PRODUCTIVITY AND PERFORMANCE MEASUREMENT IN HOSPITAL FOODSERVICE

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CHAPTER I

INTRODUCTION

According to Peter Drucker (1973), we live in an institutional society where everything from healthcare to our nation's defense is entrusted to large public service organizations. In fact, the growth of the service industry as a whole has surpassed even that of the goods-producing sector. For the first time in 1983, Gross National Product figures showed services (50% of the GNP) ahead of goods and manufacturing (41% of the GNP). Likewise, the service industry has become the largest employer of labor, with private sector services alone employing approximately 50% of the workforce in 1982 (Patton & Reilly, 1987). One would expect such a strong and expanding sector of the economy to be equally sound in its annual productivity rates; the facts, however, prove that quite the contrary is true. The American Productivity Center's average annual percentage rates of change from the 1979-1985 period report the service industry to have a total factor productivity rate of -0.1, a capital/labor ratio of 1.3 and a real product/labor hour ratio of 0.4. These results can be compared to the same figures, respectively, from the business sector: 0.5, 1.9 and 1.1 (Kendrick, 1987). This discrepancy clearly points out a major existing problem within the service industry: poor productivity.

Drucker (1973) states that all operations, whether producing tangible or intangible products, must be managed as a business with

clearly defined goals and objectives. While this is true with regard to some service operations, others such as non-profit institutions, do not fit into the business scenario quite as easily. They have different values, goals and expectations. The healthcare industry is a prime example of this ambiguity. Although both non-profit and for-profit hospitals exist, total services provided by the private healthcare sector were estimated at 141 billion dollars in 1984. Today, the hospital as a unit is continuing to expand and increase its support of auxiliary services and programs in order to compete with other facilities. Customer satisfaction has become a primary goal and larger numbers of hospital employees are joining the ranks of professional and managerial staffs in order to ensure that facilities are properly directed, automated and controlled. At the same time, the potential customer, or patient, is beginning to take responsibility for his own health and becoming more aware of available options. In response, hospitals are expanding their marketing techniques and contracting many of their in-house services to outside companies who are specialists in various support areas. The foodservice division is one of these - a service within a service and a business within a non-profit organization-turned business (Kahl & Clark, 1986).

It is no wonder that a productivity problem exists amidst all of the defining and re-defining of roles. Foodservice managers running their operations within the constraints of hospital structure and administration have a difficult task at hand. They must be productive to prove their departmental worth to the hospital as a whole, yet the definition and measurement of foodservice output is often vague. In an industry traditionally classified as service oriented, the benefits

of work measurement and industrial engineering techniques have not been utilized as they have in manufacturing and other goods-producing industries. At the same time, the healthcare environment is often segmented in such a manner that little contact exists between departments, and accountability is not clearly defined. In other cases, dual lines of authority exist which may undermine a manager's control over his employees (Fottler, 1987).

Due to a combination of these characteristic organizational problems, hospital foodservice has a reputation for being unproductive and cost-inefficient, accounting for five to seven percent of the facility's total operating costs. A majority of hospital foodservices are reported to use just 30 to 40 percent of their total departmental capacities for patient-meal preparation (Super, 1987).

According to Drucker's (1973) philosophy, the root of the problem can be traced to a managerial level and can be corrected by doing the following: 1) defining the business and its operations; 2) establishing clear goals and objectives; 3) setting priorities and targets for achievement and making employees aware of accountability; 4) defining performance measures; 5) establishing a system for generating feedback; and 6) updating, reorganizing and reviewing. Since the service industry is reliant upon the theory of management for performance, it is important for foodservice managers to be aware of the basic components that contribute to a company's overall performance, and how to evaluate them accurately. Sink (1983) clearly defines performance as consisting of seven criteria: effectiveness, efficiency, quality, quality of work life, innovation, productivity and profitability. By developing a standard system of measurement and analysis for each of these criteria

and comprehending the interrelationships between them, foodservice directors can begin to increase productivity rates within their respective operations.

Problems do exist, however, that may impede the transition from low to high quality performance levels within the foodservice industry. A series of research studies were performed by Oklahoma State University's Department of Food, Nutrition and Institution Administration in an attempt to determine the amount of correct information foodservice managers actually have regarding productivity and performance rates, and how this information is utilized in their day-to-day operations. In 1982, a study by Robertson found that although managers were measuring inputs and outputs, few were aware of what they were measuring or the difference between productivity and other components of performance. Six similar studies were since conducted by Shaw, 1983; Lamb, 1984; Pickerel, 1984; Putz, 1985; Nazarieh, 1986 and Lischke, 1986 in which various sectors of the foodservice industry were targeted, but specific performance criteria were clearly defined. Again, in many cases, standard performance ratios were unfamiliar or misunderstood by foodservice operators. Low response rates to survey instruments asking for basic productivity and performance information indicate a need for further research into this very important area. It is clear that a standard measurement of organizational performance must be developed whereby all foodservice managers can evaluate their departmental trends in the same manner. A knowledge and communication gap exists within the foodservice industry. Strengthening the backgrounds of hospital foodservice directors in the area of performance components and measurement techniques is one way to bridge this gap.

Purpose

The purpose of this study is to expand upon research previously conducted at Oklahoma State University to standardize and evaluate performance measures in hospital dietary departments. To result in a more accurate sampling of the total population, participating hospitals will be selected from three categories: 1) government sponsored, non-federal, non-profit; 2) non-government, non-profit, and 3) investor owned, for-profit. So that hospital size will not be a limiting factor, any facility fitting into one of the above categories and having over 100 beds will be an eligible member of the population.

This study is an attempt to isolate three of the most basic, and believed to be readily used, ratios of performance measurement in foodservice. Results from the computation of these ratios will be analyzed over a two-quarter period to identify possible trends in performance measurement over time. By using these same formulas and taking into consideration the variables and conditions present within their own facilities, foodservice managers will be able to use this study as a model for analysis of individual departmental performance trends.

Objectives

The objectives for this research are:

1. To measure three specific performance ratios over a period of time.

2. To expand upon the relationship between productivity and the six other performance measures: effectiveness, efficiency, quality, quality of work life, profitability and innovation.

3. To relate progressive developments in the healthcare industry to a need for optimum performance in the foodservice division.

4. To enable foodservice managers to identify trends in their own organizational performance over time.

5. To identify problem areas in organizational performance measurement and provide possible solutions which will help improve these conditions.

Hypotheses

The hypotheses for this study are:

H_1: There will be no significant association between the utilization of performance ratios (survey part II, sections A and B) and selected personal variables:

a. Age
b. Educational background
c. R.D. registration status
d. Route to ADA membership
e. Position title
f. Salary
g. Number of years in foodservice management

H_2: There will be no significant association between the utilization of performance ratios and selected institutional variables:

a. Hospital affiliation
b. Type of medical service provided
c. Type of facility
d. Size of facility
e. Facility location
f. Type of foodservice management

H_3: There will be no significant association between the utilization of performance ratios and the training received in productivity measurement.

H_4: There will be no significant association between the utilization of performance ratios and the type of hospital control.

H_5: There will be no significant association between the frequency and type of performance measures (survey part III, sections A, B and C) and selected personal variables stated in H_1 and H_3.

H_6: There will be no significant association between the frequency and type of performance measures and selected instituional variables stated in H_2 and H_4.

Assumptions and Limitation of the Study

1. Hospital foodservice managers surveyed will have enough knowledge of performance measures to accurately respond to the questionnaire.

2. The respondents will be cooperative and/or interested enough in the subject matter to complete and return the questionnaire.

3. The respondents will provide objective and honest answers based upon factual knowledge of their departmental operations.

4. Hospital foodservice managers will have access to the type of information requested and the time necessary to complete the questionnaire.

A limitation of this study is that the sample size selected may not be representative of the total population.

Definition of Terms

ADA: (American Dietetic Association) A professional organization

responsible for establishing education and supervised clinical experience requirements and standards of practice in dietetics (American Dietetic Association Reports, 1981); its primary mission is to promote optimal health and nutritional status for the population (Winterfeldt, 1987).

AHA: American Hospital Association

DRG's: (Diagnostic Related Groups) A program enacted by the Health Care Financing Administration of the federal government in order to help define the types of patients treated in hospitals and to develop expected standards for hospital admissions, lengths of stay and fixed Medicare/Medicaid payments (Chernow, 1986).

Effectiveness: Doing the right things (Drucker, 1974) or a measure of achievement against preset goals (Kinlaw, 1986-87).

Efficiency: Doing things right (Drucker, 1974) or the ratio of resources expected to be consumed to resources actually consumed (Sink, 1985).

Entrepreneur: A "self-starter," or individual who goes into business or various other endeavors for himself/herself and is willing to take the necessary personal risk involved (Ross, 1987).

Foodservice System: The methodology used to prepare, assemble and deliver food to the consumer (Lischke, 1986).

Innovation: The generation, acceptance and implementation of new ideas, processes, products, or services (Kanter, 1983).

Intrapreneur: A "corporate entrepreneur" (Ross & Unwalla, 1986), or one who operates within a company to seek opportunity by deliberately risking the introduction of change and/or improvements (Ross, 1987).

JCAH: Joint Commission on Accreditation of Hospitals.

JCAHO: Joint Commission on Accreditation of Healthcare Organizations.

Multi-factor Productivity Ratio: A measure of productivity which reflects changes in the use of many factors of production (materials, labor, capital and energy) per unit of output over time (Mark, 1986; Sourwine, 1985). A ratio which includes some or all of the outputs and some of the inputs (Swaim & Sink, 1983).

Partial Factor Productivity Ratio: A productivity ratio which includes some or all of the outputs and only one type of input (i.e. labor productivity) (Swaim & Sink, 1983).

Performance: Determined primarily by ability and motivation and the environmental factors that affect these two criteria (Cummings & Schwab, 1973). The outcome of the combined functions of innovation, effectiveness, efficiency, productivity, profitability, quality and quality of work life (Sink, 1985).

Productivity: The ratio of quantities of output to quantities of input; accomplishments of an organization as a function of the resources consumed or utilized to produce those accomplishments (Tuttle, 1986).

Productivity Index: Successive productivity measurement, usually in the form of a percentage difference between measurements for two periods. The index reveals a change in productivity over time (Swaim & Sink, 1983).

Productivity Measurement: The selection of physical, temporal and/or perceptual measures for both input and output variables and the development of a ratio of output measure(s) to input measure(s) (Sink, 1980).

Productivity Ratio: The comparison of two variables of single parameters (i.e. labor and labor, hours and hours), or of several

parameters such as net outputs when several inputs are required (Mali, 1978).

Profitability: Various financial measures that relate total revenues to total costs (Sink, 1985), or assess the attributes of financial resource utilization (Tuttle, 1986).

PPS: (Prospective Payment System) A program used by Medicare for the purpose of reducing the average length of hospital stay by requiring hospital financial management to measure its clinical productivity in terms of the end result of each case, and the cost of the full provision of patient services necessary to achieve that result (Smith & Smith, 1985).

Quality: The degree of the system's conformance to requirements, specifications and expectations (Sink, 1985). At the consumer level it indicates fitness for use (Juran & Gryna, 1980), and is a key attribute for customer evaluation of products or services (Shetty, 1987).

Quality of Work Life: Work with meaning (Mali, 1978). A state of mind/consciousness affected by a composite of factors on the job which give a sense of purpose, usefulness and responsibility to the efforts of employees (Bennett, 1983).

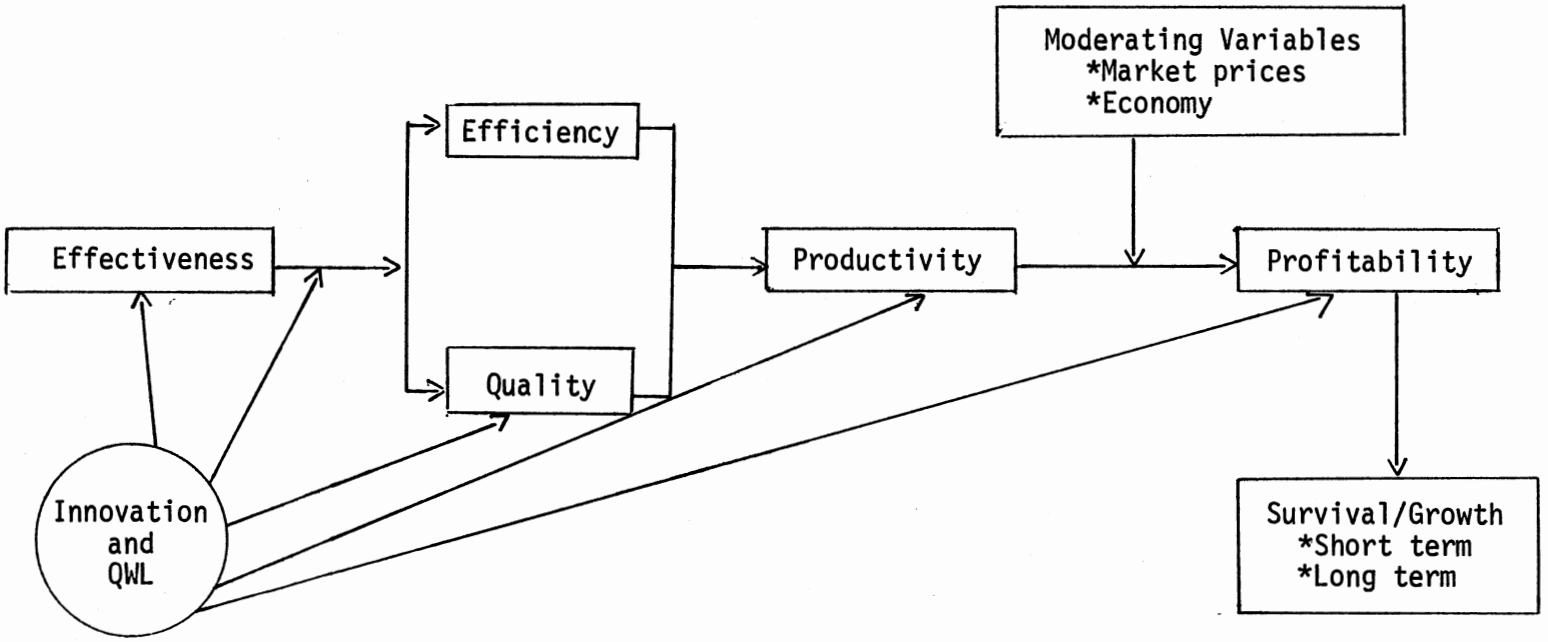
Surrogate Productivity Measures: Substitute performance measures which are highly correlated with productivity (i.e. efficiency, effectiveness, profitability, quality, quality of work life, innovation) (Swaim & Sink, 1983).

CHAPTER II

REVIEW OF LITERATURE

The terms production, productivity and performance, although often used interchangeably, represent separate concepts. Production refers solely to units of output or accomplishments, while productivity goes one step further by analyzing the relationship between input and output (Lippert, 1986). Performance is the most comprehensive of the three, taking into account the many criteria that affect an industry's operations and means of measuring the success of those operations (Tuttle & Romanowski, 1987). Productivity, then, is just one of the seven "performance indicators" defined by Somers, Locke, & Tuttle (1987) to be "tools for telling whether and to what extent key results are being achieved" (p. 135). The other six include: effectiveness, efficiency, quality, quality of work life and innovation.

It is important to note that the seven criteria of performance measurement are interrelated. Although measured and analyzed separately, organizational outcomes for each criterion must be combined in order to assess "the total picture." This interrelationship is accurately depicted in Sink, Tuttle, and DeVries' (1984) causal relationships between the seven basic performance criteria (Figure 1). From the diagram, it can be deduced that each criterion affects the others in some way, either by direct or indirect means.



From "Productivity Measurement and Evaluation: What is Available?" by D. S. Sink, T. C. Tuttle, S. J. DeVries, Summer, 1984, National Productivity Review, p. 268

Figure 1. Causal Relationships Between the Seven Basic Performance Criteria

According to Sink, Tuttle, and DeVries (1984) effectiveness, efficiency and quality appear to be the most elemental of the seven, effecting a wide range of industrial settings and forms the "groundwork" for performance analysis. Of these, effectiveness is viewed as most important due to its emphasis on output, or ideal vs. actual results. Efficiency follows a similar pattern, but focuses on inputs (resources) when comparing actual vs. expected; quality control looks at both input and output in terms of making improvements. Productivity also assesses outputs and inputs, but in comparison to one another (output/input) as a means to integrate effectiveness, efficiency and quality. Both quality of work life and innovation are also important in that they can affect each of the other five criteria in a positive or negative fashion. Last of all, there is profitability, one of the most visible and concrete performance indicators; it compares allocated funds with funds actually utilized by the operation (Sink, Tuttle, & DeVries, 1984).

Each type of business or industry does not view performance measurement techniques in the same manner. White-collar organizations, for example, may express greater concern over efficient resource utilization and customer satisfaction than rate of production (Sourwine, 1985). For this reason they tend to emphasize efficiency, productivity and quality, and are known as direct outcome systems. Traditional blue-collar, or indirect outcome systems, initially emphasize effectiveness and quality due to the complex variety of outcomes associated with production. In this case, the operator must be concerned with producing the correct output before focusing on improved efficiency (Tuttle & Romanowski, 1987).

The process of organizational assessment can assist in determining the emphasis of a particular operation. This begins with careful analysis of strengths and weaknesses to correctly isolate areas in need of improvement. Company goals and objectives must also be identified in order to determine the most appropriate route to success. Employee input in the data collection/feedback process is a vital component in providing honest evaluation and company-wide support in the program. It can also be helpful in identifying the specialized needs of direct and indirect outcome systems (Whitney, 1987; Wiley & Campbell, 1986-87).

Various performance and productivity assessments specific to the foodservice industry have been initiated by researchers at Oklahoma State University. The first of these was performed by Robertson in 1982 in an attempt to identify partial factor productivity measures used by managerial dietitians in health care systems. Results revealed a poor understanding of productivity among respondents. Forty-four percent stated they were using productivity ratios, although few indicated a true ratio. (Out of 740 responses, only 72, or 9.7 percent, were true measurements of productivity.) Likewise, many respondents provided standard productivity ratios as answers to questions in other categories. These surprisingly negative results revealed a need for further research into the area of productivity and performance measurement. A series of six follow-up studies were performed in an attempt to separate productivity from other performance measures, and to assess the importance of each criterion as utilized in various foodservice operations. These studies included: Shaw (1983) Measuring productivity and six other performance criteria in health care delivery systems; Lamb (1984) Productivity, profitability and efficiency as performance

measures in restaurants; Pickerel (1984) Effectiveness, quality, quality of work life and innovation as performance measures in restaurants, Putz (1985) Productivity and other performance measures in college and university foodservice; Lischke (1986) Assessment of productivity and related performance measures in hospital foodservice systems; and Nazararieh (1987) Productivity and performance measures in school foodservice.

Table 1 lists a summary of the seven criteria numerically ranked in order of importance and amount of time dedicated to each by the respondents in the studies. Note that each category of research findings ranks quality first in terms of both time and importance. This is an expected outcome in the field of foodservice, which is primarily concerned with customer satisfaction through presentation of good quality products. Similarly, productivity is ranked second in all but two studies, indicating a growing trend toward utilization of output/input ratios and more accurate measurement techniques. Efficiency and effectiveness vie for the third and fourth positions, followed in most cases by quality of work life and innovation. Profitability is ranked lowest on the scale of importance in all but two studies dealing with restaurants and more recent surveys of health care facilities. This may be explained by the traditional profit versus non-profit operational status. Since most restaurant owners view success in terms of revenue, this outcome is not surprising. A residual effect may also be present in Lischke's 1986 study of health care foodservice systems. Many of these operations, although functioning within non-profit institutions, are becoming more aware of profit generation through catering, hospital restaurants, bake shops and similar innovative strategies.

TABLE I

PERFORMANCE CRITERIA RANKING FROM OKLAHOMA STATE UNIVERSITY

Criteria	Shaw, 1983 Health Care Foodservice		Pickerel, 1984/ Lamb, 1984 Missouri Restaurants		Putz, 1985 College and University Foodservice		Lischke, 1986 Hospital Foodservice Systems		Nazarieh, 1987 School Foodservice	
	Time	Importance	Time	Importance	Time	Importance	Time	Importance	Time	Importance
Quality	1	1	1	1	1	1	1	1	1	1
Productivity	2	2	3	3	2	2	2	2	2	2
Efficiency	3	3	4	4	3	4	3	4	4	4
Effectiveness	4	4	5	5	4	3	4	3	3	3
Quality of Work Life	6	5	7	7	7	6	7	6	7	5
Innovation	5	6	6	6	5	5	6	7	5	6
Profitability	7	7	2	2	6	7	5	5	6	7

Time = Time spent in evaluation

Importance - Importance to the operation

From "Assessment of Productivity and Related Performance Measures in Hospital Foodservice Systems by M. K. Lischke, 1986, unpublished master's thesis, Oklahoma State University.

The results of these studies contradict the beliefs expressed by Sink, Tuttle, and DeVries (1984) ranking effectiveness as the most important of the seven criteria. It is also evident that out of the six studies performed, only the first correlates with Tuttle and Romanowski's (1987) expectations for a direct outcome system.

Some of the most recent research done by Lischke (1986) attempted to synthesize information from the previous studies into 13 standard performance ratios. Respondents were required to provide numerical data for each of these ratios over specified annual and quarterly time periods, in addition to information pertaining to the various performance measures. These results were to be utilized in the development of a model which could assist foodservice directors in monitoring and evaluating their own performance trends. Due to a low response rate and lack of productivity training among foodservice directors, additional research is required to validate existing ratios, and further educate foodservice personnel with regard to more accurate analysis of performance trends.

To clarify and expand upon recent developments in the area of performance measurement, a more detailed discussion of the existing seven criteria follows.

Profitability

Profitability can be defined as "a measure or set of measures that assesses the attributes of financial resource utilization" (Tuttle, 1986, p. 12); in the public sector it is referred to as budgetability. According to a simplified version of the economic trade-off model, total revenue minus total costs equals profits. Therefore, any profit-

oriented industry should support those policy changes that increase the gap between revenue and costs, generating incremental benefits faster than incremental costs. This action increases profit and consequently, corporate value (Everett, 1987).

Concentration, or market share, is one indicator of profitability that has been proven statistically in the literature. Several economists have noted a special relationship between profits, increased market share and the high degree of efficiency present in larger U. S. firms (Allen, 1983). Techniques as simple as packaging design have been successfully employed by companies such as Heinz, whose customers pay 12 percent more for ketchup in "squeezable" as opposed to glass jars. These tactics, along with expansion of product lines, product impact, and distribution have simultaneously led to increased market share and profitability (Gershman, 1987). ADV, or added value, should be mentioned briefly in conjunction with these objectives, as ADV emphasizes the creation of wealth through effective use of labor, capital and equipment. Although in theory this appears to be a useful economic technique, ADV attempts to increase profits through increased sales without increasing the commitment to reward labor, capital or equipment. In reality, this can only be applied in instances where a company's growth prospect is high or when opportunity exists to increase market share without raising internal costs. Since ADV also supports the reduction of bought-out items, a company would have to produce most goods and services internally without any increase in labor or equipment costs. For these reasons, this theory has not received considerable support in the United States (Bhattacharya, 1986).

In recent years, U. S. marketing strategy has favored a "back to basics" approach aimed at increasing market share by lowering operating costs, passing these savings on to the consumer and thereby increasing sales volume (Cummings & Metzger, 1987). Managers are encouraged to offer "more for less," or devise improvements that will raise profitability without inconvenience to customers or employees (Stankard, 1986). Such activity also leads to productivity improvement when resource utilization is increased and the same number of products can be made with less raw material (i.e. stable output, decreased input) (Miller, 1984). Automation through company investment in labor-saving equipment is one such approach found to lower break-even output levels by providing faster and better product delivery (Conine, 1986).

Cost cutting through a variety of different techniques has definitely proved to be an important part of business strategy in the 1980s. In many instances where poor profitability is already a problem, managerial and price changes, quality control, advertising to emphasize special features or service guarantees, and similar tactics are employed (McComas, 1986; Stankard, 1986). In other situations, cost control committees are created to involve employees in the decision making process by making them responsible for their own areas. In this way, managers hope to increase employee awareness of high costs, increase efficiency and decrease waste ("Cost Control," 1987).

In recent times, the profitability of many companies has also been affected by increasing health care expenses. In 1984, these costs amounted to $387.4 billion nationwide and governmental legislation has since placed even more of the health care responsibility with the employer (Billet, 1986).

Today, in response to the Health Care Financing Administration's initiation of DRG's, the doors have opened to a more competitive health care industry. DRG's, or diagnostic related groups, were devised to establish a fixed prospective payment system based upon the category of services rendered, rather than length of stay. This system forced both providers and recipients to evaluate quality, appropriateness and cost of service (Chernow, 1986). It also increased the demand for HMO's (health maintenance organizations) and PPO's (preferred provider organizations) which provide comprehensive health care to employees for a prepaid fee. At first these organizations were highly regulated, but as federal restrictions slowly diminish, more flexible, mutually beneficial relationships are developing between HMO's and private employers. It is possible in many cases for both to achieve their objectives: low cost health care for employers and expanding market shares for the provider (Billet, 1986).

While the expansion and diversification of the health care industry is profitable for many HMO's, this is not necessarily the case for all health care providers. Modern Healthcare's survey of multi-unit providers indicated a 47.1 percent profit loss among participating agencies in 1986 (Bell, 1987). Not-for-profit hospitals in particular have suffered from a DRG-related decrease in overall admissions and patient days and insufficient reimbursement by Medicare. These changes, in conjunction with the increasing cost of health care and competition from PPO's/HMO's have resulted in the economic failure of some hospitals and the mergers of many others (Greene, 1987). Long term goals established by the industry to combat these problems include: 1) domination of certain segments of the health care market in each community,

2) the establishment of close working relationships with employers and various medical groups, 3) achievement of consumer and employee loyalty through the development of high quality services and quality of work life, and 4) a goal to serve all patients equally, regardless of their financial status (Johnson, 1987).

The existing situation is present not only among hospitals, but in many sectors of the service industry as well. In 1985, 41 companies on the Fortune Service 500 lost money, 11 more than in 1984. Revenues increased in many companies that, at the same time, were unable to raise prices enough to generate profit (Moore, 1986).

Food and nutrition services seem to be playing an increasingly important role in raising profitability levels in the health care sector of the service industry. Hospitals using only 30-40 percent of their foodservice departments may soon be expanding due to the realization that positive nutritional support decreases average length of stay, which can actually increase marginal profitability through more productive use of bed capacity (Smith & Smith, 1985). This cost reduction in a not-for-profit setting achieves even greater importance through its addition to operating income (Hull, 1987). In an average non-profit institution with an income of 2.5 percent of revenue, $40,000 of additional revenue is required to match the profit from only $1000 in cost savings $\frac{(\text{cost savings})}{(\text{income/revenue})}$ (Smith & Smith, 1985). These findings can be used to justify the economic benefits of nutrition services.

Other foodservice expansion programs initiated by health care facilities have also been effective in improving the level of service,

quality and profitability. Baptist Medical Center in Oklahoma City provides one example, with earnings of $60,000 in 1985 from the sales of breads and specialty bakery items to a nearby hotel. Other hospitals are adding delicatessens, expanding and contracting catering services, selling meals to the homebound, offering senior citizen specials and even developing their own lines of nutritious frozen foods (Super, 1987).

The new financial manager must be aware of not only techniques to increase company profits, but also the connection to productivity. Changes in productivity of various operations can be compared to related variable costs to determine useful methods for creation of financial gain. These activities can help to maintain a "competitive edge" in almost any industry (Kohlman, 1985).

Quality of Work Life

Simply stated, quality of work life describes the type of relationship between employees and the work they do (Hackman & Oldham, 1980). It is a state of mind which can be either positively or negatively influenced by a job's characteristics and components of the physical and social environment present in the work place (Bennett, 1983). Bowditch and Buono (1982) divide these components into four categories or subsystems: 1) administrative/structural, 2) task/technology, 3) human/social and 4) informational/decision making. The administrative/structural division covers all departmental units and includes a general breakdown of the organization. Chain of command, company policy and all rules and regulations, in addition to the formal and informal power structure, are covered under this heading. The task/technology component includes the organization's information system, areas of

expertise and the tools and equipment necessary to get the job done. Similarly, the human component includes knowledge and skill, but on a more personal level. It focuses on the employees and their contributions to the company, as well as their social interactions and needs. Finally, the decision making component identifies the degree of interaction between the employees and the system, or how workers are involved in the decision making process. When combined, these four areas comprise the total organizational system and determine what, when, and how jobs get accomplished. Therefore, the modification of one or more factors in any of these categories can have an impact on the work environment and the "quality" of work life.

Early studies relating to the quality of work life--productivity relationship were not as complete, and tended to concentrate on improving physical characteristics in the workplace. One such study was performed during the late 1920s at the Hawthorne Works division of Western Electric in Chicago. Here scientists tried to establish a connection between positive changes in light, ventilation, and climate control and increased worker productivity. What they actually found was the increased amount of attention paid to employees chosen to participate in the project was the single, most influential factor in increasing productivity rates (American Hospital Association, 1973).

These findings paved the way for research into the behavioral aspects of quality of work life. Several theories were developed based on the satisfaction of basic human needs and their relationship to motivation and performance. Two of the most widely accepted views were that of Abraham Maslow and Fredrick Herzberg. The first of these devised a hierarchy of five levels of needs (physiological, safety,

social, esteem and self-actualization). The basic, or more primitive, were at the bottom of the scale and had to be satisfied before the individual could be concerned with satisfaction on a higher level (Barnes, 1980). In other words, a worker who was provided with a good physical environment, job security, good pay and positive working relationships could develop a sense of self-worth, a positive attitude, and maximum performance potential. The second theory was based on the concept of hygiene factors ("maintenance" components that did not motivate a worker, but did prevent his dissatisfaction, i. e. physical working conditions) and motivators (those factors which encouraged growth and job satisfaction, i.e. responsibility and worker involvement). This theory concluded that in order to promote good quality of work life, motivators must be incorporated into the job (Bowditch & Buono, 1982).

Unfortunately, some jobs are not as easily modified and improved as others. O'Toole (1974) provides a list of realistic statements about work that should be considered before undertaking a quality of work life improvement program:

1) Some jobs are better than others, no matter what action is taken.
2) Almost all bad jobs can be improved, at least marginally.
3) People differ widely and therefore have differing needs from their jobs.
4) Intelligence and psychological makeup are better criteria for job placement than race, sex, class or age.
5) People with jobs that they don't like are less committed to their jobs than people who like their work.
6) It is better for the individual, the workplace, and society for workers to be committed to their job than for them not to be committed. (p. 4)

Once these basic facts have been considered and limitations/capabilities identified, employers should look at the needs of their employees

on an individual basis. The Work in America Institute has identified the issues of pay, benefits, job security, alternative work schedules, stress, participation, and democratic practice as critical quality of work life issues for the 1980s (Roscow, 1981). Other areas and expectations identified as being important to hospital workers include: continuing education for on-going growth and development; jobs that make use of acquired knowledge; recognition and respect on the job; worthwhile and meaningful work; options, with regard to benefits, dress, advancement, etc.; merit-based reward systems; challenging tasks and equal opportunity (Peterfreund, 1975). Basically, this means that employees want to be utilized to their fullest potential without being taken advantage of by their employers--to be challenged without being used.

Successful organizations are those that can realistically evaluate both their own capabilities and their employees' needs/wants in an attempt to fit the job to the person. "Good stress," or challenge, should be encouraged; "bad stress," resulting from increased workload, decreased control over work, repetition, inadequate training, role ambiguity, limited opportunity, unattainable expectations, or social isolation should be avoided (U. S. Congress, 1985). If these conditions are present in the workplace, absenteeism often results as a means of avoiding the stress. An employee absence is defined as an unscheduled period of leave from work and can lead to a reduction in both quality of goods produced and levels of morales among remaining employees who must carry the extra burden (Klein, 1986). This leads to a further reduction in quality of work life, and the development of a cyclic process.

Although illness, injury, and various personal commitments are valid reasons for employee absences, a study by Smith (1977) has shown a relationship between work-related attitudes and absenteeism rates. These results are in agreement with another study conducted by Herman (1973) indicating that "work attitudes do predict work-related behavior when such behavior is under control of the subject" (p. 208). For these reasons, it is beneficial for employers to do as much as possible to match job skills with requirements and to promote a positive working environment.

According to Hackman and Oldham (1980), there are four basic ways of doing this:

1) By changing the workers themselves, through improved selection, placement and training techniques.
2) By changing others, particularly supervisors, through improved selection and training.
3) By changing the context of the work environment/work day to be better suited to employee's needs.
4) By changing the consequences of work by altering pay practices and employee benefit programs. (p. 212)

The most recent quality of work life improvement programs tend to center on the latter two components: changing the content and the consequences of work. A prime example of this trend is the development of incentive programs such as gainsharing and merit pay. The main issue in this area is fair reward for loyalty and good work on the part of managers as well as employees.

All employers are faced with the common problem of staying ahead of the competition. Attracting and maintaining a "quality" staff is an important component of this task, but to do this, employers must also be concerned with labor costs, productivity, innovation and fairness to their employees (Kanter, 1987). More and more companies have found that the introduction of a merit-based system has met many

of their goals by reducing compensation costs; improving employees' sense of teamwork, involvement and loyalty; and by establishing the relationship of pay to performance (O'Dell & McAdams, 1987). This issue is summed up by Doyel and Riley (1987) in their statement of the ultimate incentive plan goal: "to attract, retain and motivate" (p. 34) good employees.

The purpose of the economic gainsharing system (EGS), as defined in a 1983 American Productivity Center report is "to reinforce a sense of shared purpose among all employees" (p. 6). It is not designed as a means of using money to encourage people to work harder, but as a method of getting them involved in the business, by providing workers with an economic stake in company performance (Jewell & Jewell, 1987). In addition to these factors, the establishment of such a program serves as a communication tool by making employees and managers aware of company priorities and values (Swinford, 1987).

Eligibility for gainsharing plans often poses a complicated problem for companies interested in this concept. Although equal participation seems desirable, Doyel and Riley (1987) have found that programs geared to the needs of smaller work teams are most effective, especially when positions and responsibilities differ widely. Once the plan is identified, however, it is important to establish thorough performance management techniques for day to day operation. Both quantifiable criteria (i.e. sales, revenue, inventory turnover) and subjective criteria (i.e. effort, attitude, creativity) should be included, clarified and agreed upon by all participants so that common expectations are set (Doyel & Riley, 1987). In this manner, a firm groundwork is established for the building of teamwork in the

future. Because standards are agreed upon by both managers and employees, the performance evaluation process is not complicated by confusion or hostility, and problems/disagreements are more easily solved. This process results in a fair and equitable payment system and enhanced employee development.

Participative management is another practice that concentrates on altering the context and consequences of work in order to improve productivity and quality of work life. Many examples of this managerial style can be found in prominent companies worldwide, particularly in West Germany, where the "Mitbestimmung," or "Shared Authority" Law was passed in 1976. This law requires corporations employing 2,000 or more to give half the votes on their supervisory boards to labor delegates. Executives at Volkswagon claim that this practice fosters an "atmosphere of shared responsibility" (Phillips, 1987, p. 37), forcing board members to carefully deliberate each decision regarding investments, loans and managerial selection. Because workers provide input for company policy making, as well as quality control and work improvement programs, they are more likely to facilitate and less likely to resist innovation. Although evidence linking participative management to increased productivity in West Germany is not substantial, both workers and management agree that the practice is beneficial and has greatly increased communication.

Similarly, many Japanese companies practice a policy known as "ringi," which involves labor-management consultation. Results are comparable to those found in West German plants and, in many cases, the improved information exchange process has led to increased productivity through employee suggestions. Other Japanese quality of

work life policies such as lifetime employment and intensive training programs have also promoted employee productivity by encouraging a sense of job security and enhancing technical skill (Levitan & Werneke, 1984).

Experiments with employee ownership have also been successful, particularly in the United States. One specialty chemical plant, Rohm & Haas Bayport Inc., has gone to extremes by initiating a policy of total participative management. The management team at the facility includes only four people, and actual company ownership is transferred to the people responsible for doing the work; team members are cross-trained and rotate jobs every four to twelve weeks. This practice has resulted not only in a stimulating, self-initiating work environment, but an unprecedented score of 96 out of a possible 100 on a customer quality audit (Nichols, 1987). Other ESOP (employee stock ownership plans), although not as extreme, have been equally successful. A study performed by the New York Stock Exchange has shown that among larger corporations, those having employee ownership programs are also four times more likely to have other quality of work life policies (New York Stock Exchange, 1983). One reason for this, according to Rosen and Dulworth (1987), is that owners have more to gain from a performance-oriented company whose workers and managerial staff share the same goals for a positive work environment and increased productivity. Ironically, organizations that favor the opposite approach, strict employee discipline and the traditional hierarchical style of management, tend to move further away from the level of quality and commitment they expect from their employees (Harvey, 1987).

A third quality of work life strategy is one of increasing or enhancing benefit packages. In 1985, employee benefits amounted to 37.7 percent of the gross payroll, a 4.1 percent increase from 1984. For hospitals, this meant an average weekly cost of $129.71 per employee, which included wages paid for time not worked, as well as insurance premiums, pension plans, profit sharing and related options. Despite the accelerating cost, innovative employee programs and benefit packages are constantly being introduced. One suggested program calls for 18 weeks leave for employees with newborn or sick children and up to 26 weeks disability leave (Morris, 1987). Others, such as wellness, do not necessarily pay the employee, but offer him/her an opportunity to improve overall health and wellbeing by participating in fitness and nutrition-oriented activities. Employee assistance programs (EAP's) and return to work programs (RWP's) are another popular management tool used to reduce company expenses and absenteeism/ turnover rates due to on-the-job illnesses and emotional, financial or drug related problems (Centineo, 1986; Hurley, 1986). It is estimated that approximately 10 percent of the workforce encounters one or more of these disabilities at some time during their years of employment. RWP's and EAP's can actually influence other company benefit programs by affecting the costs of workers' compensation, insurance, turnover, training and administrative costs (Centineo, 1986). EAP's go one step further by serving as preventative programs, capable of helping employees to avoid future problems, as well as deal with present ones (Hurley, 1986). More and more companies are initiating programs such as AT&T's hypertension control, alcohol control, and stress management, as well as IBM's research into the development of eldercare

facilities for employees with elderly dependents. Programs such as these benefit not only employees' quality of work life, but health and wellbeing outside of the workplace as well, resulting in improvement and maintenance of the total individual (Hurley, 1986).

Alternative work schedules are a fourth quality of worklife improvement technique, accomplished by changing the context of work. Work scheduling can change in a variety of ways to be better suited to employees' life styles and personal schedules. Popular variations include a condensed work week, job sharing, permanent part-time, flexible hours of "flextime," and work at home.

Although the 40 hour, five day work week still predominates, there are a variety of operations open beyond the nine to five, Monday through Friday time slot; the health care industry is one of them (Smith, 1986). Flextime is among the various options available to these organizations, and is based on two separate time frames. The first is a core period. This is the time slot that remains constant, specified for jobs which must be accomplished at a specific time (i.e. a meal to be served); everyone must be at work during this period. The second is a more flexible period usually at the beginning or end of the work day when the pace is slower and the employee can choose his own arrival and departure time. This scheduling method has been successful in increasing employee morale, decreasing absenteeism and tardiness, increasing production, and accommodating those employees with special needs, such as working parents. Because of these results, the number of companies with flextime has increased from 15 percent in 1977 to 30 percent in 1987 (Thomas, 1987).

Condensed work weeks are those in which the normal 40 hours are worked in less than five days (Levine, 1987), and the advantages are much the same as flextime. The idea of job sharing came about as an attempt to benefit those people whose schedules would not allow them to work full time, but could not afford the sacrifice in benefits associated with most part-time jobs. It involves two people "sharing" or dividing the same job, along with its salary, benefits and other advantages. This scheduling alternative also benefits many experienced retirees who would like to return to work, but not on a full-time basis (Thomas, 1987). Similarly, permanent part-time can also be advantageous to the individual who works to supplement another income or for enjoyment purposes. Employers also benefit in this situation by not having to hire a full-time employee at a full benefit level (Levine, 1987).

Work at home is still another option for many people, especially since the onset of the personal computer and efficient telecommunication systems. Teachers, clerical workers and managerial staff are just some of the individuals currently taking advantage of this option. Research has also shown a relationship between an increased number of hours spent on home-based work, and the likelihood of being engaged in some type of service occupation. This category ranges anywhere from child care and the social services, to legal services, to various consulting organizations. The benefits of this type of work include the elimination of both child care and transportation related expenses on the part of the employee (Kanter, 1987).

Alterations in quality of work life have the potential to affect an employee's performance in a variety of ways. Without the necessary

support and enrichment provided by a healthy working environment, an employee's needs will not be satisfied and he will not perform to his maximum potential. Therefore, until a good quality of work life is a priority for the organization and its administrators, desired levels of productivity will not be achieved.

Innovation

The term innovation is very broad, encompassing many aspects of change and creativity. Basically, it can be defined as the generation, acceptance and implementation of new ideas, processes, products and services (Kanter, 1983). Mueller (1971) narrows this definition even further by stating that although all innovations are changes, all changes are not necessarily innovations. He points out that an innovative act must be deliberate and specific to the accomplishment of a particular organization's goals and objectives. In other words, people create functional innovations; they do not occur haphazardly (Wright, 1986).

A second characteristic of innovation is its degree of usefulness to the organization involved. Innovations are always system-specific in that they are designed to work within a certain operation. A new method or improvement may be beneficial in and of itself, but if it is not suited to the employees, the economics or the method of workflow within the company, it is not truly useful and cannot be considered "innovative."

In accordance with this concept, it is also possible for a certain process to be innovative in one organization and not in another. Generally, if it is new to the system itself and the people involved,

then it is an innovation as long as it meets with the other criteria discussed.

To assure that goals are being met, innovation management requires a great deal of integration at all levels of the organization. Employees and managers must both be involved in this process (Shrivastava & Souder, 1987). According to Ross and Unwalla (1986), an innovative organization focuses on teamwork and is therefore the opposite of a bureaucratic system. Additional characteristics include risk taking, flexibility, perception of the organization as a system, tolerance of mistakes, and the belief that management is motivated by creating something from nothing (Ross & Unwalla, 1986). By fostering an environment that encourages free thought and creativy, a business or industry can utilize its human resources to develop a competitive edge (Meehan, 1986).

There are two categories of individuals responsible for the initiation of the innovative process. The first of these is the entrepreneur, or

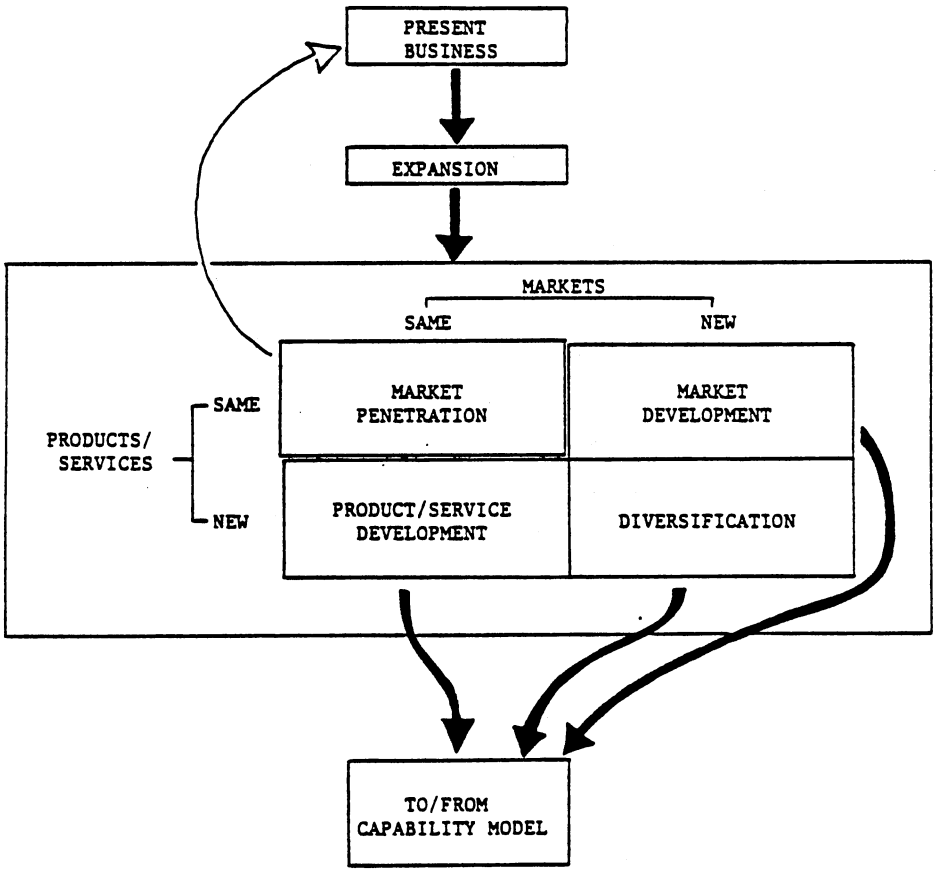
> risk taker in society, who has the organizational skills and the means to assemble the resources and technology necessary to exploit new economic opportunites that are not generally apparent to other decision-makers. (Joint Economic Committee, 1984, p. IX)

The entrepreneur is a self-starter who possesses the foresight and ambition to embark on business ventures of his own. In contrast, the intrapreneur operates within the confines of an established business or industry. He too must be creative and bold, but is challenged by ever-present corporate schedules, budgets and hierarchal controls that can inhibit the innovative process (Ross, 1987). In many cases it is the disgruntled manager/employee, unhappy with existing conditions,

who is willing to take the risks involved in making a change. Once individual goals are achieved, however, feelings of discontentment fade, the new status quo becomes acceptable to the intrapreneur, and stagnation occurs once again.

This cyclic process often makes corporate innovation difficult to achieve without the catalyst of frustration. To avoid this problem, successful companies provide a flexible environment and offer rewards for pursuing opportunity, in order to reduce the risks associated with failure (Stevenson & Jarrillo-Mossi, 1986). Other organizations have employed what are known as "staff entrepreneurs," responsible for strategic planning and identification of alternative routes to corporate success (Rothschild, 1987). The philosophy of such a staff centers around taking reasonable risks; emphasizing opportunities rather than problems; keeping things simple, while allowing for some ambiguity; being purposeful and communicative; constantly seeking improvement and keeping customer needs a priority (Nelton, 1986).

With these attitudes in mind, a company may progress toward the development of new products and services, as depicted in Anderson's (1987, p. 113) "Opportunity Model," (Figure 2). Such a strategy takes into account all of the available options, enabling management to plan for innovation and select the most appropriate direction for the organization to follow. This may be one of market penetration (existing products/existing markets), market development (existing products/new markets), product and service development (new products/existing markets), or diversification (new products/new markets) (Anderson, 1987.



From "Technology and Mindset: A Model for Generating New Product and Service Ideas" by J. Anderson, 1987, National Productivity Review, 6(2), p. 113.

Figure 2. The Opportunity Model

Companies using the "Opportunity Model" employ strategies of product and process innovation. The first of these is the most basic, involving changes in the product or service provided by the company. Within this category are incremental product innovations, providing added features or "extras" on otherwise standard products; synthetic product innovations, "combining existing ideas or technologies in creating ways to create significantly new products;" (Anderson, 1987, p. 114) and discontinuous product innovations, involving creative use of new ideas and technologies. Process innovation, or changes in the manufacture or delivery of a product, are not as obvious to the customer, even though they may involve more complex technological developments. This group also includes incremental changes which often result in lower cost, increased quality, or both; synthetic changes which alter the size, volume, or capacity of production; and discontinuous changes which replace old production methods with new ideas (i.e. automation/robotics). Both product and process innovation involve increased risk associated with the synthetic and discontinuous phases (Tushman & Nadler, 1986).

In the early stages of the product life cycle, product innovation dominates. In the foodservice industry this can mean the introduction of new menu items, such as cajun style foods, or a new concept, such as the use of video games in family style restaurants (Hart & Spizizen, 1987). In the next stage of development, quality and price (process innovation) come into play in the form of competition. Within the foodservice industry, this type of innovation generally comes from equipment manufacturers who possess the necessary financial resources to invest in research and development. Some of these include

irradiation, aseptic packaging, freeze drying and dehydration of various food items. Finally, a new product reaches maturity when only incremental changes in product/process innovation are necessary. Profitability often predominates during this period due to the balance of optimum products, production levels, and quality standards developed during the early stages of the life cycle (Hart & Spizizen, 1987; Tushman & Nadler, 1986).

Successful innovation does not quickly happen; it requires strategic planning as well as cooperation between the formal and informal components of the organization. It is management's task to coordinate activities between departments and support policy changes necessary to decrease risk and provide adequate rewards for entrepreneurial thought. In this way, the process of innovation will be on-going, resulting from organization and creativity rather than frustration within a bureaucratic operation.

Effectiveness

Effectiveness is a term related to performance, or the accomplishment of a goal or an organizational mission. It is defined as the degree of achievement of objectives (Smalley & Freeman, 1966), or "doing the right things" (Drucker, 1974, p. 17). According to Mali (1978), the accomplishment of a goal or a set of results is the most important aspect of productivity, since without the achievement of objectives, there can be no organizational performance and thus no productivity.

Kuper (1975) defines productivity to be a combination of effectiveness and efficiency, two terms often mistaken for one another. The

productivity index also combines these two items in a measurement relating outcomes to the means that produce these outcomes:

$$\text{Productivity index} = \frac{\text{output obtained}}{\text{input expended}} = \frac{\text{performance achieved}}{\text{resources consumed}} = \frac{\text{effectiveness}}{\text{efficiency}}$$

(Mali, 1978, p. 21).

As in all ratios, quantitative components must be identified and included as a means of accurate measurement and comparison to other aspects of the organization. Effectiveness measures often compare what is projected to what actually occurs, as in the following ratios identified by aerospace managers in a study performed by Kinlaw (1986-87):

> projected facility operation time vs. actual operating time; milestones projected vs. milestones reached; number of tests planned vs. number of tests completed; projected budget vs. actual budget and number of contracts required vs. number completed. (p. 28)

Similar measures can be applied in almost any organizational context.

In his book, The Effective Executive, Drucker (1967) comments that effectiveness has been ignored for many years in favor of efficiency, or the ability to do things right. Part of this oversight may be due to the predominance of the manufacturing industry and the manual tasks that provided what could be identified by industrial engineers as discrete and definable measures of output. During this period, healthcare institutions were without the support staff of therapists, dietitians, etc., and consisted of a basic physician-nurse core. Today, however, Drucker feels that we have grown into a "knowledge society" consisting of large organizations and workers who are paid to use their minds instead of their muscles. This coincides with

Naisbett and Aburdene's (1985) concept of an information society whose most important resources are people and creativity. The professional workers, executives, and trained specialists abundant in this society are hired to have a positive effect on organizational performance, or in other words, to be effective by making a contribution to the company through optimum use of ability and information (Drucker, 1967).

Managerial effectiveness is the practice utilized by such successful administrators and is defined as the extent to which a manager achieves the output requirements of his position (Reddin, 1970). It is not a personality trait but a habit which can be learned and acquired (Drucker, 1967). It must also be made clear that effectiveness itself is not an input, but an output produced from a well-managed project or organization. Effective managers then, are those who produce creative alternatives, optimize the utilization of resources and strengths (personal and organizational), focus on outward contributions in "priority areas," and obtain results through effective use of time and decision making skills (Drucker, 1967; Reddin, 1970). Personal traits can also contribute to managerial effectiveness and may include broadmindedness, leadership and the ability to inspire, clear and articulate expression and a sense of integrity. All of these characteristics enable a manager to communicate his ideas effectively, as well as weigh various options in order to set clear and realistic objectives that will benefit the organization in the long-term (Sorenson, 1983). This set of ideals and thought processes comprise the MBO, or management by objectives, system.

MBO is defined as a method of associating objectives with various positions and linking them to the overall corporate plan through the

use of effectiveness areas and effectiveness standards. This process is depicted in Table II. Effectiveness areas can be defined as the output requirements of a managerial position and may include items such as sales levels, costs and profitability (for a sales manager), and quality, inventory control and machine utilization time (for a production manager). Effectiveness standards (ES's) are sub-categories of effectiveness areas that take into account criteria for measurement. Examples include net profit, profit as a percent of sales, profit by territory, etc. (Reddin, 1970). In this manner, the effectiveness component of performance measurement relates to each of the additional six measures, as either an EA or an ES.

Techniques for effectiveness promotion are becoming more and more apparent in a variety of industries. Three methods mentioned in the literature include the promotion of effectiveness through proper utilization of employees and humanistic management processes, strategic planning, and automation. The theory behind the first of these techniques endorses the creation of a group structure and organizational climate supportive of excellence and competent working behavior (Gist, Locke, & Taylor, 1987). This behavioralistic approach favors participative management, job challenge, positive supervisor-employee relations, role clarity, formal support systems and similar motivational techniques (Daley, 1986; Toto, 1986). A customized and flexible strategic planning system exists side by side with these behavioral components, teaching managers to combine short and long term goals in an attempt to accurately predict the future (Javidan, 1987). Finally, the process of automation and proper design of work flow further enhances effectiveness through organization, resulting in improved

TABLE II

CONCEPTS OF MANAGERIAL EFFECTIVENESS

Concept	Directly Related To
MANAGERIAL EFFECTIVENESS (The importance placed on outputs)	ORGANIZATION PHILOSOPHY (Managerial effectiveness can be a clear statement of what an organization thinks is really important)
EFFECTIVENESS AREAS	SYSTEM DESIGN (What kind of position and outputs do we have and want, and what is the best structure to obtain them?
EFFECTIVENESS STANDARDS (What are the outputs of particular positions?)	JOB SPECIFICATIONS (What kind of manager is required?
	MANAGER SELECTION (Is this the man we want?)
	TRAINING PLANS (What kind of training is needed for performance in the position?)
	JOB EVALUATION (How much should we pay?)
OBJECTIVES (And degree to which they are met)	CORPORATE STRATEGY (Do objectives serve to aid the corporate strategy?)
	MANAGERIAL APPRAISAL (How well does the manager perform?)
	COACHING (Based on how well he has performed--in what does he need personal assistance?)
	CAREER PLANNING (What is the best succession of positions for each manager?)
	BUDGETS (How do possible levels of budgets and objectives relate?)
	MANAGERIAL INVENTORY (What is our quality and experience level?)

Note. From Effective Management by Objectives (p. 26) by W. J. Reddin, 1971, New York: McGraw-Hill. Copyright 1982 by McGraw-Hill. Permission pending.

quality with less throughput time. These measures must be utilized in order to develop necessary standards of measurement for organizational success (Cross, 1986-87).

Efficiency

Efficiency is defined as "the ratio of resources expected to be consumed (on the right things) to resources actually consumed" (Sink, Tuttle, & DeVries, 1984, p. 265). It is usually accomplished in situations where the amount of useful work performed is high and total energy expenditure is low, indicating that resources have been properly utilized to produce favorable results (Mali, 1978). Because the performance criterion of efficiency focuses on resource consumption it is generally categorized as an input function (Sink, Tuttle, & DeVries, 1984). When measured as a ratio, efficiency is expressed as:

$$\frac{\text{actual}}{\text{standard}} \text{ or } \frac{\text{rate/results achieved (over a specific period of time)}}{\text{rate/results expected (over the same period of time)}}$$

(Somers, Locke, & Tuttle, 1987, p. 135).

When measured as a percentage of resource utilization, efficiency can be expressed as:

$$\frac{\text{no. hours spent on productive tasks}}{\text{no. hours worked}} \text{ or } \frac{\text{total hours machine is utilized}}{\text{total hours machine is available}}$$

(Tuttle & Romanowski, 1987, p. 93).

The close relationship between efficiency and productivity has been well noted in the literature. One author points out that the commonly accepted definition of productivity (output/input) is also the industrial engineering definition for efficiency (Briskin, 1987). Others suggest that productivity must be thought of as a combination of effectiveness and efficiency since, in order to be productive, one

must consider whether a desired result is achieved (effectiveness) and what resources are consumed to achieve it (efficiency) (Mali, 1978).

This addresses an important issue; efficiency cannot be isolated and considered independent of the other performance criteria (Krepchin, 1986). Good resource utilization during the production process means virtually nothing if the end result is not timely, of good quality and able to satisfy customer expectations.

In addition to productivity, several other goals/standards have been connected to the term "efficiency." They include: 1) a progress toward organizational objectives at the least possible cost; 2) personal efficiency in individual performance; 3) work output above normal expectations; 4) doing work right; 5) satisfaction of individual motives when operating jointly toward a common goal, and 6) reduction in unit cost of output (Johnson, 1981).

A simplistic description of efficiency is therefore best expressed as "more, better, faster and cheaper." The focus is not only on how work is accomplished, but on using a production process involving optimum resource utilization with minimal waste.

Productivity

Productivity can be described as a measure of an organization's accomplishments as a function of the resources consumed to produce those accomplishments (output/input), or simply a combination of effectiveness and efficiency (Sink, 1980; Tuttle, 1986). When productivity is discussed it is usually in terms of improvement, management and/or measurement. The first of these - improvement - is a result of the other two factors; adequate management of productivity, however, can

only come about through utilization of quantifiable measurement techniques (Sink, 1981).

Sink (1981) goes on to define productivity management as "planned systematic manipulation or control of critical input variables in response to the results of the transformation process (the outputs)" (p. 9), allowing managers to objectively evaluate production through use of quantitative values. The establishment of productivity indices (output/input ratios divided by themselves over time) is equally useful, providing for the analysis of trends through noted changes in productivity from one time period to another. These ratios and indices should correspond to organizational goals and objectives and be established while work processes are being designed. They should be specific rather than broad-based, placing greater emphasis on the output itself, as opposed to related activities and processes (Mali, 1978).

Inputs to the system can include labor, materials, capital, energy or facilities. Likewise, an output is the product/service produced, or the final outcome of an operation (Tuttle & Romanowski, 1987). In most hospital dietary departments, for example, these outputs include meals and nutrition-related services (ADA Productivity, 1986).

As one would expect, there are various ways in which to combine inputs and outputs to arrive at different degrees of productivity measurement. Partial factor productivity measurement, for example, is concerned with some or all of a system's outputs, but only one form of input (i.e. labor) (Swaim & Sink, 1983). The Multifactor system is similar, taking into consideration some/all of the outputs, but with regard to more than one input (i.e. labor and capital combined) (Mark, 1986). Total Factor productivity measurement is the most

comprehensive of the three, including all outputs and all inputs in one ratio (Sink, 1980).

Once specific ratios have been established by a company, the next step is to promote their growth, thereby increasing productivity. This can be accomplished through working smarter (increase in output/same input); re-investing in the operation (large increase in output/small increase in input); reducing costs (same output/decrease in input); initiating new activities (decrease in output/larger decrease in input) and a combination of working smarter and cost reduction (increase in output/decrease in input) (Tuttle, 1986).

In addition to the statistical measurement procedures, several organizational characteristics are also essential for increased productivity. They include reliable channels of communication; clear and concise goals based on customer expectations; proper skill, technology and equipment; employee commitment and dedication; and a thorough system of feedback and evaluation (Cosgrove, 1986-87; Highlander, 1986-87; Mischkind, 1987).

Orefice and Jennings (1983) describe productivity management as a science of balance where many factors can influence the end result. The case-mix theory used in management of health care facilities takes into account the total realm of services affecting the patient. So, too, must the remaining six performance criteria be considered in conjunction with productivity ratios to provide the in-depth analysis necessary to improve organizational performance.

Quality

Maintenance and improvement of the quality of U. S. goods and

services is becoming an increasingly important issue. On an industrial scale, much of this is due to competition from newly developed countries who now challenge approximately 88 percent of our nation's products, as opposed to only 20 percent in 1976 (NASA Authorization, 1986). In a "panic" to regain superiority, major corporations are paying up to $10,000 per day for the services of quality control experts such as W. Edwards Deming. In return, corporate executives hope to obtain suggestions for effective restructuring of production and managerial techniques (Main, 1986).

Quality can be defined as

> the degree to which a product or service conforms to a set of pre-determined standards related to the characteristics that determine its value in the market place and its performance of the function for which it was designed. (Adam, Hershauer, & Ruch, 1981, p. 13)

According to this definition, quality evaluation must be concerned with specific standards of measurement. A quality improvement program must be both dichotomous and continuous, addressing not only the issue of whether or not a product works, but to what degree it performs. Quality control must also evaluate an item or service individually, as well as in comparison to a pre-established group standard. Both functional and aesthetic characteristics must be addressed, in addition to the objective and the subjective. Finally, a product's timeliness must also be considered as it plays an important role in meeting customer expectations (Adam, Hershauer, & Ruch, 1981).

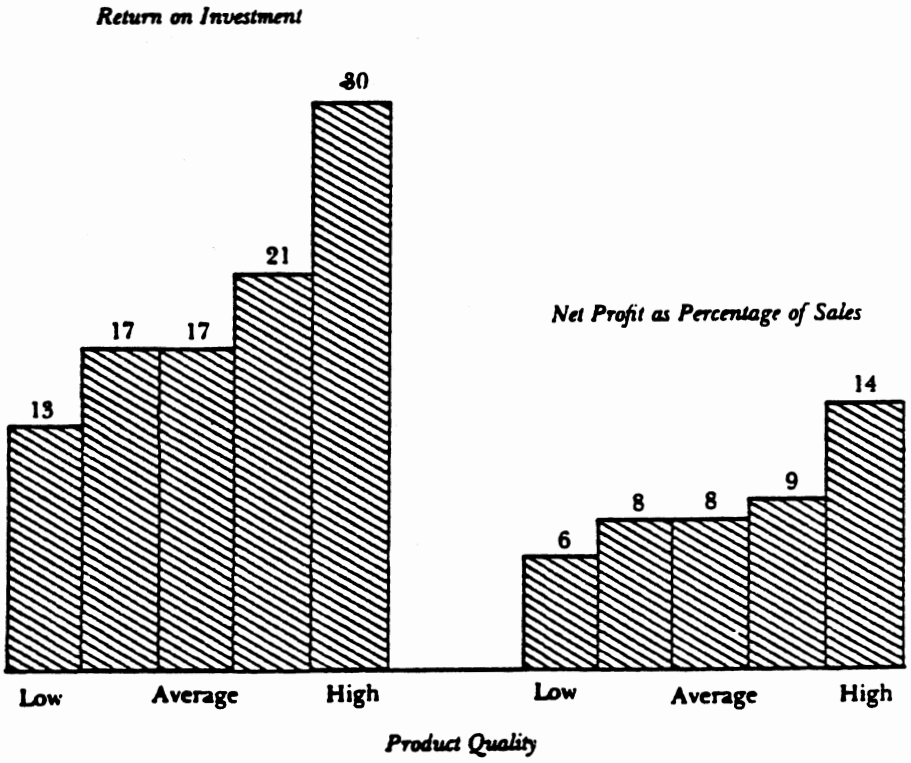
It has been noted in the literature that "when quality and productivity are related, profitability results" (Shaw, 1978, p. xi). Organizations with total defect costs between 15 and 40 percent of their budgets may be increasing output/input ratios, but not true

productivity or profitability (NASA Authorization, 1986). To test this theory, a study was performed involving input from 1200 businesses. This study, Profit Impact of Marketing Strategies, resulted in evidence indicating a definite link between quality and profitability. This was demonstrated by increased sales, improved market share and reduced costs (reduction in re-work, labor costs, handling and warranty claims; improved equipment utilization) (Figure 3) (Shetty, 1987).

It is important to consider that the true emphasis of quality control is on prevention rather than correction (King, 1984). Schonberger (1986-87) emphasizes five basic techniques to accomplish this goal:

1) place primary emphasis on production ("building quality in") rather than inspection
2) set customer-oriented goals (i.e. zero defects)
3) support on-going quality improvement programs involving each process of operation
4) encourage quality facilitators (i.e. cleanliness, daily machine checks)
5) employ process improvement techniques, problem-solving discussions, statistical quality analysis. (p. 81)

Last of all, it is essential that the need and desire for quality improvement be communicated to an all important group--the employees. Too often the message of quality improvement is interpreted by the employee as extra work with no personal benefits involved. The literature suggests that honesty is the best policy when relaying the importance of individual contributions to quality. In conjunction, the resulting benefits of increased market share and profitability must also be addressed. Whenever possible, the employee-customer connection must be emphasized with one-on-one contact where appropriate. Management should encourage employees to recall their own experiences as



From Buzzell's study cited in "Product Quality and Competetive Strategy" by Y. K. Shetty, 1987, Business Horizons, 30(3), 48.

Figure 3. Product Quality and Its Effects on Profitability

customers (both positive and negative) in order to determine the best possible form of interaction (Guaspari, 1987).

Quality assurance must be a company-wide effort, and is by no means exclusive to manufacturing and industry. In recent years, hospital administration has been encouraged to individually analyze the services they provide to determine if they are truly necessary to the organization and the patients involved (Silverman & Sommer, 1985). It is therefore equally important for support services, such as food-service, to employ their own quality control techniques to ensure their security for the future.

CHAPTER III

METHOD

Introduction

In 1982, Robertson conducted a study to identify productivity measures used by administrative dietitians in hospital foodservice. In 1983, Shaw elaborated on this concept by attempting to determine how the six additional performance criteria were measured, once productivity was defined. Lischke (1986) took this one step further by requesting that health care administrators provide numerical data to assist in the development of a standardized model for productivity and performance measurement. The purpose of this study is to further expand on previous research in the health care industry by tracking the measurement of three basic performance ratios over time and analyzing performance criteria utilization. Foodservice directors may be able to employ similar techniques, using this study as a guide, to monitor individual aspects of productivity and performance within their respective organizations.

Research Design

Descriptive status survey was the type of design chosen to meet the specifications of this study. According to Joseph and Joseph (1979), descriptive research describes a situation, area of interest, series of events, opinions, attitudes, or other variable or set of variables in a

factual and accurate manner. It is based on data collected from a representative sample without bias, and was therefore an appropriate means of reaching a diverse sample of foodservice managers working in a variety of hospital systems.

Sample

Five hundred survey participants were selected from the total population of United States hospitals having over 100 beds, as published in the 1985 edition of the American Hospital Association Guide to the Health Care Field (American Hospital Association, 1985). A table of random numbers was utilized as a means for unbiased selection. This group was chosen to increase the accuracy and response rate of the instrument by eliminating very small hospitals which were not as likely to monitor the required productivity and performance information, and osteopathic and federally operated hospitals which involved specialized concerns/operational techniques that might affect overall results of the study.

Data Collection

Preliminary Study

As the survey instrument used in the study was a revised version of the questionnaire used by Lischke (1986), the need for a repeat preliminary study was not indicated.

The Instrument

The questionnaire was developed as a simplified version of the 1986 survey used in a related productivity and performance study performed

by Lischke. As in the original study, three sections were constructed in order to obtain information pertaining to demographics, performance ratios and performance measures. Due to the length and complication of the Lischke instrument, as well as the low response rate of 10 percent, the performance sections of the new instrument were revised and condensed to elicit only basic performance information.

The first section on demographics identified both personal and institutional variables. Personal variables included: respondents' age, educational background, title and registration status, salary level, years in foodservice management and degree of training received in productivity measurement. Institutional variables included type and size of facility, affiliation, location, type of medical service provided, type of foodservice system and managerial control, percentage of annual budget allotted for food/labor and type of managerial training programs available.

The performance index section A required participants to obtain actual departmental figures for the third and fourth quarters of the 1986 fiscal year. (The time blocks defined in this section were not as important as the need to see a trend in performance measurement over a consistent time period.) The respondents were than asked to use these figures to calculate three basic performance ratios. A sample entry was provided as an example of how to calculate these ratios. Section B consisted of a list of additional ratios utilized as performance indexes. Respondents were asked to place a check mark by any of these that were utilized in their facilities.

The performance measure component of the survey instrument consisted of three sections relating to current departmental practices

and procedures used to monitor and improve performance. In Section A, respondents were given a list of activities and a Likert-type scale was used to determine the frequency of utilization. Sections B and C required respondents to place a check mark by any additional activities and employee benefit programs practiced.

The instrument was printed on three sheets of pink-colored bond; both back and front sides were used. The first sheet consisted of a cover letter explaining the need for accurate performance measurement in the foodservice industry and eliciting the participants' response. The actual questionnaire followed in three sections, each of these printed on one side of paper. Mailing information, codes and return postage were printed on the back side of the last page of the questionnaire. The instrument could be returned by re-folding and stapling (no envelope was required).

Distribution

The instrument was mailed, First Class, on June 22, 1987. Two weeks were allowed for response. A follow-up mailing was not performed due to cost and time restraints.

Data Analysis

Data collected from the survey was coded and entered into the computer using the software program PC-File III (Button, 1984); the SAS (Statistical Analysis System) was utilized in the data analysis process (Barr & Goodnight, 1976). Frequency tables were then constructed to determine the personal and institutional characteristics of the respondents and degree of utilization of the performance measures.

For more accurate statistical analysis, six of the personal and institutional characteristics were further condensed to the following groupings:

Age: 20-39; 40 years and over

Route to Registration: internship; other

Salary: $24,999 and less; $25,000-$29,999; $30,000-$34,999; and $35,000 and above

Years in Foodservice Management: 1-10; 11 or more years

Facility: hospital; other

Size: 101-300 beds; 301 or more beds

As the process of statistical analysis progressed, the list of performance measure frequences (Survey, Section IIIA) was also reduced in order to eliminate similar and unnecessary groupings. The new categories included:

Never

Frequently (3 times/day, daily, weekly, bi-weekly)

Occasionally (as needed, monthly, quarterly, twice/year, yearly)

Statistical tests performed on the data included chi-square analysis to assess the relationship between various demographic characteristics and utilization of performance measures/ratios. A five percent level of significance was used in the study.

CHAPTER IV

RESULTS AND DISCUSSION

The research instrument was designed and distributed as described in Chapter III. Five hundred institutions were randomly selected from the 1985 edition of the American Hospital Association Guide to the Health Care Field. In order to decrease the number of limitations involved in the research, any facility having over 100 total beds became an eligible member of the population.

A total of 65 surveys were returned, with a response rate of 13 percent. Out of these, one was declared ineligible due to the fact that its hospital kitchen serviced less than the 100 bed standard. Results and statistical analysis from the remaining 64 respondents are summarized in the following section.

Characteristics of the Respondents

Age and Educational Background

The majority of the respondents fall into the young-middle age range. Of these, 13 percent (N=8) are between 20-29, and 42 percent (N=27) are between 30-39. In the older age groupings, 20 percent (N=13) are between 40-49, and 23 percent (N=15) are more than 50 years of age; one participant (2 percent) did not respond to this question. These findings differ slightly from the Lischke (1986) study where four percent of the respondents were in the 20-29 year age group and 29

percent were in the 30-39 year category. This may indicate a growing trend toward younger individuals in managerial roles (Figure 4).

With regard to educational background, a majority of 47 respondents (73%) completed a BS/BA degree (Figure 5). Thirty-two percent (N=15) of these relate to some aspect of food, nutrition or dietetics, while nine percent (N=4) specify food, nutrition and institutional administration. There are three respondents (6%) each in the category of hotel/restaurant administration, home economics and business administration. The remaining 17 individuals who achieved a BS/BA degree did not specify an area of study.

Fourteen of the respondents (22%) received their master's degree; there were two individuals in each of the following categories, food/nutrition, nutrition education, foodservice administration and community health. The remaining masters level degrees were in education (N=1), food science (N=1) and business administration (N=1). Three participants listing a MS/MA degree did not specify an area of study.

One response (2%) was also received in the educational category of "other," indicating a dietetic assistantship program as an alternate route to standard educational channels. Two individuals did not choose to respond to this question. There seems to be no apparent relationship between level of education and responses in other areas of the questionnaire, however, the majority of individuals who did not specify an area of study also tended to be less specific in other areas of the survey instrument, particularly Part II: Performance Ratios.

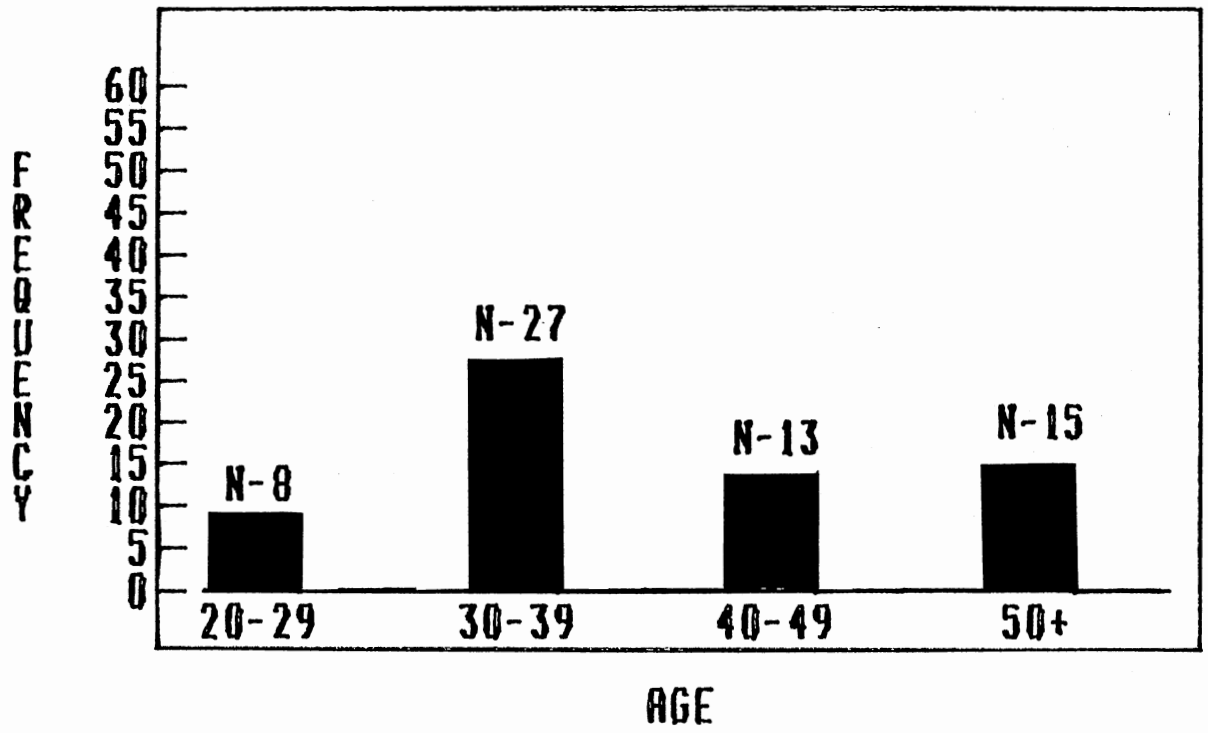


Figure 4. Age of the Respondents

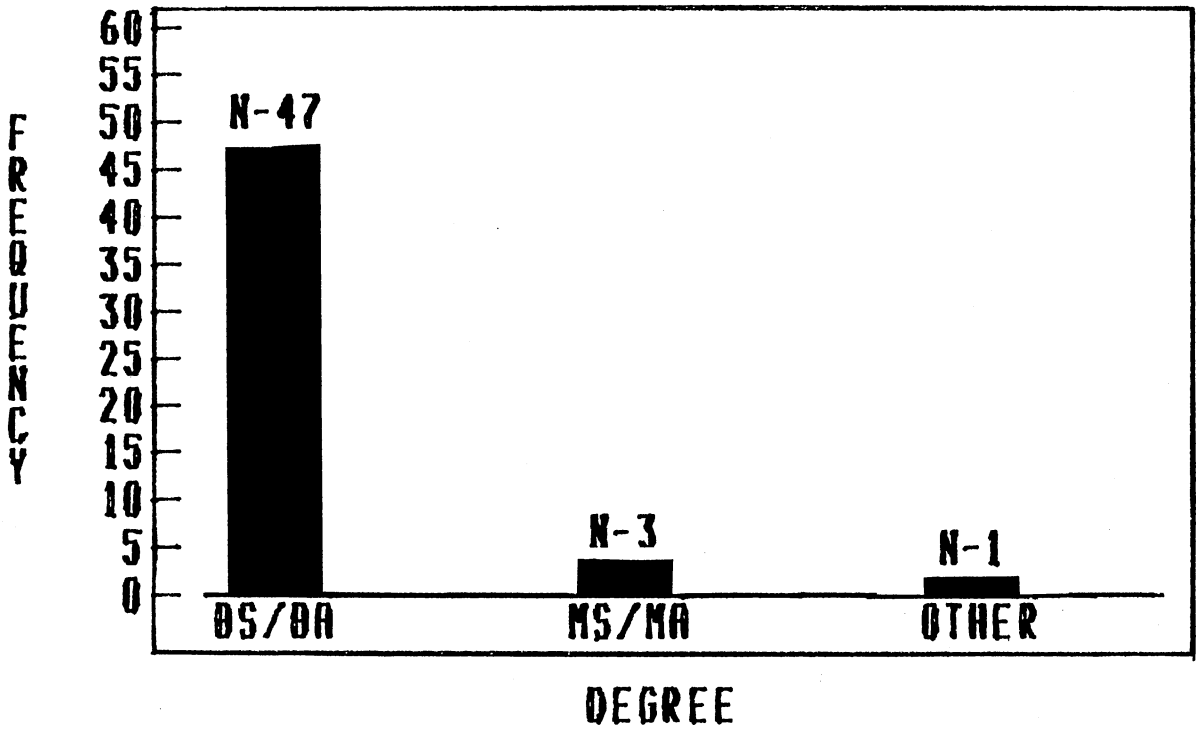


Figure 5. Degree of the Respondents

ADA Registration and Route

Seventy-eight percent (N=50) of the respondents are registered dietitians, while 19 percent (N=12) are not (Figure 6). Three percent (N=2) did not respond to this question. The dietetic internship was the preferred route to registration, utilized by 27 (54%) of the respondents who had earned their RD, while nine individuals (18%) completed the CUP program (Figure 7). The three-year work experience route was next in popularity, utilized by seven participants, or 18 percent of the registered respondents. Three individuals did go on to pursue their education, completing requirements for a master's degree and six-month work experience to become registration eligible. In the category of "other," two individuals listed a "dietetic traineeship" (3%) and two checked the category, but did not specify an alternate route. Again, no observable relationships are evident between RD status/route to registration and accuracy of survey response.

Position, Title, Salary and Years in Foodservice Management

The majority of the respondents are foodservice directors or chief clinical dietitians (N=57, 89%). Three (5%) hold the position of associate director, and an additional three (5%) are administrative dietitians; one individual (1%) is a consulting dietitian (Figure 8).

Annual salary is the next area of response and tends to correlate with years of experience and area of study. The majority of the salaries ranged from $25,000-$29,999, although persons with a managerial-type background tended to surpass this level, and all respondents

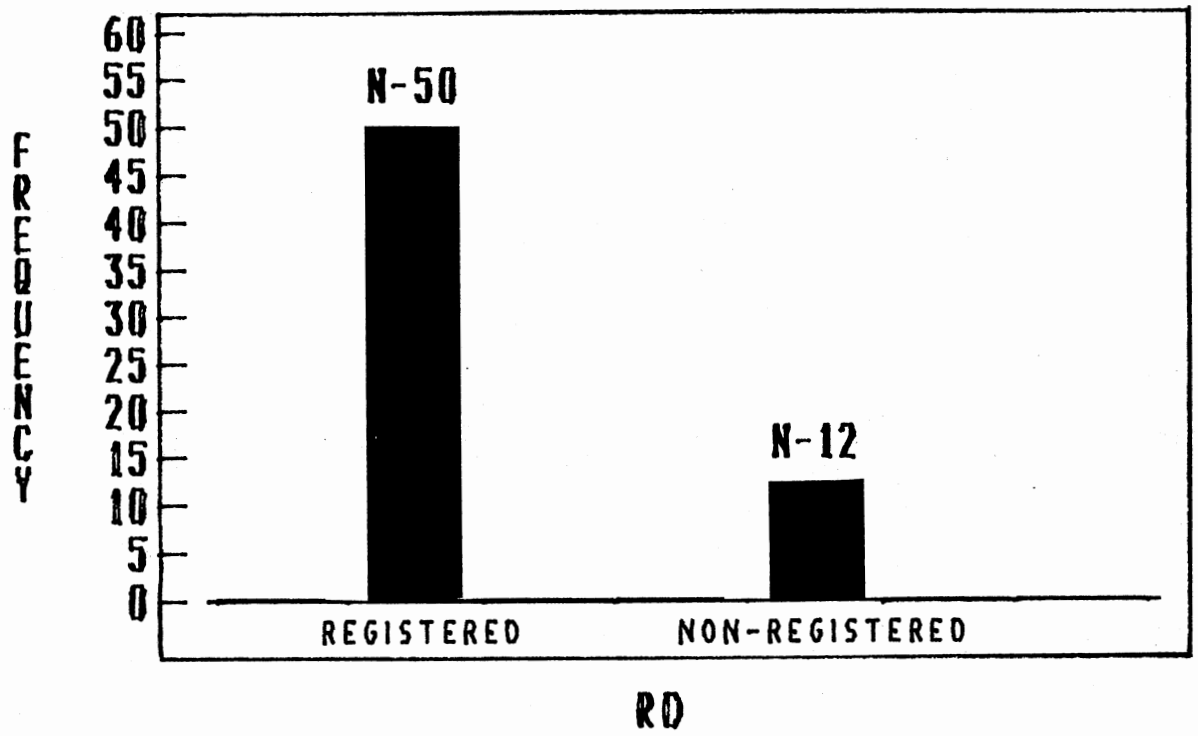


Figure 6. Registration Status of the Respondents

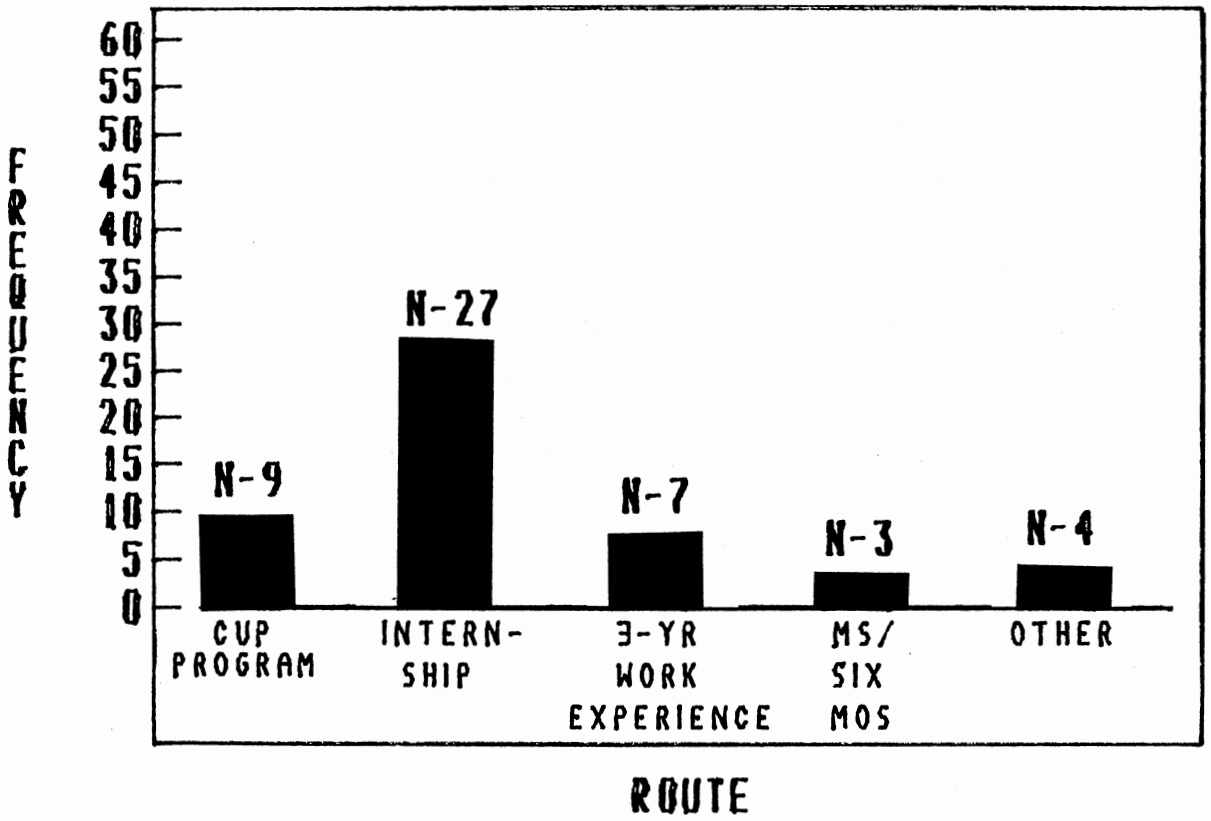


Figure 7. Route Characteristics of the Respondents

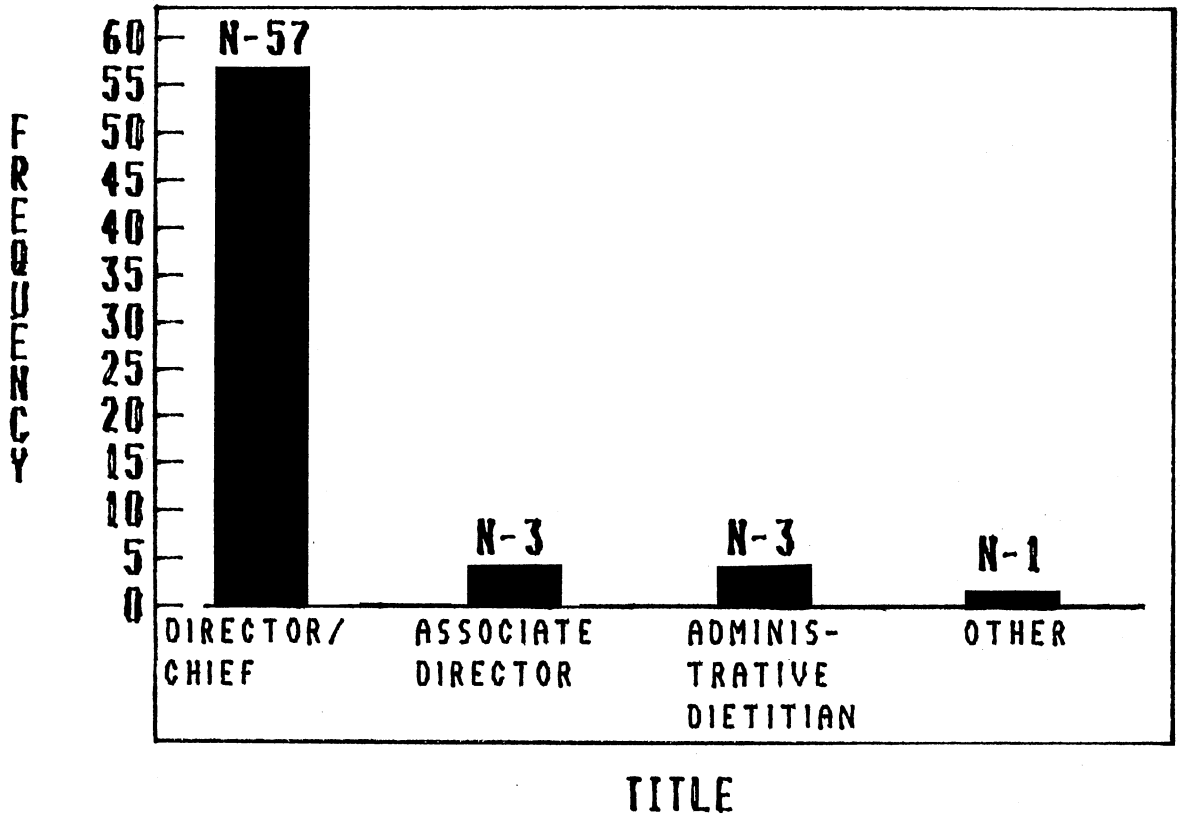


Figure 8. Title of the Respondents

having an educational history specifically related to hotel/restaurant or business administration (N=6, 9%) earned over $30,000 per year. These findings may identify a need for those administrators with clinical backgrounds to become more assertive regarding pay scales for similar work performed. It may also reinforce the importance of becoming well-versed in both clinical and managerial aspects of dietetics. The remaining summary of salary ranges can be found in Figure 9. One individual (2%) chose not to respond to this question.

It is important to note that additional years of experience in the foodservice field tended to correlate with larger annual salaries. These results are somewhat expected and can be found in most occupations. The majority of the respondents (N=23, 36%) have 16 or more years as foodservice managers, while the second largest group has an average of 6-10 years (N=17, 26%). Fourteen individuals (22%) have been working in their respective areas for 11-15 years, and nine respondents (14%) have between 1-5 years of experience (Figure 10). There was one no response in this category (2%).

Productivity Training

The category of productivity training is divided almost equally between those administrators having training (N=31, 48%) and those who do not (N=30, 47%) (Figure 11). These findings are considerably lower than reported by Lischke (1986), where 96 percent (N=53) of the respondents had some type of training in productivity. This may be due, in part, to the high percentage of response in this study from individuals having more clinically-oriented backgrounds, where productivity training may not have been a priority. It may also be a

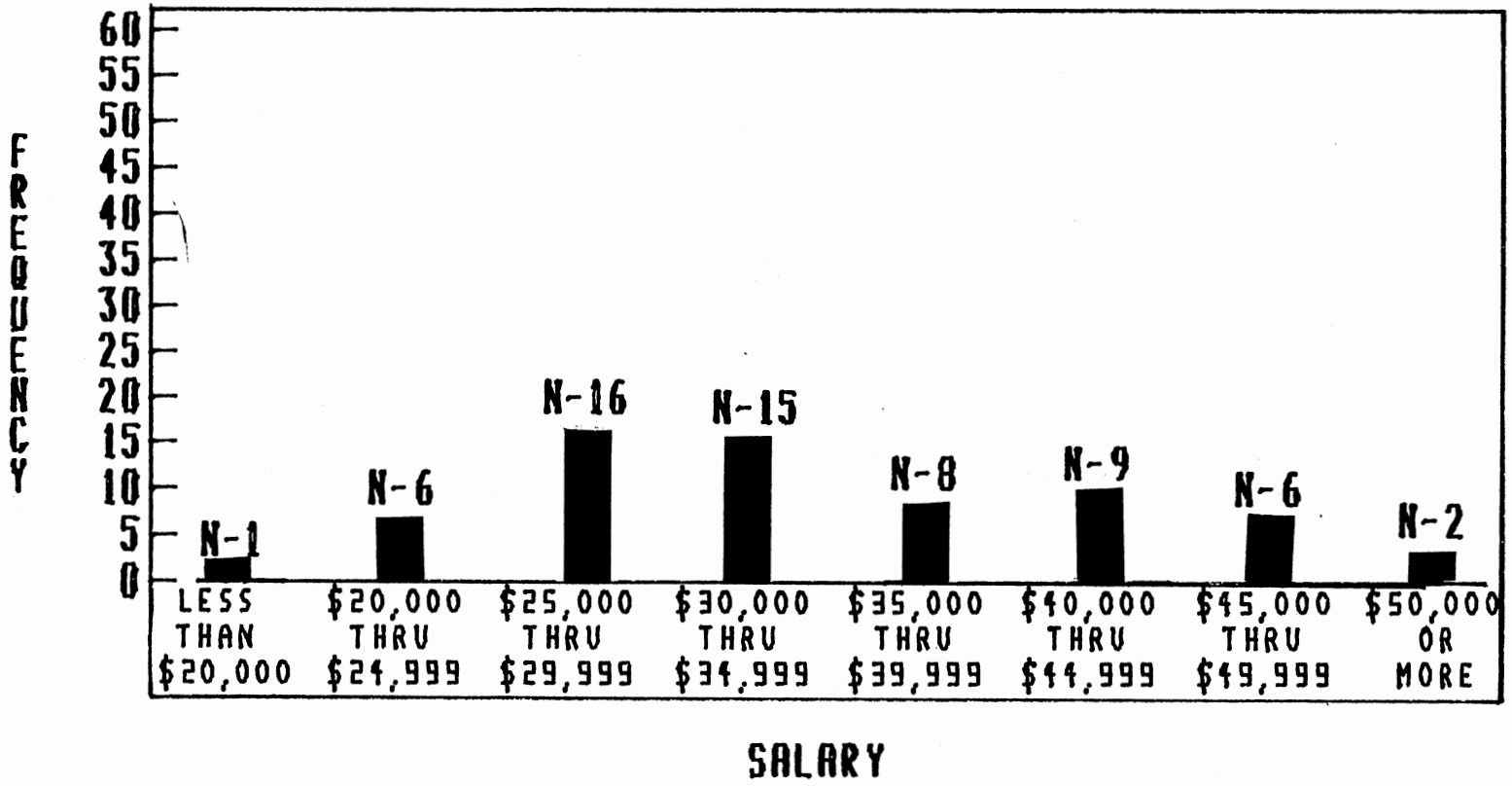


Figure 9. Salary of the Respondents

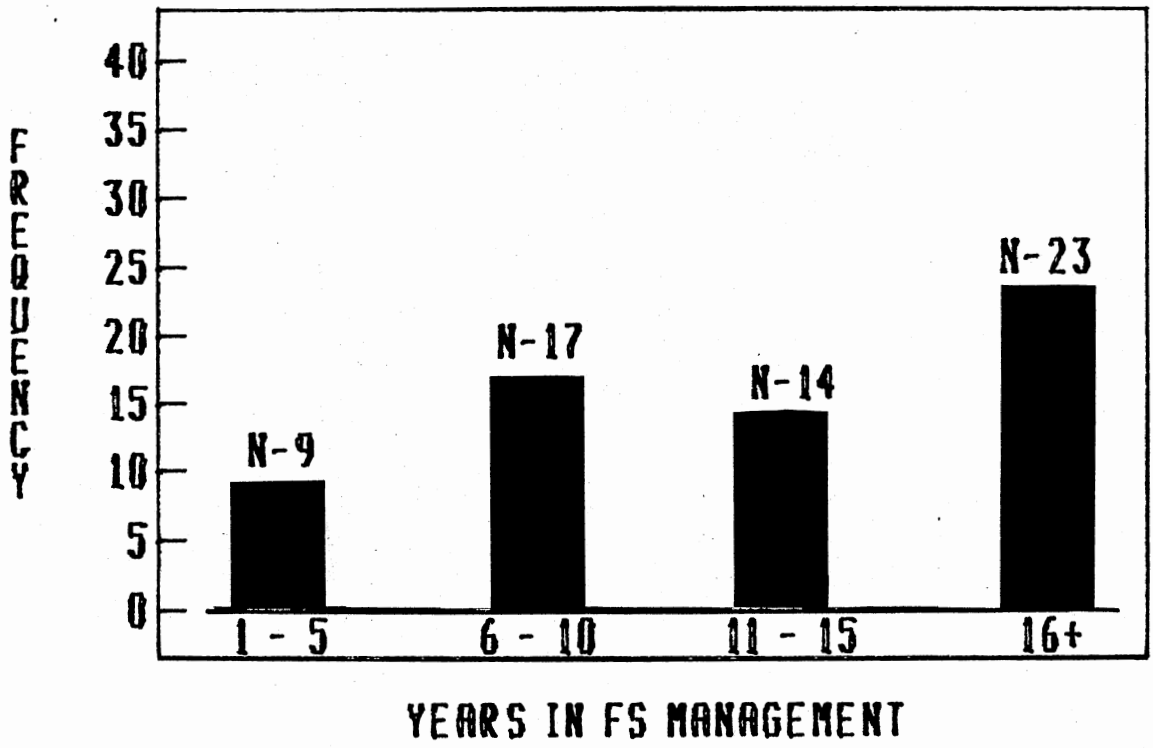


Figure 10. Years in Foodservice Management of the Respondents

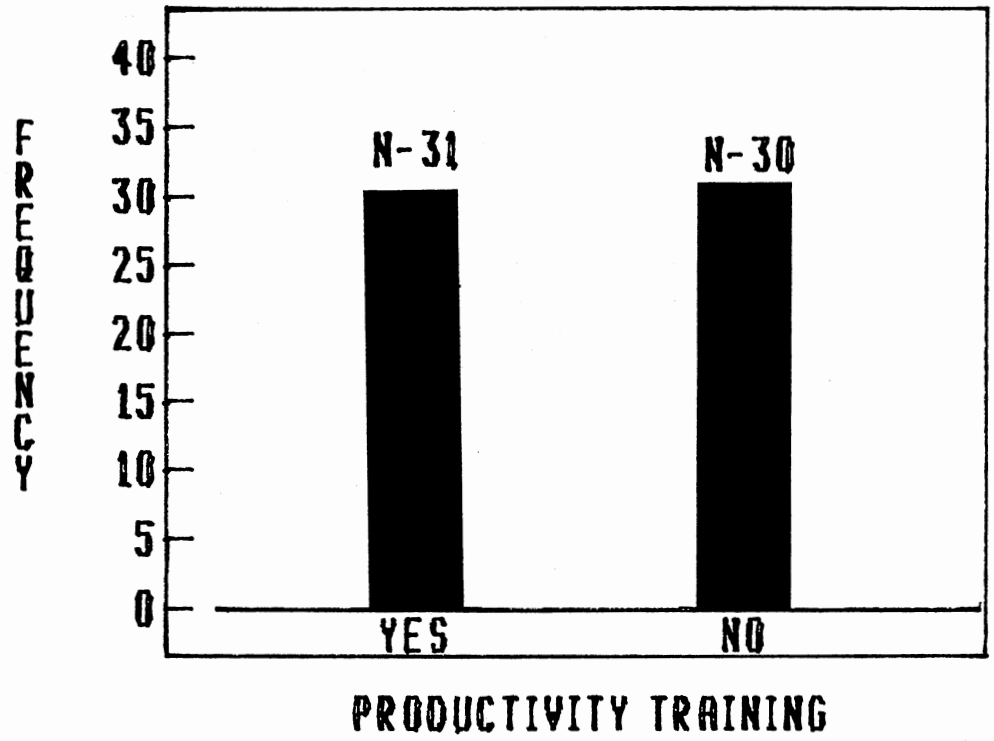


Figure 11. Productivity Training of the Respondents

result of a more exact definition of true productivity, as opposed to other aspects of managerial training. There does not seem to be evidence showing a relationship between training in productivity and increased response to the primary ratios listed in Part II, A of the survey instrument, however, an observable relationship is noted between productivity training and usage of the additional ratios listed in survey Part II, B. Three participants (5%) did not respond to this question.

Characteristics of the Institutions

Type of Hospital, Hospital Membership and Type of Service

Fifty-five percent (N=38) of the institutions responding are of the non-governmental, non-profit type. Thirty percent (N=19) are operating under state or local governmental controls, and are also non-profit institutions. The remaining 15 percent (N=19) are in operation to earn a profit. The latter is a new and steadily growing category in the traditionally non-profit health care industry. Although a relationship between a for-profit status and increased usage of productivity measurement ratios seems probable, and has been addressed in the literature, research holds no evidence to verify the theory in this case. This may be one area open to exploration in the future. (See Table III.)

With regard to hospital affiliation and accreditation, joint membership in AHA and JCAH categorizes the majority of the respondents (N=38, 59%). Membership exclusive to JCAH is next in popularity (N=12, 19%), followed by membership in JCAH, AHA and some other, more

TABLE III

CHARACTERISTICS OF THE INSTITUTION

Category	N	Percentage of Respondents
1. Type of Control		
a) Government, Nonfederal, Nonprofit	19	29.7
b) Nongovernment, Nonprofit	35	54.7
c) For profit	10	15.6
2. Hospital Membership		
a) AHA	3	4.7
b) JCAH	12	18.8
c) AHA and JCAH	38	59.4
d) Other	3	4.7
e) AHA, JCAH, Other	8	12.5
3. Type of Medical Service		
a) General	50	78.1
b) Other	13	20.3
4. Type of Facility		
a) Hospital	47	73.4
b) Hospital/Nursing Home	14	21.9
c) Other	3	4.7
5. Size of Facility		
a) 100-300	40	62.5
b) 301-500	12	18.8
c) 501-700	8	12.5
d) 701-900	2	3.1
e) 901-1100	1	1.6
f) 1101+	1	1.6
6. Location		
a) Rural	6	9.4
b) Urban	27	42.2
c) Metropolitan	30	46.9
7. Type of Foodservice Management		
a) Noncontract	53	82.8
b) Contract	11	17.2
8. Foodservice System		
a) Conventional	54	84.4
b) Other	9	14.1
9. Managerial Training Available		
a) Yes	44	66.8
b) No	19	29.7

individualized organization (N=8, 12%). Institutions belonging solely to AHA or an alternate affiliation (other) include six (5% in each category). Responses to the classification of "other" include various state and local organizations (i.e. West Virginia Hospital Association), as well as affiliations at the national level (i.e. National Restaurant Association, American Psychiatric Association).

The majority of the respondents also indicate their type of medical service to be general (N=50, 78%). Thirteen facilities (20%), however, did respond to the category of "other," listing various additional services in the areas of oncology, cardiac rehabilitation, chemical dependency, nutritional disorder, dialysis, psychiatry, orthopedic care and various womens' services. One participant (2%) did not respond to this question.

Type, Size and Location of Facility

Forty-seven (73%) of the respondents are solely hospital-type organizations, while 14 (22%) are combination hospital-nursing homes. The majority of respondents in the category of "other" primarily include psychiatric centers (N=3, 5%).

When asked to state the size of their facilities, an overwhelming majority (N=40, 63%) of the respondents indicated the first category of 101-300 beds. Responses regressed in numerical order from this point, with 12 facilities (19%) having 301-500 beds, eight (13%) having between 501-700 beds, two (3%) having 701-900 beds, and one each (1%) with 901-1100, and 1101 or more beds respectively. These results indicate the willingness of smaller facilities to participate in the study, even though larger institutions might be expected to have the

additional staffing and expertise necessary to accurately respond to questions asked on the instrument.

Similarly, about half of the respondents (N=30, 47%) reported their facilities to be located in metropolitan areas. This was not anticipated, due to the usual relationship of size and location (i.e. smaller facility/rural location), however this may be a result of the rather conservative estimates of population in each of the categories. Twenty-seven (42%) of the institutions claimed urban location, while only six (9%) were from rural communities; there was one (2%) no response to this question.

Type of Foodservice Management/
Foodservice System

Eighty-three percent (N=33) of the participating institutions were not contracted to foodservice management corporations, while 17 percent (N=11) do participate in such an arrangement. Companies include: ARA (N=3), Marriott (N=3), Service Master (N=1), Valley Foodservice (N=1) and Morrisons (N=1).

Fifty-four of the respondents (84%) utilize a conventional food-service system, while nine facilities (14%) utilize an alternate method such as cook-chill (N=8), or reliance on convenience food items (N=1).

Percentage of Annual Budget
Allocated to Food/Labor

The findings for this category are summarized in Table IV. It is important to note that interpretation of this question may differ

TABLE IV

PERCENTAGE OF ANNUAL BUDGET ALLOCATED FOR FOOD AND LABOR

Food (%)	Labor (%)	N	Percentage of Respondents
18	28	1	2.1
20	55	1	2.1
30	48	1	2.1
30	50	1	2.1
31	59	1	2.1
31	63	1	2.1
32	64	1	2.1
32	56	1	2.1
33	61	1	2.1
33	35	1	2.1
34	60	1	2.1
35	48	1	2.1
35	60	1	2.1
36	58	1	2.1
37	49	1	2.1
37	51	1	2.1
38	62	1	2.1
39	45	2	4.4
40	32	1	2.1
40	45	1	2.1
40	53	1	2.1
40	56	1	2.1
40	60	5	10.9
41	43	1	2.1
41	49	1	2.1
42	54	1	2.1
42	48	1	2.1
42	67	1	2.1
44	48	1	2.1
44	50	1	2.1
45	54	1	2.1
47	43	1	2.1
47	53	1	2.1
47	42	1	2.1
50	50	1	2.1
50	NA	1	2.1
51	49	1	2.1
54	46	1	2.1
60	40	3	6.5
80	20	1	2.1

among respondents (i.e. some included food and labor as 100 percent of the total budget, while others took into consideration additional factors such as overhead, operational costs, etc.); the latter method may decrease percentages allotted to food and labor. These findings may indicate a need for standardized definitions for food and labor costs, in addition to other basic components of a foodservice departmental budget.

Managerial Training Programs

Although in-house programs were the basis for this question, many individuals took it upon themselves to acquire managerial training outside the institutional setting. In this respect, this area may also be considered in conjunction with characteristics of the respondents. Of the individuals indicating a "yes" response to managerial training (N=44, 69%), programs included in-house training, seminars and professional meetings, teleconferences and university courses, video tapes, interaction management techniques and time and motion studies. Nineteen participants (30%) indicated that management training was not available, and one (1%) did not respond to the question.

Performance Measures

As discussed in the literature, a difference exists between productivity and other measures of performance. Section III of the survey instrument attempts to determine the degree of utilization of various performance measures by the respondents. In Part A, participants were given a list of 16 activities identified in previous studies to be

useful ways of measuring/assessing performance within a foodservice operation. They were then asked to indicate frequency of utilization by placing a number from 1-7 in the blank space preceding each activity (1=never, 2=daily, 3=weekly, 4=biweekly, 5=monthly, 6=yearly, 7=other). In the initial stages of data assessment, these categories were expanded to include four additional responses: 0=as needed, 7=quarterly, 8=twice yearly, 9=3 times daily. As the process of statisical analysis progressed, however, the list of frequencies was reduced to three categories in order to eliminate similar and unnecessary groupings. The revised categories were as follows:

Never

Frequently (3 times/day, daily, weekly, biweekly)

Occasionally (as needed, monthly, quarterly, twice/year, yearly)

Survey Section III, Parts B and C listed 11 additional activities and nine benefit programs, respectively, requiring that participants indicate utilization with a check mark. The aforementioned format is similar to the survey instrument used by Lischke (1986), however, respondents were not required to list the persons responsible for each activity performed. Instead, the performance measures were divided into three categories, as described, in order to enhance specificity and clarity of presentation. An additional seven activities, identified in recent literature as having an effect on organizational performance, were also included (i.e. labor analysis of turnover and absenteeism rates; meals-on-wheels programs; congregate meals for the elderly; facility bakeshops; employee health/fitness programs; flextime, and job sharing). To prevent misinterpretation of terminology, definitions were inserted where appropriate.

For purposes of discussion, the activities and programs described will be grouped according to the individual performance measure they represent.

Profitability Measures

Profitability can be defined as a relationship between total revenues and total costs (Sink, 1985), or an assessment of the attributes of financial resource utilization (Tuttle, 1986). Although many health care institutions are "non-profit" organizations, the division of foodservice may still be concerned with profitability, through the various services it provides. The fact that most all foodservice operations are involved with financial resource utilization in some way, may be one reason why a significant association is not found between profitability and hospital type (i.e. non-profit vs. profit).

For the purposes of this research, profitability measures include: meals-on-wheels programs (for profit), congregate meals for the elderly (for profit) and various catering operations (in-house, satellite, public, bakeshop. (See Table V.) The first of these, a for-profit meals-on-wheels program is utilized by 27 percent (N=17) of the respondents. The remaining 73 percent (N=47) either do not have this type of a program or consider it to be more of a service than a money-making opportunity. Statistical analysis has shown this aspect of profitability to be correlated with AHA membership ($p=.046$, $x^2=3.976$, $df=1$). Of the respondents utilizing a for-profit meals-on-wheels program, 94 percent (N=16) belong to AHA and six percent (N=1) do not. This behavior may be attributed to recent cost studies performed by Hospital Administrative Services of the American Hospital Association, indicating

TABLE V

SIGNIFICANT ASSOCIATIONS FOUND IN PROFITABILITY CONTROLS

Profitability Controls	Correlating Characteristics	p	X^2	df
Meals-on-Wheels Program*	Hospital Membership (AHA)	0.046	3.976	1
Catering (in-house)*	RD Status	0.047	3.948	1
Catering (in-house)*	Salary	0.038	8.415	3
Catering (Satellite)	Age	0.034	4.487	1
Catering (Satellite)*	Hospital Membership (JCAH)	0.049	3.865	1
Catering (Satellite)*	Hospital Membership (Other)	0.011	6.485	1
Catering (Public)	Age	0.004	8.110	1
Catering (Public)	Productivity Training	0.016	5.785	1

*Warning: More than 20 percent of the cells have expected counts less than 5.

that eight percent of the average hospital budget is allocated to foodservice, and thereby intensifying the need for effective cost containment (Puckett, 1988). As stated in the literature, a reduction in costs can indirectly result in a profitability increase.

The second profitability measure, congregate meals for the elderly, is not utilized by the majority of respondents (N=57, 89%). This may be due to the existence of state and locally sponsored nutrition centers that provide this service in many communities. It may also result from the inability of many elderly patrons to pay for this service.

Among the various forms of catering operations utilized, in-house (employee meals, staff functions) is the most popular, participated in by 79 percent (N=50) of the responding institutions. Significant associations are indicated in this area with regard to RD status ($p=.047$, $x^2=3.948$, $df=1$) and salary ($p=.038$, $x^2=8.415$, $df=3$). Among the 50 registered dietitians responding, 74 percent (N=37) utilized in-house catering, while only 26 percent (N=13) did not. Similarly, those respondents in the higher annual salary ranges were more likely to use in-house catering. Among individuals earning $30,000-$34,999, 93 percent (N=14) participated, while seven percent (N=1) did not. Among individuals earning $35,000/year or more, 88 percent (N=22) participated and 12 percent did not (N=3).

Catering by satellite location was found to be associated with age ($p=.034$, $x^2=4.487$, $df=1$), JCAH membership ($p=.049$, $x^2=3.865$, $df=1$) and membership in a hospital affiliation other than AHA or JCAH ($p=.011$, $x^2=6.485$, $df=1$). Of the 20 total respondents utilizing satelite catering as a money-making operation 15 (75%) were between

the ages of 20-39, while only five (25%) were 40 or over. This may be due to the exposure of younger individuals to more recent trends in profitability management and the importance of a foodservice operation's "proving its worth," rather than just existing in this day and age. Similarly, those institutions belonging to JCAH also have adequate exposure to policy and procedure regarding departmental budgeting and all aspects of planning and resource utilization (Puckett, 1988). This may be an indication of why 16 (80%) of the total 20 respondents utilizing satellite catering, a more agressive technique for increasing profitability, belong to a JCAH accredited hospital. Those facilities falling into the category of "other," more clinically affiliated memberships (i.e. American Psychiatric Association), appear to have a less frequent utilization of satellite catering (N=7, 35%).

Public catering (i.e. visitor cafeteria) is utilized by 75 percent of the respondents (N=8) and is statistically correlated with age ($p=.004$, $x^2=8.110$, $df=1$) and productivity training ($p=.016$, $x^2=5.785$, $df=1$). Again, it is the younger respondents, age 20-29, who employ this money-making technique most frequently (N=31, 66%) as opposed to the 40 and over group who are less likely to utilize public catering (N=16, 34%). As anticipated, those respondents having specific training in the area of productivity measurement are also more likely to employ a high visibility technique such as public catering. Of the 31 individuals with training in this area, 27 (60%) do utilize some form of public catering, while 18 (40%) do not.

The last aspect of catering operations, a hospital bakeshop open to the public, is utilized by 23 percent (N=15) of the respondents.

This is an expected outcome due to the experimental nature of the technique and the additional labor involved.

Quality of Work Life Measures

Quality of work life is defined as work with a sense of purpose, adding usefulness and responsibility to the efforts of employees (Bennett, 1983). Quality of work life measures associated with this research and previous productivity/performance studies performed at Oklahoma State University include: employee suggestion systems, employee recognition programs and employee reward systems (monetary and non-monetary) (Table VI).

An employee suggestion system is utilized by 42 of the 64 respondents (66%) and is statistically correlated with AHA membership ($p=.017$, $x^2=5.703$, $df=1$). Because AHA exposes its member facilities to a variety of literature regarding health care management, it is not surprising that 36 (86%) of the respondents utilizing a suggestion system are members in the AHA, while only six (14%) are not.

A similar QWL enhancement technique, employee recognition systems (i.e. employee of the month), are statistically associated with membership in an affiliation other than AHA or JCAH ($p=.000$, $x^2=13.189$, $df-1$). In this situation, however, the results are quite opposite of those discussed above. Of the 56 respondents utilizing an employee recognition system, only six (11%) have an affiliation other than AHA or JCAH. Again, these findings may be due to the standardized policies and procedures associated with these two widely accepted hospital accreditation organizations.

TABLE VI

SIGNIFICANT ASSOCIATIONS FOUND IN QWL CONTROLS

QWL Controls	Correlating Characteristics	p	X^2	df
Employee Suggestion System	Hospital Membership (AHA)	0.017	5.703	1
Employee Recognition Programs*	Hospital Membership (other)	0.000	13.189	1
Employee Reward Systems (Monetary)*	Location	0.012	8.815	2
Employee Reward Systems (Non-Monetary)*	Location	0.014	5.341	1
Employee Reward Systems (Non-Monetary)*	Facility Size	0.021	5.341	1

*Warning: More than 20 percent of the cells have expected counts less than 5.

With regard to employee reward systems (monetary), a statistical association with facility location is noted ($p=.012$, $x^2=8.815$, $df=2$). Of the 20 respondents using this technique, a total of 15 (75%) are from facilities located in metropolitan areas having greater than 50,000 inhabitants; four (20%) are found in urban areas (2,500-49,999 people) and one (5%) is located in a rural community with 1-2,499 inhabitants. These findings are not surprising in that larger communities not only have larger health care facilities with increased numbers of professional staff, more likely to be informed on the latest management trends, but may have foodservice budgets that will accommodate monetary rewards for job performance.

The same correlation is observed between employee reward systems (non-monetary) and facility location ($p=.014$, $x^2=8.160$, $df=2$), as well as facility size ($p=.021$, $x^2=5.341$, $df=1$) for many of the same reasons discussed previously. In this situation, nine out of ten respondents (90%) indicating use of non-monetary reward systems are from facilities located in metropolitan areas. With regard to hospital size, seven out of the same 10 respondents (70%) are from facilities having greater than 300 beds.

Innovation Measures

Innovation is defined as the generation, acceptance and implementation of new ideas, processes, products or services (Kanter, 1983). Performance measures relating to innovation as defined in this research include: new recipe implementation, menu analysis/revision, equipment review, and computer usage in nutrition and foodservice areas (Table VII).

TABLE VII

SIGNIFICANT ASSOCIATIONS FOUND IN INNOVATION CONTROLS

Innovation Controls	Correlating Characteristics	p	X^2	df
New Recipe Implementation*	Productivity Training	0.049	6.043	2
New Recipe Implementation*	Hospital Control	0.017	8.097	2
Menu Analysis/Revision*	Age	0.025	7.386	2
Menu Analysis/Revision*	Facility Size	0.006	10.286	2
Equipment Review*	Age	0.046	6.158	2
Equipment Review*	Years in Foodservice Management	0.041	6.397	2
Computer Usage (in nutrition services)*	Salary	0.022	9.645	3
Computer Usage (in foodservice)*	Salary	0.014	10.543	3
Computer Usage (in nutrition services)	Hospital Control	0.048	6.084	2
Computer Usage (in foodservice)	Hospital Control	0.015	8.373	2
Computer Usage (in nutrition services)	Facility Size	0.001	10.796	1
Computer Usage (in foodservice)	Facility Size	0.000	13.067	1
Computer Usage (in foodservice)	Registration Status	0.014	5.995	1
Computer Usage (in foodservice)	Facility Type	0.048	3.425	1

*Warning: More than 20 percent of the cells have expected counts less than 5.

The first of these, new recipe implementation, is used occasionally by the majority of respondents (N=53, 82%), and frequently by nine respondents (15%). Two respondents (3%) do not use this measure. Statistical correlations are present between new recipe implementation and productivity training ($p=.049$, $x^2=6.043$, $df=2$), as well as type of medical service provided ($p=.017$, $x^2=8.097$, $df=2$).

Productivity training appears to be associated in a positive manner with occasional use of new recipes (i.e. monthly, quarterly, twice/year, yearly, as needed). Of the 50 respondents cited with occasional new recipe implementation, 29 (58%) have been trained in some aspect of productivity, while 21 (42%) have not. In the category of frequent usage, however, only two out of nine respondents (22%) have had previous productivity training. This may allude to the fact that frequent introduction of new recipes (i.e. 3 times/day, daily, weekly, biweekly) is not necessary and may be too time consuming. For the purpose of this research, it is important to note that there are no participants trained in the area of productivity measurement, that do not utilize some form of new recipe implementation.

Type of hospital control also seems to have an effect on this measure of innovation. Ninety-five percent (N=18) of responding state and locally operated facilities utilize new recipes on an occasional basis, whereas the remaining five percent (N=1) employ this frequently. Non-governmental, non-profit health care facilities follow a similar pattern: 87 percent (N=30), occasionally; 8 percent (N=3), frequently; and 6 percent (N=2), never. In the for-profit category, however, the respondents are divided equally between occasional (N=5, 50%) and frequent (N=5, 50%) use. This may result from the desire to increase

revenue by increasing customer satisfaction through a better variety of menu selections.

The category of menu analysis/revisions also appears statistically correlated to two categories: age ($p=.025$, $x^2=7.386$, $df=2$) and facility size ($p=.006$, $x^2=10.286$, $df=2$). The majority of both younger (97%, N=34) and older (75%, N=21) respondents employ this technique occasionally, however, there are no respondents under 40 years of age who never utilize menu analysis, while 14 percent (N=4) of the older administrators do completely ignore this aspect of foodservice innovation. This may be attributed to the establishment of a normal routine over time, or a general resistance to change among older respondents.

The practice of equipment review is correlated with age ($p=.046$, $x^2=6.158$, $df=2$) and years in foodservice management ($p=.041$, $x^2=6.397$, $df=2$). Ninety-one percent (N=32) of the respondents age 20-39, 89 percent (N=25) of the respondents age 40 or over, 88 percent (N=23) of the respondents having between 1-10 years experience in foodservice management and 92 percent (N=34) of the respondents with 11 or more years of experience all review and assess the functioning of major pieces of equipment on an occasional basis. It is interesting to note, however, that none of the younger, less experienced managers completely avoid this reviewing process, while 11 percent (N=3) of the managers over 40, and eight percent (N=3) of those managers with more than 11 years of experience do ignore this aspect of innovation.

The area of computer usage in both nutrition and foodservice also appears to be highly correlated with several personal and institutional characteristics; namely, salary, type of hospital control and size.

With regard to salary level, the data indicates that as salary increases, so does the percentage of individuals employing computer applications. In nutrition services ($p=.022$, $x^2=9.645$, df=1), zero percent (N=0) of the respondents earning less than $24,999/year; 31 percent (N=5) from the $30,000-$34,999 group, and 60 percent (N=15) of the respondents receiving $35,000/year employ computers; within the food service area ($p=.014$, $x^2=10.543$, df=3), these numbers are zero percent (N=0), 44 percent (N=7), 47 percent (N=7) and 68 percent (N=17) respectively. Note that in both situations, it is only when salary surpasses the $35,000 level that a greater percentage of respondents are using computers as compared to those who are not. This may be due, indirectly, to better quality experience/education on the part of those individuals warranting higher salaries.

In the area of hospital control, it appears to be the non-governmental, non-profit organizations with the greatest percentage of computer utilization in both nutrition services (54%, N=19); $p=.048$, $x^2=6.084$, df=2) and foodservice (66%, N=23; $p=.015$, $x^2=8.373$, df=2). These figures can be compared with non-profit state or locally operated facilities (26%, N=5)/for-profit institutions (20%, N=2) in the nutrition area, and non-profit, state or locally operated facilities (37%, N=7)/for-profit instituions (20%, N=2) in the foodservice area. One may assume these results to be related to institutional priorities, goals for the future, and perhaps the absence of powerful external controls.

Size is another influential factor, where once again it is the larger facilities who have the manpower, professional experience and financial resources to undertake an innovative act such as the

implementation of a departmental computer. In nutrition services, 67 percent (N=16) of the responding hospitals having over 300 beds, as opposed to 25 percent (N=10) with 101-300 beds, are taking advantage of computer applications (p=.001, x^2=10.796, df=1). In the area of foodservice, these figures are 79 percent (N=19) and 33 percent (N=13), respectively (p=.000, x^2=13.067, df=1).

There are four additional variables found to have an influence on computer utilization in either nutrition or foodservice. The first of these, accreditation through JCAH, is found to be positively correlated with usage in nutrition related areas (45%, N=26; p=.033, x^2=4.530, df=1). Among participants not accredited through JCAH, or JCAH and some other organization, there is no computer usage found.

The second of the four is found to be registrational status. Fifty-six percent (N=28), (p=.014, x^2=5.995, df=1), of those individuals who are registered dietitians utilized computer operations in foodservice, as opposed to 17 percent (N=2) who did not. These respondents are most likely administrative dietitians who have some control over the foodservice area and possess the knowledge necessary to implement a computer system.

A third variable showing association is facility type (p=.048, x^2=3.925, df=1). Fifty-seven percent (N=27) of responding facilities categorized as hospitals, are found to utilize computers in foodservice, as opposed to 29 percent (N=5) of those institutions classified as "other" (i.e. nursing homes). These results are not surprising due to the health care revolution and the introduction of competition among hospitals, forcing them to utilize new technology and increase their effectiveness through services.

Similar to JCAH membership, the category of "other" hospital accreditation organizations also has an effect on computer usage ($p=.020$, $x^2=5.379$, $df=1$). Eighty-two percent (N=9) of responding facilities obtaining accreditation through an organization other than JCAH or AHA are found to utilize computer operations in the foodservice area. Anticipated categories for "other" in this instance would be more professional, standardized organizations such as the National Restaurant Association.

QWL/Innovation Measures

There are several performance measures that are not mutually exclusive and are identified in the research as having characteristics pertaining to both QWL and innovation. These include employee health/fitness programs, profit sharing, flextime, job sharing and cafeteria-style benefit programs (Table VIII).

Employee health and fitness programs (i.e. wellness centers) are fairly new concepts that, just a few years ago, could only be found in large corporations. To endorse preventative measures in addition to the traditional rehabilitative, more and more health care facilities are getting involved in this area and, at the same time, improving the quality of work life for their employees. These reasons may account for the 73 percent (N=47) response rate indicating employee access to health and fitness programs. The remaining 27 percent (N=17) of the respondents have not yet adopted, or do not have the facilities to accommodate such a center at this time.

Employee brainstorming sessions are other innovative activities that can have a positive effect on quality of work life. It is rather

TABLE VIII

SIGNIFICANT ASSOCIATIONS FOUND IN QWL/INNOVATION CONTROLS

QWL/Innovations Controls	Correlating Characteristics	p	X^2	df
Employee "brainstorming" Sessions*	Title	0.036	13.463	6
Profit Sharing*	Age	0.004	8.400	1
Profit Sharing*	Hospital Control	0.036	6.637	2
Flextime*	Age	0.020	5.432	1
Job Sharing*	Facility Size	0.022	5.246	1

*Warning: More than 20 percent of the cells have expected counts less than 5.

unexpected that a statistical correlation is indicated, relating this area to position/title of the respondents ($p=.036$, $x^2=13.463$, $df=6$). These sessions are used by the majority of respondents only occasionally and are most common among directors and chief clinical dietitians (91%, N=39), and administrative dietitians (7%, N=3). One associate director (2%) also indicated utilization of brainstorming sessions. This area may be assumed to correlate indirectly with open vs. closed managerial operations, and in instances where good communication skills are endorsed by those in authority.

The technique of profit sharing has been statistically associated with both age of the respondents ($p=.004$, $x^2=8.400$, $df=1$) and type of hospital control ($p=.036$, $x^2=6.637$, $df=2$). A total of nine individuals in the 20-39 year age group (14%) indicated utilization of profit sharing within their facilities. These findings reiterate the association between younger administration, assumed to be skilled in current managerial techniques, and utilization of innovative operational procedures. With regard to hospital controls, four of the nine respondents (45%) using profit sharing within their departments are from for-profit institutions. These results seem quite likely, indicating a desire on the part of management to "share the wealth" with employees. The remaining six are divided among non-government, non-profit (33%, N=3) and non-profit, state or locally controlled (22%, N=2) facilities.

The response to utilization of flextime is even lower among respondents (N=7, 11%), although a correlation is evident between this measure and age of the respondents ($p=.020$, $x^2=5.432$, $df=1$). In this situation, however, it is the older group of administrator who are

willing to experiment with a new procedure (86%, N=6), as opposed to the under 40 group (14%, N=1) who were, until this point the strongest supporters of current managerial trends. It is also a possibility that the implementation of flextime is a hospital-wide activity, not controlled or initiated by the foodservice administrator.

Similarly, job sharing is also utilized by a small number of respondents (N=3, 5%). It is found to be statistically correlated with hospital size, ($p=.022$, $x^2=5.246$, $df=1$), and all three respondents (N=100) are from facilities having over 300 beds. At this point, these results are indicative of what is expected, as it is usually the larger, more up-to-date facilities that serve as testing grounds for new procedures.

Cafeteria-style benefits are the last of the QWL/innovation measures, and are slightly more popular among respondents (N=16, 25%). This may be due, in part, to the growing popularity of HMO's and alternative health care plans that can benefit the employees, as well as the employers, with greater cost savings.

Effectiveness Measures

Effectiveness is defined as a measure of achievement against preset goals (Kinlaw, 1986-87). Effectiveness measures, as defined in the research, include verbal/written statement of departmental goals and management by objectives (MBO/employee evaluations) (Table IX).

The first of these, statement of departmental goals, received a high response rate by participants in the study. Sixty-one of the 64 respondents (95%) indicated occasional use of this measure, while only one individual (2%) produced a verbal/written goal statement on a more

TABLE IX

SIGNIFICANT ASSOCIATIONS FOUND
IN EFFECTIVENESS CONTROLS

Effective Controls	Correlating Characteristics	p	X^2	df
MBO/Employee Evaluations*	Route to ADA Membership	0.016	5.808	1

*Warning: More than 20 percent of the cells have expected counts less than 5.

frequent basis (i.e. 3 times/day, daily, weekly, biweekly). Two respondents (3%) did not utilize this measure.

MBO techniques were also used by the majority of respondents on an occasional basis and a statistical association exists with route to registration ($p=.016$, $x^2=5.808$, $df=1$). Among those individuals pursuing an internship as a means of obtaining registration in the ADA, 100 percent (N=23) utilized MBO procedures occasionally (i.e. as needed, monthly, quarterly, twice/year, yearly). Of those who utilized another route to registration (i.e. three-year work experience, CUP program), 78 percent (N=21) used MBO occasionally and the remaining 22 percent (N=6) never attempted this technique. These findings may be associated with the internship program's greater emphasis on foodservice management/managerial theory as opposed to other programs.

Efficiency Measures

Efficiency is defined as the ratio of resources expected to be consumed to resources actually consumed (Sink, 1985). The five measures addressed in the research include meal price analysis, budget analysis, inventory turnover analysis and labor analysis of turnover and absenteeism rates (Table X).

Meal price analysis was utilized on an occasional basis by five (91%) of the respondents, frequently by four (6%) of the respondents, and never by only two (3%) of the respondents. These results are slightly higher than those indicated in the previous productivity studies performed at Oklahoma State University, and verifies the importance of this measure as an efficiency standard. In an industry such as foodservice, where price, purveyors, tastes and trends change

TABLE X

SIGNIFICANT ASSOCIATIONS FOUND IN EFFICIENCY CONTROLS

Efficiency Controls	Correlating Characteristics	p	X^2	df
Inventory Turnover Analysis*	Type of Foodservice Management	0.000	20.415	2
Inventory Turnover Analysis*	Location	0.014	12.490	4
Labor Analysis of Turnover and Absenteeism Rates*	Hospital Membership (JCAH)	0.009	9.330	2
Labor Analysis of Turnover and Absenteeism Rates*	Route	0.017	8.128	2

*Warning: More than 20 percent of the cells have expected counts less than 5.

constantly, occasional meal price analysis is a must for survival and may be used as a profitability indicator.

Budget analysis is another standard measure of efficiency, equally necessary to assure that costs are not exceeding revenues. In this instance, 57 (89%) of the respondents utilized the process occasionally, while seven (11%) analyzed their budgets more frequently. This is concurrent with the existing trend established in this research for occasional use of performance measures.

Inventory turnover analysis is the third efficiency measure and is statistically associated with type of foodservice management ($p=.000$, $x^2= 20.415$, $df=2$) and facility location ($p=.014$, $x^2=12.490$, $df=4$). Among respondents using this measure occasionally 93 percent (N=37) are non-contract foodservice systems, while seven percent (N=3) are operated by contract companies (i.e. ARA, Mariott). In frequent utilization, however, the percentages are reversed, indicating a 57 percent (N=8) response rate for contract managers, as opposed to a 43 percent (N=6) rate for non-contract managers. It is interesting to note that 100 percent (N=10) of the respondents who never performed inventory turnover analysis were non-contract managers. This may be due to the fact that most contract companies are very competitive, requiring mandatory seminars and continuing education for their employees, so that the most recent techniques for measurement and analysis are utilized.

In the category of location, 63 percent (N=19) of the metropolitan-type facilities utilize inventory turnover analysis occasionally, 27 percent frequently (N=8), and 10 percent (N=3) do not use. This can be compared to urban hospitals, with responses of 67 percent (N=18),

seven percent (N=2) and 26 percent (N=7), and rural institutions having ratings of 33 percent (N=2), 67 percent (N=4) and 0 percent (N=0), respectively. Although all three locations differ with respect to occasional vs. frequent use, it is only the rural hospitals who do not have a respondent in the "never use" category. Because inventory turnover analysis is a standard and well-known measure of performance, rather than innovation technique, increased rural utilization is somewhat anticipated.

The fourth category of efficiency measurement is labor analysis of turnover and absenteeism rates. This is statistically associated with JCAH affiliation ($p=.009$, $x^2=4.330$, $df=2$), and route to RD status ($p=.017$, $x^2=8.128$, $df=2$). In this instance, 98 percent (N=40) of those facilities accredited through JCAH utilized the measure occasionally, as opposed to two percent (N=1) of those facilities obtaining other accreditation. In analyzing the effects of route to registration on labor analysis of turnover and absenteeism rates, 39 percent (N=9) of the respondents obtaining registration through the dietetic internship program use the measure occasionally, 31 percent (N=7) use it frequently, and 30 percent (N=7) never utilize this technique. These results can be compared with those of respondents utilizing alternative routes to registration, with rates of 78 percent (N=21), seven percent (N=2) and 15 percent (N=4), respectively. The slightly lower percentages among respondents completing the internship may be associated with the emphasis of individual programs on more clinical aspects of dietetics.

Quality Measures

Quality is defined as the degree of a system's conformance to requirements, specifications and expectations (Sink, 1985). For the purposes of this research, quality measures include temperature checks on food items, tray audits, patient surveys of foodservice quality, prior to service quality food checks/taste tests and food quality checks against actual product specifications (Table XI). Because quality is of the utmost importance in all areas of foodservice, a high response rate is anticipated.

The majority of respondents utilizing temperature checks on food items did so frequently (N=62, 97%). One respondent (1.5%) used this measure occasionally and one facility (1.5%) did not employ this measurement technique. These findings indicate a high level of utilization, as well as importance and time spent on the activity.

The tray audit system is statistically correlated with type of medical service provided ($p=.002$, $x^2=12.227$, $df=2$). Of the respondents using the measure on an occasional basis, 81 percent (N=17) provide general medical service as opposed to 19 percent (N=4) in the category of "other." All of the facilities providing general medical service utilized some form of tray audit system (100%), although 23 percent (N=3) of the facilities specializing in other areas did not. This may be due to the fact that a general-type facility emphasizes a variety of services (including foodservice), rather than concentrating efforts in one or two specialty areas.

Patient surveys are performed frequently by 31 percent (N=20) of the respondents and occasionally by 69 percent (N=44). There are no respondents who do not utilize this measure, as patient surveys/

TABLE XI

SIGNIFICANT ASSOCIATIONS FOUND IN QUALITY CONTROLS

Quality Controls	Correlating Characteristics	p	X^2	df
Tray Audits*	Type of Medical Service	0.002	12.227	2
Quality Food Checks/ Taste Tests*	Type of Foodservice System	0.044	6.235	2
Food Quality Against Product Specifications*	RD Status	0.035	6.712	2
Quality Circles*	Title	0.009	17.095	6
Quality Circles*	Years in Foodservice Management	0.038	6.548	2

*Warning: More than 20 percent of the cells have expected counts less than 5.

response cards appear to be an integral part of most health care food-service operations.

Prior to service quality checks/taste tests are statistically associated with type of foodservice system ($p=.044$, $x^2=6.235$, $df=2$). Among respondents with frequent utilization of this measure, 87 percent (N=53) are of the conventional type, while 13 percent (N=8) are non-conventional (i.e. cook/chill). Similarly, 100 percent (N=1) of the respondents with occasional use also work in conventional foodservice systems. In the category of "no utilization," 100 percent (N=1) of the respondents are of the non-conventional type of foodservice. These results indicate a more frequent utilization of prior to service food checks among conventional systems, which is a necessary procedure when considering the multitude of errors that can occur during the preparation of food "from scratch."

Food quality checks against actual product specifications are statistically associated with registration status ($p=.035$, $x^2=6.712$, $df=2$). One hundred percent (N=15) of the respondents utilizing this measure on an occasional basis were registered dietitians, as opposed to zero percent (N=0) who were non-registered. In the category of frequent utilization, 70 percent (N=20) and 30 percent (N=11) are registered and non-registered, respectively, and in the category of "no utilization," 90 percent (N=9) are RDs, while 10 percent are not (N=1). These results are not surprising with the exception of the increased percentage of no utilization among registered dietitians. This particular measure of evaluation, however, is more likely to be performed by a member of the administrative team, where registration status may not be a requirement (i.e. line supervisor or counter service supervision).

Quality circles (QCs) are the last measure of performance addressed in the survey instrument. QCs show statistical association with position/title ($p=.009$, $x^2= 17.095$, $df=6$), and years in foodservice management ($p=.038$, $x^2=6.548$, $df=2$). Data analysis shows that 90 percent (N=7) of the respondents initiating quality circles (N=27) claim the title of director or chief clinical dietitian, three percent (N=7) are associate directors, seven percent (N=2) are administrative dietitians, and zero percent (N=0) are listed in the category of "other."

With regard to frequent utilization, the percentages included: 60 percent (N=3), zero percent (N=0), 20 percent (N=1) and 20 percent (N=1), respectively; responses to "no utilization" included 93 percent (N=27), seven percent (N=2), zero percent (N=0) and zero percent (N=0), respectively. It can be deduced from the results that quality circles are most likely to be utilized by directors, chief clinical, or administrative dietitians who are concerned with employee interaction and participative techniques.

Implementation of quality circles is also connected with years in foodservice management. Among respondents having between 1-10 years of experience, 62 percent (N=16) utilized quality circles occasionally, 11 percent (N=3) utilized frequently, and 27 percent (N=1) did not utilize. This can be compared with 35 percent (N=13), five percent (N=2), and 60 percent (N=22), respectively among participants with over 11 years of experience in the field. Again, there is evidence to show that newer, more innovative and participative techniques are more often utilized by younger managers.

Performance Ratios

Primary Ratios

The original 13 performance ratios synthesized by Lischke (1986), were further condensed to include what was believed by the researcher to be three of the most basic and frequently utilized ratios in the food-service industry. They include:

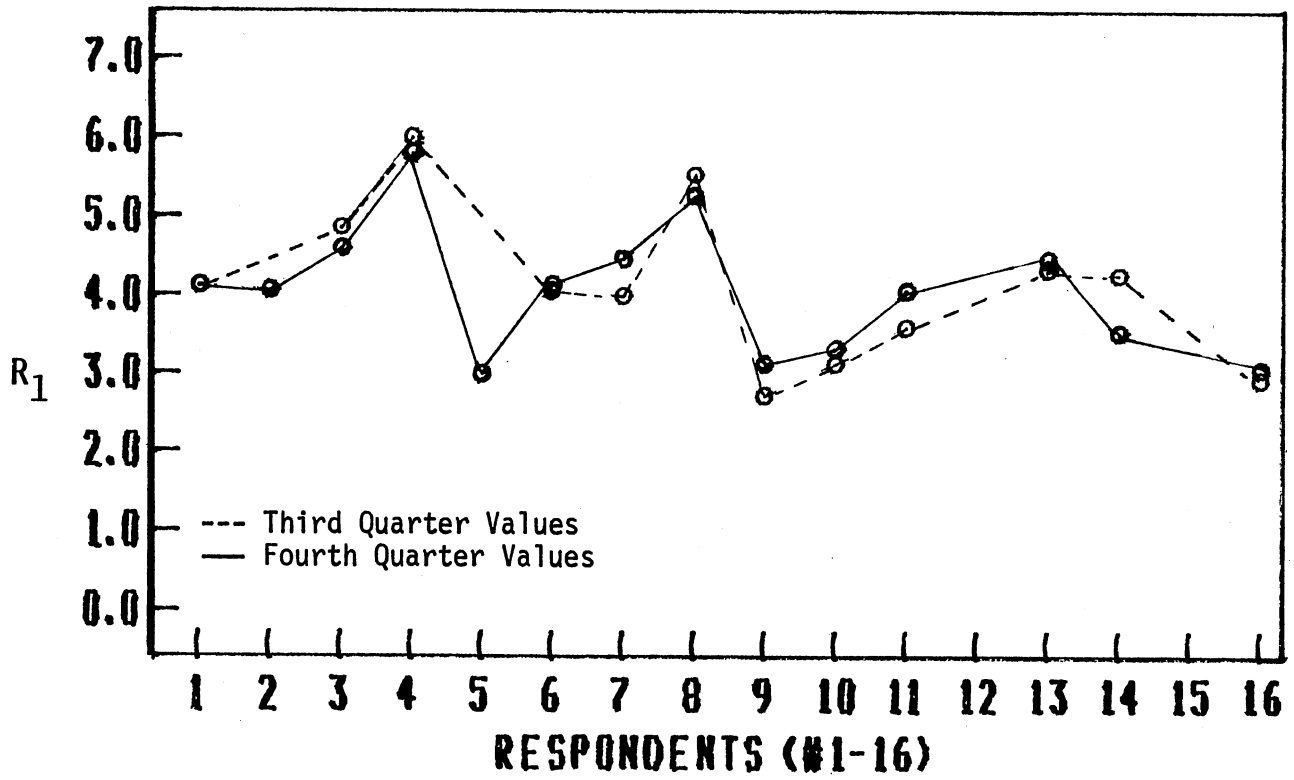
R_1: $\frac{\text{Total meals served}}{\text{Total labor hours worked}}$

R_2: $\frac{\text{Total meals prepared}}{\text{Total food cost}}$

R_3: $\frac{\text{Total revenue}}{\text{Total expenses}}$

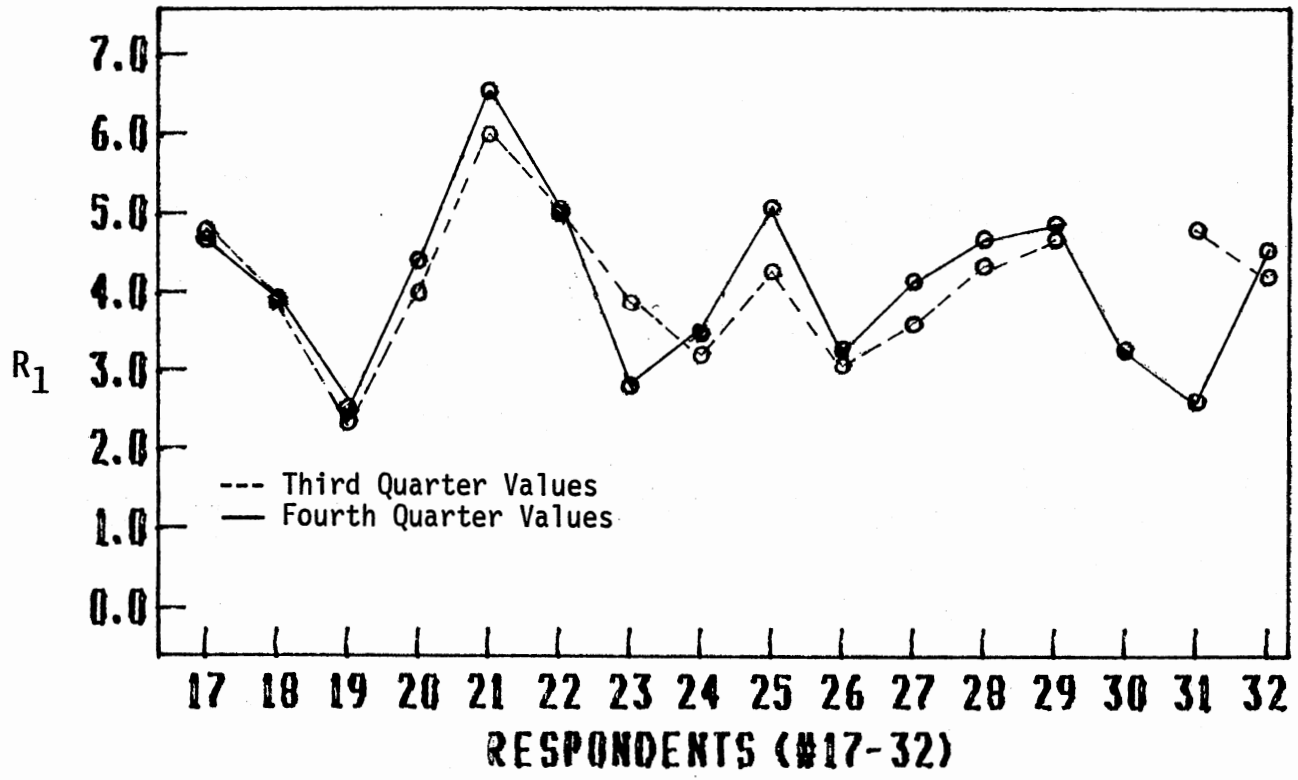
Participants were asked to provide third and fourth quarter figures for each of these ratios. The 48 facilities responding to this section were then divided into three sections (#1-16, #17-32, and #33-48) and plotted accordingly for each ratio so that trends could be analyzed.

Among the 64 participants, 16 offered no response to this section of the instrument, resulting in an overall eight percent response rate in this area. Out of the three ratios listed, R_1 was the most frequently utilized by the respondents (N=41, 85%). A total of three respondents (#12, #15, and #42) providing figures for R_2 and R_3 did not respond to R_1, while three participants (#2, #5, and #30) listed a numerical response in the fourth quarter category, but left the third quarter blank. (One individual, #43, responded to the third quarter and left the fourth quarter blank.) R_1 was also noted to have the largest variance between third and fourth quarterly values (Figures 12, 13 and 14).



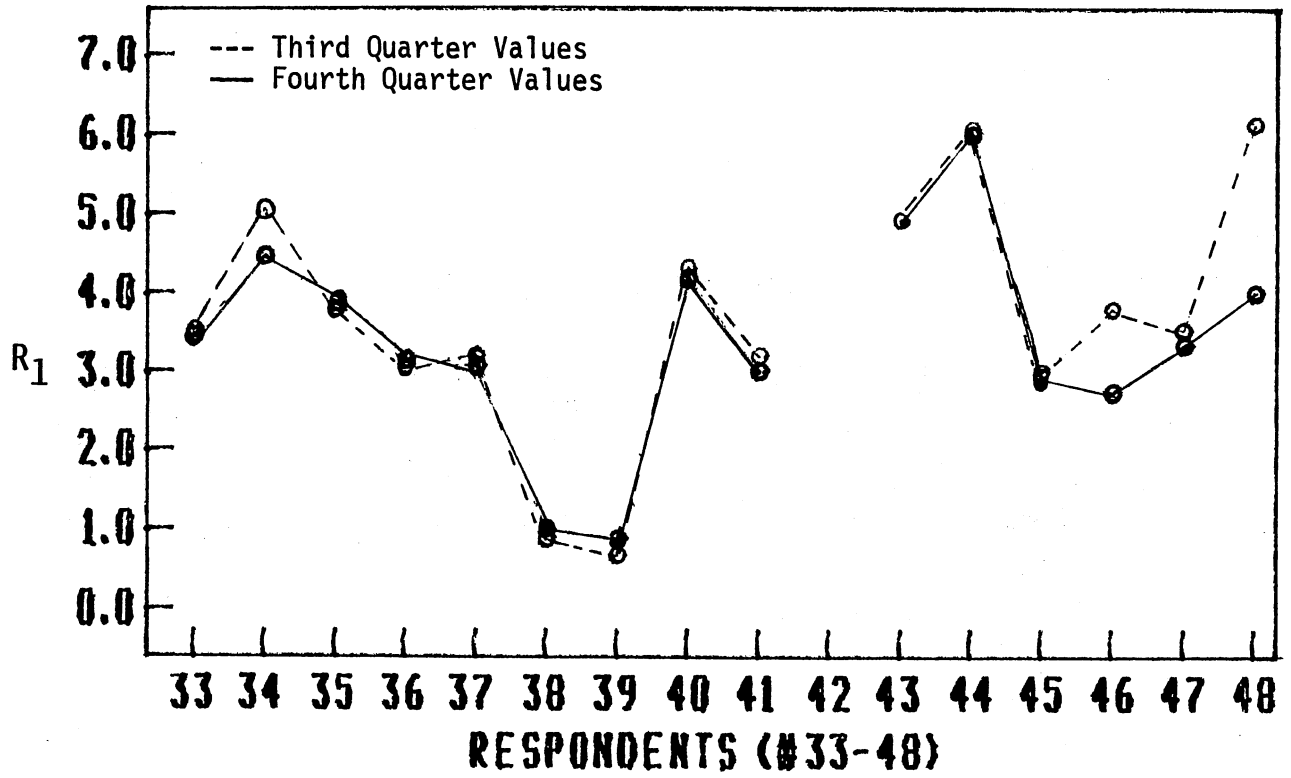
$$R_1 = \frac{\text{Total Meals Served}}{\text{Total Labor Hours Worked}}$$

Figure 12a. Quarterly Values for R_1 - Respondents 1-16



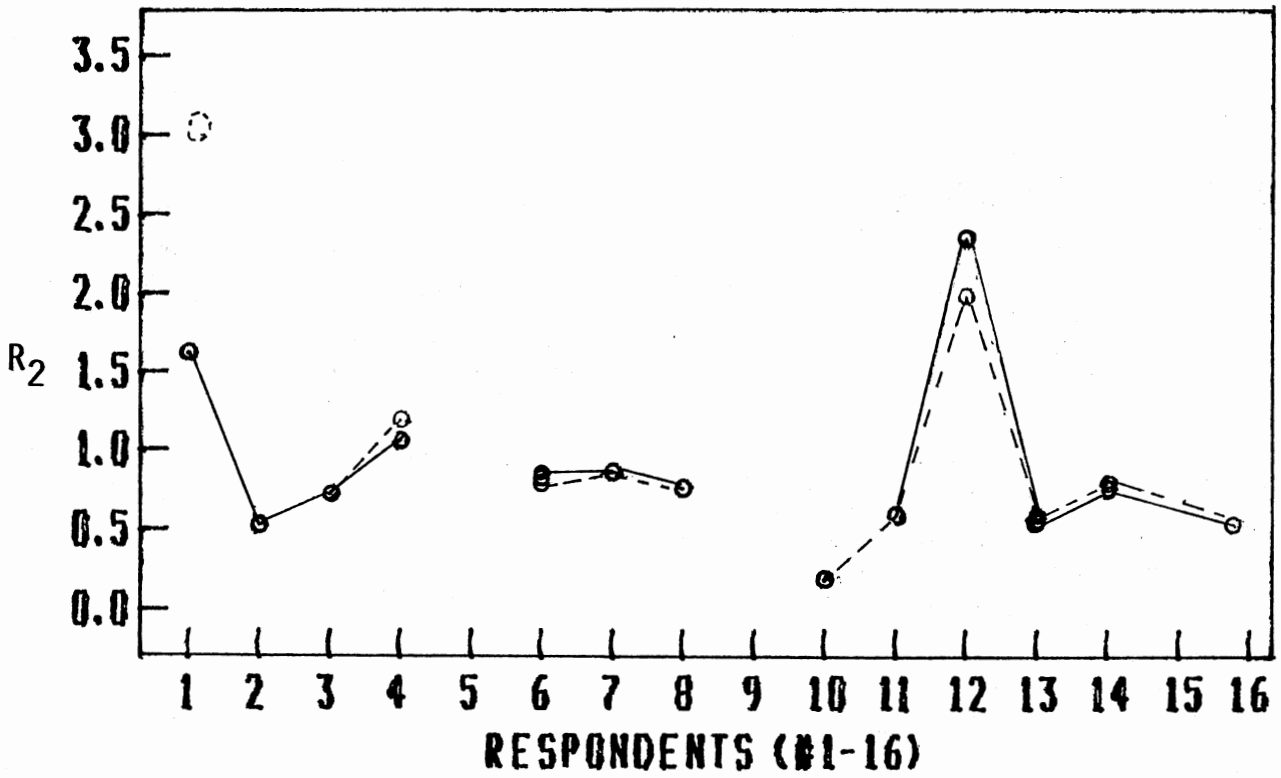
$$R_1 = \frac{\text{Total Meals Served}}{\text{Total Labor Hours Worked}}$$

Figure 12b. Quarterly Values for R_1 - Respondents 17-32



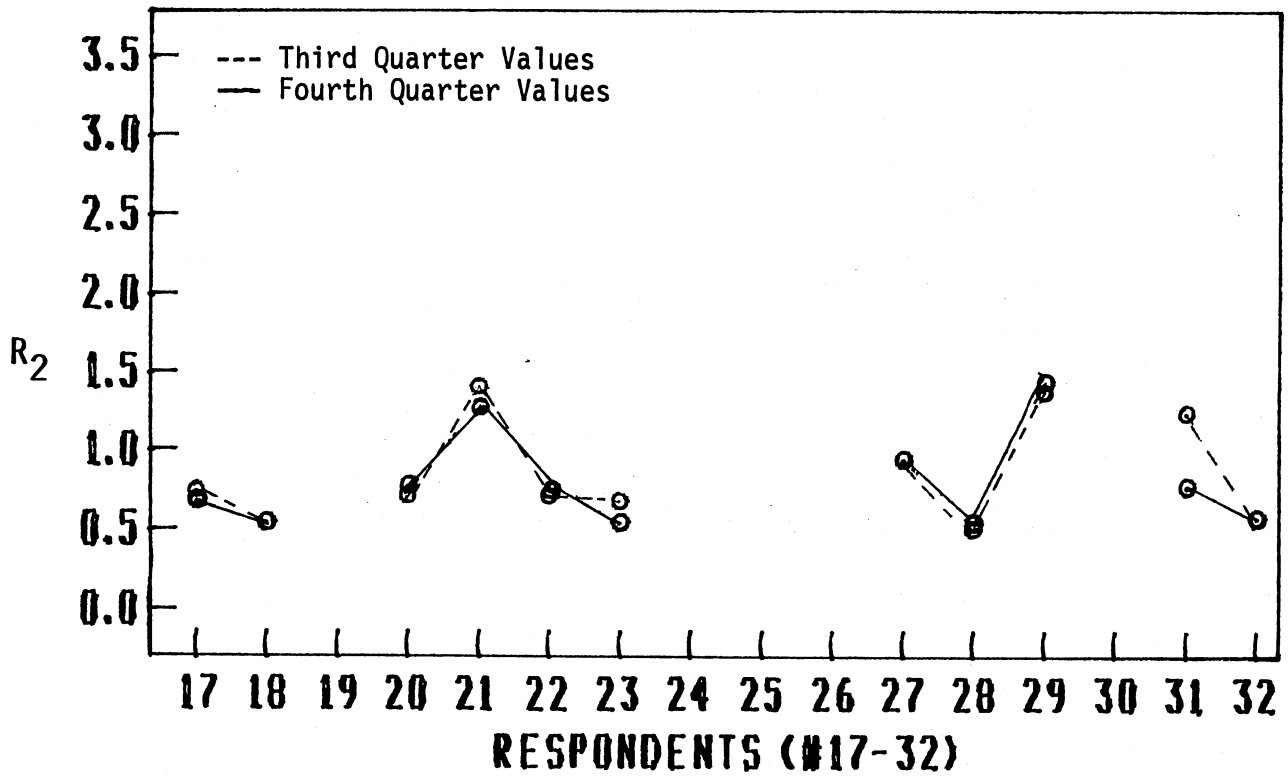
$$R_1 = \frac{\text{Total Meals Served}}{\text{Total Labor Hours Worked}}$$

Figure 12c. Quarterly Values for R_1 - Respondents 33-48



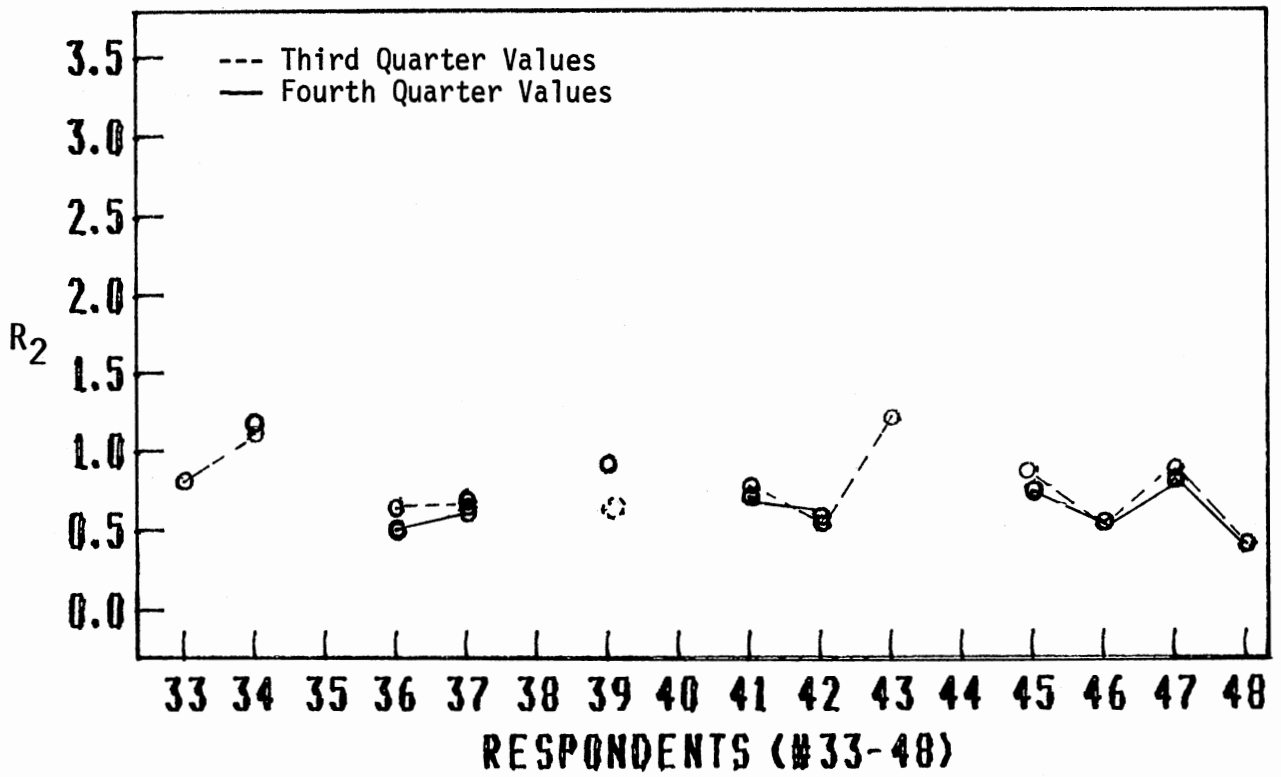
$$R_2 = \frac{\text{Total Meals Prepared}}{\text{Total Food Cost}}$$

Figure 13a. Quarterly Values for R_2 - Respondents 1-16



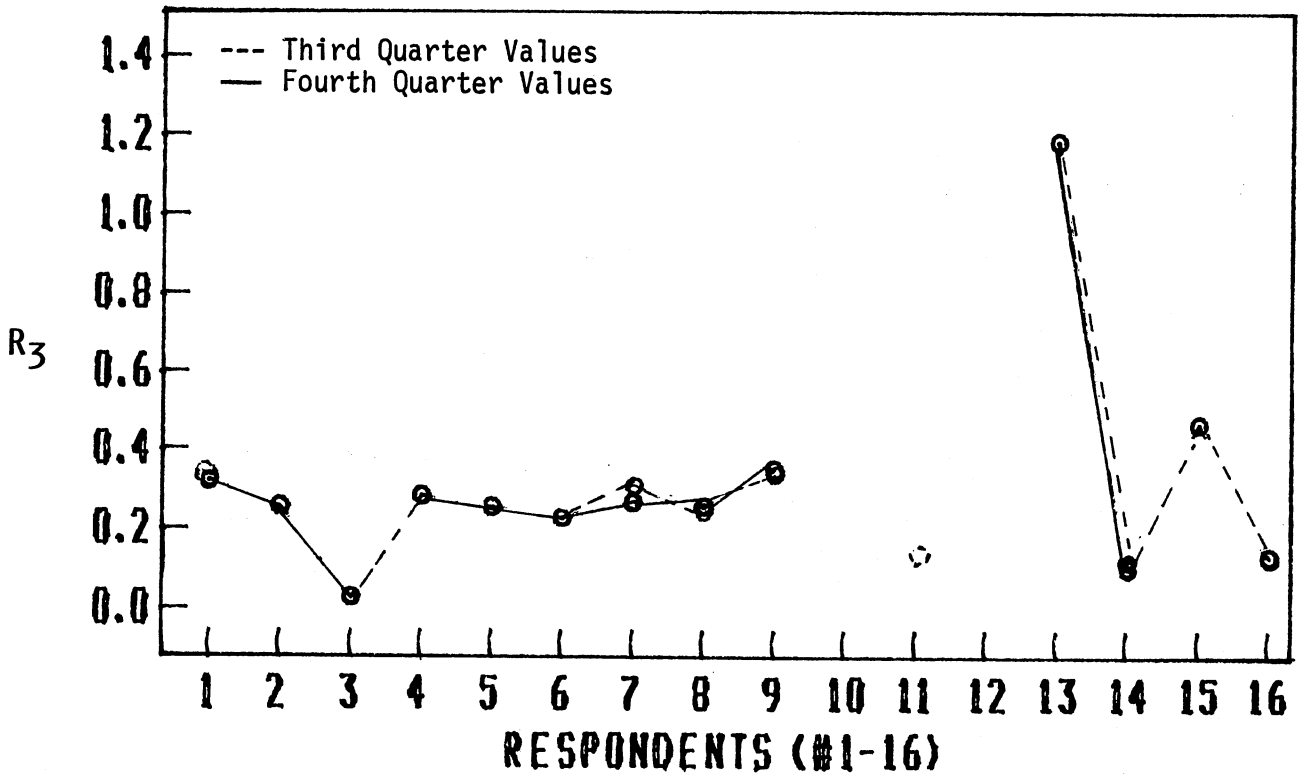
$$R_2 = \frac{\text{Total Meals Prepared}}{\text{Total Food Cost}}$$

Figure 13b. Quarterly Values for R_2 - Respondents 17-32



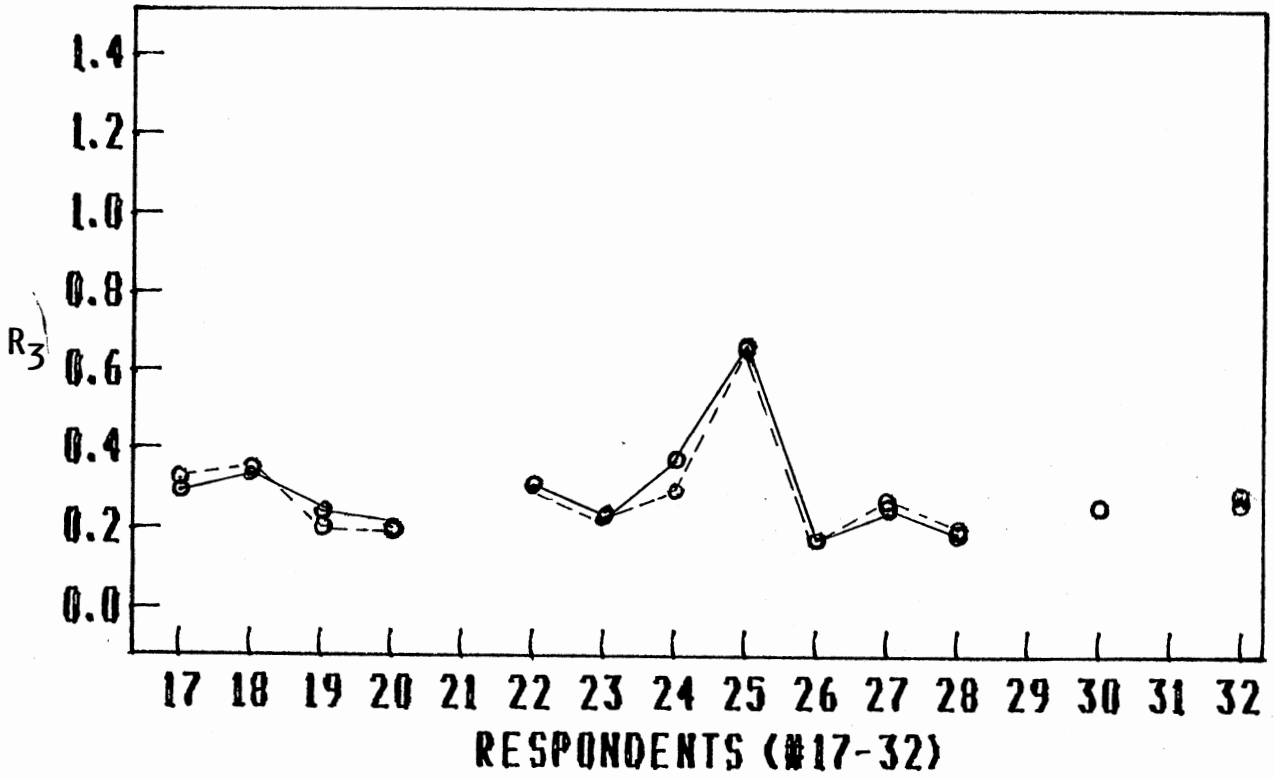
$$R_2 = \frac{\text{Total Meals Prepared}}{\text{Total Food Cost}}$$

Figure 13c. Quarterly Values for R_2 - Respondents 33-48



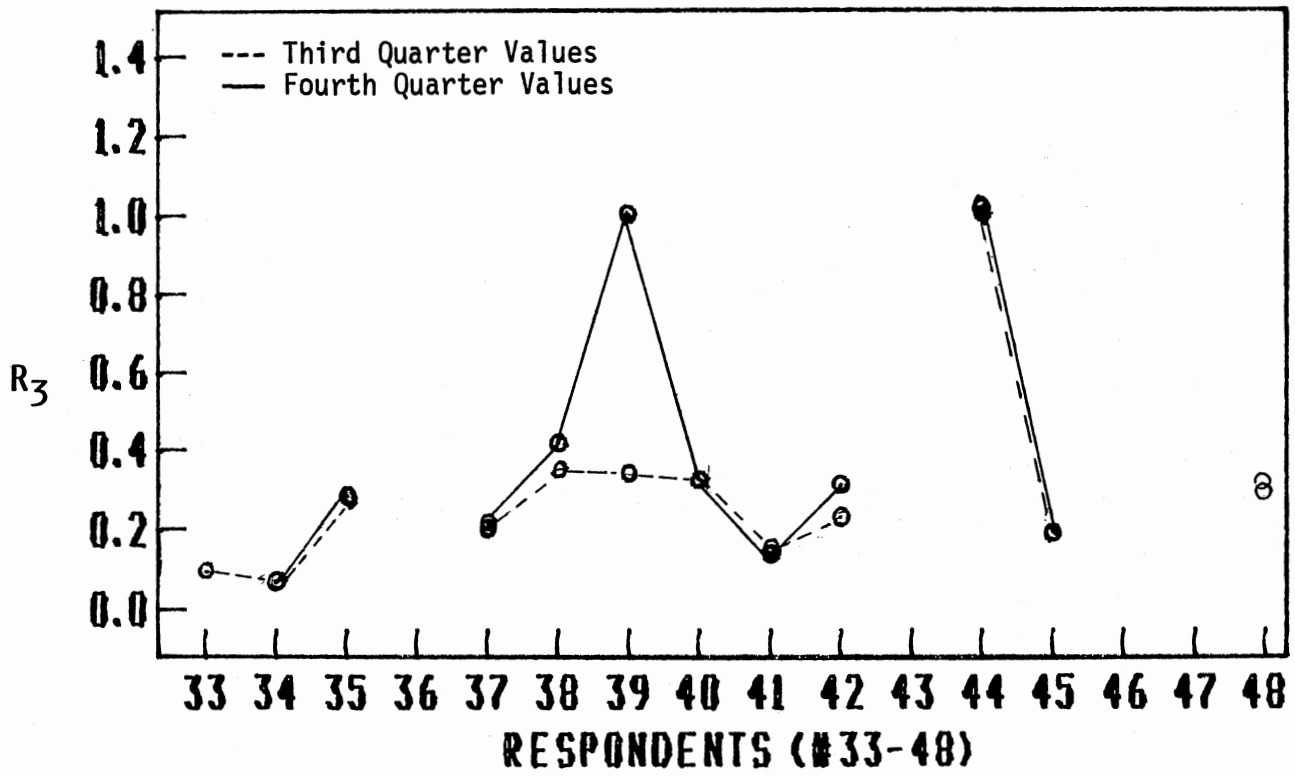
$$R_3 = \frac{\text{Total Revenues}}{\text{Total Expenses}}$$

Figure 14a. Quarterly Values for R_3 - Respondents 1-16



$$R_3 = \frac{\text{Total Revenues}}{\text{Total Expenses}}$$

Figure 14b. Quarterly Values for R_3 - Respondents 17-32



$$R_3 = \frac{\text{Total Revenues}}{\text{Total Expenses}}$$

Figure 14c. Quarterly Values for R_3 - Respondents 33-48

In contrast, R_2 received the lowest response rate (N=34, 71%), with a total of 11 facilities who did not utilize this ratio (#5, #9, #15, #19, #24, #26, #30, #35, #38, #40, #44). Respondents #53 and #43 provided a numerical response for the third quarter only, and respondent #2 indicated a response in the fourth quarter category only.

A total of nine participants chose not to indicate a response for R_3 as well (#10, #12, #21, #29, #31, #36, #43, #46, #47). The most likely explanation for these results was the lack of access to total expense-related information (i.e. utilities) on the part of the foodservice director. Two individuals (#2 and #5) responded to fourth quarter categories only, while one participant (#33) responded only to the third quarter section of the ratio.

In both of the first two ratios, third and fourth quarter values alternated among respondents with regard to numerical size. In R_1, 21 instances were identified where third quarter values were larger than fourth quarter values, and 19 cases where the opposite was true. In R_2, there were 18 third quarter values larger than their corresponding fourth quarter values, with 15 instances where the opposite was true. In R_3, however, there was more of an indication that fourth quarter values were greater than third quarter values (N=24, 69%). One explanation for these findings may be due to the fact that responding institutions adhere to the calendar, rather than fiscal, year; this would account for higher end of year sales or special events/ catering for the Christmas season.

Among the responses to R_1, both third and fourth quarter, statistical associations were found to exist with type of medical service provided ($p=.015$, $x^2=5.864$, $df=1$; $p=.006$, $x^2=7.658$, $df=1$), and

location ($p=.045$, $x^2=6.205$, $df=2$; $p=.007$, $x^2=9.926$, $df=2$). Seventy-four percent, N=37 (third quarter); 78 percent, N=39 (fourth quarter) of those facilities providing general medical service utilized the R_1 measure, as opposed to 38 percent, N=5 (third quarter); 38 percent, N=5 (fourth quarter) of the more specialized institutions. With regard to location, 81 percent, N=22 (third quarter); 89 percent, N=24 (fourth quarter) of urban-type facilities utilized this measure, as opposed to 50 percent, N=15 (third quarter); 50 percent, N=15 (fourth quarter) metropolitan and 67 percent, N=4 (third quarter); 67 percent, N=4 (fourth quarter) of facilities located in a rural area. The personal characteristics of route to registration were also found to be statistically associated with the use of R_1, however, only in the third quarter category. Among the respondents utilizing this measure, 59 percent (N=20) had completed a dietetic internship, as opposed to 41 percent (N=14) who pursued some alternate routes.

Among the respondents to R_2, both third and fourth quarters, statistical significance was again associated with type of medical service ($p=.044$, $x^2=4.076$, $df=1$; $p=.012$, $x^2=6.290$, $df=1$) and location ($p=.034$, $x^2=6.765$, $df=2$; $p=.018$, $x^2=8.046$, $df=2$). Sixty-two percent, N=31 (third quarter); 62 percent, N-31 (fourth quarter) of those facilities providing general medical service utilized the R_2 measure, as opposed to 31 percent, N=4 (third quarter); 23 percent, N=3 (fourth quarter) of the institutions providing more specialized services. With regard to location, 74 percent, N=20 (third quarter); 74 percent, N=20 (fourth quarter) of the urban-type facilities utilize this measure, as opposed to 50 percent, N=3 (third quarter); 50 percent, N=3 (fourth quarter) of the rural respondents and 40 percent, N=12 (third quarter);

37 percent, N=11 (fourth quarter) of those respondents located in metropolitan areas.

Two additional characteristics were also found to correlate with R_2, but only in the third quarter category. They are: route to registration ($p=.019$, $x^2=5.547$, $df=1$) and facility type ($p=.050$, $x^2=3.846$, $df=1$). Seventy four (N=17) of the respondents who completed a dietetic internship utilized the ratio, as opposed to 41 percent (N=11) of the respondents utilizing alternate routes. With regard to facility type, 49 percent (N=23) of the hospitals utilized this ratio, as opposed to 76 percent of those institutions falling into the category of "other" (i.e. nursing homes).

The type of service provided was also found to be associated to R_3, both third and fourth quarter categories ($p=.022$, $x^2=5.284$, $df=1$; $p=.015$, $x^2= 5.975$, $df=1$). Sixty-six percent, N=33 (third quarter); 68 percent, N=34 (fourth quarter) of the facilities providing general medical service also utilized this ratio, as opposed to 31 percent, N=4 (third quarter); 31 percent, N=4 (fourth quarter) of the specializing facilities.

Additional Ratios

Eleven additional ratios were created in section II, B of the survey instrument in an attempt to expand upon types of measurement devices utilized, without requiring further information on the part of the respondents. In this area, participants were asked to place a check mark next to any additional ratios they may be using. A category for "other" ratios was also included, so that no form of performance measurement would be ignored.

Total meals prepared/total labor hours worked (a productivity measure) was the most popular ratio, utilized by 61 percent of the respondents. In contrast, money spent on utilities/money budgeted for utilities (an efficiency measure) received the least response (6%). This may be due, in part, to a lack of access to this information by foodservice directors who do not monitor their own utilities. Response to the remaining nine categories of additional ratio utilization is summarized in Table XII. With regard to "other" ratios employed by the participants, common responses included: cost/meal, cost/patient day, patient days/labor hour, sales/service hour, days inventory on hand, total meals served/total labor hours paid and dietitian-patient contact minutes.

Statistical association was shown between utilization of additional ratios and several demographic characteristics of the respondents. They included: more than 10 years of experience in the foodservice industry, the age group of 40 years and older, the title of director or chief, ADA registration, and prior productivity training (Table XIII). Statistical association was also shown between ratio utilization and the following institutional characteristics: urban location, larger facilities (over 300 beds), JCAH affiliation, and general medical service (Table XIV).

Hypothesis Testing

In H_1, the personal variables of age, RD registration status, route to ADA membership and title affected the utilization of the performance ratios (Survey, Part II, A and B), hence, the researcher rejected Hypothesis 1.

TABLE XII

UTILIZATION OF ADDITIONAL RATIOS

Additional Ratios	Number of Respondents Who Utilized (N)	Percentage of Utilization (%)
Total meals prepared / Total labor hours worked	39	61
No. of patients served / No. of trays prepared	15	23
Total cafeteria sales / Total cafeteria labor hours worked	15	23
No. of employees who left department X 100 / No. of total employees	17	27
No. of unauthorized absences X 100 / No. of total employees	8	13
Cafeteria revenues / Cafeteria expenses	22	34
Dollars spent/utilities / Dollars budgeted/utilities	4	6
Dollars spent on materials / Dollars budgeted for materials	37	58
Dollars spent on improvements / Dollars budgeted for improvements	8	12
Money spent on labor / Money budgeted for labor	38	59
Actual sales / Forecasted sales	20	31

TABLE XIII

SIGNIFICANT ASSOCIATIONS BETWEEN ADDITIONAL RATIOS AND CHARACTERISTICS OF RESPONDENTS

Additional Ratios	Correlating Characteristics	p	X^2	df
# of Patients Served / # of Trays Prepared	Years in Foodservice Management	0.020	5.407	1
# of Patients Served / # of Trays Prepared	Age	0.021	5.308	1
# of Employees Who Left Department / # of Total Employees X 100	Age	0.049	3.871	1
# of Employees Who Left Department / # of Total Employees X 100	Years in Foodservice Management	0.021	5.360	1
# of Unauthorized Absences* / # of Total Employees X 100	Title	0.049	7.860	3
Cafeteria Revenues / Cafeteria Expenses	Years in Foodservice Management	0.047	3.962	1
Actual Sales / Forecasted Sales	RD Status	0.031	4.630	1
Actual Sales / Forecasted Sales	Years in Foodservice Management	0.032	4.588	1
"Other Ratios"	Productivity Training	0.045	4.034	1

TABLE XIV

SIGNIFICANT ASSOCIATIONS BETWEEN ADDITIONAL RATIOS AND CHARACTERISTICS OF INSTITUTIONS

Additional Ratios	Correlating Characteristics	p	X^2	df
Total Meals Prepared / Total Labor Hours Worked	Location	0.011	8.935	2
Total Cafeteria Sales / Total Cafeteria Labor Hours Worked	Facility Size	0.008	7.111	1
Money Spent on Materials* / Money Budgeted for Materials	Hospital Membership (JCAH)	0.082	4.596	1
Actual Sales / Forecasted Sales	Type of Medical Service	0.048	3.925	1
"Other Ratios"	Type of Medical Service	0.024	5.119	1

In H_2, the institutional variables of hospital affiliation, type of medical service provided, type of facility, size of facility and facility location affected the utilization of the performance ratios. For this reason, the researcher rejected Hypothesis 2.

In H_3, a significant association was indicated between the utilization of performance ratios and training received in productivity management (Table XIII), therefore, the researcher rejected Hypothesis 3.

In H_4, no significant associations were found between utilization of performance ratios and type of hospital control. For this reason, the researcher accepted Hypothesis 4.

In H_5, significant associations were found between the frequency and type of performance measures (Survey III, A, B, and C) and the selected personal variables stated in Hypotheses 1 and 3. Due to these associations, the researcher rejected Hypothesis 5.

In H_6, significant associations were found between the frequency and type of performance measures and the selected institutional variables stated in Hypotheses 2 and 4. For this reason, the researcher rejected Hypothesis 6.

CHAPTER V

SUMMARY AND RECOMMENDATIONS

The objectives of this study were to measure three specific performance ratios over time; to expand upon the relationship between productivity and the six other performance measures: effectiveness, efficiency, quality, quality of work life, profitability and innovation; to relate progressive developments in the healthcare industry to a need for optimum performance in the foodservice division; to enable foodservice managers to identify trends in their own organizational performance over time; and to identify problem areas in organizational performance measurement, and provide possible solutions to help improve these conditions.

A closed-question survey instrument was mailed to the foodservice directors of 500 randomly selected healthcare institutions having more than 100 beds. The sample was chosen from a nationwide population of non-federal, non-osteopathic facilities listed in the American Hospital Association Guide to the Healthcare Field, 1985 edition. A total of 65 surveys were returned. One questionnaire came from a hospital with less than 100 beds and was not analyzed. The resulting response rate was 13 percent (N=64) for demographics and performance measures, and eight percent (N=48) for the performance ratio section of the instrument. Data were analyzed using frequency distribution to note the occurrence of each aspect of performance measurement, and chi-square

to identify associations between demographic variables and utilization of performance measures and performance ratios.

Characteristics of Respondents

Fifty-six percent of the respondents were 39 years of age or less, while the remaining 44 percent were over 40 years of age (Figure 4). The majority of the respondents (73%) held a BS degree in some area of food, nutrition or institution administration, while 22 percent earned a Master of Science degree.

Fifty of the 64 participants were registered dietitians and 27 of these completed a dietetic internship as a prerequisite to ADA registration (Figures 6 and 7). Eighty-nine percent held the title of foodservice director or chief clinical dietitian, five percent were assistant directors, while five percent were administrative dietitians (Figure 8). Slightly less than half of the participants (48%) earned an annual salary in the range of $25,000-$34,999, 30 percent earned $35,000 or more, and 11 percent earned less than $25,000 per year (Figure 9). Fifty-eight percent of the respondents had more than 10 years of experience in the foodservice industry, while 41 percent spent between 1-10 years in the field (Figure 10). Only about half of the respondents have some exposure to productivity training (Figure 11).

Characteristics of Institutions

Respondents worked in non-profit, non-governmental institutions (55%), although 30 percent were sponsored by some form of state or local government, and 15 percent were for-profit facilities. Likewise,

59 percent of the participating health care centers were affiliated with both AHA and JCAH, 19 percent with JCAH alone and five percent with AHA and five percent with alternate affiliations at local, state and national levels. Seventy-eight percent provided general medical service, while 20 percent were more specialized. Forty-seven of the responding institutions were hospitals; 14 were combination hospital-nursing homes, while only three belonged to a non-specific category (i.e. psychiatric center). With regard to facility size, 63 percent were in the category of 101-300 beds; 19 percent had 301-500 beds, 13 percent had 501-700 beds, three percent had between 701-900 beds, and the remaining two percent had more than 900 beds

Forty-seven percent of the responding institutions were located in metropolitan areas (50,000 or more inhabitants), while 42 percent were found in urban centers (2,500-49,999 inhabitants), and 10 percent were rural facilities (1-24,999 inhabitants). The majority of the institutions (83%) managed their own foodservice department. Only 17 percent were operated by contract management companies (Table III). Eighty-four percent had conventional delivery systems, while 14 percent employed some alternative method, such as cook-chill, or utilization of convenience foods. The percentage of annual budget allocated for food varied from 18 to 80 percent, dependent upon the type of operation, individual priorities of each organization and interpretation of the question by the respondents. Similarly, labor figures ranged from 20 percent to 67 percent. Five individuals indicated a 60/40 division for labor and food, respectively; three respondents indicated the reverse of this ratio, and two respondents stated that 45 percent of their budgets were allocated for labor and

39 percent for food. More than two-thirds of the responding facilities offered some type of managerial training program, while 30 percent did not offer staff development (Table III).

Performance Measures

In this research, profitability measures included meals-on-wheels programs, congregate meals for the elderly, and various catering operations (in-house, satellite, public, bakeshop). Catering for in-house functions was the most readily utilized form of profit generation, employed by 51 percent of the respondents. This was followed by public catering (48%), satellite catering (20%), meals-on-wheels (17%), bakeshop (15%) and congregate meals for the elderly (7%). A significant association was found between the utilization of profitability measures, and registered dietitians under 40 years of age who have had some type of training in productivity, and were employed in a facility affiliated with JCAH or some other type of organizational accreditation (Table V). Among the categories of additional performance measures identified in the research, those relating to profitability were ranked sixth in terms of utilization, with an average rate of 41 percent.

Quality of work life measures included employee recognition programs (88% utilization), monetary rewards for exceptional job performance (31% utilization) and similar non-monetary reward systems (16% utilization). These measures were ranked fifth among the additional performance measures, with an average utilization rate of 50 percent. They tended to be associated with larger facilities (greater than 300 beds) that were located in metropolitan areas, and affiliated with AHA or a similar-type organization (Table VI).

Innovation measures, in order of popularity among respondents, included new recipe implementation (97%), equipment review (94%), menu analysis (94%), computer usage in foodservice (50%), and computer usage in nutrition services (41%). They were statistically associated with several variables including previous training in productivity, 11 or more years of experience in foodservice, registered dietitians 20-39 years of age, non-profit institutional status, higher salary rates, facilities having more than 300 beds, and hospitals providing general medical service who were affiliated with JCAH or a similar organization (Table VII). With regard to overall utilization, innovation measures ranked fourth among respondents, with an average rate of 75 percent.

A combined quality of work life/innovation category was also addressed in the research. It included measures such as brainstorming sessions (89% utilization), health/fitness programs (73% utilization), cafeteria-style benefit packages (25% utilization), profit sharing (14% utilization, flextime (11% utilization), and job sharing (5% utilization), which had characteristics that were both innovative and useful in improving overall working conditions for employees. Because many of these practices were relatively new to the foodservice industry, this combined category was ranked last among the performance measures, with an average utilization rate of 36 percent. These measures were shown to be associated with greater frequency of use among younger foodservice directors/chief clinical dietitians working in larger for-profit facilities (Table VIII).

Effectiveness measures included statements of departmental goals (97% utilization), and MBO practices (88% utilization). Route to ADA

registration, specifically the dietetic internship, was shown to be significant with regard to effectiveness measurement among respondents. Although this category had the highest average utilization rate (93%), both MBO and departmental goal statements were practiced infrequently, most often on a yearly basis (Table IX).

Efficiency measures in order of utilization by respondents included: budget analysis (100%), meal-price analysis (97%), inventory turnover analysis (84%), and labor analysis (80%). Overall, these procedures were ranked third among the seven categories of performance measures, with an average utilization rate of 90 percent. They were statistically associated with JCAH affiliation and metropolitan location. Respondents showing frequent utilization of these measures were generally graduates of a dietetic internship program and employed through contract management companies (Table X).

Quality measures were ranked second, overall, with an average utilization factor of 91 percent; they were also found to be among the most frequently utilized practices (daily, weekly, monthly). Included in this category according to degree of utilization were patient surveys (100%), food temperature checks (98%), food quality checks/ taste tests (98%), tray audits (95%), food quality checks against product specifications (83%), and quality circles (71%). The majority of the institutions employing these measures were found to provide general medical service and conventional foodservice. Respondents with greatest utilization of these measures were registered dietitians in the position of foodservice director or chief clinical dietitian, who had had more than 10 years of experience in the foodservice field (Table XI).

Performance Ratios

Three primary performance ratios were synthesized from Lischke (1986) in an attempt to plot the numerical results of the respondents over a two-quarter time period (Figures 12, 13, and 14). They included:

$$R_1 : \frac{\text{Total meals served}}{\text{Total labor hours worked}}$$

$$R_2 : \frac{\text{Total meals prepared}}{\text{Total food cost}}$$

$$R_3 : \frac{\text{Total revenues}}{\text{Total expenses}}$$

The three ratios were all measurements of productivity, or output/input, but were not utilized equally by the respondents. The majority of the participants (85%) were found to have provided information for R_1; this ratio also displayed the largest degree of variance between third and fourth quarterly figures, indicating a fluctuation which may have been affected by seasonal changes and/or total patient census. In contrast, R_2 received the lowest response rate (71%), indicating a possible preference among participants to record meals served as opposed to meals prepared (Figure 12).

Among responses to R_3, it was noted that the majority of fourth quarter values were found to be higher than corresponding third quarter values (Figure 14). In this instance, it was hypothesized by the researcher that the majority of fourth quarter responses were based on the calendar, rather than the fiscal year, thereby allowing for increased end of year sales, holiday catering, and other profit-generating activities.

Predominant statistical associations were noted between utilization of R_1 and larger, urban-type facilities providing general medical service, as well as among respondents who had pursued a dietetic internship as a means of obtaining ADA registration.

Among responses to R_2, significance was once again associated with general medical service and metropolitan/urban location. Increased utilization of R_3 was found to be associated solely with those facilities providing general medical care.

Eleven additional ratios were listed on the survey instrument in an attempt to identify additional utilization of performance measurement techniques by the respondents. The most commonly utilized ratio in this category was $\frac{\text{total meals prepared}}{\text{total labor hours worked}}$ (61%). Significant statistical associations were found between this section of ratios and the following demographic characteristics: age of respondents, years in foodservice management, registration status, previous productivity training, facility location, facility size, JCAH affiliation, and type of medical service provided (Tables XII, XIII, and XIV).

Recommendations

Questionnaire

Although an attempt was made to simplify the survey instrument, it is believed that the majority of foodservice directors addressed were confused/overwhelmed by the type and amount of information requested. One solution may have involved dividing the study into two separate sections based on performance ratios and performance measures. One additional suggestion might be to specify specific quarterly periods

for performance ratio figures. This would eliminate some confusion resulting from individual differences among facilities. A follow-up mailing is also strongly recommended to increase the rate of response.

Recommendations Based on the Results of the Study

1. A consistent format for productivity training must be developed to be utilized by all individuals with management responsibilities in foodservice. This is essential to assure that each administrator has a clear understanding of what type of information he/she should be measuring and tracking over time. Training programs could be initiated through AHA or JCAH as part of the accreditation process.

2. Additional research is needed in the area of productivity and performance measurement to clearly define areas of the questionnaire open to interpretation (i.e. percentage of budget allocated to food/labor, meals served as opposed to meals prepared).

3. Dietitians with clinical responsibilities must also be kept informed regarding productivity measurement. Additional research may adapt measurement and evaluation techniques to better suit the needs of nutrition services.

4. Further analysis is required to better relate utilization of performance measurement and specific ratios to improved levels of service to the client.

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APPENDIXES

APPENDIX A

CORRESPONDENCE

O K L A H O M A S T A T E U N I V E R S I T Y

Department of Food, Nutrition and Institution Administration

June 22, 1987

Dear Colleague:

Productivity and its improvement through measurement and evaluation techniques has been a growing concern of American businesses and vital to the economy as a whole. Although the business sector is the broadest area for which productivity is measured, this by no means indicates that the service industry is not affected by production losses. In light of the recent "productivity crisis" experienced by many U.S. industries, productivity monitoring and improvement techniques are no longer exclusive to the factory floor.

New developments such as Medicare's Prospective Payment System (PPS) and DRG's have forced hospital administration to begin focusing on end results, along with the full scale services necessary to achieve these results. Because foodservice systems are very much a part of total patient service and satisfaction, foodservice administrators must also take a closer look at productivity and performance within their respective departments.

This study is an attempt to standardize ratios and indexes that can be used to measure productivity in all foodservice areas. The identities of individual facilities and administrators will be held in strict confidence, but numerical figures are needed to establish a basis for comparison and evaluation of measurement trends. The code number on your questionnaire is used to facilitate response follow-up.

The results of this study center around <u>your</u> participation and input, and will help us to further the future of the foodservice industry. Please assist us in our endeavor by returning the completed questionnaire on or before July 6, 1987. Refold to display the return address and postage. Thank you.

Sincerely,

(Signed) Patricia Czajkowski
Graduate Research Assistant

(Signed) Lea L. Ebro, Ph.D., R.D.
Professor and Interim Head
Department of Food, Nutrition
and Institution Administration

APPENDIX B

RESEARCH INSTRUMENT

OKLAHOMA STATE UNIVERSITY
Department of Food, Nutrition and Institution Administration

FOODSERVICE PRODUCTIVITY STUDY

I. General Information

Directions: Please check (✓) the most appropriate response to each of the questions below.

1. Age Group: _____(1) 20-29 _____(2) 30-39 _____(3) 40-49 _____(4) 50 & above

2. Degree Attained and Major:
   _____(1) BS/BA _____
   _____(2) MS/MA _____
   _____(3) Other (please specify) _____

3. Registration Status (R.D.): _____(1) Registered (2) Non-Registered

4. Route to ADA Membership & Registration:
   _____(1) CUP
   _____(2) Internship
   _____(3) 3-Year Work Experience
   _____(4) MS plus 6 Month Work Experience
   _____(5) Other: _____

5. Position Title:
   _____(1) Director/Chief
   _____(2) Assoc./Asst. Director
   _____(3) Administrative Dietitian
   _____(4) Other: _____

6. Annual Salary:
   _____(1) Below $20,000
   _____(2) $20,000-24,999
   _____(3) $25,000-29,999
   _____(4) $30,000-34,999
   _____(5) $35,000-39,999
   _____(6) $40,000-44,999
   _____(7) $45,000-49,999
   _____(8) $50,000 and above

7. Number of years in foodservice management:
   _____(1) 1-5 years _____(2) years _____(3) 11-15 years _____(4) 16 or more

8. Have you received training in productivity measurement?
   _____(1) Yes (please specify): _____ _____(2) No

9. Type of Hospital Control:
   _____(1) Government, non-federal, non-profit (state, county, city)
   _____(2) Non-government, non-profit (church)
   _____(3) Investor owned, for-profit (private, partnership, corporation)

10. Hospital Membership:
    _____(1) AHA _____(2) JCAH _____(3) Other: _____

11. Type of medical service provided:
    _____(1) General _____(2) Other: _____

12. Type of facility:
    _____(1) Hospital _____(2) Hospital/Nursing Home _____(3) Other: _____

13. Size of facility:
    _____(1) 101-300 beds
    _____(2) 301-500 beds
    _____(3) 501-700 beds
    _____(4) 701-900 beds
    _____(5) 901-1100 beds
    _____(6) 1101 or more beds

14. Facility Location:
    _____(1) Rural (1-2,599 inhabitants)
    _____(2) Urban (2,500-49,999 inhabitants)
    _____(3) Metropolitan (50,000+ inhabitants)

15. Type of foodservice management:
    _____(1) Non-contract _____(2) Contract (please specify): _____

16. Type of foodservice system:
    _____(1) Conventional _____(2) Other (please specify): _____

17. Current & of yearly budget: _____(1) Food _____(2) Labor

18. Training program for management staff:
    _____(1) Yes (please specify): _____ _____(2) No

II. Performance Indexes

A. Directions: Please compute the following ratios using figures from your 3rd and 4th quarters of the 1986 fiscal year. All figures should be totals, including catering, snack shop, employee and patient feeding, etc. (If an entire ratio cannot be computed, please provide the figures you do have available.)

Note: -- Total meals prepared is generally a larger figure than total meals served, due to patient deaths, discharges, leftovers and any other factors that may not have been accounted for.

-- Total labor hours worked does not include paid sick time, personal leave, vacation hours, etc.

-- Total expenses include food and labor, as well as materials, equipment, departmental improvements, etc. Total revenues include all income taken in by the department through its various services.

Ratio	3rd quarter	4th quarter
Example: $\frac{\text{Total meals prepared}}{\text{Total food cost}}$	$\frac{30.341}{\$44,191} = 0.6979$	$\frac{28,621}{\$43,619} = 0.6561$
(1) $\frac{\text{Total meals served}}{\text{Total labor hours worked}}$		
(2) $\frac{\text{Total meals prepared}}{\text{Total food cost}}$		
(3) $\frac{\text{Total revenues}}{\text{Total expenses}}$		

B. Directions: Please check any of these additional ratios used to measure performance in your foodservice.

____(1) $\frac{\text{Total meals prepared}}{\text{Total labor hours worked}}$

____(2) $\frac{\text{Number of patients served}}{\text{Number of trays prepared}}$

____(3) $\frac{\text{Total cafeteria sales}}{\text{Total cafeteria labor hours worked}}$

____(4) $\frac{\text{\# of employees who left dept.}}{\text{\# of total employees}} \times 100$

____(5) $\frac{\text{\# of unauthorized absences}}{\text{\# of total employees}} \times 100$

____(6) $\frac{\text{Cafeteria revenues}}{\text{Cafeteria expenses}}$

____(7) $\frac{\text{Money spent on materials*}}{\text{Money budgeted for materials}}$

____(8) $\frac{\text{Money spent on utilities**}}{\text{Money budgeted for utilities}}$

____(9) $\frac{\text{Money spent on improvements}}{\text{Money budgeted for improvements}}$

____(10) $\frac{\text{Money spent on labor}}{\text{Money budgeted for labor}}$

____(11) $\frac{\text{Actual sales}}{\text{Forecasted sales}}$

____(12) Other (please specify):

_____

_____

_____

_____

*Materials include items such as papergoods, china, flatware, linens, etc.
**Utilities include all energy costs such as gas, electricity, water, etc.

III. Performance Measures

A. How frequently are the following activities performed in your foodservice? Please place the number of the most appropriate response in the blanks provided.

1= Never 3= Weekly 5- Monthly 7= Other (please specify)
2= Daily 4= Biweekly 6= Yearly

____ Temperature checks on food items
____ Tray audits
____ Patient surveys of foodservice quality
____ Prior-to-service quality food checks/taste tests
____ Food quality checks against actual product specifications
____ Verbal/written statement of departmental goals
____ Management by Objectives (MBO)/ employee evaluations
____ New recipe implementation
____ Menu analysis/revision
____ Equipment review
____ Meal price analysis
____ Budget analysis
____ Inventory turnover analysis
____ Labor analysis of turnover and absenteeism rates
____ Quality circles (employee initiated sessions for the purpose of suggesting and implementing improvements in operations)
____ Employee "brainstorming" sessions (informal meetings to generate ideas and discuss problems)

B. Please check any of the additional activities practiced/utilized by your department.

____ Employee suggestion system
____ Meals-on-Wheels program (for profit)
____ Congregate meal for the elderly (for profit)
____ Catering (for profit):
____(1) in-house (employee feeding, staff functions, etc.)
____(2) satellite locations
____(3) public (cafeteria/dining area available for service of guests, families and the general public)
____(4) bakeshop
____ Computer usage: ____(1) in nutrition services ____(2) in foodservice

C. Do your employees have access to the following benefits? Please check all that apply.

____ Employee health/fitness programs
____ Employee recognition programs (employee of the month, etc.)
____ Profit sharing
____ Employee reward systems: ____(1) Monetary
____(2) Non-monetary (please specify): _____
____ Flextime (an arrangement whereby employees have a degree of freedom in choosing the hours they will work each day as long as they are present during a core period specified by the department)
____ Job sharing (a program enabling two employees to share the same job, along with its allotted salary and benefits)
____ "Cafeteria-style" benefits (a program which enables employees to select health related and personal benefits that are most suited to their individual needs)

THANK YOU FOR YOUR PARTICIPATION!!!

APPENDIX C

CHI-SQUARE TABLES

Key to Chi-Square Tables

$RR_{1-3} = \frac{\text{Total meals served}}{\text{Total labor hours worked}}$, third quarter

$RR_{1-4} = \frac{\text{Total meals served}}{\text{Total labor hours worked}}$, fourth quarter

$RR_{2-3} = \frac{\text{Total meals prepared}}{\text{Total food cost}}$, third quarter

$RR_{2-4} = \frac{\text{Total meals prepared}}{\text{Total food cost}}$, fourth quarter

$RR_{3-3} = \frac{\text{Total revenues}}{\text{Total expenses}}$, third quarter

$RR_{3-4} = \frac{\text{Total revenues}}{\text{Total expenses}}$, fourth quarter

AR = Additional ratios (Survey Section II, B)

PPM = Performance measure (Survey Section III, A)

AA = Additional activities (Survey Section III, B)

BE = Benefits (Survey Section III, C)

1 = Respondent utilization

0 = No utilization by the respondent

TABLE OF AHA BY AA2

AHA AA2

FREQUENCY / ROW PCT	0	1	TOTAL
0	14 93.33	1 6.67	15
1	33 67.35	16 32.65	49
TOTAL	47	17	64

STATISTICS FOR TABLE OF AHA BY AA2

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	1	3.976	0.046

WARNING: 25% OF THE CELLS HAVE EXPECTED COUNTS LESS THAN 5. CHI-SQUARE MAY NOT BE A VALID TEST.

TABLE OF SALARY BY AA5

SALARY AA5

FREQUENCY / ROW PCT	0	1	TOTAL
2	2 28.57	5 71.43	7
3	7 43.75	9 56.25	16
4	1 6.67	14 93.33	15
5	3 12.00	22 88.00	25
TOTAL	13	50	63

FREQUENCY MISSING = 1

STATISTICS FOR TABLE OF SALARY BY AA5

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	3	8.415	0.038

FREQUENCY MISSING = 2

WARNING: 25% OF THE CELLS HAVE EXPECTED COUNTS LESS THAN 5. CHI-SQUARE MAY NOT BE A VALID TEST.

TABLE OF RD BY AA5

RD AA5

FREQUENCY / ROW PCT	0	1	TOTAL
1	13 26.00	37 74.00	50
2	0 0.00	12 100.00	12
TOTAL	13	49	62

FREQUENCY MISSING = 2

STATISTICS FOR TABLE OF RD BY AA5

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	1	3.948	0.047

FREQUENCY MISSING = 1

WARNING: 37% OF THE CELLS HAVE EXPECTED COUNTS LESS THAN 5. CHI-SQUARE MAY NOT BE A VALID TEST.

TABLE OF AGE BY AA6

AGE AA6

FREQUENCY / ROW PCT	0	1	TOTAL
2	20 57.14	15 42.86	35
3	23 82.14	5 17.86	28
TOTAL	43	20	63

FREQUENCY MISSING = 1

STATISTICS FOR TABLE OF AGE BY AA6

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	1	4.487	0.034

TABLE OF JCAH BY AA6

JCAH AA6

FREQUENCY / ROW PCT	0	1	TOTAL
0	2 33.33	4 66.67	6
1	42 72.41	16 27.59	58
TOTAL	44	20	64

STATISTICS FOR TABLE OF JCAH BY AA6

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	1	3.865	0.049

WARNING: 50% OF THE CELLS HAVE EXPECTED COUNTS LESS THAN 5. CHI-SQUARE MAY NOT BE A VALID TEST.

TABLE OF OTH_HOSP BY AA6

OTH_HOSP AA6

FREQUENCY / ROW PCT	0	1	TOTAL
0	40 75.47	13 24.53	53
1	4 36.36	7 63.64	11
TOTAL	44	20	64

STATISTICS FOR TABLE OF OTH_HOSP BY AA6

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	1	6.485	0.011

WARNING: 25% OF THE CELLS HAVE EXPECTED COUNTS LESS THAN 5. CHI-SQUARE MAY NOT BE A VALID TEST.

TABLE OF AGE BY AA7

AGE	AA7		
FREQUENCY / ROW PCT	0	1	TOTAL
2	4 11.43	31 88.57	35
3	12 42.86	16 57.14	28
TOTAL	16	47	63

FREQUENCY MISSING = 1

STATISTICS FOR TABLE OF AGE BY AA7

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	1	8.110	0.004

TABLE OF TR_PROD BY AA7

TR_PROD	AA7		
FREQUENCY / ROW PCT	0	1	TOTAL
1	4 12.90	27 87.10	31
2	12 40.00	18 60.00	30
TOTAL	16	45	61

FREQUENCY MISSING = 3

STATISTICS FOR TABLE OF TR_PROD BY AA7

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	1	5.785	0.016

TABLE OF AHA BY AA1

AHA	AA1		
FREQUENCY / ROW PCT	0	1	TOTAL
0	9 60.00	6 40.00	15
1	13 26.53	36 73.47	49
TOTAL	22	42	64

STATISTICS FOR TABLE OF AHA BY AA1

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	1	5.703	0.017

TABLE OF OTH_HOSP BY BE2

OTH_HOSP / BE2	0	1	TOTAL
0	3	50	53
	5.66	94.34	
1	5	6	11
	45.45	54.55	
TOTAL	8	56	64

STATISTICS FOR TABLE OF OTH_HOSP BY BE2

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	1	13.189	0.000

WARNING: 25% OF THE CELLS HAVE EXPECTED COUNTS LESS THAN 5. CHI-SQUARE MAY NOT BE A VALID TEST.

TABLE OF LOCATION BY BE5

LOCATION / BE5	0	1	TOTAL
1	5	1	6
	83.33	16.67	
2	23	4	27
	85.19	14.81	
3	15	15	30
	50.00	50.00	
TOTAL	43	20	63

FREQUENCY MISSING = 1

STATISTICS FOR TABLE OF LOCATION BY BE5

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	2	8.815	0.012

FREQUENCY MISSING = 1

WARNING: 33% OF THE CELLS HAVE EXPECTED COUNTS LESS THAN 5. CHI-SQUARE MAY NOT BE A VALID TEST.

TABLE OF LOCATION BY BE6

LOCATION / BE6	0	1	TOTAL
1	6	0	6
	100.00	0.00	
2	26	1	27
	96.30	3.70	
3	21	9	30
	70.00	30.00	
TOTAL	53	10	63

FREQUENCY MISSING = 1

STATISTICS FOR TABLE OF LOCATION BY BE6

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	2	8.610	0.014

FREQUENCY MISSING = 1

WARNING: 50% OF THE CELLS HAVE EXPECTED COUNTS LESS THAN 5. CHI-SQUARE MAY NOT BE A VALID TEST.

TABLE OF SIZE BY BE6

SIZE BE6

FREQUENCY / ROW PCT	0	1	TOTAL
1	37 92.50	3 7.50	40
2	17 70.83	7 29.17	24
TOTAL	54	10	64

STATISTICS FOR TABLE OF SIZE BY BE6

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	1	5.341	0.021

WARNING: 25% OF THE CELLS HAVE EXPECTED COUNTS LESS THAN 5. CHI-SQUARE MAY NOT BE A VALID TEST.

TABLE OF TR_PROD BY PPM8

TR_PROD PPM8

FREQUENCY / ROW PCT	1	2	3	TOTAL
1	0 0.00	2 6.45	29 93.55	31
2	2 6.67	7 23.33	21 70.00	30
TOTAL	2	9	50	61

FREQUENCY MISSING = 3

STATISTICS FOR TABLE OF TR_PROD BY PPM8

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	2	6.043	0.049

WARNING: 66% OF THE CELLS HAVE EXPECTED COUNTS LESS THAN 5. CHI-SQUARE MAY NOT BE A VALID TEST.

TABLE OF HOSP_TYP BY PPM8

HOSP_TYP PPM8

FREQUENCY / ROW PCT	1	2	3	TOTAL
1	0 0.00	1 5.26	18 94.74	19
2	2 5.71	3 8.57	30 85.71	35
3	0 0.00	5 50.00	5 50.00	10
TOTAL	2	9	53	64

STATISTICS FOR TABLE OF HOSP_TYP BY PPM8

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	4	14.300	0.006

WARNING: 66% OF THE CELLS HAVE EXPECTED COUNTS LESS THAN 5. CHI-SQUARE MAY NOT BE A VALID TEST.

TABLE OF AGE BY PPM9

AGE / PPM9	1	2	3	TOTAL
2	0 0.00	1 2.86	34 97.14	35
3	4 14.29	3 10.71	21 75.00	28
TOTAL	4	4	55	63

FREQUENCY MISSING = 1

STATISTICS FOR TABLE OF AGE BY PPM9

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	2	7.386	0.025

WARNING: 66% OF THE CELLS HAVE EXPECTED COUNTS LESS THAN 5. CHI-SQUARE MAY NOT BE A VALID TEST.

TABLE OF SIZE BY PPM9

SIZE / PPM9	1	2	3	TOTAL
1	0 0.00	1 2.50	39 97.50	40
2	4 16.67	3 12.50	17 70.83	24
TOTAL	4	4	56	64

STATISTICS FOR TABLE OF SIZE BY PPM9

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	2	10.286	0.006

WARNING: 66% OF THE CELLS HAVE EXPECTED COUNTS LESS THAN 5. CHI-SQUARE MAY NOT BE A VALID TEST.

TABLE OF AGE BY PPM10

AGE / PPM10	1	2	3	TOTAL
2	0 0.00	3 8.57	32 91.43	35
3	3 10.71	0 0.00	25 89.29	28
TOTAL	3	3	57	63

FREQUENCY MISSING = 1

STATISTICS FOR TABLE OF AGE BY PPM10

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	2	6.158	0.046

WARNING: 66% OF THE CELLS HAVE EXPECTED COUNTS LESS THAN 5. CHI-SQUARE MAY NOT BE A VALID TEST.

TABLE OF YRS_FS_M BY PPM10

YRS_FS_M / PPM10	1	2	3	TOTAL
1	0 0.00	0 0.00	9 100.00	9
2	0 0.00	3 17.65	14 82.35	17
3	0 0.00	0 0.00	14 100.00	14
4	3 13.04	0 0.00	20 86.96	23
TOTAL	3	3	57	63

FREQUENCY MISSING = 1

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	6	13.721	0.033

WARNING: 66% OF THE CELLS HAVE EXPECTED COUNTS LESS THAN 5. CHI-SQUARE MAY NOT BE A VALID TEST.

TABLE OF SALARY BY AA10

SALARY / AA10	0	1	TOTAL
2	7 100.00	0 0.00	7
3	11 68.75	5 31.25	16
4	10 66.67	5 33.33	15
5	10 40.00	15 60.00	25
TOTAL	38	25	63

FREQUENCY MISSING = 1

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	3	9.645	0.022

FREQUENCY MISSING = 1

WARNING: 25% OF THE CELLS HAVE EXPECTED COUNTS LESS THAN 5. CHI-SQUARE MAY NOT BE A VALID TEST.

TABLE OF SALARY BY AA11

SALARY / AA11	0	1	TOTAL
2	7 100.00	0 0.00	7
3	9 56.25	7 43.75	16
4	8 53.33	7 46.67	15
5	8 32.00	17 68.00	25
TOTAL	32	31	63

FREQUENCY MISSING = 1

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	3	10.543	0.014

WARNING: 25% OF THE CELLS HAVE EXPECTED COUNTS LESS THAN 5. CHI-SQUARE MAY NOT BE A VALID TEST.

TABLE OF HOSP_TYP BY AA10

HOSP_TYP / AA10	0	1	TOTAL
1	14 73.68	5 26.32	19
2	16 45.71	19 54.29	35
3	8 80.00	2 20.00	10
TOTAL	38	26	64

STATISTICS FOR TABLE OF HOSP_TYP BY AA10

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	2	6.084	0.048

TABLE OF HOSP_TYP BY AA11

HOSP_TYP / AA11	0	1	TOTAL
1	12 63.16	7 36.84	19
2	12 34.29	23 65.71	35
3	8 80.00	2 20.00	10
TOTAL	32	32	64

STATISTICS FOR TABLE OF HOSP_TYP BY AA11

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	2	8.373	0.015

TABLE OF SIZE BY AA10

SIZE / AA10	0	1	TOTAL
1	30 75.00	10 25.00	40
2	8 33.33	16 66.67	24
TOTAL	38	26	64

STATISTICS FOR TABLE OF SIZE BY AA10

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	1	10.796	0.001

TABLE OF SIZE BY AA11

SIZE AA11

FREQUENCY / ROW PCT	0	1	TOTAL
1	27 67.50	13 32.50	40
2	5 20.83	19 79.17	24
TOTAL	32	32	64

STATISTICS FOR TABLE OF SIZE BY AA11

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	1	13.067	0.000

TABLE OF RD BY AA11

RD AA11

FREQUENCY / ROW PCT	0	1	TOTAL
1	22 44.00	28 56.00	50
2	10 83.33	2 16.67	12
TOTAL	32	30	62

FREQUENCY MISSING = 2

STATISTICS FOR TABLE OF RD BY AA11

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	1	5.995	0.014

TABLE OF FACILITY BY AA11

FACILITY AA11

FREQUENCY / ROW PCT	0	1	TOTAL
1	20 42.55	27 57.45	47
2	12 70.59	5 29.41	17
TOTAL	32	32	64

STATISTICS FOR TABLE OF FACILITY BY AA11

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	1	3.925	0.048

TABLE OF TITLE BY PPM16

TITLE PPM16

FREQUENCY / ROW PCT	1	2	3	TOTAL
1	11 19.30	7 12.28	39 68.42	57
2	0 0.00	2 66.67	1 33.33	3
3	0 0.00	0 0.00	3 100.00	3
4	0 0.00	1 100.00	0 0.00	1
TOTAL	11	10	43	64

STATISTICS FOR TABLE OF TITLE BY PPM16

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	6	13.463	0.036

WARNING: 75% OF THE CELLS HAVE EXPECTED COUNTS LESS THAN 5. CHI-SQUARE MAY NOT BE A VALID TEST.

TABLE OF AGE BY BE3

AGE BE3

FREQUENCY / ROW PCT	0	1	TOTAL
2	26 74.29	9 25.71	35
3	28 100.00	0 0.00	28
TOTAL	54	9	63

FREQUENCY MISSING = 1

STATISTICS FOR TABLE OF AGE BY BE3

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	1	8.400	0.004

WARNING: 25% OF THE CELLS HAVE EXPECTED COUNTS LESS THAN 5. CHI-SQUARE MAY NOT BE A VALID TEST.

TABLE OF HOSP_TYP BY BE3

HOSP_TYP BE3

FREQUENCY / ROW PCT	0	1	TOTAL
1	17 89.47	2 10.53	19
2	32 91.43	3 8.57	35
3	6 60.00	4 40.00	10
TOTAL	55	9	64

STATISTICS FOR TABLE OF HOSP_TYP BY BE3

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	2	6.637	0.036

WARNING: 50% OF THE CELLS HAVE EXPECTED COUNTS LESS THAN 5. CHI-SQUARE MAY NOT BE A VALID TEST.

TABLE OF AGE BY BE7

AGE BE7

FREQUENCY / ROW PCT	0	1	TOTAL
2	34 97.14	1 2.86	35
3	22 78.57	6 21.43	28
TOTAL	56	7	63

FREQUENCY MISSING = 1

STATISTICS FOR TABLE OF AGE BY BE7

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	1	5.432	0.020

WARNING: 50% OF THE CELLS HAVE EXPECTED COUNTS LESS THAN 5. CHI-SQUARE MAY NOT BE A VALID TEST.

TABLE OF SIZE BY BE8

SIZE BE8

FREQUENCY / ROW PCT	0	1	TOTAL
1	40 100.00	0 0.00	40
2	21 87.50	3 12.50	24
TOTAL	61	3	64

STATISTICS FOR TABLE OF SIZE BY BE8

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	1	5.246	0.022

WARNING: 50% OF THE CELLS HAVE EXPECTED COUNTS LESS THAN 5. CHI-SQUARE MAY NOT BE A VALID TEST.

TABLE OF ROUTER BY PPM7

ROUTER PPM7

FREQUENCY / ROW PCT	1	2	3	TOTAL
1	0 0.00	0 0.00	23 100.00	23
2	6 22.22	0 0.00	21 77.78	27
TOTAL	6	0	44	50

FREQUENCY MISSING = 14

STATISTICS FOR TABLE OF ROUTER BY PPM7

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	1	5.808	0.016

WARNING: 50% OF THE CELLS HAVE EXPECTED COUNTS LESS THAN 5. CHI-SQUARE MAY NOT BE A VALID TEST

TABLE OF TYP_FS_M BY PPM13

TYP_FS_M	PPM13			
FREQUENCY / ROW PCT	1	2	3	TOTAL
1	10 18.87	6 11.32	37 69.81	53
2	0 0.00	8 72.73	3 27.27	11
TOTAL	10	14	40	64

STATISTICS FOR TABLE OF TYP_FS_M BY PPM13

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	2	20.415	0.000

WARNING: 33% OF THE CELLS HAVE EXPECTED COUNTS LESS THAN 5. CHI-SQUARE MAY NOT BE A VALID TEST.

TABLE OF LOCATION BY PPM13

LOCATION	PPM13			
FREQUENCY / ROW PCT	1	2	3	TOTAL
1	0 0.00	4 66.67	2 33.33	6
2	7 25.93	2 7.41	18 66.67	27
3	3 10.00	8 26.67	19 63.33	30
TOTAL	10	14	39	63

FREQUENCY MISSING = 1

STATISTICS FOR TABLE OF LOCATION BY PPM13

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	4	12.490	0.014

WARNING: 55% OF THE CELLS HAVE EXPECTED COUNTS LESS THAN 5. CHI-SQUARE MAY NOT BE A VALID TEST.

TABLE OF JCAH BY PPM14

JCAH	PPM14			
FREQUENCY / ROW PCT	1	2	3	TOTAL
0	4 66.67	1 16.67	1 16.67	6
1	9 15.52	9 15.52	40 68.97	58
TOTAL	13	10	41	64

STATISTICS FOR TABLE OF JCAH BY PPM14

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	2	9.330	0.009

WARNING: 50% OF THE CELLS HAVE EXPECTED COUNTS LESS THAN 5. CHI-SQUARE MAY NOT BE A VALID TEST.

TABLE OF ROUTER BY PPM14

ROUTER	PPM14			
FREQUENCY / ROW PCT	1	2	3	TOTAL
1	7 30.43	7 30.43	9 39.13	23
2	4 14.81	2 7.41	21 77.78	27
TOTAL	11	9	30	50

FREQUENCY MISSING = 14

STATISTICS FOR TABLE OF ROUTER BY PPM14

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	2	8.128	0.017

WARNING: 33% OF THE CELLS HAVE EXPECTED COUNTS LESS THAN 5. CHI-SQUARE MAY NOT BE A VALID TEST.

TABLE OF TYP_SERV BY PPM2

TYP_SERV	PPM2			
FREQUENCY / ROW PCT	1	2	3	TOTAL
1	0 0.00	33 66.00	17 34.00	50
2	3 23.08	6 46.15	4 30.77	13
TOTAL	3	39	21	63

FREQUENCY MISSING = 1

STATISTICS FOR TABLE OF TYP_SERV BY PPM2

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	2	12.227	0.002

WARNING: 50% OF THE CELLS HAVE EXPECTED COUNTS LESS THAN 5. CHI-SQUARE MAY NOT BE A VALID TEST.

TABLE OF FS_SYST BY PPM4

FS_SYST	PPM4			
FREQUENCY / ROW PCT	1	2	3	TOTAL
1	0 0.00	53 98.15	1 1.85	54
2	1 11.11	8 88.89	0 0.00	9
TOTAL	1	61	1	63

FREQUENCY MISSING = 1

STATISTICS FOR TABLE OF FS_SYST BY PPM4

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	2	6.235	0.044

WARNING: 66% OF THE CELLS HAVE EXPECTED COUNTS LESS THAN 5. CHI-SQUARE MAY NOT BE A VALID TEST.

TABLE OF RD BY PPM5

RD / PPM5	1	2	3	TOTAL
1	9 18.00	26 52.00	15 30.00	50
2	1 8.33	11 91.67	0 0.00	12
TOTAL	10	37	15	62

FREQUENCY MISSING = 2

STATISTICS FOR TABLE OF RD BY PPM5

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	2	6.712	0.035

WARNING: 33% OF THE CELLS HAVE EXPECTED COUNTS LESS THAN 5. CHI-SQUARE MAY NOT BE A VALID TEST.

TABLE OF TITLE BY PPM15

TITLE / PPM15	1	2	3	TOTAL
1	27 47.37	3 5.26	27 47.37	57
2	2 66.67	0 0.00	1 33.33	3
3	0 0.00	1 33.33	2 66.67	3
4	0 0.00	1 100.00	0 0.00	1
TOTAL	29	5	30	64

STATISTICS FOR TABLE OF TITLE BY PPM15

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	6	17.095	0.009

WARNING: 83% OF THE CELLS HAVE EXPECTED COUNTS LESS THAN 5. CHI-SQUARE MAY NOT BE A VALID TEST.

TABLE OF YRS_FS_M BY PPM15

YRS_FS_M / PPM15	1	2	3	TOTAL
1	1 11.11	1 11.11	7 77.78	9
2	6 35.29	2 11.76	9 52.94	17
3	8 57.14	0 0.00	6 42.86	14
4	14 60.87	2 8.70	7 30.43	23
TOTAL	29	5	29	63

FREQUENCY MISSING = 1

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	6	9.234	0.161

WARNING: 50% OF THE CELLS HAVE EXPECTED COUNTS LESS THAN 5. CHI-SQUARE MAY NOT BE A VALID TEST.

TABLE OF TYP_SERV BY RR1_3

TYP_SERV	RR1_3		
FREQUENCY / ROW PCT	0	1	TOTAL
1	13 26.00	37 74.00	50
2	8 61.54	5 38.46	13
TOTAL	21	42	63

FREQUENCY MISSING = 1

STATISTICS FOR TABLE OF TYP_SERV BY RR1_3

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	1	5.864	0.015

WARNING: 25% OF THE CELLS HAVE EXPECTED COUNTS LESS THAN 5. CHI-SQUARE MAY NOT BE A VALID TEST.

TABLE OF TYP_SERV BY RR1_4

TYP_SERV	RR1_4		
FREQUENCY / ROW PCT	0	1	TOTAL
1	11 22.00	39 78.00	50
2	8 61.54	5 38.46	13
TOTAL	19	44	63

FREQUENCY MISSING = 1

STATISTICS FOR TABLE OF TYP_SERV BY RR1_4

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	1	7.658	0.006

WARNING: 25% OF THE CELLS HAVE EXPECTED COUNTS LESS THAN 5. CHI-SQUARE MAY NOT BE A VALID TEST.

TABLE OF LOCATION BY RR1_3

LOCATION	RR1_3		
FREQUENCY / ROW PCT	0	1	TOTAL
1	2 33.33	4 66.67	6
2	5 18.52	22 81.48	27
3	15 50.00	15 50.00	30
TOTAL	22	41	63

FREQUENCY MISSING = 1

STATISTICS FOR TABLE OF LOCATION BY RR1_3

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	2	6.205	0.045

WARNING: 33% OF THE CELLS HAVE EXPECTED COUNTS LESS THAN 5. CHI-SQUARE MAY NOT BE A VALID TEST.

TABLE OF LOCATION BY RR1_4

LOCATION / FREQUENCY / ROW PCT	RR1_4 = 0	RR1_4 = 1	TOTAL
1	2 33.33	4 66.67	6
2	3 11.11	24 88.89	27
3	15 50.00	15 50.00	30
TOTAL	20	43	63

FREQUENCY MISSING = 1

STATISTICS FOR TABLE OF LOCATION BY RR1_4

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	2	9.926	0.007

WARNING: 33% OF THE CELLS HAVE EXPECTED COUNTS LESS THAN 5. CHI-SQUARE MAY NOT BE A VALID TEST.

TABLE OF ROUTER BY RR1_3

ROUTER / FREQUENCY / ROW PCT	RR1_3 = 0	RR1_3 = 1	TOTAL
1	3 13.04	20 86.96	23
2	13 48.15	14 51.85	27
TOTAL	16	34	50

FREQUENCY MISSING = 14

STATISTICS FOR TABLE OF ROUTER BY RR1_3

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	1	7.034	0.008

FREQUENCY MISSING = 14
WARNING: 22% OF THE DATA ARE MISSING.

TABLE OF TYP_SERV BY RR2_3

TYP_SERV / FREQUENCY / ROW PCT	RR2_3 = 0	RR2_3 = 1	TOTAL
1	19 38.00	31 62.00	50
2	9 69.23	4 30.77	13
TOTAL	28	35	63

FREQUENCY MISSING = 1

STATISTICS FOR TABLE OF TYP_SERV BY RR2_3

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	1	4.076	0.044

TABLE OF TYP_SERV BY RR2_4

TYP_SERV RR2_4

FREQUENCY ROW PCT	0	1	TOTAL
1	19 38.00	31 62.00	50
2	10 76.92	3 23.08	13
TOTAL	29	34	63

FREQUENCY MISSING = 1

STATISTICS FOR TABLE OF TYP_SERV BY RR2_4

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	1	6.292	0.012

TABLE OF LOCATION BY RR2_3

LOCATION RR2_3

FREQUENCY ROW PCT	0	1	TOTAL
1	3 50.00	3 50.00	6
2	7 25.93	20 74.07	27
3	18 60.00	12 40.00	30
TOTAL	28	35	63

FREQUENCY MISSING = 1

STATISTICS FOR TABLE OF LOCATION BY RR2_3

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	2	6.765	0.034

WARNING: 33% OF THE CELLS HAVE EXPECTED COUNTS LESS THAN 5. CHI-SQUARE MAY NOT BE A VALID TEST.

TABLE OF LOCATION BY RR2_4

LOCATION RR2_4

FREQUENCY ROW PCT	0	1	TOTAL
1	3 50.00	3 50.00	6
2	7 25.93	20 74.07	27
3	19 63.33	11 36.67	30
TOTAL	29	34	63

FREQUENCY MISSING = 1

STATISTICS FOR TABLE OF LOCATION BY RR2_4

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	2	8.046	0.018

WARNING: 33% OF THE CELLS HAVE EXPECTED COUNTS LESS THAN 5. CHI-SQUARE MAY NOT BE A VALID TEST.

TABLE OF ROUTER BY RR2_3

ROUTER RR2_3

FREQUENCY / ROW PCT	0	1	TOTAL
1	6 26.09	17 73.91	23
2	16 59.26	11 40.74	27
TOTAL	22	28	50

FREQUENCY MISSING = 14

STATISTICS FOR TABLE OF ROUTER BY RR2_3

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	1	5.547	0.019

FREQUENCY MISSING = 14
WARNING: 22% OF THE DATA ARE MISSING.

TABLE OF FACILITY BY RR2_3

FACILITY RR2_3

FREQUENCY / ROW PCT	0	1	TOTAL
1	24 51.06	23 48.94	47
2	4 23.53	13 76.47	17
TOTAL	28	36	64

STATISTICS FOR TABLE OF FACILITY BY RR2_3

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	1	3.846	0.050

TABLE OF TYP_SERV BY RR3_3

TYP_SERV RR3_3

FREQUENCY / ROW PCT	0	1	TOTAL
1	17 34.00	33 66.00	50
2	9 69.23	4 30.77	13
TOTAL	26	37	63

FREQUENCY MISSING = 1

STATISTICS FOR TABLE OF TYP_SERV BY RR3_3

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	1	5.284	0.022

TABLE OF TYP_SERV BY RR3_4

TYP_SERV	RR3_4		
FREQUENCY / ROW PCT	0	1	TOTAL
1	16 32.00	34 68.00	50
2	9 69.23	4 30.77	13
TOTAL	25	38	63

FREQUENCY MISSING = 1

STATISTICS FOR TABLE OF TYP_SERV BY RR3_4

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	1	5.975	0.015

TABLE OF YRS_FS_M BY AR2

YRS_FS_M	AR2		
FREQUENCY / ROW PCT	0	1	TOTAL
1	8 88.89	1 11.11	9
2	16 94.12	1 5.88	17
3	8 57.14	6 42.86	14
4	17 73.91	6 26.09	23
TOTAL	49	14	63

FREQUENCY MISSING = 1

STATISTICS FOR TABLE OF YRS_FS_M BY AR2

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	3	6.917	0.075

WARNING: 37% OF THE CELLS HAVE EXPECTED COUNTS LESS THAN 5. CHI-SQUARE MAY NOT BE A VALID TEST.

TABLE OF AGE BY AR2

AGE	AR2		
FREQUENCY / ROW PCT	0	1	TOTAL
2	31 88.57	4 11.43	35
3	18 64.29	10 35.71	28
TOTAL	49	14	63

FREQUENCY MISSING = 1

STATISTICS FOR TABLE OF AGE BY AR2

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	1	5.308	0.021

TABLE OF AGE BY AR4

AGE	AR4		
FREQUENCY / ROW PCT	0	1	TOTAL
2	29 82.86	6 17.14	35
3	17 60.71	11 39.29	28
TOTAL	46	17	63

FREQUENCY MISSING = 1

STATISTICS FOR TABLE OF AGE BY AR4

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	1	3.871	0.049

TABLE OF YRS_FS_M BY AR4

YRS_FS_M	AR4		
FREQUENCY / ROW PCT	0	1	TOTAL
1	7 77.78	2 22.22	9
2	16 94.12	1 5.88	17
3	8 57.14	6 42.86	14
4	15 65.22	8 34.78	23
TOTAL	46	17	63

FREQUENCY MISSING = 1

STATISTICS FOR TABLE OF YRS_FS_M BY AR4

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	3	6.446	0.092

WARNING: 37% OF THE CELLS HAVE EXPECTED COUNTS LESS THAN 5. CHI-SQUARE MAY NOT BE A VALID TEST.

TABLE OF TITLE BY AR5

TITLE	AR5		
FREQUENCY / ROW PCT	0	1	TOTAL
1	50 87.72	7 12.28	57
2	3 100.00	0 0.00	3
3	3 100.00	0 0.00	3
4	0 0.00	1 100.00	1
TOTAL	56	8	64

STATISTICS FOR TABLE OF TITLE BY AR5

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	3	7.860	0.049

WARNING: 75% OF THE CELLS HAVE EXPECTED COUNTS LESS THAN 5. CHI-SQUARE MAY NOT BE A VALID TEST.

TABLE OF YRS_FS_M BY AR6

YRS_FS_M / FREQUENCY / ROW PCT	AR6 0	AR6 1	TOTAL
1	8 88.89	1 11.11	9
2	13 76.47	4 23.53	17
3	5 35.71	9 64.29	14
4	16 69.57	7 30.43	23
TOTAL	42	21	63

FREQUENCY MISSING = 1

STATISTICS FOR TABLE OF YRS_FS_M BY AR6

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	3	8.858	0.031

WARNING: 25% OF THE CELLS HAVE EXPECTED COUNTS LESS THAN 5. CHI-SQUARE MAY NOT BE A VALID TEST.

TABLE OF RD BY AR11

RD / FREQUENCY / ROW PCT	AR11 0	AR11 1	TOTAL
1	37 74.00	13 26.00	50
2	5 41.67	7 58.33	12
TOTAL	42	20	62

FREQUENCY MISSING = 2

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	1	4.630	0.031

WARNING: 25% OF THE CELLS HAVE EXPECTED COUNTS LESS THAN 5. CHI-SQUARE MAY NOT BE A VALID TEST.

TABLE OF YRS_FS_M BY AR11

YRS_FS_M / FREQUENCY / ROW PCT	AR11 0	AR11 1	TOTAL
1	8 88.89	1 11.11	9
2	14 82.35	3 17.65	17
3	6 42.86	8 57.14	14
4	16 69.57	7 30.43	23
TOTAL	44	19	63

FREQUENCY MISSING = 1

STATISTICS FOR TABLE OF YRS_FS_M BY AR11

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	3	7.654	0.054

WARNING: 25% OF THE CELLS HAVE EXPECTED COUNTS LESS THAN 5. CHI-SQUARE MAY NOT BE A VALID TEST.

TABLE OF TR_PROD BY AR12

TR_PROD AR12

FREQUENCY / ROW PCT	0	1	TOTAL
1	20 64.52	11 35.48	31
2	26 86.67	4 13.33	30
TOTAL	46	15	61

FREQUENCY MISSING = 3

STATISTICS FOR TABLE OF TR_PROD BY AR12

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	1	4.034	0.045

TABLE OF LOCATION BY AR1

LOCATION AR1

FREQUENCY / ROW PCT	0	1	TOTAL
1	3 50.00	3 50.00	6
2	5 18.52	22 81.48	27
3	17 56.67	13 43.33	30
TOTAL	25	38	63

FREQUENCY MISSING = 1

STATISTICS FOR TABLE OF LOCATION BY AR1

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	2	8.935	0.011

WARNING: 33% OF THE CELLS HAVE EXPECTED COUNTS LESS THAN 5. CHI-SQUARE MAY NOT BE A VALID TEST.

TABLE OF SIZE BY AR3

SIZE AR3

FREQUENCY / ROW PCT	0	1	TOTAL
1	35 87.50	5 12.50	40
2	14 58.33	10 41.67	24
TOTAL	49	15	64

STATISTICS FOR TABLE OF SIZE BY AR3

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	1	7.111	0.008

TABLE OF JCAH BY AR7

JCAH / AR7	0	1	TOTAL
0	5 83.33	1 16.67	6
1	22 37.93	36 62.07	58
TOTAL	27	37	64

STATISTICS FOR TABLE OF JCAH BY AR7

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	1	4.596	0.032

WARNING: 50% OF THE CELLS HAVE EXPECTED COUNTS LESS THAN 5. CHI-SQUARE MAY NOT BE A VALID TEST.

TABLE OF TYP_SERV BY AR11

TYP_SERV / AR11	0	1	TOTAL
1	32 64.00	18 36.00	50
2	12 92.31	1 7.69	13
TOTAL	44	19	63

FREQUENCY MISSING = 1

STATISTICS FOR TABLE OF TYP_SERV BY AR11

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	1	3.925	0.048

WARNING: 25% OF THE CELLS HAVE EXPECTED COUNTS LESS THAN 5. CHI-SQUARE MAY NOT BE A VALID TEST.

TABLE OF TYP_SERV BY AR12

TYP_SERV / AR12	0	1	TOTAL
1	35 70.00	15 30.00	50
2	13 100.00	0 0.00	13
TOTAL	48	15	63

FREQUENCY MISSING = 1

STATISTICS FOR TABLE OF TYP_SERV BY AR12

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	1	5.119	0.024

WARNING: 25% OF THE CELLS HAVE EXPECTED COUNTS LESS THAN 5. CHI-SQUARE MAY NOT BE A VALID TEST.

VITA

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Master of Science

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