

## INTRODUCTION TO FOODSERVICE SYSTEMS

A foodservice director has many options for food production and service. Most foodservice directors inherit a foodservice system, but may make modifications to that system or select and build a new system. For example, in today's environment it is very difficult to find adequate labor, which is forcing school foodservice directors to consider alternatives in food production. Also, there is a great concern about food safety, including Hazard Analysis Critical Control Point (HACCP) program implementation, and quality control that might be improved in centralized food production. If a change is to be made in the system, it is important to know what alternatives are available.

In this chapter, information will be presented about:

- Unique characteristics of foodservice
- Flow of food
- Form of food purchased
- Types of foodservice systems
  - ⇒ Conventional
  - ⇒ Centralized (Commissary)
  - ⇒ Ready-Prepared
  - ⇒ Assembly-Serve
- Advantages and disadvantages of each type of foodservice system

### Unique Characteristics of Foodservice

There are some characteristics of foodservice that make it unique compared to production of other products. This uniqueness influences decisions that are made about production and service. Some of these characteristics include:

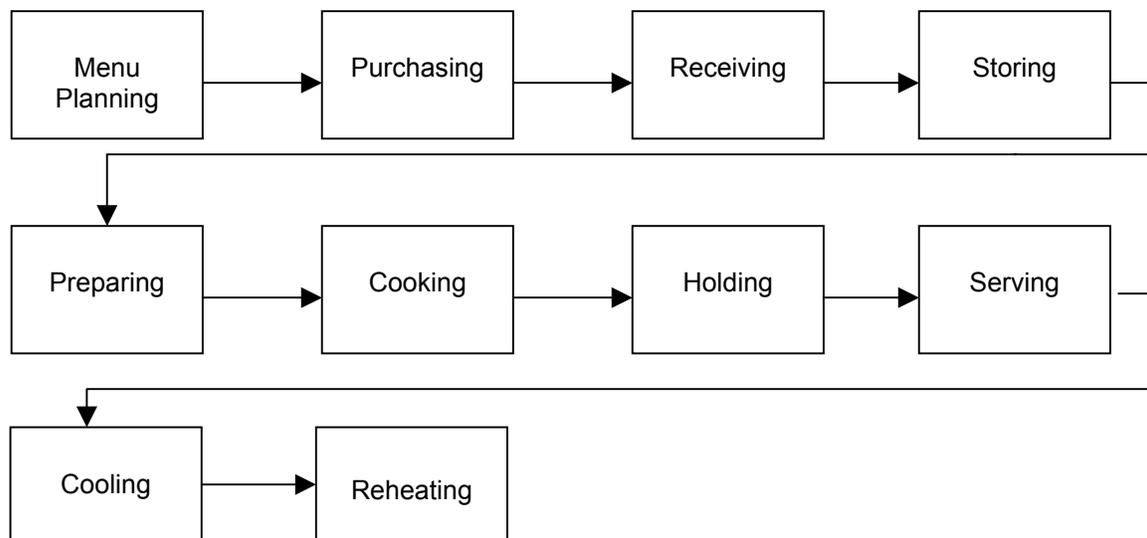
- Demand for food occurs at peak times, around breakfast, lunch, and dinner meals. Between these peak demand times, there are valleys or slow times.
- Demand for food may vary depending on time of year and competitive events, and production must be modified accordingly.

- Food production and service are labor intensive.
- Both skilled and unskilled labor is needed.
- Food is perishable, requiring it to be handled properly before, during, and after preparation.
- Menus change on a daily basis, thus, production changes daily.

These characteristics create challenges in scheduling employees and production, difficulty in staffing, and high labor and food costs. Conventional foodservice systems exhibit these characteristics. Foodservice directors look for ways to reduce or eliminate the impact of these characteristics—and alternative foodservice systems offer solutions. For example, commissary foodservice systems centralize the production process and allow for economies of scale, reducing the costs of food production. Ready-prepared foodservice systems separate production and service in that food is prepared and stored either frozen or chilled for later rethermalization and service. This removes the peaks and valleys of production that occur when production is planned around service. Thus, this is a more cost-effective foodservice system than the conventional system. Foodservice systems may be combined to meet the unique needs of a district school foodservice operation.

## Flow of Food

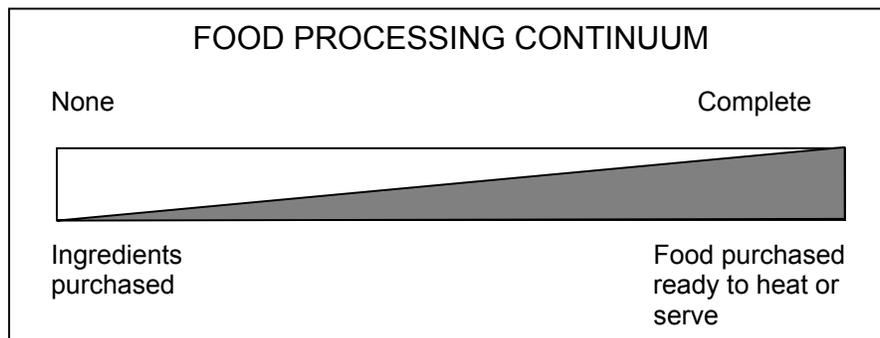
It is important to understand the flow of food through a foodservice system in order to determine the system that will best meet your needs and to develop an effective HACCP program. Food flows through ten possible processes:



As we talk more about the four types of foodservice systems, you will find that all of these processes do not apply to all of the systems. Also, when food production is centralized, a **transporting** process needs to be added. With a centralized foodservice system, there will be different processes (and critical control points) for the central food production facility and the receiving kitchens (satellites). In the chapter on food safety, there will be a more in-depth discussion about the critical controls that need to be in place during each process in the food flow.

## Form of Food Purchased

Another concept that is important to the understanding of foodservice systems is the form in which the food is purchased. Following is a diagram of the food processing continuum:



This diagram depicts the continuum of food processing that might be done prior to purchasing. For example, if food were purchased at the “none” end of the continuum, the ingredients for a product would be purchased. If food were purchased at the complete end, the food product would be ready to heat or serve (perhaps requiring no preparation or only rethermalization).

Here is an example that you might find in school foodservice. Let’s take Italian bread. We could make many different decisions about where on the food processing continuum to purchase Italian bread. We could purchase all of the ingredients (yeast, flour, sugar, shortening, and salt) and make our own bread from scratch. In this case, the food is purchased with no prior processing (none end of the food processing continuum). We could purchase frozen bread dough, proof it, and bake it. In this case, we are purchasing items somewhere in the mid-range of the food processing continuum. Purchasing from the complete end of the continuum, we could purchase Italian bread already baked and all we do is serve. There are many examples in school foodservice of similar choices for how much processing will be done in the foodservice operation and how much will be done prior to purchasing the product.

Purchasing decisions differ depending on the type of foodservice system that is in place. For example, with centralized food production, food is more likely to be purchased from the left end of the continuum—with little or no processing. The processing or food preparation will be done in the central kitchen. This often represents a substantial food cost savings—one of the goals for centralized production. Food costs and labor costs usually are inversely related—as one goes up the other one goes down. If the quantities of food produced are very high, as in the case of a large central kitchen, productivity (usually measured as meals per labor hour) will increase, making labor costs more reasonable. In the assembly-serve foodservice system food is purchased at the complete end of the food processing continuum. That means food costs are high; but less labor is required, so labor costs decrease. We will talk more about how food is purchased as the various types of foodservice systems are discussed.

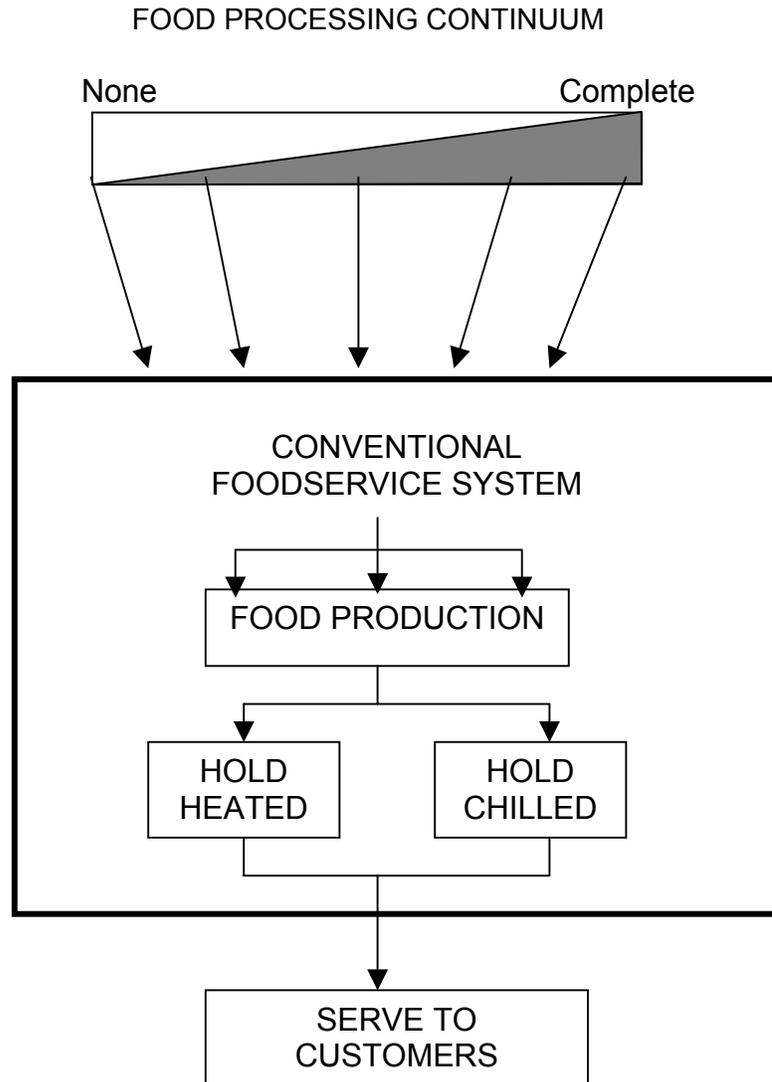
## **Types of Foodservice Systems**

Four types of foodservice systems are described in the literature: conventional, commissary, ready-prepared, and assembly-serve (Unklesbay et al., 1977). There are numerous examples of each of these systems in operation, both in school foodservice and in other segments of the foodservice industry; and there are many variations of them, too! A description of these systems will be useful if you are considering making changes in your operation.

### **Conventional Foodservice System**

The conventional foodservice system is most common, although that is changing due to the current operating environment. In conventional foodservice systems, ingredients are assembled and food is produced onsite, held either heated or chilled, and served to customers. For this foodservice system, food is purchased all along the food processing continuum. For example, some items may be purchased from the none end and require full preparation. Other items may be purchased with some processing, while others may be purchased fully prepared, only requiring portioning and service.

Here is a diagram of a conventional foodservice system:



Conventional foodservice systems are used extensively in schools, restaurants, colleges and universities, and cafeterias. Because of the current labor shortage, many of these conventional foodservice systems are using more and more food products from the complete end of the food processing continuum.

### **Advantages of Conventional Foodservice Systems**

There are several advantages to conventional foodservice systems:

- **High degree of perceived quality**—this system makes people think of fresh and homemade food products, which people often equate with quality.

- **Flexibility in menu items**—any menu item can be included on the menu because food is prepared and served soon after production.
- **Food is served soon after preparation**—which means that most often freezing, chilling, or reheating typically does not impact the quality of the food product.
- **Traditional standardized recipes can be used**—there is little need to modify recipes for chilling and reheating or extremely large production quantities. This means that there will be a large number of standardized quantity recipes available for use.

### Disadvantages of Conventional Foodservice Systems

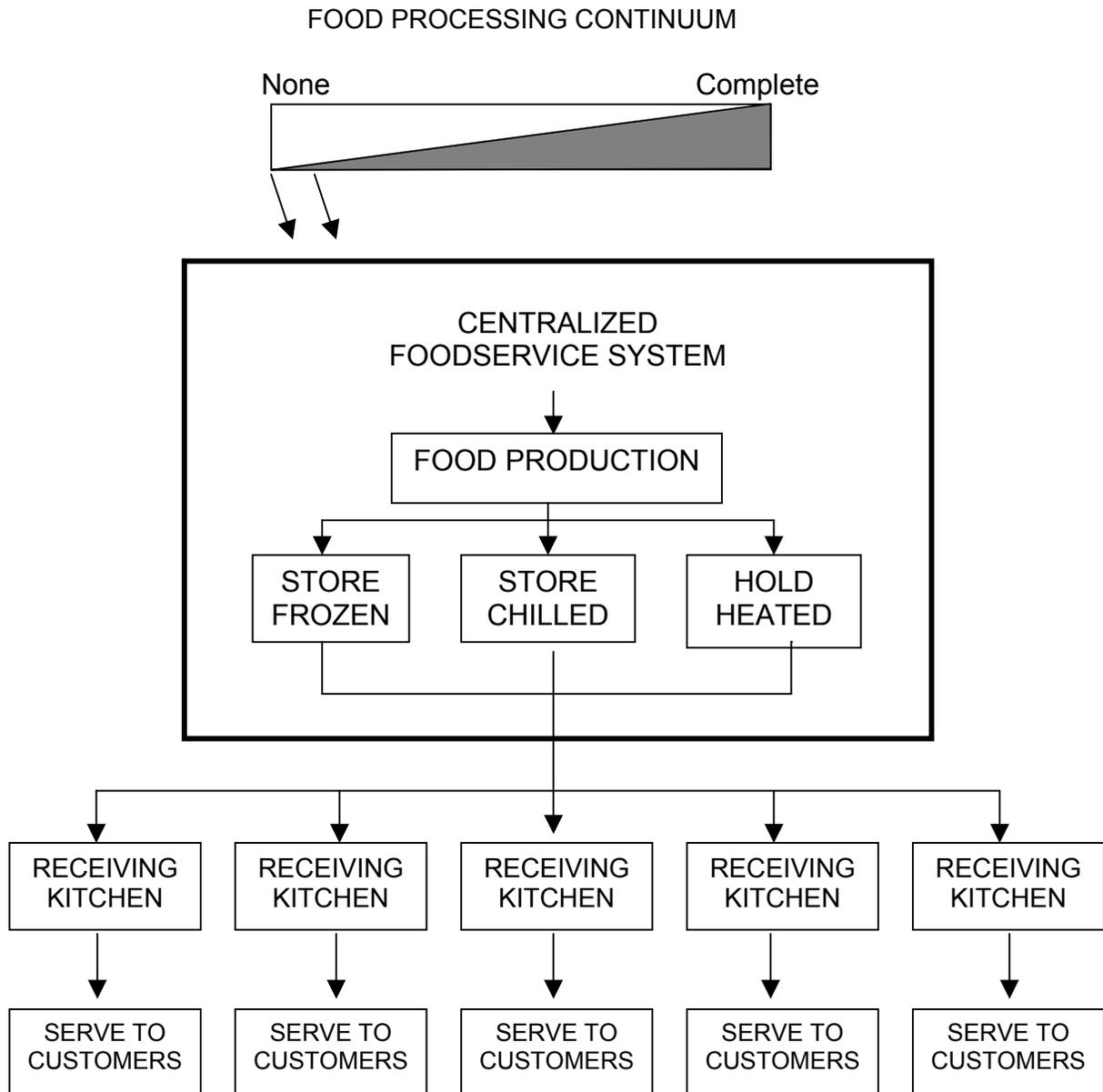
There also are several disadvantages of conventional foodservice systems:

- **Labor intensive**—with conventional systems, preparation is timed in relation to when the food will be served and eaten, thus, this system is more affected by the peaks and valleys of demand for food than any of the other systems. More labor will need to be scheduled during peak times, making the cost of labor higher for this system than for any of the other foodservice systems.
- **Consistency**—may be a problem if there are several conventional kitchens within a school system. There may be great variability in food quality, portion sizes, and food costs due to unskilled labor. For example, are all cooks following the same standardized recipes, or are they being a little “creative”? Do you have cooks with better cooking techniques in some operations? Do all of the school foodservice managers have the same expectations of employees? These kinds of inconsistencies can be a managerial headache!
- **Higher food costs**—higher costs could result because there is less control of portion sizes, more deliveries (drops) are required by the vendors, and waste may be greater. There may be more total inventory since it is dispersed across many locations.
- **Food safety**—there is less control over food safety in conventional foodservice systems compared to other foodservice systems. There are more decisions that must be made at critical control points, and those decisions are made by a great number of staff members at many locations. It often is difficult to provide the supervision necessary to ensure consistency in how staff follows the standard operating procedures in multiple schools.

## Centralized (Commissary) Foodservice System

The commissary food service system (also known as central kitchen, central food production, or food factory) centralizes food production, and food is transported to satellites (receiving kitchens) where it is served to customers. Food usually is purchased near the none end of the food processing continuum, and food preparation is done in the central kitchen, which results in lower food costs. Labor costs also are lower because of the centralization of food preparation. This food service system takes advantage of economies of scale, so it is most effective when mass food production is required.

The food product flow for this type of system is:



One unique characteristic of the centralized foodservice system is that food is transported to external locations (satellites or receiving kitchens) for service. **Two factors will need to be considered about the food that is transported: temperature and packaging.** Food can be transported either hot or cold, which impacts the delivery and the equipment needs in the receiving kitchens and in transportation. The food can be sent to the receiving kitchens bulk or pre-plated, which impacts the equipment and labor needed at the receiving kitchen. In addition, food production and delivery schedules must be coordinated.

Centralized (or commissary) foodservice systems are used in many types of foodservice operations. Perhaps the application of centralized foodservice systems that is most easily visualized is in the airline industry. There is a central production facility on or near the airport property where the food is prepared, pre-plated, sealed, and either chilled or frozen. The pre-plated meals are placed in closed carts, and the trays with the cold items are assembled and placed in closed carts. These carts are transported by truck to the airplane (satellite), where the food is placed in the galley. The plates requiring rethermalization are placed in convection ovens by the caterer. Once the airplane is airborne, the stewards assemble and distribute meals. Assembly usually only consists of placing the passengers' choice of hot entrée on the tray that contains all of the cold items. Once the airplane lands at its destination, the caterer sends a truck to the airplane to get the used carts, trays, and dishes and returns them to the central food production facility for washing and sanitizing. At the same time, the airplane is supplied with the meals required for the next flight.

Many restaurant corporations centralize food production, too. Williams Sonoma, located in San Francisco, operates three Bay Cafes. They produce the gourmet sandwiches, salads, soups, and baked goods at the original restaurant and transport them to the other two restaurants.

There are many examples of centralized foodservice systems in schools, and the numbers have expanded dramatically in the past 20 years. Many of the large school districts located in urban areas use central production, including school districts in cities such as San Bernardino, California; Louisville, Kentucky; Boston, Massachusetts; Minneapolis, Minnesota; St. Paul, Minnesota; Columbus, Ohio; Cleveland, Ohio; Dayton, Ohio; Portland, Oregon; Philadelphia, Pennsylvania; and Pittsburgh, Pennsylvania. There are many more urban school districts using centralized foodservice systems. They also are being used in medium-sized school districts, such as Elko, Nevada and Corvallis, Oregon.

## Advantages of Centralized Foodservice Systems

There are many advantages of centralized foodservice systems:

- **Lower food and supply costs**—there can be significant cost savings from purchasing food and supplies in the very large quantities needed for one very large operation rather than for several smaller operations. Also, most food will be purchased near the none end of the food processing continuum, where food costs are lowest.
- **Purchasing Power**—Large centralized facilities provide the opportunity to have a great deal of purchasing power. Supplier/vendor issues such as delivery schedules, order size, quality control, and return policies may be reduced or eliminated. Vendors often make deliveries to only one location, which also can save money in purchasing. Purchases such as milk and bread probably still will be delivered to the individual schools. Some operations may negotiate with a prime vendor to deliver some items directly to schools while still getting pricing based on overall purchases in the district.
- **Effective utilization of USDA commodities**—central foodservice systems are able to utilize raw government commodities in a timely and creative manner. Flexibility in the recipe use of commodities exists. This presents a cost savings, and similar products will not need to be purchased on the open market.
- **Ingredient control is improved**—with a centralized foodservice system, there is greater control over ingredients, which decreases food costs. Often the central kitchen is planned with an ingredient room where food items are pre-weighed and measured prior to preparation. This controls the quantities of ingredients used and ensures that standardized recipes are followed.
- **Inventory control**—processes often are in place to ensure that food is issued in the appropriate quantities and there is good inventory turnover so that spoilage does not occur and food quality is maintained. This results in good fiscal management in that receiving sites maintain a “just-in-time” inventory.
- **Lower labor costs**—labor costs (and total number of employees) can be reduced significantly using central food production. The high production quantities provide opportunities to increase productivity. This is an especially important selling point in today’s environment where labor is scarce and expensive.
- **Flexibility in scheduling of food preparation**—if food is transported cold, there is a great deal of flexibility in the scheduling of food production. This eliminates the peaks and valleys of demand for food and allows labor costs to be controlled. Production can be scheduled at any time during the day or any day of the week since it is separated from service.

- **Mechanization of preparation**—central kitchens utilize mechanized equipment to increase the efficiency of food preparation and minimize the lifting and heavy work on the part of employees.
- **Quality control**—central food production provides the opportunity to have more quality control in the food served, including the consistency of products throughout many service sites. There are three aspects of food quality:
  - **Microbiological quality**—central production often lends itself to more control over the microbiological quality of food because of the number of controls that are in place at all points in the flow of food through the system. HACCP plans and procedures must be in place in centralized foodservice systems, and the size often allows for HACCP to be the main part of someone’s job.
  - **Aesthetic quality**—color, texture, and appearance all are aesthetic factors that are important in meals. These factors can be ensured through menu planning, purchasing, and preparation procedures in place in a centralized foodservice system. There will be consistency among all schools in the district.
  - **Nutritional quality**—again, centralized menu planning, purchasing, and preparation all can ensure the nutritional quality of the meals in a centralized foodservice system because of the consistency and control that is possible.
- **Consistency**—menus are planned, and food is purchased and prepared centrally, which allows for consistency in which food items that are being served at the schools throughout a district.
- **Better utilization of production facility**—one central production facility allows for better space and equipment utilization compared to the use of multiple small kitchens throughout a district. Also, productivity might be increased (and facility utilization improved) by getting contracts to provide food/meals to other school districts or other agencies such as hospitals, HeadStart, Meals on Wheels, senior nutrition programs, and day care centers. Catering for the school district would be another way to maximize facility utilization.
- **Flexibility in location**—while schools are located in neighborhoods that sometimes have very high land costs, central production facilities can be located in less expensive areas of town. The primary consideration is that the location be accessible to highways for deliveries to and from the facility. A central location within the school district may be advantageous, too.

- **Fully-equipped kitchens are not needed in each school, saving equipment costs**—thus, when schools are aging and equipment needs to be replaced, a central food production facility eliminates the need for some equipment at the receiving kitchen. This also is very advantageous for school districts in which growth is rapid. When building new schools, full production kitchens are not needed, which results in space savings and lower building costs.

### **Disadvantages of Centralized Foodservice Systems**

There are several possible disadvantages to centralized foodservice systems:

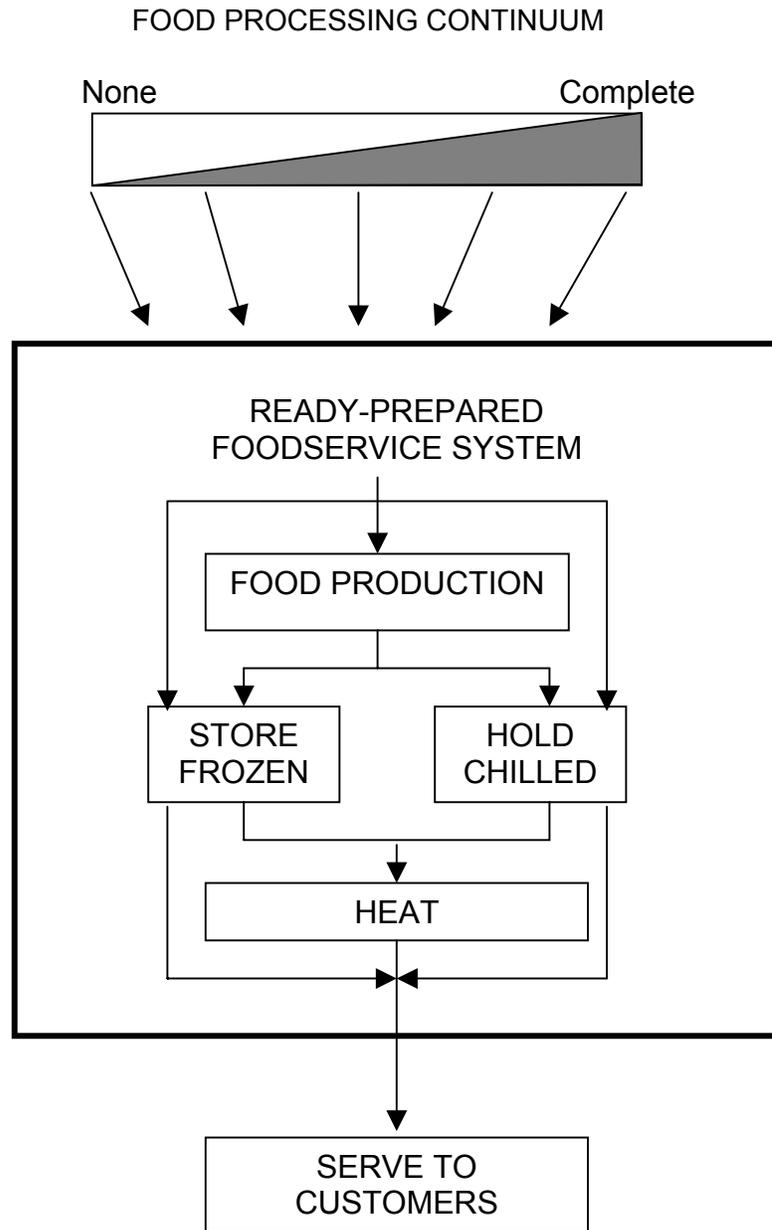
- **High initial capital investment for building and equipment**—the initial cost of building and equipping a central production facility may be very high. Issues such as payback period and growth capabilities need to be considered since the investment may be advantageous over the long term.
- **More technically skilled employees are required**—some of the equipment and processes in a central food production facility require more technical skills than are needed in a conventional foodservice system. For example, bakers may be needed to complete the more complex quantity baking that would be done.
- **Some jobs may be very monotonous**—some of the jobs in a central food production facility are assembly line. These may be monotonous jobs that would not be appropriate for some employees.
- **Equipment malfunctions can be significant**—if equipment fails, the impact is far greater for a central production facility than if a piece of equipment failed in a school kitchen. Efforts will be required to reduce the downtime of equipment. Preventive maintenance will be extremely important. Maintenance personnel dedicated to a facility is essential.
- **Transportation costs**—in conventional foodservice systems transportation of prepared foods to receiving kitchens is not a cost, while in centralized foodservice systems it can be a significant cost. Costs will include: trucks or vans, delivery equipment such as carts, gasoline, maintenance and repair, and insurance. In addition, you will need truck drivers to deliver products. Those drivers may need a Commercial Drivers License (depending on the truck size and local regulations) and in some areas may be members of a union such as Teamsters. Union membership may have a big impact on the salary requirements of the truck drivers.
- **Perceived loss of quality**—mass production often is perceived by customers to be less desirable than traditional food preparation.

- **Recipe modifications may be required**—due to the large quantities produced. Also, if products are chilled or frozen, recipe modifications may be needed to maintain product quality. Current standardized recipes will need to be restandardized when converting to central food production. This may require purchasing different products/ingredients. Testing of products for both quality and taste will need to be an ongoing process.
- **Food safety problems can affect many customers**—if there were a foodborne illness outbreak, many more customers would be affected. There will need to be very tight controls in place via a well-planned and implemented HACCP program to minimize the risks related to food safety. Laboratory testing of products should be conducted on a continual basis.
- **Individuals preparing the food are not serving the food to customers**—cooks will not get any feedback from students about the quality of food, and the customer seems less real. Foodservice directors in central kitchens often make efforts to connect the production staff with students. For example, students are invited for kitchen tours to learn about how their food is prepared. These tours provide some interactions with students for the central food production staff. Directors also may want to involve production staff in reviewing students' evaluation of school foodservice.

## Ready-Prepared Foodservice System

The ready-prepared foodservice system has been in use for many years. In ready-prepared foodservice systems, food is produced onsite, held chilled or frozen, reheated, and served to customers on site. Food production can be scheduled at any time, since food is prepared and stored frozen or chilled for later rethermalization and service. This system also allows multiple-day production to be done at one time. For example, if chili is on the menu two times in the next 30 days, the total amount of chili can be made at one time, which reduces labor costs. For this foodservice system, food is purchased all along the food processing continuum. For example, some items may be purchased from the none end, and require full preparation. Soups, entrees, casseroles, and sauces would likely be fully prepared on site from ingredients purchased at the none end of the food processing continuum. Other items may be purchased with some processing, while others may be purchased fully prepared, only requiring portioning and service.

Here is a diagram of a ready-prepared foodservice system:



Ready-prepared systems are used widely in hospitals and prisons. They are not often used in school foodservice, which more often operates conventional or centralized foodservice systems.

## **Advantages of Ready-Prepared Foodservice Systems**

There are several advantages of ready-prepared foodservice systems. Some of the main advantages include:

- **Flexibility in scheduling food preparation**—if food is prepared and stored frozen or chilled for later use, there is a great deal of flexibility in the scheduling of food production. This eliminates the peaks and valleys of demand for food and allows labor costs to be controlled. Production can be scheduled at any time during the day since it is separated from service.
- **Lower labor costs**—large quantities of food can be prepared at one time and stored for later rethermalization and service; thus, food can be prepared for several meals at once. For example, spaghetti sauce could be prepared in large enough quantities to last a month rather than preparing it three times during that same time period.

## **Disadvantages of Ready-Prepared Foodservice Systems**

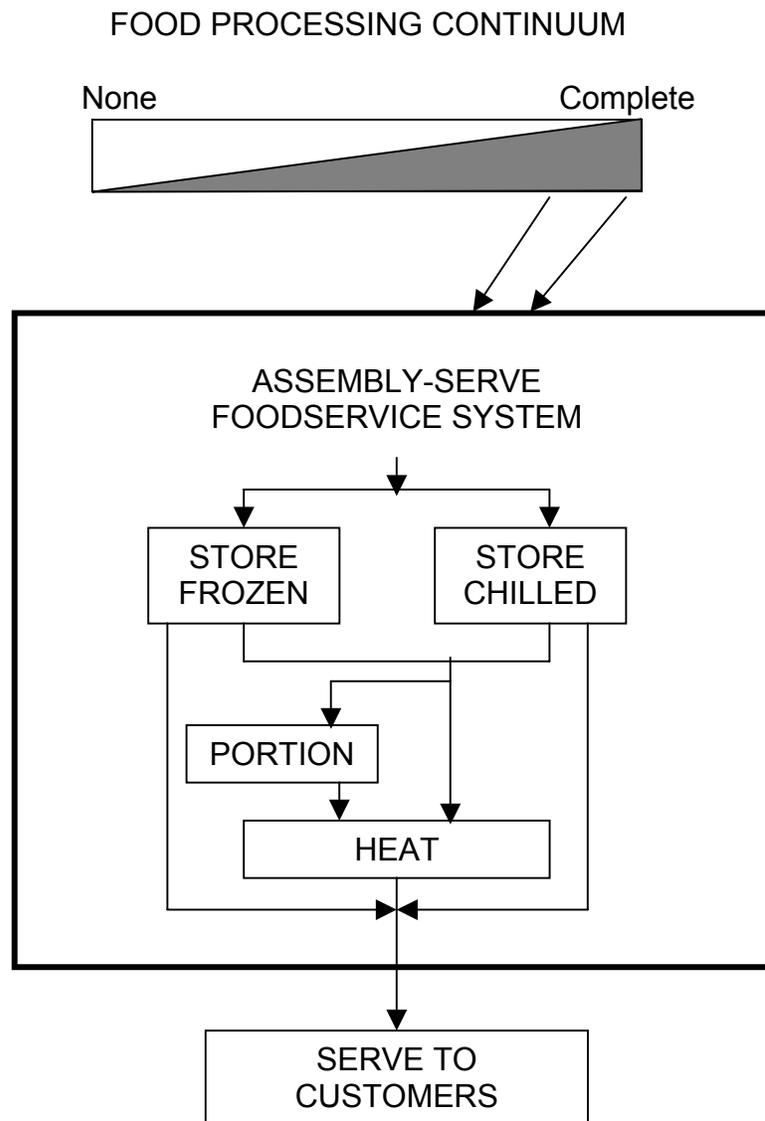
There are several possible disadvantages of ready-prepared foodservice systems:

- **Menu variety may be limited**—some food items might not be suitable for the chilling or freezing process.
- **High initial capital investment for equipment**—the initial cost of equipment for a ready-prepared system may be very high, but consideration of issues such as payback period, lower food cost, and lower labor costs usually will offset the initial costs in a short period of time.
- **Perceived loss of quality**—mass production often is perceived to be less desirable than traditional food preparation.
- **Recipe modifications may be required**—due to the large quantities produced. Also, if products are chilled or frozen, recipe modifications may be needed to maintain product quality. Some standardized recipes will need to be restandardized when converting to a ready-prepared foodservice system. This may require purchasing different products/ingredients.
- **Food safety problems can affect many customers**—if there were to be a foodborne illness outbreak, many more customers would be affected. There will need to be very tight controls in place, via a well-planned and implemented HACCP program, to minimize the risks related to food safety.

## Assembly-Serve Foodservice System

The assembly-serve foodservice system traditionally has been the least common, although that is changing due to the current operating environment. In today's environment labor is scarce and expensive. Also, there are many choices in foods that can be purchased that only require heating and serving. In assembly-serve foodservice systems, food is purchased at the middle to complete end of the food processing continuum. The purchased food is stored either frozen or chilled for later use. It is then portioned, reheated, and served to customers.

A diagram of the assembly-serve foodservice system follows:



## Advantages of Assembly-Serve Foodservice Systems

There are several advantages of assembly-serve foodservice systems. The main advantages include:

- **Lower labor costs**—with assembly-serve systems, food is purchased that is almost fully prepared, requiring little labor for production.
- **Limited equipment needs**—because the food is almost fully prepared, for the most part all that will need to be done is rethermalization. Little equipment will be needed to rethermalize the food, portion it, and serve it to customers. This results in lower initial capital expenses when building a new facility.

## Disadvantages of Assembly-Serve Foodservice Systems

There are several possible disadvantages of assembly-serve foodservice systems:

- **High food cost**—since foods are purchased at the complete or nearly complete end of the food processing continuum, most of the labor in preparing the product is already done. This increases the food cost of the product compared to preparing the menu item from scratch (little or no end of the food processing continuum).
- **Menu variety may be limited**—while the variety of prepared menu items has increased in recent years, there still is not the variety of items that can be prepared in a conventional, centralized/commissary, or ready-prepared foodservice system.
- **Availability of menu items**—the continued availability of menu items may be a problem for cycle menus. Some foodservice directors have included items on their menus only to find that the product has been discontinued, reformulated, or no longer carried by the distributor from whom they purchase.
- **Perceived loss of quality**—customers often view “homemade” products as having a higher quality than prepared items.

## **Combination Systems**

Often, foodservice operations in school districts have characteristics of more than one of the foodservice systems. For example, school districts that have central production facilities may prepare some items in the central kitchen and some food items in the receiving (satellite) kitchens. This often is done to ensure the highest quality for a food item that is popular with students.

Another example of combination systems within a district is when a central kitchen is used to prepare meals for the elementary schools and conventional kitchens are used to prepare meals for middle and high schools. This often is a more cost-effective method for serving large numbers of meals while still meeting the needs of the students.

In yet another example, some districts will centralize one function such as a bakery. All baking will be done in a central site and the baked products distributed to schools throughout the district. Other production would be done in the individual schools.

There are many ways that these systems can be combined to increase the efficiency of an operation and meet the unique needs of a school district. The factors that will influence these decisions will be discussed in later chapters.

### **Case in Point**

Clark County School District, Las Vegas, Nevada, is the fastest growing school district in the nation. They had 235 schools in January 2001, four of which opened that month. They have a central kitchen, but the kitchen does not have the capacity to produce all of the meals needed by the district. They have started a "Dish Up" program in which high schools produce meals for three or four elementary schools in addition to meals served at the high school. Thus, they are centralizing food production at a central kitchen and at regional or base kitchens. This combination provides them with labor efficiencies and the ability to produce the large number of meals needed by the school district.

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