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Work Function Analysis of Vegetarian Entree Production

Susan Maloney

Kathleen Z. Zolber

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Abstract

WORK FUNCTION ANALYSIS OF VEGETARIAN ENTREE PRODUCTION

by

Susan Maloney, Kathleen K. Zolber,

Kenneth I. Burke, Bertrum C. Connell, and Gerald Shavlik

Data on actual labor time can be utilized as an effective management tool. With labor cost representing about 50 percent of direct cost in foodservice, it is essential to examine how labor time is being utilized.

A continuous time study was conducted to determine the total labor time for the production of eight vegetarian entrees. The two work areas observed were the ingredient assembly area and the cooks' production area. This labor time was recorded by Work Functions to find the distribution of labor time. Data from the observations were compiled using an Apple II computer system. Reports were generated to show: a) observed frequency of each Work Function, b) time expended in seconds for each Work Function, c) percentage distribution of labor time expended per Work Function, d) total time for each employee involved in the entree production, and e) percentage of total time for each employee involved in the entree production. The total labor time ranged from 39.97 to 19.33 seconds per serving. Entrees with the highest labor time required a large amount of hand labor. The largest percentage of labor time was spent in the category of direct time with a range

of 96.75 to 94.47 percent. Indirect labor time was less than 5 percent of total labor time and delay time was less than 5 percent of the total labor time.

A second objective was to compare the cooks' labor time with data from Research Project I which was collected in 1970 using a similar methodology. Since the completion of Research Project I, an ingredient assembly area, and computer generated standardized production formulas are being utilized in the foodservice system. The comparison between data from Research Project I and II was made to determine delegation of routine tasks from cooks' area to ingredient room personnel. These comparisons indicated reduction in cooks' labor time. The percentage distribution of labor time increased in direct labor time while indirect labor time decreased.

A one-way analysis of variance indicated there was a significant difference in mean labor time between the eight vegetarian entrees for direct labor time, and total labor time.

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WORK FUNCTION ANALYSIS OF VEGETARIAN ENTREE PRODUCTION

by

Susan Maloney, Kathleen K. Zolber,
Kenneth I. Burke, Bertrum C. Connell, and Gerald Shavlik

A Manuscript Submitted by Susan Maloney
in Partial Fulfillment of the Requirements for the Degree
Master of Science in Dietetics

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Each person whose signature appears below certifies that this manuscript in his/her opinion is adequate, in scope and quality, in lieu of a thesis for the degree Master of Science.

Kathleen K. Zolber, Chairman
Kathleen K. Zolber, Professor of Food Systems
Administration

Kenneth I. Burke
Kenneth I. Burke, Associate Professor of Nutrition

Bertrum C. Connell
Bertrum C. Connell, Assistant Professor of Nutrition
and Dietetics

Gerald Shavlik
Gerald Shavlik, Assistant Professor of Biostatistics

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INTRODUCTION

Hospital costs are accelerating each year, with labor becoming a major expense (1). The Hospital Administrative Services Monitrend report indicated that during the last six months of 1981, 51.6 percent of direct costs in foodservice was labor (2). In order to reduce labor cost in the foodservice system, an examination of how labor time is utilized is essential.

Data on actual labor time can be utilized as an effective management tool. Ruf suggested it can be used in PERT network scheduling, make-or-buy decision techniques and cost effectiveness analysis (3). Labor time can also aid managers as a decision making technique to evaluate the menu mix, the production scheduling of personnel, and allocation of equipment usage (4).

Labor time analysis should be used as a cost control mechanism. This is necessary as labor is a variable cost subject to inflation. This type of analysis is an effective management tool in predicting labor hour requirements to eliminate over-or-under scheduling of employees (5). An analysis of the distribution of labor time by Work Functions can indicate how labor time is being utilized. If routine tasks are performed by highly skilled employees, it can be an expensive use of labor. Such tasks could be delegated to an employee paid at a lower rate (6).

Labor time could be utilized in the planning and control process in foodservice systems with the application of computers. The speed

and flexibility of the computer allows this information to be available as needed by the foodservice manager. The labor cost could be added to the raw food cost to help determine the cost per serving of menu items, and establish an accurate selling price. The computer can also compile the labor time for a production schedule indicating how many employees and how much labor time is needed for the day's Work Function activities.

PURPOSE

The major objective of this research was to determine the labor time in the production of eight selected vegetarian entrees, and to identify the distribution of labor by Work Function classification. A second objective was to make a comparison of labor time with data from Research Project I conducted by LeBrun in 1970 (6). To help reduce cooks' labor time, LeBrun recommended that the cooks' time should not be used in recipe calculations and that an ingredient assembly area be utilized. With these recommended changes, comparisons were to include: a) the degree of delegation of routine tasks to ingredient assembly area personnel to decrease the production time of the cooks and b) to determine if the percentage of the cooks' production time has shifted by Work Function classification.

HYPOTHESIS

Distribution of labor time by Work Functions and total production time can vary from one entree to another depending on the production

methods used. The null hypothesis for the statistical analysis was, there is no significant difference between the labor time expended in the production of eight vegetarian entrees for direct labor time, indirect labor time, delay time and total labor time.

LITERATURE REVIEW

Several methods have been used to collect and evaluate the data in labor time studies. One method involves the use of Master Standard Data (MSD), where time values are assigned to short repetitive tasks. Recipes are reduced into these basic tasks and are assigned the time values. Total production time is determined for the production formula (7). Another method is to make direct continuous observations in which an observer records all activities during the time scheduled to accomplish a specified set of procedures (6). Direct observations can also be made by work sampling which consists in using a random number table to determine the time span between each observation during the time scheduled to accomplish a specified set of tasks.

MASTER STANDARD DATA (MSD)

Through the use of MSD, a foundation was laid for developing a standard code in foodservice preparation. In a study conducted by Waldvogel and Ostenso (7) three single-item entrees were tested. This testing was done by observing entree production in order to define basic activities. An alpha-mnemonic code was developed and assigned to each of the tasks. The Time Measurement Units (TMU) from the MSD were then added for each coded element of the alpha-mnemonic code. To verify these TMU's, stopwatch times of ten replications were compared. The TMU's in the research were found to be reliable at the ± 5 percent level.

The MSD was then tested in a long-cycle production of 100 portions

of a complete product. Time values from MSD were compared with stopwatch times. The percentage differences were within ± 5 percent; therefore, the MSD Quantity Food Production Code was considered valid and reliable for determining single-item entree production times. The researcher in the study felt it was feasible to develop a universal code for quantity food production (7).

Waldvogel and Ostenso (9) conducted another research study utilizing MSD to estimate production time in relation to volume, based on two standardized entree formulas. Differences in production time between 100, 200, and 500 servings were determined. The results showed labor time per portion decreased as production volume increased, but it was not directly proportional. An inspection of the elemental breakdown showed that for some elements, production time increased in direct proportion to volume. For others, time differences were due to increased frequency of specific code elements within the larger element. As volume approached system capacity, the decrease in production time per portion began to level off. Labor time could not be correctly determined by multiples of individual portions or for a specific batch size. The data indicated that labor was most effectively utilized when the volume produced at any one time or the specific batch size was directly related to the system capacity (9).

Another study reported by Ruf and Matthews (3) was conducted using vegetarian entrees. The purpose of the study was to develop a method for establishing time standards that would be economical, easy to use

with minimal training, adaptable to various layouts and storage areas, and accurate. To determine the relationship of volume to time, four formulas were tested in batches of 100, 300, and 500 servings. The results showed that labor time per portion decreased as production volume increased, but was not directly proportional. Time differences were due to increased frequency of coded activities such as measuring food or handling equipment. The researchers noted that when facility capacity is reached, the decrease in time per portion becomes relatively stable and the optimal production volume is approached.

Matthews and Waldvogel (4) continued research using MSD and conducted a study to develop "macro" elements of production which could be used to determine production labor time for three classifications of entrees. The three classifications identified were: a) single-item, which is an entree whose preparation requires individual handling of each portion, b) combination, which is multi-ingredients that require various handling procedures in preparation, and c) roast, which are large cuts of meat that are baked whole and then portioned. Two from each classification were produced in 100 portion batches. The weighing and measuring was done in a prepreparation area. As new activities were defined and tested, an alpha-mnemonic code was assigned. Total production time which included handling and process time was studied. The "macro" elements proved to be applicable to entree formulas for determining production time requirements. The total handling time for the three classifications of entrees was similar between and among classifications,

but process time varied within and among the classifications.

Matthews and Waldvogel (10) tested to see if the time required to produce three classifications of three quantity levels could be synthesized using MSD. They also wanted to determine the feasibility of producing various combinations (menu mixes) of these entrees within the constraints of a simulated foodservice system.

Six entrees were selected with two from each of the single-item, combination, and roast classifications. The macro elements with TMU's were applied to 100, 300, and 500 portions of each formula. Handling and processing times were added together for a total production time. Various menu mixes of the three classifications were analyzed to see if they could be produced by one person in four hours.

The handling time for the 100 portions in all three classifications was basically the same. Handling time in the 300 and 500 portions of roast and single-item entrees more than doubled because of the necessity for slicing of portions of roast and preparing single-item entrees.

In analyzing the menu mixes, the production item for each entree was graphed, and the menu mixes were evaluated. If the production time exceeded the time constraint, it was eliminated. The researchers suggested this method of estimating production time would be useful when planning menu mixes, scheduling production personnel and forecasting labor costs.

ACTIVITY SAMPLING

Ho and Matthews (8) conducted a study using activity sampling in

two nursing home facilities with similar organizational and operational characteristics to examine the distribution of labor time in the food-service system and to evaluate reliability of using modified activity sampling. This was done by conducting two observations with seven day samplings in each facility. Many randomly selected instantaneous observations were made to estimate the time spent in work or delay during a specific time period.

The results showed there were no significant differences between labor time in the two nursing facilities or the two samplings at the 5 percent level. The study indicated the modified activity sampling technique was reliable in analyzing activities of personnel in nursing facilities with similar organizational and operational characteristics.

In both nursing facilities the breakdown in percent of the work classifications was 81 percent direct work time, 9 percent indirect work time, and 10 percent delay time. The highest percent of time spent in direct work activities was spent in cleaning, service and transportation. The highest percentage of time in the indirect was spent in instruction, appraisal and conferences, and the highest percentages of time spent in delay time was waiting for foods during tray assembly, 15 minute breaks and time wasted because of lack in supervision.

CONTINUOUS TIME STUDY

Hauge and Knickrehm (5) did a continuous time study with salads. The purpose of this research was to develop methods to assess the relationship between the total production time for salads and the number

of servings prepared, and to develop a procedure for salad production to balance production demand with employee time.

Data were collected from the observation of one skilled employee. The presentation of eight salads were observed over a period of three months. The number of replications for each item produced varied from seven to thirty-nine.

The results showed a change in quantity is not always the factor most associated with change in production time. However, the relationship was significant at the 0.05 level for cole slaw, cottage cheese, and relishes and at the 0.10 level for fruit salad and potato salad. A suggestion was made that the use of preprepared ingredients might reduce production time. Another variable in production was clean-up time. It was recommended that the skills of a trained salad cook should not be wasted in clean-up time. Collection and analysis of labor time data are valuable in system optimization in terms of predicting labor hour requirements, and utilization of personnel (5).

LeBrun (6) did a continuous time study to: a) develop a method for determining labor time and labor cost of cooks by Work Function in the production of selected vegetarian entrees and b) determine the percentage relationship of cooks' labor time to food cost in four selected classifications of entrees. Eleven entrees were observed for three consecutive replications in the menu cycle. The classifications of entrees were: a) breaded and fried, b) loaf, c) pasta, and d) stew and vegetable pie.

The time observed by LeBrun (6) for direct labor ranged from 92.04 to 80.08 percent. For direct labor time, the range of processing time was 63.68 to 31.74 percent. In six different days over 50 percent of the supportive cooks labor time expended was in preliminary processing. Transportation ranked second for direct labor time with a range of 41.37 to 21.45 percent. Time spent walking empty seemed excessive with a range of 19.20 to 6.21 percent. The third sub-category for direct labor time was cleaning which ranged from 14.96 to 2.55 percent. Indirect labor time ranged from 17.14 to 5.62 percent. The sub-categories for indirect labor time included instruction and appraisal. Recipes that were not standardized needed more instruction time. Delay time ranged from 7.19 to 1.11 percent. Findings indicated that a closer evaluation is needed for the transportation time, especially for Work Function walking empty. A closer look is also needed for labor expended in the Work Function preliminary processing time.

One of the objectives of LeBrun's study was to see if a relationship between cooks' labor time and food cost could be established for each specific classification of entrees. If a ratio could be determined, it would help to predict labor cost. The results showed that the relationship of cook labor cost to food cost was not as consistent among entrees within a specified classification as was expected.

Recommendations from the study were that direct work activities, especially those not requiring skilled personnel, be delegated to supportive personnel to extend the services of the cook. Work involving

quantitative judgment such as forecasting production should be computerized.

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METHODOLOGY

A continuous time study was used to collect the labor time data for entree production in this research. Continuous time study entails direct observation from a convenient location where all activities can be observed and, if needed, questions can be asked during the production time of the entree. Eight vegetarian entrees were selected for this study and each entree production was observed for three replications in the menu cycle. The instruments utilized were a digital watch, clipboard, a Work Function Classification form and an Entree Production Labor Time recording form.

The digital watch was set at the actual time of day, with the hours based on a 24 hour clock and the time recorded on the form as hours: minutes: seconds. The timing of Work Function activities began when the production formula was picked up by the employee working in the ingredient assembly area. The timing was stopped when the cook placed the last pan of ready-to-serve entree in the warmer for use in the cafeteria or on patient trayline. The start time was recorded for each Work Function. Since it was a continuous time study the stop time was the same as the start time of the next Work Function, recorded in the sequence of activities. Only at the end of the series of Work Functions was the stop time recorded for any production formula.

The Work Function Classification included direct, indirect and delay time. Direct labor time included preparation, processing, transpor-

tation of equipment and supplies, transportation empty, pot and pan washing and housekeeping. Indirect labor time included instruction or teaching, and appraisal. The delay time included forced delay, personal and idle delay. Each of these twelve sub-categories were comprised of specific Work Functions that are descriptive of tasks performed by employees.

The Entree Production Labor Time form was used to record the data. At the top of the form, information about the entree item such as name, number of servings, and the date prepared was recorded. The bottom portion of the form was used to record employees work number, the Work Function with the start time, stop time, and the total time. Each day the observer began recording the data on the form.

The foodservice production system was centralized. The production formula and food items were assembled, produced and served in one location of the foodservice department. The two work areas observed in the production area were the ingredient assembly area and the cooks' production area. All production formulas for each menu item were first sent to the ingredient assembly area where all ingredients were pre-prepared, assembled and weighed according to the production formula. The ingredients for each production formula were delivered from the ingredient assembly area to the cooks' area where the cook utilized his/her expertise to produce a quality product.

A pilot study was conducted for one week. The purpose was to:

- a) determine if there were any problems in the data collection method,

b) develop the data collection skills of the observer, and c) standardize the data collection procedure. The advantages of conducting the pilot study were: a) the researcher became more familiar with the Work Function Classification and the Entree Production Labor Time forms, and b) the employees began to feel at ease with having specific Work Functions timed and recorded.

The data from the Entree Production Labor Time form were entered into a computer to be compiled. Reports were generated to show: a) frequency each Work Function was observed, b) time expended in seconds for each Work Function, c) percentage distribution of labor time expended per Work Function, d) total time for each employee involved in the entree production, and e) percentage of total time for each employee involved in the entree production.

A one-way analysis of variance was used to determine if there was a difference in mean labor time between the eight vegetarian entrees for direct labor time, indirect labor time, delay time and total labor time.

FINDINGS AND DISCUSSION

Continuous time study techniques were used to collect data on labor time utilized in the Work Functions in the production of eight vegetarian entrees. Actual time expended in the production of each entree was recorded and tabulated to determine the total percentage distribution of time utilized in each Work Function.

LABOR TIME PER WORK FUNCTION

The data on the labor time in seconds per serving by Work Function for the eight vegetarian production formulas are shown in Table 1. There was a range of 39.97 seconds per serving recorded for Bean Burritos, to 19.33 seconds per serving for Cottage Cheese/Walnut Loaf.

The entrees that required the largest amount of labor by hand were Bean Burritos, Enchiladas, Egg Foo Yung, and Pizza with a range of 39.97 to 29.25 seconds per serving. This is reflected by the higher amount of labor expended than in the four other entrees.

Work Function 1, preparation or preliminary processing, indicates labor time expended in the ingredient assembly area. Of the eight entrees studied, Chinese Pepper Steaks was highest in this category with 8.35 seconds per serving since there was chopping and slicing of the vegetables and vegesteaks. The next highest labor time in this category for an entree was Cottage Cheese/Walnut Loaf with 3.95 seconds per serving. Chopping of the walnuts and celery required for the production of this entree increased labor time in this category. The next

Table 1 Total labor time in seconds per serving by work functions of eight vegetarian entrees

WORK FUNCTION	Cottage Cheese/ Walnut Loaf	Chinese Pepper Steaks	Breaded Vegesteaks	Canton Noodles	Pizza	Egg Foo Yung	Enchilada	Bean Burrito
Total Processing	11.65	13.01	12.95	14.84	17.76	26.11	25.04	29.79
1. Preliminary Processing	3.95	8.35	1.00	3.39	1.21	2.03	2.18	1.45
2. Preparation or Cooking	7.70	4.66	11.95	11.45	16.55	24.08	22.86	28.34
Total Transportation	5.82	5.90	6.27	5.25	8.72	4.67	5.47	7.48
3. Food	3.36	3.63	3.72	3.45	4.52	2.73	3.16	3.70
4. Equip. and Supplies	0.99	0.95	1.36	0.87	0.87	0.67	1.25	2.43
5. Walking Empty	1.47	1.32	1.19	0.93	3.33	1.27	1.06	1.35
Total Cleaning	0.88	0.71	1.29	0.68	1.16	0.36	1.15	1.37
6. Pot and Pan Washing	0.54	0.17	0.28	0.31	0.36	0.16	0.31	0.36
7. Housekeeping	0.34	0.54	1.01	0.37	0.80	0.20	0.84	1.01
TOTAL DIRECT	18.35	19.62	20.51	20.77	27.64	31.14	31.66	38.64
8. Directions	0.53	0.79	0.19	0.42	0.24	0.68	0.43	0.22
9. Appraisal	0.23	0.15	0.03	0.41	0.15	0.11	0.21	0.35
TOTAL INDIRECT	0.76	0.94	0.22	0.83	0.39	0.79	0.64	0.57
10. Interruption beyond control	0.22	0	0.23	0.26	1.12	0.53	0.54	0.64
11. Personal Delay	0.01	0.19	0.24	0.04	0.11	0.03	0.18	0.13
12. Idle Time	0	0	0	0	0	0	0	0
TOTAL DELAY	0.23	0.19	0.47	0.30	1.23	0.56	0.72	0.77
GRAND TOTAL	19.33	20.74	21.20	21.90	29.25	32.48	33.01	39.97

highest labor time was for entree Canton Noodles with 3.39 seconds per serving. This production formula also involved a large amount of chopping and slicing of vegetables.

Work Function 2, preparation or cooking, indicates labor time expended in the cooks' area. This activity accounts for the highest percentage of labor seconds per serving in Bean Burritos with 28.34 seconds per serving, the next highest was Egg Foo Yung with 24.08 seconds per serving, and then Enchiladas with 22.86 seconds per serving. The lowest was Chinese Pepper Steaks with 4.66 seconds per serving.

In Work Function 3, transportation of food, Pizza was the highest in labor time in this category with 4.52 seconds per serving. The method used in baking increased labor time for this entree. The pizzas were small round individual servings that were placed on a baking sheet pan. Only a limited amount of individual pizzas could be placed on each sheet pan due to the shape of the product. In order to keep the quality high, only a few servings were baked ahead of serving time. This resulted in the cooks frequently walking back and forth from the ovens to the cafeteria warmers.

For five of the entrees studied, (Pizza, Bean Burritos, Canton Noodles, Enchiladas, and Egg Foo Yung) there was limited warmer space for such a large number of servings. Some of the entrees had to be stored in the cooks' ovens at a low temperature and then transported to the cafeteria warmer as space allowed due to storage limitations.

Work Function 4, transportation of equipment, supplies and other,

ranged from 2.43 seconds per serving as was seen in production time of the Bean Burritos to a low of .67 seconds per serving for Egg Foo Yung.

Work Function 5, walking empty, indicated Pizza had the highest labor time in this category with 3.33 seconds per serving. Most of this time comes from the cook going from the area of the cafeteria warmers after delivering the Pizza for service to the cafeteria and returning.

Work Function 6, pot and pan washing, reflects the time spent rinsing and cleaning utensils, pots and pans before taking them to the pot washing machine. The labor time in this Work Function ranged from .54 seconds per serving for Cottage Cheese/Walnut Loaf to .16 seconds per serving for Egg Foo Yung.

Work Function 7, housekeeping, shows the labor time spent cleaning work areas after an entree was completed. Entrees that required additional time in clean up included Breaded Vegesteaks, Bean Burritos, and Enchiladas. The range of labor time in these entrees was 1.01 to 0.84 seconds per serving.

Direct labor time includes Work Functions 1 through 7. Bean Burritos, Enchiladas, Egg Foo Yung and Pizza required the highest amount of labor time in production with a range of 38.64 to 27.64 seconds per serving. Entrees that did not require much labor time in production were Canton Noodles, Breaded Vegesteaks, Chinese Pepper Steaks and Cottage Cheese/Walnut Loaf, which had a range of 20.77 to 18.35 seconds per serving.

Work Function 8, directions, was highest in labor time for Chinese Pepper Steaks at 0.79 seconds per serving. It was observed that a vacation relief employee worked in the cooks' area and helped in the production of this entree for two out of the three replications.

Work Function 9, appraisal for future planning, ranged in labor time from .41 seconds per serving for Canton Noodles to .03 seconds per serving for Breaded Vegesteaks.

Indirect labor time includes Work Functions 8 and 9. The range in labor time was from .94 seconds per serving for Chinese Pepper Steaks to .22 seconds per serving for Breaded Vegesteaks.

Work Function 10, interruption beyond control, labor time was highest for Pizza with 1.12 seconds per serving. Waiting by the oven for the Pizza to finish baking added labor to this Work Function. Chinese Pepper Steak did not expend any labor time in this category.

Work Function 11, personal delays, had limited labor time expended in this category. This usually involved sanitation and safety activities. The labor time ranged from .24 seconds per serving for Breaded Vegesteaks to .01 seconds per serving for Cottage Cheese/Walnut Loaf.

Work Function 12, idle time, did not reflect labor time expended in this category for any of the eight production formulas.

Delay time includes Work Functions 10 through 12. The range of labor time was 1.23 seconds per serving as seen in Pizza to .19 seconds per serving in Chinese Pepper Steaks.

PERCENTAGE DISTRIBUTION OF LABOR TIME PER WORK FUNCTION

Data on the percentage of labor time of the eight vegetarian production formulas are shown in Table 2. Findings indicated the largest percentage of labor was being spent in direct time, with a range from 96.75 to 94.47 percent. Direct time indicates the time spent in work contributing directly to the preparation of the production formula. In the area of direct time, the highest percentage of time was spent in category 2, preparation or cooking, with the exception of Chinese Pepper Steaks which had the highest percentage of 40.26 in Work Function 1, preparation or preliminary processing. Entrees with the second highest percentage of labor time in the area of direct time were in category 3, transportation of food, which included Breaded Vegesteaks, Canton Noodles, Pizza, Enchiladas, Bean Burritos, and Egg Foo Yung with a range of 17.54 to 8.41 percent. Category 1, preparation or preliminary processing, was second highest for Cottage Cheese/Walnut Loaf with 20.42 percent. Category 2, preparation or cooking, was second highest for Chinese Pepper Steak with 22.47 percent.

Total processing was highest in percentage of labor for Egg Foo Yung, Enchiladas, and Bean Burritos with a range from 80.38 to 74.54 percent. These are entrees that require a large amount of hand labor for shaping the individual servings.

Cottage Cheese/Walnut Loaf, Pizza, Breaded Vegesteaks, Chinese Pepper Steaks, and Canton Noodles had a high distribution of labor in transportation with a range of 30.10 to 23.97 percent. In this category,

Table 2 Percentage distribution of total labor time by work functions of eight vegetarian entrees

WORK FUNCTION	Cottage Cheese/ Walnut Loaf	Chinese Pepper Steaks	Breaded Vegesteaks	Canton Noodles	Pizza	Egg Foo Yung	Enchilada	Bean Burrito
Total Processing	60.25	62.73	61.09	67.78	60.68	80.38	75.84	74.54
1. Preliminary Processing	20.42	40.26	4.71	15.48	4.12	6.24	6.60	3.62
2. Preparation or Cooking	39.83	22.47	56.38	52.30	56.56	74.14	69.24	70.92
Total Transportation	30.10	28.44	29.55	23.97	29.83	14.37	16.58	18.70
3. Food	17.39	17.50	17.54	15.76	15.46	8.41	9.58	9.25
4. Equip. and Supplies	5.13	4.58	6.41	3.95	2.99	2.05	3.80	6.08
5. Walking Empty	7.58	6.36	5.60	4.26	11.38	3.91	3.20	3.37
Total Cleaning	4.55	3.39	6.11	3.13	3.96	1.11	3.46	3.41
6. Pot and Pan Washing	2.78	0.80	1.34	1.42	1.24	0.49	0.92	0.90
7. Housekeeping	1.77	2.59	4.77	1.71	2.72	0.62	2.54	2.51
TOTAL DIRECT	94.90	94.56	96.75	94.88	94.47	95.86	95.88	96.65
8. Directions	2.77	3.81	0.91	1.92	0.82	2.09	1.30	0.54
9. Appraisal	1.17	0.73	0.14	1.86	0.53	0.34	0.63	0.86
TOTAL INDIRECT	3.94	4.54	1.05	3.78	1.35	2.43	1.93	1.40
10. Interruption beyond control	1.13	0	1.07	1.17	3.81	1.62	1.64	1.60
11. Personal Delay	0.03	0.90	1.14	0.17	0.37	0.08	0.54	0.33
12. Idle Time	0	0	0	0	0	0	0	0
TOTAL DELAY	1.16	0.90	2.21	1.34	4.18	1.70	2.18	1.93
GRAND TOTAL	100	100	100	100	100	100	100	100

Work Function 3, transportation of food, had the highest percentage of labor time.

Breaded Vegesteaks had the highest percentage of cleaning time which was 6.11 percent. The limited production area for this activity made it difficult to complete the breading function without having some crumbs drop to the floor. Additional labor time was required in the cleaning function after the breading of the vegesteaks was completed.

The percentage of labor time for indirect labor in all production formulas was less than 5 percent of the total. Chinese Pepper Steaks was highest with 4.54 percent, followed by Cottage Cheese/Walnut Loaf with 3.94 percent and then Canton Noodles with 3.78 percent. A vacation relief employee worked in the cooks' area who prepared two out of three replications for Chinese Pepper Steaks and required directions for clarification when the entree was prepared. The same happened with one replication of Cottage Cheese/Walnut Loaf. During one replication of Canton Noodles an employee was training in the cooks' area which increased total labor time in this Work Function.

The percentage of distribution of delay time ranged from 4.18 percent recorded for Pizza to .90 percent recorded for Chinese Pepper Steaks. Some of the cook's labor time for pizza was spent waiting by the ovens for the entree to finish baking.

COMPARISON OF LABOR TIME OF EIGHT VEGETARIAN ENTREES

A one-way analysis of variance of labor seconds per serving for

these eight vegetarian entrees is seen in Table 3. The F-values were significant for direct labor time with $p=.0009$ and total labor time with $p=.0018$. Indirect labor time and delay time were not significantly different.

The mean labor time of the eight vegetarian entrees was 26.0379 seconds per serving. There appeared to be two groupings of the total labor time in the eight vegetarian entrees. The four highest labor time comprised group 1 with a range from 38.6333 to 27.6367 for Bean Burritos, Enchiladas, Egg Foo Yung and Pizza. Group 2 consisted of Canton Noodles, Breaded Vegesteaks, Chinese Pepper Steaks and Cottage Cheese/Walnut Loaf with a range of mean total labor time from 20.7800 to 18.3500. Multiple comparisons indicated a significant difference between group 1 entrees and group 2 entrees ($p<.001$) for direct labor time and total labor time. The entrees in group 1 were those requiring a large amount of hand labor.

COMPARISON WITH DATA FROM RESEARCH PROJECT I

Labor time expended by the cooks in Research Project I and Research Project II is shown in Table 4. Research Project I was completed in 1970 by LeBrun (6). Research Project II is this study conducted in 1981. Since 1970 an ingredient assembly area has been added in the storeroom, and production formulas are generated utilizing a computer. Weighing and measuring tasks formerly done in the cooks' area have been delegated to lesser skilled employees in the ingredient assembly area.

Table 3 F-value from analysis of variance of labor time for
eight vegetarian entrees

Work Function	F-ratio	p-value
Direct labor time	6.609	0.0009
Indirect labor time	0.983	0.4765
Delay time	0.814	0.5887
Total labor time	5.761	0.0018

Table 4 Comparison between research project I and II
of cooks' total labor time in four production
formulas

cooks' total labor time			
	research project		difference between Research project I and II (min)
	I (min)	II (min)	
Breaded Vegesteaks			
Direct	.363	.199	.164
Indirect	.033	.002	.031
Delay	.023	.001	.022
TOTAL	.42	.20	.22
Chinese Pepper Steaks			
Direct	.207	.095	.112
Indirect	.02	.013	.007
Delay	.013	.001	.012
TOTAL	.24	.11	.13
Canton Noodles			
Direct	.313	.089	.224
Indirect	.033	.007	.026
Delay	.006	.002	.004
TOTAL	.35	.10	.25
Cottage Cheese/ Walnut Loaf			
Direct	.21	.166	.044
Indirect	.043	.010	.033
Delay	.006	0	.006
TOTAL	.26	.18	.08

For Breaded Vegesteaks, the cooks' labor time decreased from .42 to .20 minutes per serving. The greatest saving in labor time was in direct time with a change of .164 minutes per serving, then indirect labor time with .031 minutes per serving, and then delay time with .022 minutes per serving.

The cooks' labor time decreased from .24 to .11 minutes per serving for Chinese Pepper Steaks. The greatest decrease in labor time was direct time with a change in .112 minutes per serving, next was delay time with .012 minutes per serving, and indirect time with .007 minutes per serving.

The decrease in total cooks' labor time in Canton Noodles was .25 minutes per serving. This is the largest reduction in cooks' labor time recorded in the production of four entrees that were observed. The greatest reduction came in direct labor time with a decrease in .224 minutes per serving, then indirect time with .026 minutes per serving, and then delay time with a decrease of .004 minutes per serving.

In the entree Cottage Cheese/Walnut Loaf, the cooks' total labor time decreased .08 minutes per serving. This production formula had the least amount of labor time changes between Research Project I and Research Project II. The largest decrease was in direct labor time with a savings of .044 minutes per serving, next was indirect labor time with .033 minutes per serving, and then delay time with .006 minutes per serving.

The percentage distribution of labor time by Work Functions is

stated in Table 5. In Research Project II a smaller percentage of total labor time was spent in processing for Breaded Vegesteaks while more labor time was being spent with Canton Noodles, Chinese Pepper Steak, and Cottage Cheese/Walnut Loaf. Canton Noodles shows the largest percentage increase from 53.48 to 67.78 percent. Research Project II indicated a lower percentage of labor time was spent in all four entrees in preliminary processing with Breaded Vegesteaks showing the largest change from 34.85 to 4.71 percent. However, the labor time increased in processing in all four entrees in Research Project II. In Cottage Cheese/Walnut Loaf the change in that Work Function was from 26.53 to 39.83 percent, while the labor time in the other three entrees doubled or more than doubled in percentage.

Total transportation was higher in Research Project II in Chinese Pepper Steaks, Breaded Vegesteaks and Cottage Cheese/Walnut Loaf while Canton Noodles decreased from 28.62 to 23.97 percent in labor time. Transportation of food increased in all four entrees in Research Project II because all food was delivered to the cooks' production area from the ingredient assembly area. Transportation of equipment and supplies increased in Breaded Vegesteaks in Research Project II while the other three entrees decreased, with Canton Noodles showing the largest reduction from 8.71 to 3.95 percent. In Research Project II Work Function, walking empty, increased in Cottage Cheese/Walnut Loaf while the other three entrees decreased with Canton Noodles showing the greatest change from 12.42 to 4.26 percent.

Table 5 Comparison between research project I and II for cooks' labor time in four vegetarian entrees

WORK FUNCTION	Canton Noodles		Chinese Pepper Steaks		Breaded Vegesteaks		Cottage Cheese/Walnut Loaf	
	research project		research project		research project		research project	
	I	II	I	II	I	II	I	II
Total Processing	53.48	67.78	56.32	62.73	63.68	61.09	49.50	60.25
1. Preliminary Processing	30.91	15.48	47.87	40.26	34.85	4.71	22.97	20.42
2. Preparation or Cooking	22.57	52.30	8.45	22.47	28.83	56.38	26.53	39.83
Total Transportation	28.62	23.97	24.34	28.44	21.45	29.55	23.67	30.10
3. Food	7.49	15.76	8.73	17.50	10.33	17.54	10.24	17.39
4. Equip. and Supplies	8.71	3.95	8.06	4.58	3.59	6.41	7.22	5.13
5. Walking Empty	12.42	4.26	7.55	6.36	7.53	5.60	6.21	7.58
Total Cleaning	5.58	3.13	2.55	3.39	6.91	6.11	6.91	4.55
TOTAL DIRECT	87.68	94.88	83.21	94.56	92.04	96.75	80.08	94.90
8. Directions	11.05	1.92	9.01	3.81	5.62	0.91	17.14	2.77
9. Appraisal	0.58	1.86	0.53	0.73	0.14	0.14	0.96	1.17
TOTAL INDIRECT	11.63	3.78	9.54	4.54	5.76	1.05	18.10	3.94
10. Interruption beyond control	0	1.17	0.61	0	0.02	1.07	0.14	1.13
11. Personal Delay	0.63	0.17	1.09	0.90	1.06	1.14	0.74	0.03
12. Idle Time	0.03	0	5.49	0	1.07	0	0.89	0
TOTAL DELAY	0.66	1.34	7.19	0.90	2.15	2.21	1.77	1.16
GRAND TOTAL	99.97	100	99.94	100	99.95	100	99.95	100

In Research Project II, total cleaning decreased in Canton Noodles, Breaded Vegesteaks, and Cottage Cheese/Walnut Loaf. There was an increase in Chinese Pepper Steaks from 2.55 to 3.39 percent.

In the total direct labor time reported in Research Project II there was an increase in all four entrees. These increases indicate there was an increase in productivity in preparation of these production formulas.

In Research Project II, Work Function, directions, decreased in all four entrees. Total appraisal increased in all entrees except Breaded Vegesteaks which remained the same at .14 percent. Total indirect labor time decreased in Research Project II in all four entrees.

In Research Project II, total delay decreased in Chinese Pepper Steaks from .61 to zero percent, while the Canton Noodles, Breaded Vegesteaks, and Cottage Cheese/Walnut Loaf increased. In personal time, labor time increased for Breaded Vegesteaks while Canton Noodles, Chinese Pepper Steaks and Cottage Cheese/Walnut Loaf decreased in percentage of labor time. Total idle time decreased in all four entrees since labor time expended in these entrees was zero in Research Project II. In total delay time for Research Project II, Canton Noodles increased from .66 to 1.34 percent and Breaded Vegesteaks increased from 2.15 to 2.21 percent while there was a decrease in Cottage Cheese/Walnut Loaf from 1.77 to 1.16 percent and a larger decrease of 7.19 to .90 percent for Chinese Pepper Steaks.

CONCLUSIONS, RECOMMENDATIONS AND SUMMARY

CONCLUSIONS

With the use of a continuous time study, total labor time and distribution of labor time by Work Functions were found in the production of eight vegetarian entrees.

The total labor time indicated a large range in production time of these eight vegetarian entrees. One reason was because of the different amount of hand labor required in each entree. When the hand labor increased so did the labor time as was shown in the direct labor time.

The percentage distribution of labor time indicated direct labor time was the highest. Because computer generated standardized production formulas were used, the ingredient assembly area personnel and the cooks do not have to use their time to make calculations. The ingredient assembly area personnel tasks include weighing, measuring, and the preliminary slicing, dicing, and chopping of the ingredients for the production formulas. The cooks' labor is expended in processing the entree for service.

With the delegation of routine tasks to the ingredient assembly area personnel, the cooks could spend more labor time in preparation or cooking, rather than walking back and forth to the storeroom for supplies

Bean Burritos required the largest amount of hand work just pre-

ceding service to maintain quality. This required several cook's assistants to help with the hand work. Enchiladas, Pizza, Breaded Vegesteaks required a lesser amount of hand labor, they could be prepared ahead of time and stored in the refrigerator until heated just before serving time. Egg Foo Yung and Canton Noodles required a large amount of hand labor just prior to service, but required the labor time of only one cook in preparation. Cottage Cheese/Walnut Loaf and Chinese Pepper Steaks were entrees that required only mixing the ingredients together and heating to the correct temperature and required the least amount of labor.

There was limited warmer space for the cafeteria. The entrees Bean Burritos, Enchiladas, Egg Foo Yung and Pizza had to be stored in ovens in the cooks' area and taken to the cafeteria warmers as space allowed. This required the cooks to walk back and forth to the warmers for two reasons: a) to check the available space in the warmers and b) transport the entree from the ovens to the warmers. This increased transportation time for production of these entrees.

A comparison with cooks' labor time in four entrees from Research Project I, conducted by LeBrun in 1970, was possible because the methodology and data collection were similar. This comparison indicated a savings in cooks' labor time since the addition of the ingredient assembly area and the use of computer generated production formulas. The shift in Work Functions shows more labor time is being used for direct labor time while less labor time is being utilized for indirect labor time.

RECOMMENDATIONS

On the basis of this study it is recommended that routine tasks, transportation and shaping individual entree servings by hand be delegated to a cook's helper. This would give more time for the cooks to utilize their special training in entree production.

Additional warmer space is needed to store the entrees for cafeteria service. This would reduce transportation time during the meal time, and the cooks could use this time to prepare the entrees for the next meal.

A different production method is needed in the preparation of Pizza. A method of preparing one large pizza on the sheet pan and then cutting the pizza after it comes out of the oven could be used so more servings could be placed on the sheet pan, which would increase the number of servings heated at one time in the ovens. In turn this would reduce the number of pans to be transported and stored in the cafeteria warmers.

Another continuous labor time study should be conducted for the remaining vegetarian entrees in the menu cycle. This would complete a labor time analysis for entree production formulas. This information can be used for production planning, to indicate problems in the production methods used, and could be used to determine the selling price of the entrees in the cafeteria which reflects the labor cost in addition to the food cost.

SUMMARY

With labor cost representing about 50 percent of direct cost in foodservice, it is necessary to examine how labor time is being utilized. A continuous time study was conducted to determine the total labor time in the production of eight vegetarian entrees, and to identify the distribution of labor by Work Function. The total labor time ranged from 39.97 to 19.33 seconds per serving. Total direct labor time was the Work Function category with the highest amount of labor time for all eight entrees. The percentage of labor time distributed by Work Functions indicated direct labor time ranged from 96.75 to 94.47 percent. Indirect labor time was less than 5 percent and delay time was less than 5 percent.

Labor time was compared in four entrees with data from Research Project I collected in 1970 by LeBrun (6). A comparison was made to determine the shift of labor time in the Work Function classifications, and the degree of delegation of tasks from the cooks' area to the ingredient assembly area. There was a decrease of cooks' labor time from Research Project I to Research Project II, with savings that ranged from .25 to .08 minutes per serving. The cooks' labor time by Work Function shifted with direct labor time showing an increase while indirect labor time showed a decrease from Research Project I to Research Project II.

The data from production of eight vegetarian entrees were tested by a one-way analysis of variance to determine if there was any dif-

ference between the labor time for direct labor time, indirect labor time, delay time and total labor time. The null hypothesis was rejected since there was a significant difference in the labor time for the production of eight vegetarian entrees for direct labor time and total labor time.

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Appendix A

Instruments used in data collection

Entree Production Labor Time

Work Function Classification

Page No. _____

ENTREE PRODUCTION LABOR TIME

Recipe Name _____ # _____ observation in a series of _____

Meal _____ Number of servings _____

Date(s) _____ Observer _____

[illegible]

WORK FUNCTION CLASSIFICATION

DIRECT WORK FUNCTIONS

A. Processing

1. Preparation or preliminary processing

(a) labeling	(o) shredding
(b) chopping	(p) slicing
(c) spreading	(q) sorting
(d) cracking eggs	(r) stirring
(e) cutting	(s) thawing
(f) dicing	(t) trimming
(g) grinding	(u) washing
(h) mashing	(v) weighing
(i) measuring	(w) breadding
(j) mixing	(x) sifting
(k) paring	(y) straining
(l) peeling	(z) draining
(m) sectioning	(aa) scooping
(n) shaping	(bb) coring

- (wa) looking in cupboard, drawer, refrigerator or freezer
- (wb) placing tray or container in cart
- (wc) opening of cans, cartons or containers
- (wd) emptying cans, cartons or containers
- (we) reading production sheet
- (wf) portioning before preparation
- (wg) turning on processing equipment
- (wh) running water, rinsing food
- (wi) covering container
- (wj) adjusting equipment
- (wk) running food disposal
- (wl) transfer from one container to another

2. Preparation or cooking

- (a) blending -- topping
- (b) breadding
- (c) seasoning
- (d) stirring
- (e) toasting
- (f) mixing or whipping
- (f) shaping
- (h) placing food in jet steamer
- (i) removing food from jet steamer
- (j) emptying cans, cartons or containers

WORK FUNCTION CLASSIFICATION CONT'DDIRECT WORK FUNCTIONS CONT'D2. Preparation or cooking cont'd

- (k) opening cans, cartons or containers
- (l) portioning entrees
- (m) frying
- (n) scooping
- (o) grilling
- (p) placing food in cooking or serving pan
- (q) covering pans
- (r) placing food in steam kettle
- (s) removing food from steam kettle
- (t) placing food in oven
- (u) removing food from oven
- (v) uncovering pans
- (w) transfer food from one container to another
- (x) placing food on stove
- (y) removing food from stove
- (z) greasing pans or grill
- (z1) placing pans, trays or containers in cart
- (z3) adjusting equipment
- (z4) turning on or off equipment
- (z5) placing pans in warmer
- (z6) rinsing or draining food
- (z7) scraping grill
- (z8) looking in cupboard, drawer or refrigerator
- (z9) running food disposal
- (z10) sifting
- (z11) labeling
- (z12) out of work area
- (z13) measuring
- (z14) cutting

B. Transportation3. Transportation of food

- (a) delivery of loaded food carts
- (b) moving of food to and from storeroom
- (c) moving of food to and from refrigerator
- (d) moving of food to and from all other areas within department

WORK FUNCTION CLASSIFICATION CONT'DDIRECT WORK FUNCTIONS CONT'D

B. Transportation cont'd

4. Transportation of equipment, supplies and other
 - (a) moving soiled equipment to washing area
 - (b) moving clean equipment to preparation or serving area
 - (c) moving of clean dishes, utensils, pans within department
 - (d) moving soiled dishes, utensils, pans within department
 - (e) moving paper goods and other supplies
 - (f) moving of garbage or other trash
 - (g) moving anything other than food
5. Transportation empty
 - (a) walking
 - (b) unladen locomotion

C. Cleaning

6. Pot and pan washing
 - (a) rinsing pots and pans or utensils
 - (b) washing pots and pans or utensils
 - (c) rinse out the sink
 - (d) ringing washcloth
 - (e) wiping pans or containers
7. Housekeeping
 - (a) cleaning food carts
 - (b) cleaning installed equipment
 - (c) cleaning mobile equipment
 - (d) cleaning work counters
 - (e) sweeping floors
 - (f) mopping floors
 - (g) placing containers in trash

WORK FUNCTION CLASSIFICATION CONT'DINDIRECT WORK FUNCTIONS

D. Instruction or teaching

8. Direction

- (a) conversation pertaining to work
- (b) giving instructions
- (c) on-the-job training
- (d) receiving instructions
- (e) reading menu
- (f) reading schedule
- (g) reading production sheets
- (h) reading employee's work schedule
- (i) reading directive from administration

E. Appraisal

9. Appraisal for future planning

- (a) checking dishes for cleanliness
- (b) inspection of area -- sanitation and safety
- (c) inspection of food preparation
- (d) inspection of left-overs
- (e) tasting

7/9/81

WORK FUNCTION CLASSIFICATION CONT'DDELAYS

F. Forced Delay

10. Interruption beyond control

- (a) broken or faulty equipment
- (b) assembly belt stops
- (c) power failure
- (d) slow cafeteria line
- (e) wait for elevator
- (f) wait for foods, supplies or serving equipment and people
- (g) punching in or out on time clock

G. Personal and idle delays

11. Personal delays

- (a) adjusting hairnet
- (b) coffee breaks
- (c) drinking fountain
- (d) sanitation and safety related activities
- (e) putting on apron or cap
- (f) rest room

12. Idle time

- (a) conversation not pertaining to business
- (b) loafing

7/9/81

Appendix B

Computer Printouts

Total labor time for three replications
for the eight vegetarian entrees

RECIPE: COTTAGE CHEESE &
WALNUT LOAF
OBSERVATION: 1
SERVINGS: 272

WORK FUNCTION	EMPLOYEE NO.				BREAD CRUMBS	PUSH CARTS	TOTAL	TIME/ SERVING	% OF TOTAL	
	14	16	82	82A						
TIME IN SECONDS										
1			478	205	61	190		934	3.43	19.19
2	1879							1879	6.91	38.62
3	248		242	257	25	52	27	850	3.13	17.48
4	159		10	57	25	49		300	1.10	6.17
5	139		55	18	17	31	39	299	1.10	6.14
6	35		6	38	5	11		95	0.35	1.95
7	51				25	37		114	0.42	2.34
8	138		41		2			181	0.66	3.71
9	152				1			153	0.56	3.15
10					18	41		60	0.22	1.22
11					2			2	0.01	0.03
12								0	0.00	0.00
TOTALS	2801	0	832	575	181	411	65	4865	17.89	100.00

RECIPE: COTTAGE CHEESE &
WALNUT LOAF
OBSERVATION: 2
SERVINGS: 192

WORK FUNCTION	EMPLOYEE NO.				BREAD CRUMBS	PUSH CARTS	TOTAL	TIME/ SERVING	% OF TOTAL	
	14	16	82	82A						
TIME IN SECONDS										
1			701	91	43	134		969	5.05	21.62
2	726	1140						1866	9.72	41.64
3	230	61	308	87	18	36	27	767	3.99	17.11
4	70		55	34	18	34		211	1.10	4.72
5	72	18	158	16	12	22	39	336	1.75	7.51
6	14		6	107	4	8		138	0.72	3.08
7	5				18	26		49	0.26	1.10
8	39		12	48	1			100	0.52	2.23
9					1			1	0.00	0.02
10					13	29		42	0.22	0.94
11					1			1	0.01	0.02
12								0	0.00	0.00
TOTALS	1156	1219	1240	383	128	290	65	4481	23.34	100.00

RECIPE: COTTAGE CHEESE &
WALNUT LOAF
OBSERVATION: 3
SERVINGS: 256

WORK FUNCTION	EMPLOYEE NO.				BREAD CRUMBS	PUSH CARTS	TOTAL	TIME/ SERVING	% OF TOTAL	
	14	16	82	82A WALNUTS						
TIME IN SECONDS										
1			460	167	57	177	861	3.36	20.05	
2	1658						1658	6.48	38.60	
3	211		365	84	23	48	758	2.96	17.66	
4	99			30	24	46	198	0.77	4.62	
5	85		176	52	16	29	396	1.55	9.23	
6	66		17	42	5	10	140	0.55	3.25	
7	27		4		24	35	90	0.35	2.09	
8	95		11		1		107	0.42	2.50	
9	28				1		29	0.11	0.68	
10					17	38	56	0.22	1.29	
11					1		1	0.01	0.03	
12							0	0.00	0.00	
TOTALS	2269	0	1033	375	169	384	65	4295	16.78	100.00

RECIPE: COTTAGE CHEESE &
WALNUT LOAF
OBSERVATION: AVERAGE
SERVINGS: 1

WORK FUNCTION	EMPLOYEE NO.				BREAD CRUMBS	PUSH CARTS	TOTAL	TIME/ SERVING	% OF TOTAL	
	14	16	82	82A WALNUTS						
TIME IN SECONDS										
1			2.40	0.63	0.22	0.70		3.95	3.95	20.42
2	5.72	1.98						7.70	7.70	39.83
3	0.98	0.11	1.31	0.58	0.09	0.19	0.11	3.36	3.36	17.39
4	0.45		0.11	0.17	0.09	0.18		0.99	0.99	5.13
5	0.41	0.03	0.57	0.12	0.06	0.11	0.16	1.47	1.47	7.58
6	0.15		0.04	0.29	0.02	0.04		0.54	0.54	2.78
7	0.11		0.01		0.09	0.14		0.34	0.34	1.77
8	0.36		0.09	0.08	0.01			0.53	0.53	2.77
9	0.22				0.00			0.23	0.23	1.17
10					0.07	0.15		0.22	0.22	1.13
11					0.01			0.01	0.01	0.03
12								0.00	0.00	0.00
TOTALS	8.39	2.12	4.52	1.86	0.66	1.51	0.28	19.33	19.33	100.00

RECIPE: CHINESE PEPPER STEAK
OBSERVATION: 1
SERVINGS: 175

WORK FUNCTION	EMPLOYEE NO.				PUSH CARTS	TOTAL	TIME/ SERVING	% OF TOTAL
	14	15	82	82A				
TIME IN SECONDS								
1			765	1381		2146	12.26	49.66
2	922					922	5.27	21.34
3	43		112	327	27	509	2.91	11.77
4	52		4	122		178	1.02	4.12
5	57		26	120	39	242	1.38	5.59
6	6		24	5		35	0.20	0.81
7	12			65		77	0.44	1.78
8	126		58			184	1.05	4.26
9						0	0.00	0.00
10						0	0.00	0.00
11	13			16		29	0.17	0.67
12						0	0.00	0.00
TOTALS	1231	0	989	2036	65	4321	24.69	100.00

RECIPE: CHINESE PEPPER STEAK
OBSERVATION: 2
SERVINGS: 175

WORK FUNCTION	EMPLOYEE NO.				PUSH CARTS	TOTAL	TIME/ SERVING	% OF TOTAL
	14	15	82	82A				
TIME IN SECONDS								
1			309	720		1029	5.88	35.89
2		470	7	32		509	2.91	17.75
3		140	94	557	27	818	4.67	28.52
4		63	9	41		113	0.65	3.94
5		39	28	45	39	151	0.86	5.25
6		11	5			16	0.09	0.56
7		2		89		91	0.52	3.17
8		91				91	0.52	3.17
9		10				10	0.06	0.35
10						0	0.00	0.00
11				40		40	0.23	1.40
12						0	0.00	0.00
TOTALS	0	826	452	1524	65	2867	16.38	100.00

RECIPE: CHINESE PEPPER STEAK
OBSERVATION: 3
SERVINGS: 175

WORK FUNCTION	EMPLOYEE NO.				PUSH CARTS	TOTAL	TIME/ SERVING	% OF TOTAL
	14	15	82	82A				
TIME IN SECONDS								
1			369	839		1208	6.90	32.67
2	954			61		1015	5.80	27.45
3	69		101	382	27	579	3.31	15.65
4	76		9	123		208	1.19	5.63
5	19		30	212	39	300	1.71	8.10
6	36					36	0.21	0.97
7	11			103		114	0.65	3.08
8	129			11		140	0.80	3.79
9	50			19		69	0.39	1.87
10						0	0.00	0.00
11	29					29	0.17	0.78
12						0	0.00	0.00
TOTALS	1373	0	509	1750	65	3697	21.13	100.00

RECIPE: CHINESE PEPPER STEAK
OBSERVATION: AVERAGE
SERVINGS: 1

WORK FUNCTION	EMPLOYEE NO.				PUSH CARTS	TOTAL	TIME/ SERVING	% OF TOTAL
	14	15	82	82A				
TIME IN SECONDS								
1		0.90	2.17	4.29		8.35	8.35	40.26
2	3.57	0.27	0.18	1.18		4.66	4.66	22.47
3	0.21	0.12	0.42	1.43	0.15	3.63	3.63	17.50
4	0.24	0.07	0.08	0.55		0.95	0.95	4.58
5	0.14	0.02	0.12	0.63	0.22	1.32	1.32	6.36
6	0.08	0.00	0.05	0.18		0.17	0.17	0.80
7	0.04	0.17		0.32		0.54	0.54	2.59
8	0.49	0.02	0.11	0.02		0.79	0.79	3.81
9	0.10			0.04		0.15	0.15	0.73
10				0.08		0.00	0.00	0.00
11	0.08			0.03		0.19	0.19	0.90
12						0.00	0.00	0.00
TOTALS	4.96	1.57	3.13	8.74	0.37	20.74	20.74	100.00

RECIPE: BREADED VEGESTEAK
OBSERVATION: 1
SERVINGS: 400

WORK FUNCTION	EMPLOYEE NO.					BREAD CRUMBS	PUSH CARTS	TOTAL	TIME/ SERVING	% OF TOTAL
	14	16	82	101AA	FLT 6					
	TIME IN SECONDS									
1			65			322		387	0.97	4.44
2	2260	1041			1989			5290	13.23	60.65
3	322	243	135		212	88	27	1026	2.57	11.77
4	197	40			256	83		576	1.44	6.60
5	88	168	53		224	53	39	624	1.56	7.16
6	90				47	18		155	0.39	1.78
7	166	6			124	63		359	0.90	4.12
8	12	6	5		26			49	0.12	0.56
9		20						20	0.05	0.23
10					26	70		96	0.24	1.10
11	37	24			78			139	0.35	1.59
12								0	0.00	0.00
TOTALS	3172	1548	258	0	2982	697	65	8722	21.81	100.00

RECIPE: BREADED VEGESTEAK
OBSERVATION: 2
SERVINGS: 510

WORK FUNCTION	EMPLOYEE NO.					BREAD CRUMBS	PUSH CARTS	TOTAL	TIME/ SERVING	% OF TOTAL
	14	16	82	101AA	FLT 6					
	TIME IN SECONDS									
1			88			418		506	0.99	5.22
2	731			4473				5204	10.20	53.67
3	530		99	1135		114	27	1904	3.73	19.64
4	96			352		108		556	1.09	5.73
5	97		45	218		68	39	467	0.92	4.82
6				137		24		161	0.31	1.66
7				486		82		568	1.11	5.86
8			55	60				115	0.23	1.19
9	19							19	0.04	0.20
10						91		91	0.18	0.93
11				105				105	0.21	1.08
12								0	0.00	0.00
TOTALS	1473	0	287	6966	0	904	65	9696	19.01	100.00

RECIPE: BREADED VEGESTEAK
OBSERVATION: 3
SERVINGS: 350

WORK FUNCTION	EMPLOYEE NO.					BREAD CRUMBS	PUSH CARTS	TOTAL	TIME/ SERVING	% OF TOTAL
	14	16	82	101AA	FLT 6					
	TIME IN SECONDS									
1			75			288		363	1.04	4.55
2	1177	574		2600				4351	12.43	54.56
3	750	56	267	522		78	27	1700	4.86	21.32
4	314	52		102		74		542	1.55	6.80
5	30	83	21	159		47	39	379	1.08	4.75
6	36					16		52	0.15	0.65
7	202	39		59		57		357	1.02	4.47
8	12			69				81	0.23	1.02
9								0	0.00	0.00
10		29				62		91	0.26	1.15
11	5			54				59	0.17	0.74
12								0	0.00	0.00
TOTALS	2526	833	363	3565	0	622	65	7975	22.78	100.00

RECIPE: BREADED VEGESTEAK
OBSERVATION: AVERAGE
SERVINGS: 1

WORK FUNCTION	EMPLOYEE NO.					BREAD CRUMBS	PUSH CARTS	TOTAL	TIME/ SERVING	% OF TOTAL
	14	16	82	101AA	FLT 6					
TIME IN SECONDS										
1			0.18			0.82		1.00	1.00	4.71
2	3.48	1.41		5.40	1.66			11.95	11.95	56.38
3	1.33	0.26	0.43	1.24	0.18	0.22	0.07	3.72	3.72	17.54
4	0.53	0.08		0.33	0.21	0.21		1.36	1.36	6.41
5	0.17	0.22	0.09	0.29	0.19	0.13	0.09	1.19	1.19	5.60
6	0.11			0.09	0.04	0.05		0.28	0.28	1.34
7	0.33	0.04		0.37	0.10	0.16		1.01	1.01	4.77
8	0.02	0.01	0.04	0.10	0.02			0.19	0.19	0.91
9	0.01	0.02						0.03	0.03	0.14
10		0.03			0.02	0.18		0.23	0.23	1.07
11	0.04	0.02		0.12	0.07			0.24	0.24	1.14
12								0.00	0.00	0.00
TOTALS	6.01	2.08	0.75	7.95	2.48	1.76	0.16	21.20	21.20	100.00

RECIPE: CANTON NOODLES
OBSERVATION: 1
SERVINGS: 300

WORK FUNCTION	EMPLOYEE NO.						PUSH CARTS	TOTAL	TIME/ SERVING	% OF TOTAL
	14	15	82	82A	101AA	FLT 6				
	TIME IN SECONDS									
1			703	607				1310	4.37	14.52
2	2301	71			1692	623		4687	15.62	51.95
3	278		340	774	8	61	27	1488	4.96	16.49
4	168		57	33				258	0.86	2.86
5	174		73	24	5	47	39	362	1.21	4.01
6	74			9	38	20		141	0.47	1.56
7	69				7	11		87	0.29	0.96
8	135				32			167	0.56	1.85
9	10				295	19		324	1.08	3.59
10	12				37	121		170	0.57	1.88
11	7			21				28	0.09	0.31
12								0	0.00	0.00
TOTALS	3228	71	1173	1468	2114	902	65	9021	30.07	100.00

RECIPE: CANTON NOODLES
OBSERVATION: 2
SERVINGS: 400

WORK FUNCTION	EMPLOYEE NO.						PUSH CARTS	TOTAL	TIME/ SERVING	% OF TOTAL
	14	15	82	82A	101AA	FLT 6				
	TIME IN SECONDS									
1			716	422				1138	2.85	14.42
2	4083	5						4088	10.22	51.80
3	408	16	293	588			27	1332	3.33	16.88
4	396		27	27				450	1.13	5.70
5	204	7	127	9			39	386	0.96	4.89
6	139							139	0.35	1.76
7	165							165	0.41	2.09
8	96							96	0.24	1.22
9	25							25	0.06	0.32
10	65							65	0.16	0.82
11			8					8	0.02	0.10
12								0	0.00	0.00
TOTALS	5581	28	1171	1046	0	0	65	7891	19.73	100.00

RECIPE: CANTON NOODLES
OBSERVATION: 3
SERVINGS: 400

WORK FUNCTION	EMPLOYEE NO.						PUSH CARTS	TIME/ SERVING	% OF TOTAL	
	14	15	82	82A	101AA	FLT 6				
TIME IN SECONDS										
1			802	380				1182	2.96	18.60
2	3250	155						3405	8.51	53.58
3	319		189	291			27	826	2.06	12.99
4	145		43	56				244	0.61	3.84
5	116		79	17			39	251	0.63	3.94
6	33		14					47	0.12	0.74
7	154			13				167	0.42	2.63
8	185							185	0.46	2.91
9	33							33	0.08	0.52
10	16							16	0.04	0.25
11								0	0.00	0.00
12								0	0.00	0.00
TOTALS	4251	155	1127	757	0	0	65	6355	15.89	100.00

RECIPE: CANTON NOODLES
OBSERVATION: AVERAGE
SERVINGS: 1

WORK FUNCTION	EMPLOYEE NO.						PUSH CARTS	TOTAL	TIME/ SERVING	% OF TOTAL
	14	15	82	B2A	101AA	FLT 6				
	TIME IN SECONDS									
1			2.05	1.34				3.39	3.39	15.48
2	8.67	0.21			1.88	0.69		11.45	11.45	52.30
3	0.91	0.01	0.78	1.59	0.01	0.07	0.07	3.45	3.45	15.76
4	0.64		0.12	0.11				0.87	0.87	3.95
5	0.46	0.01	0.25	0.05	0.01	0.05	0.11	0.93	0.93	4.26
6	0.23		0.01	0.01	0.04	0.02		0.31	0.31	1.42
7	0.34			0.01	0.01	0.01		0.37	0.37	1.71
8	0.38				0.04			0.42	0.42	1.92
9	0.06				0.33	0.02		0.41	0.41	1.86
10	0.08				0.04	0.13		0.26	0.26	1.17
11	0.01		0.01	0.02				0.04	0.04	0.17
12								0.00	0.00	0.00
TOTALS	11.78	0.23	3.22	3.13	2.35	1.00	0.18	21.90	21.90	100.00

RECIPE: PIZZA
OBSERVATION: 1
SERVINGS: 150

WORK FUNCTION	EMPLOYEE NO.						GRATED CHEESE	PUSH CARTS	TOTAL	TIME/ SERVING	% OF TOTAL
	14	15	59	82	FLT 10	FLT11					
	TIME IN SECONDS										
1				47			144		191	1.27	5.02
2	394	556	1167						2117	14.11	55.66
3		278	152	70			69	27	595	3.97	15.65
4		46	34				52		132	0.88	3.47
5		218	129	95			30	39	511	3.41	13.43
6		24	56	10			12		102	0.68	2.69
7		10	87				22		119	0.79	3.13
8			10						10	0.07	0.26
9		11							11	0.07	0.29
10			11				4		15	0.10	0.39
11									0	0.00	0.00
12									0	0.00	0.00
TOTALS	394	1143	1646	222	0	0	333	65	3804	25.36	100.00

RECIPE: PIZZA
OBSERVATION: 2
SERVINGS: 400

WORK FUNCTION	EMPLOYEE NO.						GRATED CHEESE	PUSH CARTS	TOTAL	TIME/ SERVING	% OF TOTAL
	14	15	59	82	FLT 10	FLT 11					
	TIME IN SECONDS										
1				36			434		470	1.17	3.09
2	2017	69			4853	1448			8387	20.97	55.17
3	997	86		166	707	74	206	27	2263	5.66	14.88
4	91				140		157		388	0.97	2.55
5	1039	50		31	401		91	39	1651	4.13	10.86
6					27		38		65	0.16	0.42
7					301	10	66		377	0.94	2.48
8	145	10			8				163	0.41	1.07
9	106	2			23				131	0.33	0.86
10	1275						12		1287	3.22	8.47
11	6			5		12			23	0.06	0.15
12									0	0.00	0.00
TOTALS	5676	217	0	238	6460	1544	1003	65	15203	38.01	100.00

RECIPE: PIZZA
OBSERVATION: 3
SERVINGS: 350

WORK FUNCTION	EMPLOYEE NO.						GRATED CHEESE	PUSH CARTS	TOTAL	TIME/ SERVING	% OF TOTAL
	14	15	59	82	FLT 10	FLT 11					
TIME IN SECONDS											
1				48			361		409	1.17	4.79
2	1039					4057			5096	14.56	59.68
3	464			171		548	172	27	1381	3.95	16.18
4						141	130		271	0.78	3.18
5	330			28		386	76	39	858	2.45	10.05
6						54	31		85	0.24	1.00
7	5					168	55		228	0.65	2.67
8	41					45			86	0.25	1.01
9	21								21	0.06	0.25
10							10		10	0.03	0.12
11				9		84			93	0.27	1.09
12									0	0.00	0.00
TOTALS	1900	0	0	256	0	5483	835	65	8539	24.40	100.00

RECIPE: PIZZA
OBSERVATION: AVERAGE
SERVINGS: 1

WORK FUNCTION	EMPLOYEE NO.						GRATED CHEESE	PUSH CARTS	TOTAL	TIME/ SERVING	% OF TOTAL
	14	15	59	82	FLT 10	FLT 11					
	TIME IN SECONDS										
1				0.18			1.03		1.21	1.21	4.12
2	3.55	1.29	2.59		4.04	5.07			16.55	16.55	56.56
3	1.27	0.69	0.34	0.46	0.59	0.58	0.49	0.11	4.52	4.52	15.46
4	0.08	0.10	0.08		0.12	0.13	0.37		0.87	0.87	2.99
5	1.18	0.53	0.29	0.26	0.33	0.37	0.22	0.15	3.33	3.33	11.38
6		0.05	0.12	0.02	0.02	0.05	0.09		0.36	0.36	1.24
7	0.00	0.02	0.19		0.25	0.17	0.16		0.80	0.80	2.72
8	0.16	0.01	0.02		0.01	0.04			0.24	0.24	0.82
9	0.11	0.03			0.02				0.15	0.15	0.53
10	1.06		0.02				0.03		1.12	1.12	3.81
11	0.01			0.01		0.09			0.11	0.11	0.37
12									0.00	0.00	0.00
TOTALS	7.42	2.72	3.66	0.94	5.38	6.51	2.37	0.26	29.25	29.25	100.00

RECIPE: EGG FOO YUNG
OBSERVATION: 1
SERVINGS: 250

WORK FUNCTION	EMPLOYEE NO.									PUSH CARTS	TOTAL	TIME/ SERVING	% OF TOTAL
	10	14	15	16	80	82	82A	101AA	FLT 5				
	TIME IN SECONDS												
1					300		279				579	2.32	8.43
2			3992	268							4260	17.04	62.01
3			382	57	230		152			27	848	3.39	12.34
4			159		28		42				229	0.92	3.33
5			161	49	100		56			39	405	1.62	5.89
6			12				11				23	0.09	0.33
7			25		11						36	0.14	0.52
8			265		82						347	1.39	5.05
9			39								39	0.16	0.57
10			104								104	0.42	1.51
11											0	0.00	0.00
12											0	0.00	0.00
TOTALS	0	0	5139	374	751	0	540	0	0	65	6869	27.48	100.00

RECIPE: EGG FOO YUNG
OBSERVATION: 2
SERVINGS: 675

WORK FUNCTION	EMPLOYEE NO.									PUSH CARTS	TOTAL	TIME/ SERVING	% OF TOTAL	
	10	14	15	16	80	82	82A	101AA	FLT 5					
	TIME IN SECONDS													
1						711	610					1321	1.96	6.10
2		724	6085					3214	7254			17277	25.60	79.82
3		181	333			217	187	48	129	27		1122	1.66	5.18
4			303			27	5		140			475	0.70	2.19
5		91	132			58	61	35	100	39		516	0.76	2.38
6			15				31	129	14			189	0.28	0.87
7			133			7		8				148	0.22	0.68
8			64					64	5			133	0.20	0.61
9			22					7				29	0.04	0.13
10			56					192	176			424	0.63	1.96
11								12				12	0.02	0.06
12												0	0.00	0.00
TOTALS	0	996	7143	0	0	1020	894	3709	7818	65	21645	32.07	100.00	

RECIPE: EGG FOO YUNG
OBSERVATION: 3
SERVINGS: 250

WORK FUNCTION	EMPLOYEE NO.									PUSH CARTS	TOTAL	TIME/ SERVING	% OF TOTAL	
	10	14	15	16	80	82	82A	101AA	FLT 5					
TIME IN SECONDS														
1					172		279					451	1.80	4.76
2	3102	549	3401	348								7400	29.60	78.14
3	73	90	211	83	178		123			27		785	3.14	8.29
4	18	36	30		8		3					95	0.38	1.00
5		15	83	49	76		96			39		358	1.43	3.78
6		3	12				12					27	0.11	0.29
7		21					40					61	0.24	0.64
8	94	9		11								114	0.46	1.20
9	32											32	0.13	0.34
10	118		15									133	0.53	1.40
11					15							15	0.06	0.16
12												0	0.00	0.00
TOTALS	3437	723	3752	491	449	0	553	0	0	65	9470	37.88	100.00	

RECIPE: EGG FOO YUNG
OBSERVATION: AVERAGE
SERVINGS: 1

WORK FUNCTION	EMPLOYEE NO.									PUSH CARTS	TIME/ TOTAL SERVING	% OF TOTAL	
	10	14	15	16	80	82	82A	101AA	FLT 5				
	TIME IN SECONDS												
1					0.63	0.35	1.05				2.03	2.03	6.24
2	4.14	1.09	12.86	0.82				1.59	3.58		24.08	24.08	74.14
3	0.10	0.21	0.96	0.19	0.54	0.11	0.46	0.02	0.06	0.08	2.73	2.73	8.41
4	0.02	0.05	0.40		0.05	0.01	0.06		0.07		0.67	0.67	2.05
5		0.06	0.39	0.13	0.23	0.03	0.23	0.02	0.05	0.12	1.27	1.27	3.91
6		0.00	0.04				0.05	0.06	0.01		0.16	0.16	0.49
7		0.03	0.10		0.01	0.00	0.05	0.00			0.20	0.20	0.62
8	0.13	0.01	0.38	0.01	0.11			0.03	0.00		0.68	0.68	2.09
9	0.04		0.06					0.00			0.11	0.11	0.34
10	0.16		0.19					0.09	0.09		0.53	0.53	1.62
11					0.02			0.01			0.03	0.03	0.08
12											0.00	0.00	0.00
TOTALS	4.58	1.46	15.38	1.15	1.60	0.50	1.90	1.83	3.86	0.21	32.48	32.48	100.00

RECIPE: ENCHILADA
OBSERVATION: 1
SERVINGS: 700

WORK FUNCTION	EMPLOYEE NO.								GRATED CHEESE	PUSH CARTS	TOTAL	TIME/ SERVING	% OF TOTAL
	14	15	16	82	101AA	104A	FLT 6	FLT 7					
	TIME IN SECONDS												
1				916					421		1337	1.91	6.27
2	5036	2811				3875	2954				14676	20.97	68.84
3	442	705		421		98	111		200	27	2004	2.86	9.40
4	166	20		19		532	181		152		1070	1.53	5.02
5	105	385		57		18	82		88	39	774	1.11	3.63
6	57	172		20		18	43		36		346	0.49	1.63
7	28	30				33	168		64		323	0.46	1.52
8	149	148				35					332	0.47	1.56
9		43									43	0.06	0.20
10		19				53	198		12		282	0.40	1.32
11	15	12		6		99					132	0.19	0.62
12											0	0.00	0.00
TOTALS	5998	4345	0	1439	0	4761	3737	0	975	65	21320	30.46	100.00

RECIPE: ENCHILADA
OBSERVATION: 2
SERVINGS: 450

WORK FUNCTION	EMPLOYEE NO.								GRATED CHEESE	PUSH CARTS	TOTAL	TIME/ SERVING	% OF TOTAL
	14	15	16	B2	101AA	104A	FLT 6	FLT 7					
	TIME IN SECONDS												
1				711					271		982	2.18	7.62
2	3534	2572	2059		659						8824	19.61	68.51
3	255	108	357	409					129	27	1284	2.85	9.97
4	243	27	68	23	37				98		496	1.10	3.85
5	21	18	104	26	19				57	39	284	0.63	2.20
6	19	9	86						23		137	0.31	1.07
7	189	10		9	45				41		294	0.65	2.29
8	177	8	23								208	0.46	1.62
9	42	112	47								201	0.45	1.56
10	47				10				8		65	0.14	0.50
11	70	17		17							104	0.23	0.81
12											0	0.00	0.00
TOTALS	4597	2881	2744	1195	770	0	0	0	627	65	12879	28.62	100.00

RECIPE: ENCHILADA
OBSERVATION: 3
SERVINGS: 400

WORK FUNCTION	EMPLOYEE NO.								GRATED CHEESE	PUSH CARTS	TOTAL	TIME/ SERVING	% OF TOTAL
	14	15	16	82	101AA	104A	FLT 6	FLT 7					
	TIME IN SECONDS												
1				738					241		979	2.45	6.12
2	5019	2187						3995			11201	28.00	70.07
3	793	29		438				108	115	27	1509	3.77	9.44
4	147	60		14				145	87		453	1.13	2.83
5	124	90		64				205	51	39	572	1.43	3.58
6	18			7					21		46	0.11	0.29
7	510	4						7	37		558	1.39	3.49
8	124	18									142	0.36	0.89
9								47			47	0.12	0.29
10								423	7		430	1.07	2.69
11	31							17			48	0.12	0.30
12											0	0.00	0.00
TOTALS	6766	2388	0	1261	0	0	0	4947	558	65	15985	39.96	100.00

RECIPE: ENCHILADA
OBSERVATION: AVERAGE
SERVINGS: 1

WORK FUNCTION	EMPLOYEE NO.								GRATED CHEESE	PUSH CARTS	TOTAL	TIME/ SERVING	% OF TOTAL
	14	15	16	82	101AA	104A	FLT 6	FLT 7					
	TIME IN SECONDS												
1				1.58					0.60		2.18	2.18	6.60
2	9.20	5.07	1.53		0.49	1.85	1.41	3.33			22.86	22.86	69.24
3	1.06	0.44	0.26	0.87		0.05	0.05	0.09	0.29	0.05	3.16	3.16	9.58
4	0.38	0.08	0.05	0.04	0.03	0.25	0.09	0.12	0.22		1.25	1.25	3.80
5	0.17	0.27	0.08	0.10	0.01	0.01	0.04	0.17	0.13	0.08	1.06	1.06	3.20
6	0.06	0.09	0.06	0.02		0.01	0.02		0.05		0.31	0.31	0.92
7	0.58	0.03		0.01	0.03	0.02	0.08	0.01	0.09		0.84	0.84	2.54
8	0.31	0.09	0.02			0.02					0.43	0.43	1.30
9	0.03	0.10	0.03					0.04			0.21	0.21	0.63
10	0.03	0.01		0.00	0.01	0.03	0.09	0.35	0.02		0.54	0.54	1.64
11	0.08	0.02		0.02		0.05		0.01			0.18	0.18	0.54
12											0.00	0.00	0.00
TOTALS	11.90	6.19	2.03	2.62	0.57	2.27	1.78	4.12	1.39	0.13	33.01	33.01	100.00

RECIPE: BEAN BURRITOS
OBSERVATION: 1
SERVINGS: 820

WORK FUNCTION	EMPLOYEE NO.							GRATED CHEESE	PUSH CARTS	TOTAL	TIME/ SERVING	% OF TOTAL
	14	15	80	82	101AA	FLT 2	FLT 3					
	TIME IN SECONDS											
1				657				309		966	1.18	3.35
2	6780	6542	1599		41	53	5258			20273	24.72	70.38
3	576	1139	283	337			522	147	27	3030	3.70	10.52
4	644	628	109	39			229	111		1760	2.15	6.11
5	57	264	39	46				65	39	509	0.62	1.77
6	188	139		9			38	27		401	0.49	1.39
7	213	595		3			5	47		863	1.05	3.00
8	93	22	57				14			186	0.23	0.65
9		42	223	32						297	0.36	1.03
10	11	163	13			146	64	9		406	0.49	1.41
11	77	37								114	0.14	0.40
12										0	0.00	0.00
TOTALS	8639	9571	2323	1123	41	199	6130	714	65	28805	35.13	100.00

RECIPE: BEAN BURRITOS
OBSERVATION: 2
SERVINGS: 735

WORK FUNCTION	EMPLOYEE NO.							GRATED CHEESE	PUSH CARTS	TOTAL	TIME/ SERVING	% OF TOTAL
	14	15	80	82	101AA	FLT 2	FLT 3					
	TIME IN SECONDS											
1			1188					277		1465	1.99	4.39
2	4670	5384	1126		4124	4491	4329			24124	32.82	72.34
3	315	827	417		380	472	366	132	27	2935	3.99	8.80
4	473	995	55		94	60	165	100		1942	2.64	5.82
5	194	429	122		145		127	58	39	1114	1.52	3.34
6	62	104						24		190	0.26	0.57
7	270	136	58		9	84	8	42		607	0.83	1.82
8	76	60	25			18	34			213	0.29	0.64
9	15	12	211				26			264	0.36	0.79
10	66	111	14			57	155	8		411	0.56	1.23
11	52	19					13			84	0.11	0.25
12										0	0.00	0.00
TOTALS	6193	8077	3216	0	4752	5182	5223	640	65	33348	45.37	100.00

RECIPE: BEAN BURRITOS
OBSERVATION: 3
SERVINGS: 735

WORK FUNCTION	EMPLOYEE NO.							GRATED CHEESE	PUSH CARTS	TOTAL	TIME/ SERVING	% OF TOTAL
	14	15	80	82	101AA	FLT 2	FLT 3					
	TIME IN SECONDS											
1			68	513				277		858	1.17	2.96
2	4144	5481	2107		3213		5257			20202	27.49	69.76
3	8	745	182	303	913		193	132	27	2502	3.40	8.64
4	264	576	688	28	117		68	100		1841	2.50	6.36
5	87	563	433	65	154		5	58	39	1404	1.91	4.85
6	148	36			13		24	24		245	0.33	0.85
7	206	388			12		187	42		835	1.14	2.88
8	88						11			99	0.13	0.34
9		35	62	134						231	0.31	0.80
10	232	44	14		197		144	8		639	0.87	2.21
11	67	15			20					102	0.14	0.35
12										0	0.00	0.00
TOTALS	5244	7883	3554	1043	4639	0	5889	640	65	28957	39.40	100.00

RECIPE: BEAN BURRITOS
OBSERVATION: AVERAGE
SERVINGS: 1

WORK FUNCTION	EMPLOYEE NO.							GRATED CHEESE	PUSH CARTS	TOTAL	TIME/ SERVING	% OF TOTAL
	14	15	80	82	101AA	FLT 2	FLT 3					
TIME IN SECONDS												
1			0.57	0.50				0.38		1.45	1.45	3.62
2	6.75	7.59	2.12		3.34	2.06	6.48			28.34	28.34	70.92
3	0.38	1.18	0.39	0.27	0.59	0.21	0.47	0.18	0.04	3.70	3.70	9.25
4	0.60	0.97	0.38	0.03	0.10	0.03	0.20	0.14		2.43	2.43	6.08
5	0.15	0.56	0.27	0.05	0.14		0.06	0.08	0.05	1.35	1.35	3.37
6	0.17	0.12		0.00	0.01		0.03	0.03		0.36	0.36	0.90
7	0.30	0.48	0.03	0.00	0.01	0.04	0.09	0.06		1.01	1.01	2.51
8	0.11	0.04	0.03			0.01	0.03			0.22	0.22	0.54
9	0.01	0.04	0.21	0.07			0.01			0.35	0.35	0.86
10	0.14	0.14	0.02		0.09	0.09	0.16	0.01		0.64	0.64	1.60
11	0.09	0.03			0.01		0.01			0.13	0.13	0.33
12										0.00	0.00	0.00
TOTALS	8.70	11.13	4.01	0.93	4.28	2.43	7.53	0.87	0.09	39.97	39.97	100.00

Appendix C

Computer Printouts

Time in seconds for four activities in

entree production; Push Out Carts,

Grated Cheese, Bread Crumbs, Chopped Walnuts

RECIPE: PUSH OUT CARTS
OBSERVATION: 1

WORK FUNCTION	EMPLOYEE NO. ----- 82	% OF TOTAL

	TIME IN SECONDS -----	
1		0.00
2		0.00
3	15	32.61
4		0.00
5	31	67.39
6		0.00
7		0.00
8		0.00
9		0.00
10		0.00
11		0.00
12		0.00

TOTALS	46	100.00

RECIPE: PUSH OUT CARTS
OBSERVATION: 2

WORK FUNCTION	EMPLOYEE NO. ----- 82	% OF TOTAL

	TIME IN SECONDS -----	
1		0.00
2		0.00
3	45	50.56
4		0.00
5	44	49.44
6		0.00
7		0.00
8		0.00
9		0.00
10		0.00
11		0.00
12		0.00

TOTALS	89	100.00

RECIPE: PUSH OUT CARTS
OBSERVATION: 3

WORK FUNCTION	EMPLOYEE NO. ----- 82	% OF TOTAL

TIME IN SECONDS		

1		0.00
2		0.00
3	20	32.79
4		0.00
5	41	67.21
6		0.00
7		0.00
8		0.00
9		0.00
10		0.00
11		0.00
12		0.00

TOTALS	61	100.00

RECIPE: PUSH OUT CARTS
OBSERVATION: AVERAGE

WORK FUNCTION	EMPLOYEE NO. ----- 82	% OF TOTAL

TIME IN SECONDS		

1		0.00
2		0.00
3	26.67	40.82
4		0.00
5	38.67	59.18
6		0.00
7		0.00
8		0.00
9		0.00
10		0.00
11		0.00
12		0.00

TOTALS	65.33	100.00

RECIPE: GRATED CHEESE
OBSERVATION: 1
OUNCES: 640

WORK FUNCTION	EMPLOYEE NO. 82.1	TIME/ OUNCE	% OF TOTAL
	TIME IN SECONDS		
1	403	0.63	43.10
2		0.00	0.00
3	123	0.19	13.16
4	176	0.28	18.82
5	122	0.19	13.05
6	18	0.03	1.93
7	87	0.14	9.30
8		0.00	0.00
9		0.00	0.00
10	6	0.01	0.64
11		0.00	0.00
12		0.00	0.00
TOTALS	935	1.46	100.00

RECIPE: GRATED CHEESE
OBSERVATION: 2
OUNCES: 640

WORK FUNCTION	EMPLOYEE NO. 82.1	TIME/ OUNCE	% OF TOTAL
	TIME IN SECONDS		
1	424	0.66	46.64
2		0.00	0.00
3	147	0.23	16.17
4	124	0.19	13.64
5	77	0.12	8.47
6	69	0.11	7.59
7	40	0.06	4.40
8		0.00	0.00
9		0.00	0.00
10	28	0.04	3.08
11		0.00	0.00
12		0.00	0.00
TOTALS	909	1.42	100.00

RECIPE: GRATED CHEESE
OBSERVATION: 3
OUNCES: 640

WORK FUNCTION	EMPLOYEE NO. 82.1	TIME/ OUNCE	% OF TOTAL
	TIME IN SECONDS		
1	397	0.62	40.18
2		0.00	0.00
3	312	0.49	31.58
4	142	0.22	14.37
5	58	0.09	5.87
6	19	0.03	1.92
7	60	0.09	6.07
8		0.00	0.00
9		0.00	0.00
10		0.00	0.00
11		0.00	0.00
12		0.00	0.00
TOTALS	988	1.54	100.00

RECIPE: GRATED CHEESE
OBSERVATION: AVERAGE
OUNCES: 1

WORK FUNCTION	EMPLOYEE NO. 82.1	TIME/ OUNCE	% OF TOTAL
	TIME IN SECONDS		
1	0.64	0.64	43.22
2		0.00	0.00
3	0.30	0.30	20.55
4	0.23	0.23	15.61
5	0.13	0.13	9.07
6	0.06	0.06	3.74
7	0.10	0.10	6.60
8		0.00	0.00
9		0.00	0.00
10	0.02	0.02	1.20
11		0.00	0.00
12		0.00	0.00
TOTALS	1.47	1.47	100.00

RECIPE: BREAD CRUMBS
 OBSERVATION: 1
 OUNCES: 533

WORK FUNCTION	EMPLOYEE NO. 82.1	TIME/ OUNCE	% OF TOTAL
	TIME IN SECONDS		
1	934	1.75	49.92
2		0.00	0.00
3	184	0.35	9.83
4	132	0.25	7.06
5	55	0.10	2.94
6		0.00	0.00
7	253	0.47	13.52
8		0.00	0.00
9		0.00	0.00
10	313	0.59	16.73
11		0.00	0.00
12		0.00	0.00
TOTALS	1871	3.51	100.00

RECIPE: BREAD CRUMBS
 OBSERVATION: 2
 OUNCES: 286

WORK FUNCTION	EMPLOYEE NO. 82.1	TIME/ OUNCE	% OF TOTAL
	TIME IN SECONDS		
1	519	1.81	38.91
2		0.00	0.00
3	193	0.67	14.47
4	159	0.56	11.92
5	153	0.53	11.47
6	75	0.26	5.62
7	92	0.32	6.90
8		0.00	0.00
9		0.00	0.00
10	143	0.50	10.72
11		0.00	0.00
12		0.00	0.00
TOTALS	1334	4.66	100.00

RECIPE: BREAD CRUMBS
 OBSERVATION: 3
 OUNCES: 435

WORK FUNCTION	EMPLOYEE NO. 82.1	TIME/ OUNCE	% OF TOTAL
	TIME IN SECONDS		
1	809	1.86	52.13
2		0.00	0.00
3	199	0.46	12.82
4	258	0.59	16.62
5	109	0.25	7.02
6	19	0.04	1.22
7	119	0.27	7.67
8		0.00	0.00
9		0.00	0.00
10	39	0.09	2.51
11		0.00	0.00
12		0.00	0.00
TOTALS	1552	3.57	100.00

RECIPE: GRATED CHEESE
 OBSERVATION: AVERAGE
 OUNCES: 1

WORK FUNCTION	EMPLOYEE NO. 82.1	TIME/ OUNCE	% OF TOTAL
	TIME IN SECONDS		
1	1.81	1.81	46.22
2		0.00	0.00
3	0.49	0.49	12.58
4	0.47	0.47	11.89
5	0.30	0.30	7.57
6	0.10	0.10	2.61
7	0.36	0.36	9.11
8		0.00	0.00
9		0.00	0.00
10	0.39	0.39	10.02
11		0.00	0.00
12		0.00	0.00
TOTALS	3.91	3.91	100.00

RECIPE: CHOPPED WALNUTS
OBSERVATION: 1
OUNCES: 480

WORK FUNCTION	EMPLOYEE NO. ----- 82.1	TIME/ OUNCE	% OF TOTAL
	TIME IN SECONDS -----		
1	260	0.54	36.83
2		0.00	0.00
3	89	0.19	12.61
4	80	0.17	11.33
5	44	0.09	6.23
6		0.00	0.00
7	159	0.33	22.52
8	20	0.04	2.83
9	15	0.03	2.12
10	19	0.04	2.69
11	20	0.04	2.83
12		0.00	0.00
TOTALS	706	1.47	100.00

RECIPE: CHOPPED WALNUTS
OBSERVATION: 2
OUNCES: 960

WORK FUNCTION	EMPLOYEE NO. 82.1	TIME/ OUNCE	% OF TOTAL
TIME IN SECONDS			
1	576	0.60	44.51
2		0.00	0.00
3	177	0.18	13.68
4	132	0.14	10.20
5	51	0.05	3.94
6	66	0.07	5.10
7	72	0.08	5.56
8		0.00	0.00
9		0.00	0.00
10	220	0.23	17.00
11		0.00	0.00
12		0.00	0.00
TOTALS	1294	1.35	100.00

RECIFE: CHOPPED WALNUTS
OBSERVATION: 3
OUNCES: 480

WORK FUNCTION	EMPLOYEE NO. 82.1	TIME/ OUNCE	% OF TOTAL
	TIME IN SECONDS		
1	246	0.51	24.36
2		0.00	0.00
3	151	0.31	14.95
4	184	0.38	18.22
5	150	0.31	14.85
6	33	0.07	3.27
7	135	0.28	13.37
8		0.00	0.00
9		0.00	0.00
10	111	0.23	10.99
11		0.00	0.00
12		0.00	0.00
TOTALS	1010	2.10	100.00

RECIFE: CHOPPED WALNUTS
OBSERVATION: AVERAGE
OUNCES: 1

WORK FUNCTION	EMPLOYEE NO. 82.1	TIME/ OUNCE	% OF TOTAL
	TIME IN SECONDS		
1	0.55	0.55	33.60
2		0.00	0.00
3	0.23	0.23	13.90
4	0.23	0.23	13.97
5	0.15	0.15	9.29
6	0.05	0.05	2.79
7	0.23	0.23	13.97
8	0.01	0.01	0.85
9	0.01	0.01	0.63
10	0.17	0.17	10.16
11	0.01	0.01	0.85
12		0.00	0.00
TOTALS	1.64	1.64	100.00