



Practice Paper of the Academy of Nutrition and Dietetics: Principles of Productivity in Food and Nutrition Services: Applications in the 21st Century Health Care Reform Era

ABSTRACT

Food and nutrition services, along with the health care organizations they serve, are becoming increasingly complex. These complexities are driven by sometimes conflicting (if not polarizing) human, department, organization, and environment factors and will require that managers shift how they think about and approach productivity in the context of the greater good of the organization and, perhaps, even society. Traditional, single-factor approaches to productivity measurements, while still valuable in the context of departmental trend analysis, are of limited value when assessing departmental performance in the context of an organization's goals and values. As health care continues to change and new models of care are introduced, food and nutrition services managers will need to consider innovative approaches to improve productivity that are consistent with their individual health care organization's vision and mission. Use of process improvement tools such as Lean and Six Sigma as strategies for evaluating and improving food and nutrition services efficiency should be considered.

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MANAGERS OF FOOD AND nutrition services have been held accountable for resource use within their departments for decades. Traditionally, quantitative productivity measures have been used to justify use of existing resources and requests for new ones. In addition, productivity measures have helped to identify opportunities for quality improvement in products and performance improvement related to services and processes. However, current and unprecedented

change in the health care industry has called into question the relative value of these simple measures and what they mean in regard to efficient and effective management of food and nutrition services by registered dietitian nutritionists (RDNs) and nutrition and dietetics technicians, registered (NDTRs).

The primary purpose of this Practice Paper is to explore the history of productivity applications, review concepts of productivity, raise awareness of factors influencing traditional use of productivity measures, and suggest future productivity assessment.

HISTORY OF PRODUCTIVITY IN FOOD AND NUTRITION SERVICES

Frederick Taylor is typically credited with launching the concept of productivity assessment. His work in the late 1800s demonstrated that work could be monitored and potentially done more efficiently to achieve the same output with fewer inputs.¹ More recently, Ozcan¹ described productivity

as effective use of a given set of resources.

Application of productivity measurement techniques in food and nutrition services has been reported since the 1930s.² According to a review by Brown and Hoover,³ research on ways to measure and improve productivity in foodservice operations resulted in the definition and evaluation of many productivity measures and ratios, the most prevalent being labor ratios such as labor minutes per meal or labor minutes per meal equivalent. Most of the early research on productivity in food and nutrition services operations⁴⁻⁸ focused on single-factor relationships between an input and output. Brown and Hoover³ cautioned that such narrow, focused use of productivity measurement could result in inaccurate productivity measurement.

Systems View of Productivity

Bertalanffy's⁹ view of a system introduced the concepts of inputs, processes, and outputs and emphasized the importance of the interrelatedness of the parts of the system. Spears and Vaden¹⁰ used these basic systems components (Figure 1) in the development of their foodservice systems model. Their model identified key labor, materials, facilities, and operational inputs; subsystems, management functions, and linking processes that contribute to the transformation of inputs; and key outputs of meals, financial accountability, and performance indicators. The influence of the environment, controls, and feedback on this open system are detailed as well.

The systems model provided the framework for the practice paper on

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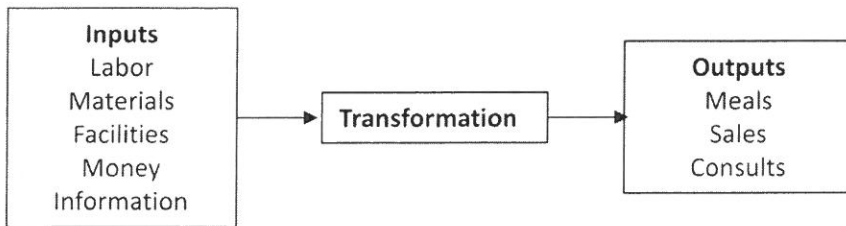


Figure 1. Basic components of the systems model.

measuring productivity in health care foodservice by Puckett and colleagues,¹¹ who suggested that productivity could be improved by reducing inputs, increasing outputs, or some combination of the two. Because labor is typically the more predominant cost in an operation (and more readily quantifiable), Puckett and colleagues¹¹ recommend developing productivity work standards and implementing productivity monitoring and benchmarking practices focused on labor.

Multiple Factor Productivity

Brown and Hoover^{3,12} first suggested that a multiple factor model of productivity assessment, which included a combination of capital, energy, materials, and labor inputs related to multiple operation outputs, might provide a more comprehensive evaluation of a foodservice operation's use of all resources. Their total factor productivity (TFP) ratio was calculated as a monthly sum of outputs (eg, food sales, meal counts, head counts, and nutrition care services) related to a monthly sum of inputs (eg, food costs, labor costs, other operating expenses, inventories, capital, and utilities). The authors^{3,12} reported that the relationships between variables and the TFP ratio appeared to be unique to each operation. They encouraged foodservice managers to use the TFP model to monitor productivity on a monthly basis to identify productivity trends and assess the effect of managerial decisions on productivity.

More complex mathematical techniques for evaluating the efficiency of multiple inputs to achieve multiple outputs include data envelopment analysis and stochastic frontier analysis. The data envelopment analysis model is a linear programming model that computes an efficiency score based on multiple inputs and multiple outputs.¹ The stochastic frontier analysis model compares optimal costs vs actual costs given various combinations of inputs and outputs.¹³

Taylor, Reynolds, and Brown¹⁴ reported success in using a data envelopment analysis model to evaluate cost-effectiveness of a restaurant menu. The stochastic frontier analysis by Assar and Matawie¹⁵ of 101 health care foodservice operations in the United States and Australia suggested that health care foodservice operations could reduce their input costs by nearly 25% without decreasing their total output by focusing on appropriate skill levels of employees, ensuring that raw materials are readily available, and monitoring the operation of older equipment to ensure it can work when needed. The authors¹⁵ found that managers with more years of experience and advanced education had more efficient operations.

The US Bureau of Labor Statistics uses multifactor productivity indexes that include combined inputs of capital, labor, energy, materials, and purchased business services to track the productivity of various industry segments. Their multifactor analysis of productivity change during the period 2000 to 2006 suggested a negative productivity growth of 0.1% in health care productivity and a positive productivity growth of 3% in foodservice operations.¹⁶

Given the complexity of these multifactor models, their use has been limited in food and nutrition services. A more practical, organization-specific approach to productivity measurement might be needed.

IMPORTANCE OF PRODUCTIVITY

Measuring and monitoring productivity is an important component of the food and nutrition services manager's role.^{11,12,17} Puckett and colleagues¹¹ suggest that productivity and quality are the two most important issues in organization management. These two issues are of particular interest in health care today relative to the systems concept. First of all, the concept of the environment has expanded well beyond

that of the department and organization to include changes that are influencing the entire health care system. Also, in the context of health care, the overarching output is the health of patients.

Health care costs in the United States exceeded \$2.3 trillion in 2011.¹⁸ The continued increase in health care costs with little change in health care productivity has created increased interest in finding ways to increase productivity in health care operations.^{16,19} Kocher and Sahni¹⁹ encourage elimination of time-wasting, low-value activities; increased use of technology; increased standardization of work to avoid rework; increased use of teams; and increased use of evidence-based personalized care as strategies for improving health care productivity. Glatter²⁰ cautioned focusing only on indicators such as number of patients seen as the productivity index, and encouraged instead a focus on individual patients and their specific needs to reproduce high-quality, reproducible outcomes with attention to cost containment through evidence-based medicine.

The shifting health care environment challenges food and nutrition services directors to be much more aware of the efficiency and quality of the work being done in their operations. Strategies for increasing productivity become more challenging as the complexity and scope of services in food and nutrition service departments increases.

PRODUCTIVITY AND EXPANDING SCOPE OF SERVICES

Food and nutrition services departments in health care facilities are becoming increasingly complex to meet the changing needs and demands of administrators, patients, and clients. This complexity is evident in patient meal service, clinical nutrition services, and retail offerings as the number of business units within a single food and nutrition department expands in depth and breadth.

Historically, meal service to patients was the primary focus of foodservice departments in health care. Gradually, service expanded to employee and visitor meals and nutrition care services. Today, each of these categories has been further expanded to accommodate food and nutrition needs inside and outside of the health care system. For example, many patient meal

Scope of Services



Figure 2. Example of depth and breadth of business units in a food and nutrition services department.

services operations now offer hotel-style room service menus and meal delivery, post-discharge home meal delivery, and mobile meals for the homebound. The retail component has exploded to include multiple cafeterias, vending machines, on- and off-site catering, convenience stores, and coffee shops. Clinical services include inpatient medical nutrition therapy, outpatient counseling, community education, and clinical research. Figure 2 depicts the depth and breadth of services offered through a typical food and nutrition services department in a health care organization.

This expansion makes it difficult to increase productivity when resources (especially labor) are stretched across a number of business units. For example, food preparation staff may be used to produce food items for several service units such as patient dining, employee and visitor cafes, catering, and vending. In this context, it is very difficult to link labor expenditures to specific outcomes.

The Role of Food and Nutrition Managers

Accountability for the productivity of each business unit within a manager's span of control is a basic expectation

along with common managerial functions that include planning, organizing, staffing, budgeting, directing, and controlling. Managers are further expected to make decisions in the best interest of the department and organization. This requires a full grasp of productivity within units, throughout the department, and in the context of the organization's mission, vision, strategic plan, and corporate values. Finally, managers must be able to effectively communicate productivity outcomes to an organization's leadership in the context of resource use and allocation. The art of compromise on the part of managers will be more important than ever before to ensure the most efficient use of resources.

Complexities and uncertainties will also require that managers exercise a philosophical shift in how they think about and approach productivity in the context of the greater good of the organization and perhaps even society. Traditionally, health care food and nutrition services managers have thought of themselves as leaders in food and nutrition services. To be successful in the current health care environment, managers are being challenged to see their role as a manager of a health care system. Decisions are no longer made strictly in the

context of department goals but rather within the much more holistic vision of health improvements for patients, visitors, and staff alike.

Critical thinking and reasoning are more important than ever, but are taking on an emerging nuance referred to as polarity thinking.²¹ Polarities are defined as interdependent yet potentially polar opposite pairs of values, such as values of highest quality and least cost. These may seem to be opposite and competing values, yet both must be managed simultaneously to achieve the most positive outcome. Polarity thinking is a skill that acknowledges that there are differences in best practice and, rather than aim for an optional solution to every problem, effective managers learn to manage the polarities that exist from an interprofessional perspective and always within the context of the mission and vision of the organization. The move toward polarity thinking and its relevance in productivity starts with an understanding of how productivity traditionally has been addressed, how it is changing, and the issues that are driving change.

Ratios for Productivity

A number of input-to-output ratios are used in food and nutrition services as a means to analyze the efficiency and effectiveness of resource use. Most emphasis is on the input of labor relative to a meal or service unit of output,²² as shown in Figure 3. These ratios are also used for internal and external benchmarking. However, the absolute value of these comparative exercises is increasingly called into question given the unique factors that influence productivity in individual food and nutrition departments and the variations in ways that labor is used to achieve outcomes.^{23,24}

Factors That Influence Comparative Productivity Analysis. Single-factor ratios, such as those in Figure 3,

Patient meal service	Retail	Clinical services
Meals/labor hour	Sales/employee	Registered dietitian nutritionist/patients (caseload)
Labor minutes/meal	Sales/day part	Patients counseled/hour
Meals/full-time employee	Average retail transaction (ART)/employee or day part	Nutrition screens/person
Trays assembled/minute		Nutrition assessments/person group education

Figure 3. Common ratios for comparing inputs to outputs, by business unit.

are increasingly of limited value for broad analysis of food and nutrition services operations given the complexities of individual food and nutrition departments and unique attributes of specific organizations. Human, department, organization, and environment factors all influence productivity analysis.

Human Factors

Aggregated labor costs typically totals more than half of the operating budget for a food and nutrition services department. Numerous political, economic, and social factors are currently influencing the potential productivity of this most valuable and important labor resource. From a policy perspective, regulatory requirements such as those in the Family Medical Leave Act (FMLA), while providing job security, are causing some labor challenges within food and nutrition services departments. By design, managers often find it difficult, if not impossible, to schedule replacement workers when an employee takes intermittent or extended FMLA leave. This puts management in the difficult position of placing perhaps undue/unreasonable expectations on other employees at work that day or having to pay overtime to bring in additional employees to cover the absence. Neither option is ideal from a productivity perspective because one puts strain on a resource and the other expends a more costly one. Use of FMLA leave time by RDNs and NDTRs means fewer clinical staff to complete required nutrition screenings and assessments. In addition, patients with language barriers and low literacy skills require more resources for effective treatment and care. All of these factors must be taken into account and accommodated to ensure that each patient receives quality of care while resources are used as conservatively as possible.

Economics plays a role as well in labor productivity. Foodservice hourly employees are often among the lowest paid within health care organizations, yet these employees are expected to be engaged and highly productive. Language skills, literacy, and an aging workforce are just a few of the socio-cultural issues that often influence productivity in foodservice operations. Language and literacy skills influence training effectiveness and comprehension of expectations on the job. Finally,

an aging workforce will struggle with the physical demands of high-volume, fast-paced foodservice and nutrition services operations.²⁵

Approaches to productivity in nutrition services are changing as well. As shown in Figure 3, measures of clinical productivity typically are single-factor ratios of labor input to unit of service output. The primary value was equity of workload distribution.²⁶ Today, productivity in clinical services is much more, if not exclusively, focused on measurable, sustainable health outputs that align with the overarching health care goals of effective treatment and prevention with a goal of helping prevent hospital admission/readmission. This renewed emphasis on prevention changes inputs in the form and number of nutrition care providers and, more importantly, how, where, and by whom these services are provided. Technology in the form of telenutrition and virtual medicine are emerging as new health care delivery mechanisms that provide cost-effective care in a way that is convenient and accessible for patients.²⁷ Health care models such as accountable care organizations, patient-centered medical homes, and shared medical appointments emphasize interprofessional collaboration, including the services of food and nutrition practitioners, in the prevention and treatment of disease. Food and nutrition services managers must continually analyze skill levels and costs of various nutrition care providers and allocate resources based on skill level needed per service task. For example, initial screenings and healthy eating nutrition education may not require the expertise and expense of an RDN and could be allocated at less cost to NDTRs or other support staff.²⁴ Factors that influence the staffing mix include the acuity profile of patients, complexity of nutrition care to be provided, and literacy levels and language skills of patients.

Department Factors

Patient dining and retail foodservice units are operated and managed separately in many health care food and nutrition services departments. Both, however, are influenced by external forces, menu design, staff skill requirements, purchasing policies, production technologies, and service strategies.

Beginning in the early 2000s, there was a major change in patient meal

delivery practices. To accommodate patients' desire to eat what they want, when they want, many hospitals switched to the concept of hotel-style room service. The rigidity of centralized trayline meal assembly with set meal delivery times was inconsistent with these patient expectations. Simultaneously, menus for patient menu service became more complex as demographic changes, increased cultural diversity, and more adventurous eaters populated patient beds. More sophisticated menus require careful scrutiny of labor and skill needs.²⁸ The use of hotel-style room service places a higher demand on tray delivery staff and often requires additional staff to ensure that patient requests are honored when they make them and within a set period of time. This style of service is often less productive than the traditional meal service.²⁹

Managers of retail foodservice units have been under a great deal of pressure, both from administrators and staff within the organization and from external sources, to align their menu offerings with the overarching goals of health care. Many managers are being asked, if not mandated, to reduce or eliminate items such as fried foods and sugared beverages, or to add items such as locally grown foods, to make menu offerings more consistent with preestablished nutrition standards. This is a shift from the past practice of retail foodservice units offering what the customer wants as long as these offerings were financially profitable. This shift in menu offerings creates tension because many of the less-healthy offerings, although best sellers and profit driven, are not consistent with health and wellness goals. Managers are challenged to simultaneously maintain, if not increase, revenue while maintaining customer satisfaction. As menus shift to emphasize locally sourced and freshly prepared products, managers need to allocate more purchasing time to source the products and reallocate resources to cover the higher skill levels and time needed to process, prepare, and serve these foods. A shift to front-of-the-house, made-to-order service places further strain on labor resources.

The type of production system is another factor that influences labor productivity.²² Cook-chill systems and their many variations were designed to

maximize labor productivity while securing an extended shelf life for products produced. Such systems are highly mechanized and allow for efficient use of other resources, including time, space, and skilled labor.

Organization Factors

There are a number of organization factors that influence productivity in food and nutrition services departments. Most important is the philosophy and leadership style of organizational administration. More than ever before, organization leaders are under pressure to ensure financial health while simultaneously satisfying high expectations for service on the part of health care consumers. Organization leaders determine the financial objectives for each department and set the tone for customer service throughout an organization. The balance between these sometimes opposing values will influence productivity within and between departments. For example, whether gourmet, and perhaps local and sustainable, foods are offered as menu choices to promote better health outcomes and patient satisfaction, inputs in the form of money for raw food and skilled labor would be allocated differently compared with an organization that perhaps values valet parking and concierge services to elevate patient satisfaction.

The age, physical layout, and design of facilities significantly affect productivity. Issues such as the sheer distance from the food production center to patient rooms will influence meal delivery time and the number of employees needed to transport meals. Age and sophistication of equipment is another factor that can enhance or limit productivity. For example, production equipment with automated stirring and temperature recording mechanisms frees production staff time compared with equipment that needs the physical input and constant attentiveness of foodservice staff.

An organization's approach to employee wellness has the potential to influence productivity as well. The Centers for Disease Control and Prevention (CDC) contend that healthier employees are more likely to be more productive.³⁰ The CDC encourages workplace wellness programs as a way to increase employee productivity and reports that companies that support

workplace health have a greater percentage of employees at work each day. The CDC argues that the cost savings of providing a workplace health program would be less than the cost of absenteeism, including overtime and replacement training costs.²⁹

Environment Factors

Hospital administrators are challenged in their decision making by the competitive health care environment. Many hospitals have goals targeting performance on national benchmarking comparisons for patient satisfaction.

New Centers for Medicare and Medicaid Services hospital value-based purchasing guidelines (see <http://www.cms.gov/Medicare/Quality-Initiatives-Patient-Assessment-Instruments/hospital-value-based-purchasing/index.html>) that link a hospital's reimbursement for care to its quality outcomes and patient satisfaction ratings are putting increased pressure on all hospital administrators, including those in food and nutrition services for high quality and less costly performance. Hospitals can lose up to 2% of expected Medicare/Medicaid reimbursement for performing below the mean in patient medical outcomes and on patient ratings of satisfaction. The pressure for high performance was increased with the introduction of the federally mandated Hospital Consumer Assessment of Healthcare Providers and Systems collection of patients' ratings of their perceptions of the hospital care they received. These ratings are published on a national website (www.hcahpsonline.org), allowing consumers to compare and potentially choose a hospital based on these ratings.

The imminent yet unknown implications of the Affordable Care Act are another environmental factor affecting health care. To accommodate a surge of enrollment in health care plans while simultaneously reducing (or at least containing) costs, provision of care and services likely will need to change. According to Berry,³¹ "Future provider revenues will have less to do with patient volumes and more to do with clinical outcomes, quality, and cost efficiency. Providers that get good results for their patients and keep costs in check stand to be rewarded with performance bonuses and shared savings. Those that do not do these things can expect financial penalties that will affect revenues and tarnish their credit profile."

Another challenge is that what a health consumer wants may not align with the overall mission of health care. In fact, some studies indicate that patients value nonclinical amenities and experience over and above the health treatments they receive.²⁸ This may be in direct opposition to what health care organizations are being pressured to provide from health advocacy and governance bodies. Advocacy groups such as Partners for a Healthy America, Healthcare Without Harm, and Corporate Accountability International are working directly with health care leaders to set standards for health and wellness within health care organizations.³² This pressure creates tension because leaders are put in the position of making difficult decisions relative to resource allocation. How organization leaders choose to balance these polarizing expectations clearly influences resource allocation and subsequently productivity.

BENCHMARKING

Benchmarking, operationalized initially by Xerox Corporation in the 1970s, is defined by Ettorchi-Tardy, Levif, and Michel³³ as a management tool for continuous measurement of one's own performance to implement best practices for the best cost. It involves comparing one's performance against an internal standard of excellence or against data from external organizations thought to be "best in class." Puckett and colleagues¹¹ suggest that internal benchmarking is the most important because it allows food and nutrition services directors to track fluctuations in productivity and make adjustments as needed.

Food and nutrition service managers should determine which internal measures they will use to track their productivity performance over time. For example, a manager who is concerned about the tray assembly process might choose to monitor both trays assembled per minute and tray accuracy percentage to help determine whether improving efficiency (ie, increasing the number of trays assembled per minute) influences effectiveness (ie, the accuracy of trays assembled). The combination of the two indicators will help managers determine the appropriate productivity targets for the unit.

External benchmarking for food and nutrition services is available through

professional organizations and commercial companies. The Association for Healthcare Foodservice's Benchmarking Express allows members to benchmark many foodservice and clinical productivity and operational indicators against other hospitals of similar size. Companies such as Truven Health Analytics maintain large databases of information on hundreds of hospitals to allow comparisons among hospitals and departments, such as food and nutrition services. Most of the comparisons are for single-factor productivity measures such as meals per labor hour or nutrition consults per labor hour, but combining measures may help provide a more complete assessment. For example, a manager who is concerned about RDN productivity might examine minutes per nutrition assessment and acuity level of patients per RDN and compare these results with similar indicators from similar hospitals used for benchmarking performance.

PRODUCTIVITY AND PERFORMANCE IMPROVEMENT

One use of productivity that will certainly continue during this time of change in health care is the use of productivity ratios and indicators to improve performance within food and nutrition departments. Performance improvement, as applied to food and nutrition, is the continuous study and adaptation of an organization's functions and processes to increase the probability of achieving the desired outcomes as defined by the organization. Performance improvement is also used to better meet the needs of customers, patients, and stakeholders.³⁴

As health care continues to change and new models of care are introduced, food and nutrition services managers will need to consider innovative approaches to improve productivity that are consistent with their individual health care organization's vision and mission. For example, a foodservice manager in a hospital whose mission includes a focus on being leaders in sustainability may need to focus productivity measures such as pounds of locally sourced produce served per pre-preparation labor hour or pounds of food waste per meal served.

Managers will need to be much more focused on process in their approaches

to productivity analysis. Models such as Lean and Six Sigma, once exclusive to manufacturing, are making inroads into the service sectors^{35,36} and provide ways to evaluate and perfect processes. For example, the nutrition services administrative team at Florida Hospital used Lean to assess and improve processes in their food preparation and production operation. The analysis resulted in a \$350,000 annual savings in labor costs and a reduction in the total space needed for food production operations.³⁷

SUMMARY

Food and nutrition services administrators are being continually challenged to improve the productivity of their operations. This pressure will likely increase with the uncertainty in the health care field created by the Affordable Care Act and changing models for health care services.

Traditional single-factor measures of productivity that linked a single input and output continue to be used by food and nutrition services administrators to assess various productivity outcomes in their units. Such measures provide a way for internal trend tracking, but are likely less effective comparisons with other institutions because of the increased complexity and uniqueness of individual departments. The use of multifactor productivity measures has been reported, but because of complexities in use, these have not been widely adopted. Combining multiple productivity measure when assessing operations can help managers better address the polarity in values that often exist in operational decisions.

Use of internal benchmarking is encouraged because it provides a way for food and nutrition services managers to monitor and track operational improvements over time. Managers should also consider use of process improvement tools such as Lean and Six Sigma as strategies for evaluating and improving the efficiency of food and nutrition services.

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