353-483	4	6	10
420-460	4	7	12	484-583	4	6	11
461-484	4	7	13	584-614	4	7	11
485-571	5	7	13	615-764	5	7	12
572-682	5	7	14	765-892	5	7	13
683-717	5	8	15	893-905	5	8	13
718-793	6	8	15	906-927	5	8	14
794-904	6	8	16	928-1046	6	8	14
905-950	6	8	17	1047-1187	6	8	15
951-1014	7	8	17	1188-1239	6	8	16
1015-1035	7	8	18	1240-1290	7	8	16
1036-1126	7	9	18	1291-1328	7	9	16
1127-1182	7	9	19	1329-1470	7	9	17
1183-1236	8	9	19				
1237-1348	8	9	20				
1349-1415	8	9	21				
1416-1461	8	9	21				

CENTRAL FOOD PREPARATION FACILITY

The distribution of the workload among worker categories in the CFPF, averaged over the two-week work sampling period, is contained in Table 7. Overall nonproductive time was greater than for any other single task category, but varied widely between the individual jobs. As was observed in the satellite dining facilities, non-productive time was greater for military personnel than for the civilian employees, but generally appeared to be excessive in almost all cases. Food preparation and portioning and packaging are the most labor intensive operations. However, a significant portion of the productive labor was devoted to administration, which may, perhaps, be attributed partly to the need for maintaining thorough records during the evaluation of the CFPF.

TABLE 7

DISTRIBUTION OF WORKLOAD BY WEEK

CENTRAL FOOD PREPARATION FACILITY

	MILITARY SUPERVISOR		CIVILIAN SUPERVISOR		MILITARY COOKS		CIVILIAN COOKS		CIVILIAN BAKERS		FOOD SERVICE WORKERS		WAREHOUSE-MEN		ADMINISTRATIVE PERSONNEL		JANITORS		TOTAL	
	M-HR	%	M-HR	%	M-HR	%	M-HR	%	M-HR	%	M-HR	%	M-HR	%	M-HR	%	M-HR	%	M-HR	%
Food Preparation	0.50	1.04	29.22	36.27	45.33	40.84	34.00	43.23	80.07	55.03	50.03	27.05	0.00	0.00	0.07	0.05	0.58	0.21	236.74	20.80
Portioning-Packaging	1.33	2.77	6.94	8.62	25.26	22.76	17.15	21.81	27.79	19.10	63.07	34.11	6.59	10.35	0.03	0.02	0.77	0.28	144.80	12.72
Sanitation	.04	0.09	.28	.34	1.60	1.44	1.08	1.38	1.83	1.26	18.12	9.80	1.28	2.01	0.08	0.05	209.74	74.93	234.07	20.57
Supply	.40	0.84	.89	1.10	1.86	1.68	0.82	1.04	.94	.65	1.08	0.58	17.85	28.04	0.00	0.00	1.13	0.40	24.99	2.20
Supervision	14.90	30.94	14.61	18.13	5.40	4.87	2.33	2.97	.28	.19	.77	0.42	1.32	2.07	18.37	12.61	2.51	0.90	60.46	5.31
Administration	16.60	34.46	8.96	11.12	2.42	2.18	2.14	2.72	1.31	.90	1.83	0.99	23.79	37.37	91.05	62.50	2.75	0.98	151.40	13.30
Productive	33.78	70.13	60.90	75.59	79.52	71.63	57.53	73.14	110.14	75.70	134.88	72.94	49.66	78.01	109.59	75.22	217.44	77.68	853.46	74.99
Non-Productive	14.39	29.87	19.67	24.41	31.50	28.37	21.13	26.86	35.36	24.30	50.04	27.06	14.00	21.99	36.10	24.78	62.49	22.32	284.65	25.01
Total	48.17	100.00	80.57	100.00	111.04	100.00	78.65	100.00	145.50	100.00	184.92	100.00	63.66	100.00	145.69	100.00	279.93	100.00	1138.11	100.00

Taking a different viewpoint, the data indicate that the time spent on different tasks in each job category seems to be reasonably consistent with expectations. The one exception is that warehousemen spend an inordinate amount of their time on administrative duties, for which no plausible explanation can be offered. Again, as noted in the dining facilities, civilian supervisors were involved in a supervisory capacity far less than might be presumed for such a position.

Evaluating productivity cast considerable doubt on the validity of the results of the work sampling analysis. Although the data are sufficiently precise for this purpose, and the results presented can be justified on this basis, it is felt that the conditions under which the work sampling was conducted were not realistic. The data provided in Table 8 is the reported production of portions of entrees, selected vegetable items, and soups, sauces and gravies in the CFPF for each month up to and including the month of June, in which the work sampling was accomplished. No significant changes in equipment capacities or staffing occurred during that time. Yet, the production levels varied from approximately 60,000 to over 195,000 portions per month. If the nominal production capacity of the CFPF is set at 200,000 portions per month, a not unreasonable assumption under the circumstances, actual production has been only 30-35% of capacity following the startup of operations in February and March when most production was to establish inventory. Even during work sampling, when some effort was made to achieve a degree of similitude in order that the results adequately reflected the true potential of the CFPF, only slightly more than 40% of capacity was utilized. During the remainder of June, production was at about only 8.5% of capacity, to balance overproduction during the work sampling.

The consequence of such gross underutilization of available capacity, particularly with reference to labor, is that considerable instability and inefficiencies in operations can be tolerated without degrading effectiveness, i.e., fulfilling production requirements. That production was unstable is readily apparent when examining average production by day of the week, Table 8, which varied by an order of magnitude during the five months of operation. Since pace rating could not be done during the work sampling, the data will not support unqualified conclusions regarding operational efficiency. However, based on informal

qualitative evaluations and "expert opinion", that can be substantiated by citing numerous specific examples, there is certainly reason to question how efficient CFPF production operations really were during the time the data was collected.

TABLE 8

CFPF ENTREE PRODUCTION

	FEBRUARY	MARCH	APRIL	MAY	JUNE	WORK SAMPLING PERIOD
Monthly	170,173	195,098	70,812	68,871	60,739	44,507
Average Daily Production	8,956	8,483	5,058	3,443	3,197	4,451
Average Monday Production	11,296	9,505	5,174	4,012	2,750	3,930
Average Tuesday Production	9,509	9,117	5,090	3,015	3,154	6,044
Average Wednesday Production	8,641	7,549	5,892	4,653	5,458	7,637
Average Thursday Production	9,259	9,055	5,165	4,595	4,422	4,392
Average Friday Production	6,660	7,469	3,424	1,338	2,148	1,631

It is our considered opinion that productive man-hours presented in Table 7, although actually observed, are biased by a "Parkinson's Law" effect, i.e., work expands to fill the time available, and that activity recorded as productive effort was, more often than not, performed at less than 100% efficiency. Therefore, the results and findings in this area are suspect.

Despite a lack of confidence in the data, an attempt was made to derive manpower requirements models for the CFPF, similar to those developed for the satellite dining facilities. A variety of possible measures of production were assessed, e.g., dollar volume and pounds of food processed, other than number of portions produced. Regression models of various kinds -- linear, exponential, power function, and multivariate -- were fit to data for the separate job categories and for combined groups of the data. The coefficients of determination for these models ranged from a low of $r^2 = 0.002$, which indicated no relationship existed among the variables, to a maximum $r^2 = 0.45$, which is still too low for the model to be useful for predicting staffing requirements. At best, the results of this exercise tended to confirm the opinions expressed above.

The only guidelines for staffing the CFPF that can be offered, at this time, are based on the following argument. Production during the months April through June was at about ten times the average daily headcounts in the satellite dining facilities, 6000-7000 meals per day. If the CFPF, with the observed staffing levels, has an actual production capacity of 200,000 portions a month, essentially as demonstrated in February and March, it is conservatively estimated as being able to support over 15-16,000 meals a day without increasing total staffing. Conversely, it is suggested that to continue to operate at these lower levels, some reductions in CFPF staffing could, and should be, achieved.

INGREDIENT PREPARATION ACTIVITY

Operations in the IPA differ from those at the central kitchen, as shown in the workload distribution in Table 9. The main function of this activity is the preparation and packaging of raw ingredients including shredding, packing, and weighing of vegetables and fruits for the satellite dining facilities to use in salad and meal preparation and for CFPF production. As in the CFPF, most of the effort is in food preparation, portioning and packaging, and sanitation. Since little cooking is required, the greatest emphasis is on portioning and packaging operations. Nonproductive time, 19%, is lower than for either of the two elements of the CFPS already discussed.

TABLE 9

DISTRIBUTION OF WORKLOAD

INGREDIENT PREPARATION ACTIVITY

	MILITARY SUPERVISOR		MILITARY COOKS		CIVILIAN COOKS		FOOD SERVICE WORKERS		TOTAL	
	M-HR	%	M-HR	%	M-HR	%	M-HR	%	M-HR	%
Food Preparation	1.96	9.33	24.14	16.52	17.47	21.67	42.49	25.06	86.06	20.61
Portioning-Packaging	0.40	1.92	34.00	23.27	20.67	25.63	39.40	23.24	94.47	22.63
Sanitation	1.07	5.09	19.02	13.02	17.44	21.64	49.43	29.16	87.01	20.84
Supply	0.86	4.10	8.26	5.66	1.96	2.43	2.53	1.49	13.61	3.26
Supervision	4.46	21.23	6.24	4.27	2.79	3.46	1.13	0.66	14.65	3.51
Administration	6.72	32.01	27.50	18.82	5.65	7.01	2.81	1.66	40.55	9.71
Productive	15.47	73.68	116.92	80.02	65.99	81.84	137.78	81.28	336.36	80.57
Non-Productive	5.53	26.32	29.19	19.98	14.64	18.16	31.74	18.72	81.14	19.43
Total	21.00	100.00	146.11	100.00	80.63	100.00	169.51	100.00	417.50	100.00

The military supervisor spends most of his time in administration and supervision, 53%, but a relatively high percentage of time was nonproductive. It should be noted, however, that during the two weeks of work sampling in the IPA, the military supervisor was available for only half of the time, thus these data may not provide an accurate profile of normal operations. Much of the administrative work was performed by military cooks since no specific position was provided for this purpose.

Ingredient preparation did not maintain records on daily production, and the only available production data was the issues and receipts on any given day. These records were inadequate for determining a meaningful measure of productivity. For the same reasons, staffing models could not be derived.

TROOP ISSUE SUPPORT ACTIVITY

The warehousing operation was the only part of this activity work-sampled. It was assumed that the CFPS would otherwise have little or no effect on the overall workload in the administrative area. The allocation of time for each of the major tasks in all job categories, Table 10, is as expected. Nonproductive time was only 17% of the total time, considerably lower than for any other element of the CFPS included in the work measurement evaluation.

The main function of the TISA is to supply the dining facilities, central kitchen and ingredient preparation with the raw materials needed for day-to-day operations. Therefore, the dollar volume of materials handled is summarized on a daily basis, in Table 11, as a measure of production output. Dividing the total cost of material handled by total man-hours the estimated productivity is $75.12 per man-hour. Unfortunately, this value of productivity could be biased by the manner in which the CFPF was operated during the work sampling period. The level of production in the CFPF was very low during that time, so that the volume of materials handled and transported to CFPF was correspondingly reduced far below that which would be observed in normal operations.

A variety of regression models were fitted to the production data available, but none could be determined which is sufficient for predicting manpower requirements. The maximum coefficient of determination obtained was $r^2 = 0.17$.

TABLE 10

DISTRIBUTION OF WORKLOAD BY WEEK

TROOP ISSUE SUPPORT ACTIVITY

	FOREMAN		WAREHOUSEMAN		DRIVER		TOTAL	
	M-HR	%	M-HR	%	M-HR	%	M-HR	%
Receiving	0.13	0.16	18.50	5.31	8.13	9.12	26.76	5.13
Warehouse Operation	6.88	8.21	233.75	67.05	7.88	8.84	248.51	47.65
Shipping	0.25	0.30	21.75	6.24	22.00	24.68	44.00	8.44
Transportation	0.00	0.00	2.25	0.65	24.00	26.92	26.25	5.03
Supervision	21.75	25.96	2.13	0.61	0.25	0.28	24.13	4.63
Administration	42.88	51.19	15.75	4.52	1.25	1.40	59.88	11.48
Productive	71.89	85.82	294.13	84.37	63.51	71.25	429.53	82.36
Non-Productive	11.88	14.18	54.50	15.63	25.63	28.75	92.01	17.64
Total	83.77	100.00	348.63	100.00	89.14	100.00	521.54	100.00

TABLE 11

TISA PRODUCTION

FROM	TO	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	TOTAL
Cold Storage	SDF	$6690.61	$ 8.55	$4725.57	-	$4768.08	$16192.80
Dry Storage		1716.77	374.55	1386.58	$ 462.06	1940.14	5880.09
Central Kitchen		1783.76	107.38	2695.22	10.64	3183.39	7780.38
Dessert Kitchen		511.43	-	435.32	-	402.75	1349.50
Ingredient Preparation		824.40	7.47	315.24	-	802.64	1949.74
	Sub-Total	$11526.96	$497.94	$9557.92	$ 472.70	$11096.99	$33152.51
TISA	Ingredient Preparation	$289.39	-	$888.03	$164.62	$331.94	$1678.88
TISA	Central Kitchen	-	-	-	$287.77	$895.07	$1182.83
TISA	Dessert Kitchen				1491.65	1673.70	3165.85
	Sub-Total	$289.39		$888.03	$1944.03	$2900.70	$6027.56
	Grand Total	$11526.96	$497.94	$10445.95	$2416.73	$13997.69	$39180.07

SECTION V

CONCLUSIONS

a) The workloads in the satellite dining facilities, as a function of the percentage total man-hours actually observed, is quite different than the results obtained in similar work measurement evaluations at other military installations.[2,3,4] It appears, then, that CFPF support does impact on the distribution of effort within the dining facilities, although total man-hours required in satellite dining facilities is less than for conventional dining hall operations.

b) The percentage of nonproductive time observed in the satellite dining facilities, approximately 23% of total man-hours expended, compares very favorably to commercial food service operations, and to a standard of 20.6% for an 8.5-hour shift.[5] Although not conclusively supported by available data, this is thought to have resulted because of the more efficient, realistic staffing of the satellite dining facilities.

c) The distribution of workloads in the satellite dining facilities for the individual job categories indicates that the work being performed by personnel in some positions is not entirely consistent with what may be expected on the basis of their job descriptions. A glaring example of this condition is the large amount of time allocated to food preparation operations by civilian supervisors (much more than for cooks!), as compared to the very limited amount of time, slightly more than 5%, spent on supervision. These results may have implications with regard to recruiting and training food service personnel.

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[2]R. J. Giglio, R. D. Davis, R. A. Grabiac, and R. R. Weitz, "A Methodology to Estimate Work Force Requirements in Military Food Service Facilities", Department of Industrial Engineering and Operations Research, University of Massachusetts, Amherst, Massachusetts, November, 1977.

[3]R. L. Bustead, "CAFe System Experiment at Fort Lewis, Washington", US Army Natick Laboratories, Natick, Massachusetts, December, 1972.

[4]M. M. Davis and J. R. Wetmiller, "A Work Analysis of Food Service Personnel at Travis AFB, California", US Army Natick Laboratories, Natick, Massachusetts, July, 1973.

[5]"Labor Productivity in Selected Civilian Cafeterias", J. A. Mixon, and Associates, Chevy Chase, Maryland, April, 1977.

d) Some nonproductive time occurs in the satellite dining facilities because of the inability to schedule personnel in the most efficient manner. Improvements may be obtained by using part-time personnel, or full-time personnel working split shifts, or by providing greater flexibility in scheduling to meet the actual workload requirements.

e)Based on these data, satellite dining facilities serving around 1000 meals per day seem to provide for the "best" utilization of personnel as measured by meals per man-hour. Facilities serving a larger number of meals are only marginally more effective in this respect, and may introduce other problems, e.g., long waiting lines, or the facility may be located at excessive distances from some portion of the assigned population, which offset these benefits.

f) Staffing levels in the central kitchen appeared to be more than sufficient during the work sampling period. Although the results of the work sampling suggests a highly productive work-force, two factors must be considered. First, there was a high degree of variability in the production levels on a day-to-day, as well as from month-to-month, basis with an essentially constant work-force. Secondly, at least some of the existing volume production equipment was not effectively utilized during the sampling period, if at all. As an example, pie filling operations were often performed manually involving up to five food service personnel, when a pie-filling machine was available that required only two people and operated much faster. Ostensibly, the reason for not using the filling machine is that it took excessive clean-up time. Since the work sampling was intended to measure the effects of a CFPF on personnel performance and requirements, such procedures preclude developing valid conclusions from the data.

g) The distribution of workload in the IPA and TISA elements was about as expected and did not reveal any inexplicable contradictions. Both of these components showed, overall, a lower percentage of nonproductive manhours than either the satellite dining facilities or the CFPF, even less than the proposed standard of 21% nonproductive time. This may be attributed to the fact that TISA functions were not substantially changed by the CFPS, and Fort Lee had more than two years of experience with the IPA prior to the evaluation, hence were more stable and manageable than the newer elements of the CFPS.

APPENDIX A

APPENDIX A

WORK SAMPLING SCHEDULE

APRIL

PERIOD	SUN	MON	TUE	WED	THU	FRI	SAT
	2	3	4	5	6	7	8
2nd	X	8402 3701	9304 8400	3108 3024	3118 3701	3024 9304	X
	9	10	11	12	13	14	15
1st	X	X	3118 3024	8402 9304	8400 3701	9304 3108	3024 3701
	16	17	18	19	20	21	22
2nd	8402 3701	X	X	3701 9304	3024 8400	8402 3108	3118 3024
	23	24	25	26	27	28	29
1st	3108 3024	9304	X	X	9304 3024	3701 8402	9304 3118
	30						
2nd	9304 3108						

MAY

PERIOD	SUN	MON	TUE	WED	THU	FRI	SAT
		1	2	3	4	5	6
1st						3024	
2nd		9304 3118	3701 3024	X	X	3701	9304 8400
	7	8	9	10	11	12	13
1st	9304	3108 3118	8400 3701	3024 3108	X	X	8400
2nd	3024						
	14	15	16	17	18	19	20
1st	X	8402	9304	3701	3118	X	
2nd		3108	3118	8402	9304		3701
	21	22					
1st	3701 8402	3701					

APPENDIX A

WORK SAMPLING SCHEDULE

JUNE

PERIOD	SUN	MON	TUE	WED	THU	FRI	SAT
					1	2	3
					TISA	TISA	X
	4	5	6	7	8	9	10
	X	TISA	TISA	TISA	TISA	TISA	X
	11	12	13	14	15	16	17
	X	TISA	TISA	TISA	X	CFPA	X
	18	19	20	21	22	23	24
	X	CFPA	CFPA	CFPA	CFPA	CFPA	X
	25	26	27	28	29	30	
	X	CFPA	CFPA	CFPA	X	CFPA	

APPENDIX B

APPENDIX B

DATA COLLECTION FORMS

SATELLITE DINING FACILITIES

WORKER CATEGORIES

CODE	CATEGORY
1	Supervisor, Military
2	Supervisor, Civilian
3	Cook, Military
4	Cook, Civilian
5	Clerk, Military
6	Food Service Worker, Civilian

TASK CATEGORIES

CODE	CATEGORY
11	Prepares Food for Cooking
12	Cooks Food
13	Prepares Soups, Salads, Desserts & Breads
14	Prepares Cooking Equipment
21	Serves on "A" Line
22	Replenish Serving Lines
23	Serves on Short Order Line
31	Cleans Kitchen
32	Cleans Dining Room
33	Cleans Serving Line
34	Dishwashing
41	Receives Supplies
42	Maintains Supplies
43	Issue Supplies
50	Supervision
60	Administrative
71	Scheduled Breaks
72	Absent
73	Idle
74	Force Delay

10. FOOD PREPARATION:

11. Prepares for Cooking: Obtains ingredients. Opens food cans, boxes, pans, and/or bags. Places raw or pre-cooked items into appropriate cooking, heating, or serving containers. Cuts meats and vegetables. Mixes ingredients as required.

12. Cooks Food: Selects proper temperature settings, monitors food being cooked or rethermalized, and seasons food as required. Includes preparing eggs, hot cakes, french toast, meats, and other items on the serving line grill that are not immediately served to a customer. Removes ready food from cooking utensils and places in serving or replenishing containers.

13. Prepares Soups, Salads, Desserts, and Breads: Includes all productive time required to prepare soups, salads, and pre-baked desserts and breads and to transport items to serving line or tables.

14. Prepares Cooking Equipment: Includes all productive time required for obtaining and prelocating pots, pans, spatulas, and other cooking implements in preparation for cooking.

20. SERVING:

21. Serves on "A" Line: Cuts individual portions of meat on serving line. Serves patrons in line. Prepares utensils for serving.

22. Replenish Serving Line: Includes all time required to place, replenish, and remove food from the serving line and self-serve area. Makes beverages, refills milk coolers, ice cream freezers, and beverage dispensers.

23. Serves on Short-Order Line: Cooks and serves items such as steaks, hot dogs, hamburgers and other items directly from the grill to the customer. Includes time required for preparation of cooking and serving implements to be used on the short-order line.

30. DINING HALL SANITATION:

31. Cleans Kitchen: Cleans cooking utensils (pots, pans, etc.) and returns items to proper locations or receptacles. Cleans equipment and spaces (ranges, preparation tables, steam kettles, mixes, refrigerators, freezers, and dry storage areas, etc.). Sweeps and mops kitchen floor. Empties garbage cans and cleans garbage area.

32. Cleans Dining Room: Cleans tables, sweeps or vacuums floor, refills salt and pepper shakers and napkin dispensers.

33. Cleans Serving Line: Includes all productive time prior to, during, and after a meal expended in cleaning equipment and utensils on the serving line and in the self-serve area.

34. Dishwashing: Includes all time in the warewash function (washing, scraping, sorting, and transporting soiled and clean dishes to and from the warewash area). Includes time spent in start-up and shut-down of the warewashing equipment.

40. SUPPLIES:

41. Receives Supplies: Unloads all incoming supplies at the dock. Transports supplies to storage areas. Uncrates, unpacks, and stores supplies in appropriate locations.

42. Maintains Supplies: Repositions stored supplies to insure that longest stored items are used first.

43. Issues Supplies: Issues food supplies to cooks and records issues. Receives returned unused issues not used by cooks and annotates records indicating return.

50. SUPERVISION:

Inspects dining hall to assure cleanliness and maintenance of good sanitation practices; and gives or receives supervision.

60. ADMINISTRATIVE:

Drafts and types correspondence; prepares various forms for control records, maintains civilian employees personnel and pay records; maintains inventories and receipts for incoming food and expendable supplies. Inventories supplies after each meal, daily, and when directed by food service supervisory personnel. Buys out of stock items from other dining halls for immediate issue.

70. NON-PRODUCTIVE:

71. Scheduled Breaks: All time set aside for coffee breaks and meals.

72. Absent: Employee cannot be located in any work area.

73. Idle: Any time spent that is not work related (e.g., leaning on equipment and talking with others).

74. Forced Delay: Unavoidable delay, e.g., waiting for customers to arrive at serving line.

INTERVAL WORK SHEET

FACILITY _____ DATE _____ TIME _____ OBSERVER _____

OBS / TIME	TASK CATEGORIES																	
	11	12	13	14	21	22	23	31	32	33	34	41	42	43	50	60	71	72	73
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APPENDIX C

APPENDIX C

DATA COLLECTION FORMS

CENTRAL FOOD PREPARATION ACTIVITY

WORKER CATEGORY

CODE	CATEGORY
1	Supervisor, Military
2	Supervisor, Civilian
3	Cook, Military
4	Cook, Civilian
5	Baker, Civilian
6	Food Service Worker, Civilian
7	Warehouseman
8	Administrative
9	Other (Janitors)

TASK CATEGORY

CODE	CATEGORY
11	Ingredient Preparation
12	Entree Preparation
13	Dessert Preparation
21	Portioning
22	Packaging
23	Freezing
24	Packing
25	Storing
31	Sanitation, Equipment
32	Sanitation, Entree/Ingredient Preparation Spaces
33	Sanitation, Dessert Preparation Spaces
34	Sanitation, Storage Spaces/Other
41	Inventory/Maintenance
42	Shipping/Receiving
50	Supervision
60	Administrative
71	Scheduled Break
72	Absent
73	Idle

TASK DEFINITIONS

CENTRAL KITCHEN & INGREDIENT PREPARATION

10. FOOD PREPARATION:

11. Ingredient Preparation: Obtains raw ingredients; opens food cans, boxes and/or bags; cuts or slices meats and vegetables; mixes ingredients as required.

12. Entree Preparation: Obtains ingredients as required; places ingredients into cooking or heating equipment; selects proper cooking temperatures and monitors items being cooked; obtains required cooking implements.

13. Dessert Preparation: Obtains ingredients for baking as required; mixes and places ingredients into baking vessels; selects baking temperatures and monitors items while baking.

20. PREPARED ITEMS HANDLING:

21. Portioning: Cuts, places, ladles, etc., prepared items into portion size.

22. Packaging: Places portions into issue size containers, bags, etc.

23. Freezing: Places or removes items from quick freezer.

24. Packing: Places packaged items into shipping containers.

25. Storing: Places, packed or packaged items into storage areas (holding freezers/refrigerators).

30. SANITATION:

31. Sanitation Equipment: Cleans cooking or preparation equipment utensils, containers, etc.

32. Sanitation Entree/Ingredient Preparation Spaces:

33. Sanitation Dessert Preparation Spaces:

34. Sanitation Storage Spaces/Other:

40. SUPPLY:

41. Inventory/Maintenance: Inventories storage areas for quantities and conditions of items being held. Repositions stored supplies to insure that longest stored items are used first.

42. Shipping/Receiving: Loads or unloads items from or onto delivery vehicles either manually or with material handling equipment.

50. SUPERVISION:

Inspects CFPA areas to assure cleanliness and maintenance of good sanitation practices; and gives or receives supervision.

60. ADMINISTRATIVE:

Drafts and types correspondence; prepares various forms for control records and maintains employee work records.

70. NON-PRODUCTIVE:

71. Scheduled Break: All time set aside for coffee breaks and meals.

72. Absent: Employee cannot be located in any work or break area.

73. Idle: Any time spent that is not work related.

INTERVAL WORK SHEET

FACILITY _____ DATE _____ TIME _____ OBSERVER _____

OBS / TIME	TASK CATEGORIES																		
	11	12	13	21	22	23	24	25	31	32	33	34	41	42	50	60	71	72	73
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APPENDIX D

APPENDIX D

DATA COLLECTION FORMS

TROOP ISSUE SUPPORT ACTIVITY

WORKER CATEGORY

CODE	CATEGORY
1	Warehouseman, Foreman
2	Warehouseman
3	Motor Vehicle Operator

TASK CATEGORY

CODE	CATEGORY
11	Receiving/CFPF
12	Receiving/IP
13	Receiving/SDF
14	Receiving/Other
21	Warehouse Operation
31	Shipping/CFPF
32	Shipping/IP
33	Shipping/SDF
34	Shipping/Other
41	Transportation/CFPF
42	Transportation/IP
43	Transportation/SDF
50	Supervisory
60	Administrative
71	Scheduled Break
72	Absent
73	Idle

TISA TASK DEFINITIONS

10. RECEIVING:

Unloads items from delivery vehicles manually or with forklift truck. Task category used is by origin of items.

11. Receiving/CFPF: From Central Food Preparation Facility (CFPF).

12. Receiving/IP: From Ingredient Preparation (IP).

13. Receiving/SDF: From Satellite Dining Facilities (SDF).

14. Receiving/Other: From suppliers, Ft. Pickett, A.P. Hill, etc.) Note origin.

21. WAREHOUSE OPERATION:

Packs, unpacks, sorts, stacks, dunnages, bins and moves items, in-storage checks, internally tallies out stock. Operates forklift in handling warehoused items. Maintains cleanliness of warehouse spaces.

30. SHIPPING:

Loads items manually or with forklift onto delivery vehicles for shipment to approximate destinations.

31. Shipping/CFPF: To Central Food Preparation Facility (CFPF).

32. Shipping/IP: To Ingredient Preparation (IP).

33. Shipping/SDF: To Satellite Dining Facilities (SDF).

34. Shipping/Other: To Ft. Pickett, A.P. Hill, etc.

40. TRANSPORTATION:

Delivering subsistence and obtaining signed receipts. Transports subsistence to and from warehouses, CFPF, IPA, SDF.

41. Transportation/CFPF: To/from CFPF.

42. Transportation/IP: To/from IP.

43. Transportation/SDF: To/from SDF.

50. SUPERVISORY:

Supervises warehouse functions, checks safety, sanitary and security conditions, receives or gives supervision, inspects storage and subsistence.

60. ADMINISTRATIVE:

Receives subsistence documents; performs inventory, plans weekly and daily work schedules, reviews all incoming and outgoing shipping documents, verifies and tallies all subsistence received.

70. NON-PRODUCTIVE:

71. Scheduled Break: All time set aside for coffee breaks or meals.

72. Absent: Employee cannot be located in any work area.

73. Idle: Time spent that is not work related.

INTERVAL WORK SHEET

FACILITY _____ DATE _____ TIME _____ OBSERVER _____

OBS / TIME	TASK CATEGORIES																		
	11	12	13	14	21	22	23	31	32	33	34	41	42	43	50	60	71	72	73
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