LABOR PRODUCTIVITY STANDARDS IN TEXAS SCHOOL FOODSERVICE OPERATIONS

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I am submitting herewith a thesis written by Allison Rachelle Fowler entitled "Labor Productivity Standards in Texas School Foodservice Operations." I have examined this thesis for form and content and recommend that it be accepted in partial fulfillment of the requirements for the dual degree of Master of Science with a major in Institutional Administration and Master of Business with a major in Administration.

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ABSTRACT

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LABOR PRODUCTIVITY STANDARDS IN TEXAS
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Labor cost can impact a school foodservice budget greatly. This study investigated the utilization of labor productivity standards and meal equivalents (MEs) in Texas school foodservice operations and school foodservice directors' perceptions of how variables affect labor productivity. A questionnaire was mailed to 200 randomly selected Texas school foodservice directors; 105 (52%) responses were analyzed. The most common standard used was meals per labor hour (MPLH) (76%); both MPLH and labor cost as a percentage of revenue (%LABOR) were utilized more frequently in larger size districts. Meal equivalent (ME) conversions were most commonly defined as one lunch, two breakfasts, $2.00 of a la carte sales or three or four after-school snacks. Respondents felt that volume of meals produced was the most important variable affecting labor. There was little consistency in use of labor productivity standards and ME conversions in Texas schools, which therefore limits the validity of external benchmarking. However, foodservice directors can utilize standards internally to forecast labor needs, make decisions about productivity, and hold employees accountable for their time.

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CHAPTER I

INTRODUCTION

Productivity in school foodservice is defined as a measure or level of output of goods produced in relation to the input of resources. Output can be number of meals, number of servings, number of customers served, or amount of revenue generated, while the input of resources are most likely labor hours or money spent (Martin & Conklin, 1999; Payne-Palacio & Theis, 2005).

Productivity is often considered an intangible factor by operators, possibly due to the fact that it is difficult to measure and cumbersome to track. It often takes a back seat to meeting deadlines, satisfying customers, or just producing the product on time (Bonham, 2003). The efficient and productive use of labor can have a major impact on a school foodservice budget as labor usually comprises 40 to 45 % of the budget ("In Schools," 2000).

Labor is a commodity that cannot be purchased on short notice, and developing an efficient productive workforce and productivity standards is an evolutionary process (Kavulla, 1996; Payne-Palacio & Theis, 2005). Competition in the marketplace and changes in the economy have forced operators to find more cost-effective ways to manage their labor force (McSparan & Verno, 1995). Knickrehm, McConnell, and Berg (1981) state that each organization must do an accurate assessment of its own needs and determine which method of controlling the labor force is most effective. Therefore, each

foodservice director must be knowledgeable about the factors influencing productivity in his/her own operation in order to choose a standard that best fits the operation (Knickrehm et al., 1981). Foodservice directors should be cautious in choosing production standards, ensuring that the standards reflect an accurate picture of current duties and that they are clearly defined, realistic, understandable, and easy to use. Standards can provide valuable information that can be used to project labor needs; but most of all, they should be achievable in order to be effective. Reliable measurement tools will provide valuable feedback to managers enabling them to make decisions about productivity and to hold employees accountable for their use of time (McSparan & Verno, 1995).

The literature identifies three predominant labor standards used in the school foodservice industry – meals per labor hour, labor cost as a percentage of sales/revenue, and servings per labor hour. Johnson and Chambers (2000) found that meals per labor hour was one of the most common performance measures used for external benchmarking in foodservice operations.

Meals per labor hour is determined by dividing the total number of meal equivalents (ME's) the school cafeteria serves per day by the number of labor hours allotted to that school per day (Martin & Conklin, 1999). Payne-Palacio and Theis (2005) suggest that school foodservice operations produce one meal per every four to five minutes of labor which would equate to 12 to 15 meals per labor hour; likewise, Spears and Gregoire (2004) state that the standard of 13 to 15 meals per labor hour is commonly

used. Pannell-Martin (1999) suggests that staffing standards increase or decrease depending on the size of the operation. She also recommends different standards for a conventional system that is preparing food from raw ingredients on site versus a convenience system that is using processed foods and disposable dinnerware (Pannell-Martin, 1999). Pannell-Martin's standards have been used by the Texas Comptroller's Office for use in conducting School Performance Reviews. However, many foodservice directors have disagreed with these standards believing that they did not fit their specific operations. The key issue of disagreement is that different formulas are used to calculate the definition of a ME (B. Wallace, personal communication, November 3, 2006). Pannell-Martin (1999) recommended that three breakfasts equal one ME and $3.00 of a la carte revenue equal one ME. However, since Pannell-Martin's standards were first developed, school foodservice operations have expanded into varied types of breakfast service such as breakfast in the classroom, and grab-and-go programs. A la carte programs have expanded and include more convenience foods as well as schools have expanded into after-school snacks. Throughout the school foodservice industry, different definitions of a ME are being used. Districts may use two, three, or four breakfasts as equal to one ME and a range from $1.00 to $3.00 in a la carte revenue as equal to one ME. Due to variations in defining a "meal," meals per labor hour production standards have different meanings in different school districts.

As one can tell, ME's and productivity standards are very complex issues, and there are many variables that influence the number of labor hours required for a foodservice operation. The literature identifies a total of twelve variables:

1) The number and length of serving periods may affect labor needs (Pannell-Martin, 1999).
2) The number of serving lines in operation during peak times may increase labor (Kavulla, 1996; Pannell-Martin, 1999).
3) The type of operation such as on-site production, central kitchen operation, a finishing kitchen operation or a pre-plate operation may cause differences in labor needs (Pannell-Martin, 1999).
4) The equipment available, the floor plan and flow of the kitchen may increase or decrease labor needs (Campbell, 1985; Pannell-Martin, 1999; Schechter, 1997).
5) Offer versus Serve programs can cause variance in the number of choices offered to students and the items on a lunch tray (Mayo & Olsen, 1987).
6) The size of the operation and types of service such as breakfast, lunch, and snacks will require differing amounts of labor (Martin & Conklin, 1999; Pannell-Martin, 1999; Waldvogel & Ostenso, 1977).
7) Variations in menus and menu choices could require a greater number of items to be prepared (Knickrehm, et al., 1981; Pannell-Martin, 1999; Yung, Matthews, Johnson & Johnson, 1981).

8) The length of the menu cycle length determines repetition, therefore, increasing or decreasing employee efficiency at production task. (Knickrehm et al., 1981; Pannell-Martin, 1999).

9) The type of foods purchased, for example convenience foods versus non-processed raw food items, influences the labor hours needed. (Kavulla, 1996; Pannell-Martin, 1999; Schechter, 1997; Yung et al., 1981).

10) The overall skill level of the workforce affects labor requirements which is determined by the availability of training and the number of part-time workers. (Campbell, 1985; Cluskey & Messersmith, 1991; Pannell-Martin, 1999; Schechter, 1997; Yung et al., 1981).

11) The extent of responsibilities of the manager in charge influences productivity. If he/she is a working manager, his/her labor hours may be used for actual production activities; but if the manager is only expected to supervise employees and processes, this labor time may not be counted for production. (Pannell-Martin, 1999).

12) The use of disposable utensils such as plates and flatware may greatly affect productivity (Pannell-Martin, 1999).

Foodservice directors should give careful consideration to productivity standards. Kavulla (1996) states that, "Employees appreciate knowing what their job requirements are, and once performance becomes the focus of your management style, supervision becomes easier, productivity goes up and labor costs come down." (p. 32)

Statement of the Problem

Labor costs make up more than 40% of most school foodservice budgets; therefore, school foodservice directors must utilize labor productively. It is imperative to the success of a school foodservice operation that productivity is measured and benchmarked to ensure efficiency and control labor cost.

Purpose of the Study

The purpose of this research was to explore the utilization of labor productivity standards in Texas school foodservice operations. This research sought to determine the most used productivity standards in Texas school foodservice operations and the school foodservice directors' perceptions of how variables may affect labor productivity. Specific objectives were:

1. To determine the most commonly used labor productivity standards in Texas.
2. To determine what methods are used by school foodservice directors to calculate ME's.
3. To determine if the size of school foodservice operation or the education level of the foodservice director is associated with the utilization of labor productivity standards.
4. To determine school foodservice directors' perceptions of the level of importance of variables that may affect labor productivity.

5. To determine if school foodservice directors' perceptions of the level of importance of variables that may affect labor productivity are correlated to district size.

Null Hypotheses and Research Questions

Null hypotheses are as follows:

Null Hypothesis 1. There will be no difference the size of school districts based on utilization of labor productivity standards.

Null Hypothesis 2. There will be no difference in utilization of labor productivity standards based on educational level of school foodservice directors.

Null Hypothesis 3. There will be no difference between the foodservice directors' perceptions of the level of importance of 12 variables that may affect labor productivity for school foodservice operations.

Other research questions covered on the survey were:

What are the most commonly used labor productivity standards in Texas?

What are the methods to calculate ME's that are most frequently used by school foodservice directors?

CHAPTER II

REVIEW OF LITERATURE

Productivity Trends in School Foodservice

In the literature, productivity is commonly defined as the level of output of goods and services produced in relation to the input of resources (Ivancevich, 2004). Output for foodservice operations is most often measured in quantifiable variables such as the number of meals, number of servings, number of customers, or amount of revenue generated, while resources are in most cases considered labor hours or money spent (Martin & Conklin, 1999; Payne-Palacio & Theis, 2005).

Managing productivity is essential to operational efficiency. However, foodservice directors must be able to measure productivity in order to manage it. Measuring foodservice productivity is extremely challenging due to the complexity of foodservice operations (Bonham, 2003). Most methods employed in the industry today do not account for many of the variables that affect productivity. Although the literature discusses these variables, no method has been developed to incorporate all the variables into a comprehensive method of measuring productivity. Without specific guidance as to how to measure productivity, many directors choose timeliness, customer satisfaction, and other institutional criteria as measures of their success (Bonham, 2003).

Foodservice productivity in the United States (US) increased modestly in the 1950's and mid-1960's; however, in the 1970's and 1980's productivity began to

decrease (Pannell-Martin, 1999). Throughout the 1990's, many school districts around the US struggled with decreased funding, and it became more important for school foodservice operations to break even financially ("In Schools," 2000). In an environment where educators struggle to secure resources that contribute to classroom instruction, school administrators are reluctant to commit funds to the school foodservice operation. *Foodservice Director* reported in a September 2004 survey that 76% of foodservice operators expected productivity standards to become more prevalent as a tool in foodservice operations and noted that profitability is becoming more important as a performance standard ("Measuring Up," 2004).

School foodservice directors are long past just providing a wholesome nutritious breakfast and lunch. Public schools are becoming more business-like, and administrators expect that support services generate revenues to at least break even, if not generate a surplus, while maintaining high standards of quality. Labor costs account for 40 to 45 % of a school foodservice budget; therefore, the efficient and productive use of labor can make a significant impact on the financial well-being of an organization ("In Schools," 2000). Reynolds (1994) implied that if foodservice operations are to remain self-sufficient, it is imperative for directors to view increases in productivity not as a trendy practice but as a competitive advantage.

Need for Productivity Standards

Few would argue the need for productivity standards. Developing an efficient productive workforce and establishing realistic and effective productivity standards are

not short-term processes; they require much time and resources (Kavulla, 1996; Payne-Palacio & Theis, 2005). Due to changes in the labor market and competition, operators are forced to manage labor in cost-effective ways (McSparan & Verno, 1995). Knickrehm et al. (1981) believed that productivity standards must be specific to the organization. They suggested that each organization must complete an accurate assessment of its own needs in order to develop the most effective method of controlling labor costs. Whatever method is applied must address the factors influencing productivity in the operation (Knickrehm et al., 1981). A thorough assessment will produce information from which productivity standards can be developed. Once developed, applied, and refined over time, these standards can provide valuable information for planning and projecting labor needs. However, if standards are not achievable and thoroughly communicated, they may not increase efficiency but become counter-productive. Therefore, directors of school foodservice operations should strive to develop production standards that are clearly defined, realistic, understandable, and easy to use. Only then will such standards benefit the operation by providing reliable measurement tools and valuable feedback to managers thus enabling them to make data based decisions about productivity and hold employees accountable for their use of time (McSparan & Verno, 1995).

Current Labor Standards

In the school foodservice industry, there are typically three predominant labor standards used: meals per labor hour, labor cost as a percentage of sales or revenue, and

servings per labor hour. Johnson and Chambers (2000) conducted research to determine use of performance measures in institutional foodservice. They surveyed 600 randomly selected foodservice directors from four categories of foodservice operations: college/university, correctional, healthcare, and schools. They found that meals per labor hour were one of the most common performance measures used when benchmarking with others.

Meals per Labor Hours

Before one can determine meals per labor hour, he/she must establish a formula for meal equivalents (ME's). Many foodservice directors take issue with utilizing meals per labor hour due to the variety of definitions used for ME's. Pannell-Martin (1999) recommends that three breakfasts equal one ME and $3.00 in a la carte revenue equal one ME. The Texas Comptroller's Office has adopted this formula for conducting School Performance Reviews. However, throughout the school foodservice industry this definition differs somewhat due to the expansion of school feeding. The National Food Service Management Institute (2001) recommends that two breakfasts or three after-school snacks are equal to one ME; and to convert a la carte sales to ME's, they suggest that total a la carte sales be divided by the free lunch reimbursement plus the commodity value per meal.

Today, breakfast may be served in a variety of ways from the traditional service to delivery in each classroom. After-school snacks and a la carte programs have also expanded and changed since Pannell-Martin made her recommendations for calculation

of ME's. School foodservice operations are serving breakfast in the classrooms, or the types of foods offered are now convenience items instead of made from scratch items. Therefore, depending on the type of operation some districts may use two, three, or four breakfasts to equal a ME and a range of $1.00 to $3.00 in a la carte revenue to equal a ME. Once a formula for ME's is determined, meals per labor hour can be calculated by dividing the total number of ME's that the school serves per day by the number of labor hours allotted to that school per day (Martin & Conklin, 1999). Payne-Palacio and Theis (2005) suggest that school foodservice operations produce one meal per every four to five minutes of labor which would equate to 12 to 15 meals per labor hour. Likewise, Spears and Gregoire (2004) suggest that the standard of 13 to 15 meals per labor hour is more commonly used for schools.

Pannell-Martin (1999) suggests that staffing standards increase or decrease depending on the size of the operation to adjust for economies of scale. She also recommends different standards for a conventional system that is preparing food from raw ingredients on site versus a convenience system that is using processed foods and disposables. As the literature suggests, there are several variations for utilizing meals per labor hour as a productivity standard. The differences in this standard's application to an operation make it difficult to benchmark one district to another.

Labor Cost as a Percentage of Revenue

Another method of controlling labor is to commit a percentage of revenue for labor expenses. Labor expenses account for a large percentage of school foodservice

expenditures. The North Carolina Department of Education sets the standard that no more than 50 % of revenue should be expended on labor including benefits (Pannell-Martin, 1999). Kavulla (1996) cautions directors that the percentage of revenue can be misleading because the mixture of free, reduced-price, and paid meals may skew the revenue results. Since the prices charged for paid and reduced meals varies, the revenue per meal can vary greatly. In such cases, the percentage of revenue method would produce unreliable benchmarks for comparisons with other districts. Furthermore, the hourly wage differs depending on the regional labor market, which also greatly impacts labor costs (Kavulla, 1996).

Servings per Labor Hour

One of the variables that needs to be accounted for in the standard is the difference that occurs due to the "Offer versus Serve" program. Under "Offer versus Serve," students do not have to take all five components on the menu. According to the Texas Department of Agriculture (TDA) (2005), "Offer versus Serve" is mandated in high school operations in an effort to reduce food cost and is optional in school operations in the lower grades. Depending on the menu planning system being used (i.e., Food-based, or Nutrient Standard), the number of items that a student may choose ranges from two to five items for a reimbursable meal (TDA, 2005). In this case, the school foodservice operator could utilize servings per labor hours as a standard. This approach would adjust the standards for high school students who do not take as many choices as elementary students.

Mayo and Olsen (1987), recommends that 56 to 90 servings per labor hour would be an acceptable range in establishing labor requirements in their findings from a study conducted in 40 schools of the Richmond Public School System. Since the requirements for serving sizes also vary from elementary to high school, this system would also allow for adjustment due to serving size differences (Mayo & Olsen, 1987). Brown and Hoover (1990) feel that servings per labor hour are the best measure of labor productivity because it accounts for more of the identified variables.

Variables that Affect Labor Productivity

Clearly, ME's and productivity standards are a very complex issue. The literature identifies a total of 12 variables that influence the number of labor hours required to produce meals for a school foodservice operation.

Some variables are not always controlled by the foodservice director. One such variable is the number and length of serving periods (Pannell-Martin, 1999). Serving periods are normally established by the school administrator and may not reflect the most efficient use of foodservice resources. In some cases, schools will have long breaks between serving periods, and this can be unproductive time. Also, the number of serving lines in an operation can put a demand on labor during peak times (Kavulla, 1996; Pannell-Martin, 1999). When a large group of students is released at one time, a multitude of serving lines must be open to accommodate that volume of customers. Both of these issues can cause decreases in productivity.

The type of operation can also affect labor needs. For example, labor needs may differ depending on whether the facility has on-site production, a central kitchen, a finishing kitchen or a pre-plate operation (Almanza, Kotschevar & Terrell, 2000; National Food Service Management Institute, 2001; Pannell-Martin, 1999). School districts may utilize one or all of these types of operations, depending on the facilities and resources available. Not only the type of operation, but the equipment available, the floor plan, and the flow of the kitchen can also affect productivity (Campbell, 1985; Pannell-Martin, 1999, Schechter, 1997). In "Offer versus Serve" programs, the number of choices offered to students and the number of items on a lunch tray may vary (Mayo & Conklin, 1999; TDA, 2005). Since "Offer versus Serve" is mandated in high schools but not in other schools, this can cause differences within a school district (TDA, 2005). The size of the operation and types of service (i.e., breakfast, lunch, snacks, etc) can also either increase or decrease the economies of scale in an operation (Hill & Jones, 2001; Martin & Conklin, 1999; Pannell-Martin, 1999; Waldvogel & Ostenso, 1977).

Some variables are under the control of the foodservice director. Menu and the menu cycle length can play a role in productivity as shorter cycles give employees more opportunities for repetition which refines their skills (Yung et al., 1981). Hill and Jones (2001) refer to this as learning effects, in which labor productivity increases over time as individuals learn the most efficient way to perform a particular task. Another variable under the control of the director is the number of choices on the menu. Many Texas school foodservice operations offer several menu choices for students each day. Menus

with no choices will require fewer production hours than menus which require staff to make many small batches of more items (Knickrehm et al., 1981; National Food Service Management Institute, 2001; Pannell-Martin, 1999).

In addition to the menu, the type of foods prepared affects labor requirements. Much time for portioning and preparation can be eliminated with convenience foods (Kavulla, 1996; National Food Service Management Institute, 2001; Pannell-Martin, 1999; Schechter, 1997; Yung, 1981). According to a special report in *Foodservice Director* (2001); seven out of ten foodservice directors reported increases in the use of convenience foods in their operations. Pannell-Martin (1999) recognizes this in her meal per labor hour standards by offering one set of standards for conventional operations and a separate standard for operations using predominantly convenience foods.

The type and skill level of the workforce can also have an effect on productivity. Many districts have hired more part-time employees in an effort to reduce health insurance and other fringe benefits costs (National Food Service Management Institute, 2001; Taylor & Mayeux, 1994). However, a high number of part-time workers may lead to more turnovers and a less experienced workforce causing productivity to be lower, just as training programs for employees may increase productivity (Campbell, 1985; Cluskey & Messersmith, 1991; Pannell-Martin, 1999; Schechter, 1997; Payne-Palacio & Theis, 2005). Ivancevich (2004) maintains that directors must utilize human resource management activities such as training and development of employees in order to increase productivity. In some operations, the manager in charge is a working manager

and his/her labor hours may be included in production hours; however, in other operations the manager may only be expected to supervise (Pannell-Martin, 1999). One will find some school foodservice directors excluding the manager's hours in the total labor hours for the kitchen, while others include a portion or all of their labor hours.

Lastly, the use of disposables as opposed to washing of dishes can greatly affect productivity (Pannell-Martin, 1999). If permanent dishes are used, the time spent washing dishes will differ depending on the level of automation of dish washing and the number of dishes used. Van Nortwick, (2001) reports that by remodeling the existing dish room operation at Baptist Health Medical Center in Little Rock, Arkansas to a variable speed flight-type ware-washer and a pulper, Nutrition Services was able to reduce labor by five full-time employees. Pannell-Martin (1999) also cites a cost comparison for washing dishes versus using disposables in Fairfax County Public School. This study revealed that costs for using disposables were $0.065 less per plate than costs for washing dishes (i.e. labor, detergents, utilities, and equipment replacement), with the majority of this difference being in labor cost.

Utilizing Mail Surveys

In the past few years researchers have seen that response rates to all types of surveys are declining (Brennan, 2004). Andrews et al. (2003) noted that cash incentives could increase the number of responses by twice as much as altruistic motives. Since perceptions of the effort required to complete a survey may also affect response rates (Andrews et al., 2003), it may be beneficial to communicate to the participants the

estimated time to complete the survey. Bright and Smith (2002) also found that a prize drawing and the offer of a summary of the results yielded a quicker and larger response. Shannon and Bradshaw (2002) recommend including a pre-notification letter. Some increase in response rates occurs when invitations and reminders inviting participation are utilized. Brennan (2004) found that including a replacement questionnaire with the second reminder letter produced a quicker response. According to a study by Clark and Kaminski (1990), the most cost-effective approach can be achieved by using a form letter and mailing bulk mail, with an actual stamp on the reply envelope. This type of postage treatment increased the return rate with minimal cost.

Andrews et al. (2003) suggest that the survey be reviewed by knowledgeable analysts to ensure completeness of questions and format appropriateness. A small pilot study to emulate all procedures proposed by the main study is also strongly suggested. Piloting can be critical to perfecting the survey, testing the method for survey distribution and estimating response rates (Andrews et al., 2003).

CHAPTER III

METHODOLOGY

A questionnaire (Appendix A) was developed by the primary researchers in this study to determine the productivity standards used by school foodservice directors. The questionnaire was designed to identify the type of labor productivity standards used and definitions for meal equivalents (ME's). The questionnaire consisted of three sections: school demographics, labor standards, and perceptions of school foodservice directors on the importance of selected variables that may affect labor productivity.

The questionnaire included eight partially open ended questions to allow foodservice directors to contribute additional information, two closed-ended questions with established responses, and 12 questions in which participants were asked to rate on a five-point Likert-type scale the importance of variables related to Offer versus Serve, number of serving lines, length of serving periods, on-site production versus central kitchen operations, differences in equipment, volume of meals produced, length of menu cycle, number of choices, utilization of processed versus convenience foods, the use of disposables, experience of the workforce, and impact of supervisory labor hours. The instrument was reviewed by an expert group of six professionals in the field, and modifications were made based on their comments. Clarity and readability of questions were assessed through a pilot test conducted with 15 North Texas foodservice directors

selected from area foodservice directories. Thirteen responses were received; and as a result of the test, necessary revisions were made to improve readability and clarity.

The Texas Woman's University Institutional Review Board approved the procedures for the study (Appendix B). The consent form was written into the questionnaire as "The return of your completed questionnaire constitutes your informed consent to act as a participant in this research."

The revised questionnaire included questions on school district demographics, education level of the foodservice director, labor standards used, and method to determine labor hours needed for a food production operation. In addition, the questionnaire asked participants to rate the importance of 12 variables affecting labor productivity. For districts utilizing the meals per labor hour standard, participants were asked to define ME's.

A mailing list of all authorized representatives for the National School Lunch and Breakfast Programs in Texas was obtained from the Texas Department of Agriculture. From this list, a random sample of 200 Texas school foodservice directors was drawn. An original cover letter, and the questionnaire with a self-addressed postage-paid return envelope were sent. Approximately three weeks later non-respondents were mailed a follow-up letter, a replacement copy of the questionnaire, and another postage-paid return envelope as suggested by Brennan (2004) to shorten the response time. According to recommendations of Bright and Smith (2002), to increase participation, respondents were entered into a drawing for a $50 gift certificate to a local retail store and offered a

summary of the results. To increase response rates, return envelopes were stamped with a postage stamp as recommended by Clark and Kaminski (1990).

Data was transferred from the questionnaires to data tables for analyses. All tests were done using the computerized statistical package, SPSS version 12.0. The significance value for the tests was $p < .05$. Questions inquiring about the demographic information of the district (question 2, 3, and 4), education level of the foodservice director (question 5), labor standards used (question 6), and how labor is determined (question 7) were summarized with descriptive statistics such as means, standard deviations, and frequency distributions.

Analysis of Variance (ANOVA) was used to determine if size of school foodservice operations was different by the utilization of labor productivity standards. ANOVA was used instead of t tests because of the large distribution in the scores for enrollment and the relatively unequal cell sizes in the independent variable. Nonparametric χ^2 tests of association were conducted to test for the relationship between utilization of labor productivity standards and the education level of the foodservice directors. The most commonly used labor productivity standard was determined through descriptive statistics. Pearson's Product Moment correlations were used to test for significant relationships between the importance variables affecting labor productivity. Answers to questions about the definitions of ME's (questions 20 to 23) were summarized with descriptive statistics.

CHAPTER IV

RESULTS

The purpose of this research was to explore the utilization of labor productivity standards in Texas school foodservice operations. This research sought to determine the most used productivity standards in Texas school foodservice operations and the school foodservice directors' perceptions of how variables may affect labor productivity. From 200 questionnaires mailed, 106 school foodservice directors responded, for a 53% rate of return. However, one questionnaire was discarded because of the respondent's failure to complete 50% of the questionnaire. Usable data from the other 105 questionnaires were summarized and analyzed.

School Demographics

Table 1 summarizes the average enrollment, percentage of free, reduced and paid meals, type of management and education level of directors. Mean district enrollment was 11,292. The sample had great variety in district size as the smallest district in the sample had an enrollment of 102 students while the largest reported an enrollment of 85,000 students. The types of meals served according to payment status were free (48.02%), reduced (11.05%) and paid (40.35%). The economic level of districts varied considerably, as some districts reported as low as 1.2% free students while other districts reported only 1% paid students.

Table 1

Demographic Characteristics of Texas School Districts, Type of Management and Foodservice Director Level of Education

	n	Mean ± SD	Min	Max
Enrollment	102	11,292 ± 15,994	102	85,000
% Free students	100	48 ± 20.4	1.2	86
% Reduced students	100	11 ± 9.6	30	90
% Paid students	100	40.4 ± 21.6	1	98.5

Note: Frequencies not equal to 105 reflect missing data.

Participants were asked if the district foodservice operation was outsourced to a food service management company or self-operated by the district. The majority of the respondents (95.2%), indicated that the foodservice operations were self-operated by the school districts. As shown in Table 2, about one-third of the directors (36 of the 105) had Bachelor's degrees while the remaining participants were almost evenly split among high school/GED (21.9%), some college (21.0%) and a graduate degree (22.9%).

Table 2

Frequencies and Percentages of Type of Management and Foodservice Director Level of Education

	n	%
Type of Management		
Self-Operated	100	95.2
Outsourced	5	4.8
Foodservice Director Level of Education		
High school/GED	23	21.9
Some college	22	21.0
Bachelor's	36	34.3
Graduate	24	22.9

Note: Frequencies not adding to 105 and percentages not adding to 100, reflect missing data.

Labor Productivity Standards Used

As shown in Table 3, the most commonly used labor standard in Texas school foodservice operations was meals per labor hour (MPLH). Seventy-seven of the 102 participants utilized meals per labor hour in their operations. The next most popular productivity standard was labor as a percentage of revenue or sales (%LABOR) with 28 of the school foodservice operations using this standard. Only 11 school foodservice directors chose to utilize servings per labor hour (SPLH) as a productivity standard, and

17 reported that other standards were being used. Other standards reported included sales/revenue per labor hour, plate cost, experience, or that the district establishes number of labor hour . Two participants reported that they "hired what is needed."

One-way Analyses of Variance (ANOVA) were conducted on enrollment between participants who used the various labor standards and participants who did not use the standards (see Table 3). The 77 districts that used MPLH as a standard for projecting labor needs (M = 14,276, SD = 1,950) had significantly greater enrollment than districts that did not use this standard (M = 2,100, SD = 5,657), $F = 12.15$, $p < .01$. The 28 districts that reported using %LABOR (M = 17,053, SD = 22,237) also had significantly greater enrollment than the 74 districts not utilizing this standard (M = 9,112, SD = 12,390), $F = 5.22$, p .05. No differences in enrollment size were found for the use of SPLH and other labor productivity standards. Nonparametric χ^2 tests of association revealed no significant relationships in the education level of the food directors by the utilization of the production standards, $p > .05$.

When asked to report all the ways they determined the labor hours needed in a kitchen, 58.1% participants responded that they use MPLH standards. Forty-three percent of the respondents reported that past experience in foodservice was used to make this determination (See Table 4). Twenty-seven of the participants also reported that they use the same staffing as prior year with no change. Twenty-one of the participants reported using labor cost as a percentage of revenue/sales to adjust or predict labor needs.

Table 3

District Enrollment as Associated with Labor Standards Used by Texas School Foodservice Directors (N=102)

	n	Mean +/- SD	*F*	*p*
Meals per labor hour			12.15	.001
No	25	2,100 ± 5,657		
Yes	77	14,276 ± 17,119		
Labor as a percentage of revenue/sales			5.22	.024
No	74	9,112 ± 12,390		
Yes	28	17,053 ± 22,237		
Serving per labor hour			.172	.679
No	91	11,521 ± 15,989		
Yes	11	9,395 ± 16,690		
Other methods			.884	.349
No	85	10,626 ± 14,127		
Yes	17	14,623 ± 23,514		

Note: One-way Analyses of Variance (ANOVA) were conducted on enrollment between participants who used the various labor standards and participants who did not use the standards.

Definitions of Meal Equivalents

For school foodservice operations that use MPLH, the definition of meal equivalent (ME) is important in order to accurately benchmark and compare data internally and externally. School foodservice directors do not have one consistent

method for defining ME. Therefore, this study collected data on the various methods used by school foodservice directors to convert school breakfasts, a la carte sales, and after school snacks to ME. As shown in Table 5, the most common conversion used for breakfasts was "2 Breakfast = ME" with 43 respondents favoring this definition. Other definitions frequently used were "1 Breakfast = ME" used by 20 respondents or "3 Breakfasts = ME", used by 17 participants.

Table 4

Frequencies and Percentages of Texas School Foodservice Directors Who Used Various Methods to Determine Labor Hours Needed for School Foodservice (N=105)

Method [a]	n	%
From past experience in foodservice	45	42.9
Use meals per labor hour standard	61	58.1
Use labor cost as a percentage of revenue/sales	21	20.0
Use servings per labor hour standard	9	8.6
Use the same staffing as prior year, with no change	27	25.7
Other	12	11.4

Note: [a] Participants were asked to mark all methods that applied.

A la carte ME's were most commonly defined as a ME for every $2.00 of a la carte revenue by 23 of the respondents who converted a la carte items to ME's. The next most frequently used methods to convert a la carte sales to ME's were the free reimbursement lunch rate used by 15 directors and $3.00 of revenue used by 13 directors. Eight directors stated that they used the paying student lunch price to convert a la carte revenue to ME. Seven directors noted that they did not sell a la carte, and therefore this question was not applicable. Of the nine respondents in the "Other" category, two used the adult price and another reported using the paid lunch price plus the reimbursement rate. Others noted an exact money figure that was being used to make this conversion with figures ranging from a low of $1.25 to a high of $2.75 (See Table 5).

Aft r-school nack were added to the National School Lunch Program in 1998, but this study found that about one-half of schools do not participate in the after-school snack program. The majority of respondents who participated in the after-school snack program defined a ME as three snacks or four snacks. Several participants (n = 9) noted that they did not consider snacks in the calculation of ME. However, only two respondents utilized 5 snacks to 1 ME and one participant used 10 snacks per ME. While one participant noted the use of another method, it was not defined. Many participants made comments that they did not participate in the after-school snack program (See Table 5).

Table 5

Frequencies & Percentages of Meal Equivalent (ME) Definitions Used by Texas School Foodservice Directors

	n	%
Breakfast ME (N=83), 1 ME =		
1 Breakfast	20	24.1
2 Breakfast	43	51.8
3 Breakfast	17	20.5
4 Breakfast	1	1.2
Other	2	2.4
A la carte ME (N=71), 1 ME =		
$1.00 of revenue	3	4.2
$2.00 of revenue	23	32.4
$3.00 of revenue	13	18.3
Free reimbursement lunch rate	15	21.1
Paid meal price	8	11.3
Other	9	12.7
After-school snack ME (N=53), 1 ME =		
1 After-school snack	5	9.4
2 After-school snack	2	3.8
3 After-school snack	16	30.2
4 After-school snack	17	32.1
Not included in ME	9	17.0
Other	4	7.5

Importance of Variables Affecting Labor Productivity

The questionnaire asked school foodservice directors to rate the importance of 12 variables that may affect labor productivity. Table 6 shows that the volume of meals produced was considered the most important variable ($M = 4.60$, $SD = .70$). Participants felt that the length of menu cycle ($M = 3.0$, $SD = 1.3$) and number of items offered due to Offer versus Serve ($M = 3.2$, $SD = 1.3$) were the least important variables; however, all variables had a mean greater than 3.0 and thus were perceived as important.

Pearson's Product Moment Correlations were also conducted to test the relationships between size of the school district and the variables affecting labor (See Table 7). A significant, moderate, negative correlation was found between enrollment and variance due to Offer versus Serve (OS), $r(105) = -.329$, $p < .01$, indicating that increased enrollment of a school district was related to lower importance on variances due to OS by the food directors. A significant, weak, negative correlation was also found between enrollment and length of the menu cycle, $r(105) = -.234$, $p < .05$. This result indicates that increased enrollment was related to lower importance on the length of the menu cycle. A significant, moderate, positive correlation was found between enrollment and variance in serving lines, $r(105) = .339$, $p < .01$, indicating that an increased enrollment was related to an increased importance on the variance in serving lines.

Table 6

School Foodservice Directors' Average Importance Ratings of Variables for Staffing a Kitchen

Variables	n	Mean ± SD
Volume of meals produced	105	4.6 +/- 0.7
Equipment available	105	4.3 +/- 0.9
On-site production vs central kitchen	101	4.3 +/- 1.1
Use of processed/convenience foods	105	4.0 +/- 0.9
Experience of workforce	105	3.9 +/- 1.1
Number of menu choices offered	105	3.9 +/- 1,1
Length of serving periods	105	3.8 +/- 1.2
Including supervisory labor	105	3.8 +/- 1.2
Use of disposables	104	3.8 +/- 1.1
Varying number of serving lines	102	3.5 +/- 1.4
Varying items due to Offer vs. Serve	105	3.4 +/- 1.3
Length of menu cycle	104	3.0 +/- 1.3

Pearson`s Product Moment Correlations were also conducted between the variables that affect labor productivity (See Appendix C). Significant, positive correlations were found between variance due to Offer versus Serve (OS) and five other variables, all *r*s, $p < .05$. Those who felt Offer versus Serve was important also felt that length of serving periods, difference in equipment between schools, length of menu cycle, the number of choices offered, and experience of workforce were important. Directors that valued the varying number of serving lines as important also found use of disposables, $r(105) = .303$, $p < .01$, and use of processed/convenience foods $r(105) = .290$, $p < .01$, and volume of meals, $r(105) = .247$, $p < .05$, as important.

The length of the serving periods was also significantly moderately positively correlated with differences of equipment, volume of meals served, length of menu cycle, and the number of choices offered all *r*s > .300, $p < .05$. Moderate correlations were also found between on-site production versus central kitchen and differences in equipment, and volume of meals. Directors who valued differences in equipment also valued volume of meal , length of menu cycle, and number of choices offered. Moderate correlations were present between volume of meals produced and the number of choices offered, use of disposables and experience of the workforce, all *r*s, $p < .05$. The strongest correlation existed between the length of the menu cycle and the number of choices offered, $r(105) = .564$, $p < .01$, however, a moderate correlation also existed between the length of the menu cycle and the experience of the work force. Additional moderate correlations were found between the number of choices offered and the experience of the workforce and

between the use of processed/convenience foods and the use of disposables, all *rs*, $p < .05$, (See Appendix C).

Table 7

Pearson's Product Moment Correlations Between Enrollment and Variables Affecting Labor in Texas School Foodservice Operations

Variables	Enrollment
Variance due to OS	-.329 **
Variance in serving lines	.339 **
Length of serving periods	-.012
On-site vs. central kitchen	.045
Differences in equipment	-.117
Volume of meals	.079
Length of menu cycle	-.234 *
Number of menu choices	-.154
Processed vs convenience foods	.065
Use of disposables	.169
Experience of workforce	-.084
Supervisory labor	-.191

Note: * $p < .05$, ** $p < .01$.

Null Hypotheses

Null hypotheses are as follows:

Null Hypothesis 1. There will be no difference the size of school districts based on utilization of labor productivity standards. Analyses of Variance showed differences in the average enrollment for MPLH and Labor as a percentage of revenue/sales, but not for serving per labor hour and other methods, thus this hypothesis was partially supported.

Null Hypothesis 2. There will be no difference in utilization of labor productivity standards based on educational level of school foodservice directors. Nonparametric χ^2 tests provided upport for this hypothesis

Null Hypothesis 3. There will be no difference between the foodservice directors' perceptions of the level of importance of 12 variables that may affect labor productivity for school foodservice operations. All 12 variables had an importance rating greater than 3.0, thus this hypothesis wa supported.

CHAPTER V

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Summary of Major Findings

The purpose of this research was to explore the utilization of labor productivity standards in Texas school foodservice operations and school foodservice directors' perceptions of how variables may affect labor productivity. Meals per labor hour were found to be the most common labor standard used by foodservice directors in Texas (76%). This upports Johnson and Chambers (2000) findings that meals per labor hour were the most prevalent standard used for benchmarking in a study of college/university, correctional, healthcare and school foodservice institutions. Meals per labor hour and labor as a percentage of revenue were found to be utilized more frequently in the larger size districts. Therefore, the hypothesis that there will be no difference in the utilization of labor productivity standards based on the size of schools districts is rejected. However, no difference in utilization of labor productivity standards based on educational level of school foodservice directors is acceptable as the data showed no difference.

Meal equivalent (ME) conversions were most commonly defined by respondents as: two breakfasts equaling a ME; $2.00 yielding a ME; and four or three after-school snacks equaling a ME. It would appear that about one-half of Texas school foodservice directors are following the recommendations of the National Food Service Management Institute (2001) which recommends that two breakfasts equal one ME. However, it

should also be noted that about one-fifth of respondents reported using three breakfasts per ME which concurs with Pannell-Martin (1999) recommendations. The National Food Service Management Institute recommends that three after-school snacks are equal to one ME, and approximately less than one-third of the directors were using this conversion, which demonstrates that respondents did not consistently follow the National Food Service Management Institute recommendations. To further demonstrate inconsistency, the majority of directors are converting a la carte revenue to ME's by dividing by $2.00. Pannell-Martin's (1999) recommendation of $3.00 of a la carte revenue as equal to a ME was utilized by slightly less than one-fifth of the respondents, and none indicated that they used the recent 2001 recommendation by the National Food Service Management Institute that the free reimbursement rate for a lunch plus the commodity value be equal to a ME. However, about one-fifth of the respondents stated that they used the free reimbursement rate, which would not include the commodity value.

Volume of meals produced was the most important variable affecting labor. Adjusting meals per man hour for volume of meals is recommended by Pannell-Martin (1999), and her recommendations are used by the Texas Comptroller's Office during school performance reviews in Texas. The utilization of processed/convenience foods rather than scratch cooking was also considered to affect labor; this variable is incorporated into Pannell-Martin's recommendations, and one might question whether recognition of this variable has increased the awareness of Texas school foodservice directors. All variables were rated as a 3.0 or higher; therefore, participants felt they

were all important. The hypothesis that there would be no difference between the foodservice directors' perceptions of the level of importance of 12 variables that ay affect labor productivity for school foodservice operations was found acceptable.

Results showed districts with a smaller enrollment valued the importance of varying items due to use of the Offer versus Serve option while districts with larger enrollment attached greater importance to varying number of serving lines. This may be due to the fact that larger districts are likely to have more serving lines than smaller districts. Directors who valued the importance of the use of disposables on labor also felt that the use of processed or convenience food was important. Length of the menu cycle had the strongest correlation with the number of choices offered, but also correlating with the number of choices offered were the experience of the workforce, volume of meals produced, and varying items being offered due to offer versus serve. Directors who felt that the volume of meals produced affected labor also strongly believed that on-site versu central kitchen operations, differences in equipment, and the number of choices offered were important. In addition, varying items due to offer versus serve was correlated with the length of the menu cycle and the experience of the workforce.

Conclusions

From this study, one can conclude that the approximately three-fourths of Texas school foodservice directors who are utilizing MPLH use a variety of definitions of a ME and that this is likely to impede accurate external benchmarking among districts. However, since standards and definitions would be consistent within the district, MPLH

could still be a valuable tool for internal benchmarking. This could include measuring productivity between individual school operations within a district and comparing productivity for different time periods.

This study shows that the variables that are identified in the literature as affecting labor are con idered important by school foodservice directors and that inter-relationships are sometimes complex. An example of how these variables are interrelated would be breakfast served in the classroom, which has become a trend in the last few years. This type of operation could involve the use of convenience foods and processed foods versus items that are mad from scratch. Many schools are preparing meals from pre-made individually wrapped items to reduce labor in preparation and compensate for the labor needed for packing and delivering to the classrooms. The volume increase that occurs when all tudent receive breakfast meals in the classroom can cause an on-site operation to resemble a central kitchen as staff prepare breakfast menu items for classroom delivery. It is obvious that th effects of these variables are related. These variables do affect labor requirements, and foodservice directors should consider them as much as possible when making future plans.

For external benchmarking to be effective, a common definition of ME's will be necessary. Thi may be difficult as the various menu planning systems for the National School Lunch allow for the meal pattern to be met by varying number of items (2 to 5) and the implementation of Offer versus Serve. Therefore, one could conclude that use of servings per labor hours as recommended by Mayo and Olsen (1987) would eliminate

this variable (Brown & Hoover, 1990). However, servings per labor hours are not widely used in Texas, as only 11 reported its use. The data collection for servings per day is more cumbersome than collecting the number of meals. The National School Lunch Program requires that meal data be summarized each day and collected centrally in a district, while records showing the amounts of food served are only required to be maintained at the school sites. This additional data collection may be a hindrance to the use of the standard of servings per labor hour. Under this method, variances prevalent due to meal pattern and offer versus serve would be removed.

Recommendations

Through additional study, one could identify benchmark standards for ranges of serving volume and vary the standards for scratch operations, the utilization of processed or convenience foods, and disposables. The challenge remaining would be to address the variable of equipment available, the experience of the workforce, and the number of serving lines. It would also be important to determine and provide direction on whether upervising labor was to be included. With further research, a standard could be developed that accounts for a majority of variables so that external benchmarking could provide accurate comparisons.

In summation, there seems to be little consistency in current use of productivity standards and definitions of ME's by Texas school foodservice directors. This indicates that school foodservice directors should be cautious about using productivity standards for external benchmarking. However, school foodservice directors can still utilize

standards to provide valuable information to assist them in projecting labor needs, making decisions about productivity, and holding employees accountable for their use of time within the district. When benchmarking with others, school foodservice directors should remember that it is critical that they take into consideration variances in the definitions for ME's.

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APPENDIX A

Questionnaire

THE RETURN OF YOUR COMPLETED QUESTIONNAIRE CONSTITUTES YOUR INFORMED CONSENT TO ACT AS A PARTICIPANT IN THIS RESEARCH.

Thank you for taking the time to complete this survey. If you would like a copy of the results, please provide and email address or physical address, and a summary will be sent to you as a "thank you" for your participation.

Address: _____ or email: _____

_____

Tell us about your district:

1. District Name: _____

2. What is the approximate student enrollment in your district? _____

3. What is your percentage of Free, Reduced and Paid students?
   - O Free _____%
   - O Reduced _____%
   - O Paid ___%

4. Who manages your food service operation?
   - O Self-operated by the district
   - O Outsourced to a contract management company or managed by a contract management company.

5. What is the highest level of education achieved by the Food Service Director?
   - O High School Diploma/GED
   - O Some College hours
   - O Associate's Degree
   - O Bachelor's Degree
   - O Graduate Degree

Tell us about your labor.

6. Which of the following labor standards have you used? (You may mark more than one)
   - ○ Meals per labor hour
   - ○ Labor as a percentage of revenue/sales
   - ○ Serving per labor hour
   - ○ Other, please describe: _____

7. How do you determine how many labor hours are needed in your kitchen(s)? (Mark all that apply)
   - ○ From past experience in foodservice
   - ○ Use meals per labor hour standard
   - ○ Use labor cost as a percentage of revenue/sales as a guide
   - ○ Use servings per labor hour standard
   - ○ Use the same staffing as prior year, with no change
   - ○ Other, please describe: _____

Please give us your opinion as to how important the following issues are in staffing a kitchen. Circle the appropriate number between 1 and 5; with "1" being Not Important and "5" being Very Important.

8. The number of items students take per tray due to Offer vs. Serve

Not Important				Very Important
1	2	3	4	5

9. Varying number of serving lines from one school to another

Not Important				Very Important
1	2	3	4	5

10. Length of serving periods.

Not Important 1	2	3	4	Very Important 5

11. On-site production versus a central kitchen operation.

Not Important 1	2	3	4	Very Important 5

12. Equipment available at each location.

Not Important 1	2	3	4	Very Important 5

13. The volume of meals produced.

Not Important 1	2	3	4	Very Important 5

14. Length of menu cycle.

Not Important 1	2	3	4	Very Important 5

15. The number of choices offered on the menu.

Not Important 1	2	3	4	Very Important 5

16. Utilization of processed/convenient foods rather than scratch cooking

Not Important				Very Important
1	2	3	4	5

17. Utilization of disposable versus washing dishes.

Not Important				Very Important
1	2	3	4	5

18. Experience of workforce

Not Important				Very Important
1	2	3	4	5

19. Including supervisory labor hours in total hours?

Not Important				Very Important
1	2	3	4	5

If you use the meals per labor hour standard, please answer the following questions 20-22.

20. How do you define a meal equivalent for breakfast?
    - ○ 1 Breakfast = Meal Equivalent
    - ○ 2 Breakfast = Meal Equivalent
    - ○ 3 Breakfast = Meal Equivalent
    - ○ 4 Breakfast = Meal Equivalent
    - ○ Other. Please describe _____

21. How do you define a meal equivalent for a la carte sales?
    - ○ $1.00 of a la carte revenue = Meal Equivalent
    - ○ $2.00 of a la carte revenue = Meal Equivalent
    - ○ $3.00 of a la carte revenue = Meal Equivalent
    - ○ The amount of free reimbursement rate for lunch of a la carte revenue = Meal Equivalent
    - ○ Other. Please describe _____

22. How do you define a meal equivalent for after-school snacks?
    - ○ 1 After-school Snacks = Meal Equivalent
    - ○ 2 After-school Snacks = Meal Equivalent
    - ○ 3 After-school Snacks = Meal Equivalent
    - ○ 4 After-school Snacks = Meal Equivalent
    - ○ Other. Please describe _____

Thank you for your time; you will be entered for a drawing for a $50.00 gift certificate to Barnes & Noble Bookstores upon returning this survey.

Please return in the enclosed postage paid envelope or to:

Texas Woman's University
Department of Nutrition and Food Sciences
P.O. Box 425619
Denton, TX 76204-9982
ATTN: Labor Productivity Study

APPENDIX B

TWU Institutional Review Board Approval Letter

TEXAS WOMAN'S UNIVERSITY
DENTON DALLAS HOUSTON

Institutional Review Board
Office of Research and Sponsored Programs
P.O. Box 425619, Denton, TX 76204-5619
940-898-3378 Fax 940-898-3416
e-mail: IRB@twu.edu

September 26, 2005

Ms. Allison Rachelle Fowler
590 Briarcliff Dr.
Garland, TX 75043

Dear Ms. Fowler:

Re: Labor Productivity Standards in Texas School Foodservice Operations

The above referenced study has been reviewed by the TWU Institutional Review Board (IRB) and was determined to be exempt from further review.

If applicable, agency approval letters must be submitted to the IRB upon receipt PRIOR to any data collection at that agency. Because you do not use a signed consent form in your study, the filing of signatures of participants with the TWU IRB is not required.

Another review by the IRB is required if your project changes in any way, and the IRB must be notified immediately regarding any adverse events. If you have any questions, feel free to call the TWU Institutional Review Board.

Sincerely,

Dr. David Nichols, Chair
Institutional Review Board - Denton

cc. Dr. Carolyn Bednar, Department of Nutrition & Food Sciences
Graduate School

APPENDIX C

Pearson's Product Moment Correlations

Correlations between Variables Affecting Labor in School Foodservice Operations

Variables	Variance due to OS	Variance in serving lines	Length of serving periods	On-site vs central kitchen	Differences in equipment	Volume of meals	Length of menu cycle	Number of menu choices	Processed vs convenience foods	Use of disposables	Experience of workforce
Variance due to OS											
Variance in serving lines	-.048										
Length of serving periods	.323**	.146									
On-site vs. central kitchen	.202*	.090	.124								
Differences in equipment	.331**	.189	.376**	.383**							
Volume of meals	.232*	.247*	.367**	.492**	.445**						
Length of menu cycle	.483**	-.138	.377**	.188	.375**	.296**					
Number of menu choices	.412**	.120	.343**	.193	.328**	.445**	.564**				
Processed vs convenience foods	.151	.290**	.126	.134	.119	.219*	.073	.200*			
Use of disposables	.095	.303**	.214*	.222**	.175	.335**	-.021	.179	.508**		
Experience of workforce	.465**	.051	.279**	.155	.292**	.317**	.362**	.495**	.192*	.228*	
Supervisory labor	.240*	.089	.272**	.088	.214*	.158	.216*	.152	.226*	.235*	.164

Note: * $p < .05$, ** $p < .01$.