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Trends in the foodservice industry: convenience foods

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TRENDS IN THE FOODSERVICE INDUSTRY

CONVENIENCE FOODS

AN INDUSTRY PROJECT

Presented to the Faculty of the Hotel School
of Florida International University for the degree
of
Masters of Science in Hotel and Food Service Management

by
John R. Adams Jr.

June, 1979
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SECTION I
EVOLUTION OF CONVENIENCE FOODS

Ten or fifteen years ago the use of convenience foods could have been considered a mere drop in the bucket. Today, frozen prepared foods are available in great abundance and far beyond just being a convenience. They have become a necessity without which the modern food service operator would be deprived of his most effective weapon in the battle of ever-mounting cost of operation. In experienced hands, frozen prepared or pre-fabricated foods are of tremendous versatility, allowing creativity to once again play a part in the food industry.

Since World War II, the hospitality industry has experienced a rapid growth in the use of convenience foods. This development took place with a great deal of noise from within and without the food service industry.

Part of the problem surrounding such products, frozen or otherwise prepared, lies in the fact that relatively little is known about history, development, even the major characteristics, as well as the application of such products. The term "convenience" attached to pre-fabricated and pre-prepared foods is ill chosen, inaccurate and misleading.
We are no longer dealing with convenience, but a major tool with which we can combat one of the major problems that has befallen the food service industry as of late. The shortage of skilled cooks and chefs. That, together with the rising costs of doing business, today's operator is forced to look elsewhere to find solutions and relief. Convenience is really the last thing he is looking for. Convenience foods must be considered a necessity to keep operators in a competitive position where cost is concerned.

In order to understand the potential as well as the limitations, to make the proper choice, to apply and handle properly, we must first learn to understand the product itself.

What we today call "convenience foods" are not a phenomena that suddenly appeared overnight. Preserving surpluses of food has developed throughout the ages. Being part of an evolution controlled by man's constant and energetic drive towards improvement of the ways he provides for his basic needs, pre-processed food products had their beginning at the dawn of time. In all likelihood it probably started when an early caveman accidently dropped a haunch of venison too close to the fire in his cave and suddenly discovered how much better it tasted after having been exposed to the fire. The quest of mankind to preserve some of the surplus food supplies for the days of want also had a great influence on the evolution and development of today's prepared and
processed foods.

Hundreds of years before Columbus, the Incas of Peru were freeze-drying much of their food. They would lug meat, fish, potatoes, and such into the high Andes and expose them to the bitter cold. The food would freeze, partially thaw when the sun came up, then freeze again at night. Before long, all the food's moisture sublimated, leaving dry nearly imperishable material that would spring back to life when boiled in water.

The invention of preserving fruits, vegetables, meat, soups and broths by thermal sterilization in sealed containers by Nicholas Appert, a French confectioner in 1780 marked the beginning for the canning industry.

In 1869, Julius Maggi, son of an Italian immigrant, was put in charge of his father's mill in the sleepy village of Kemptal near Zurich, Switzerland. Julius, a very alert, imaginative and alert businessman, had traveled extensively. During his many journeys he had become acutely aware of the many changes taking place all over the continent. The Industrial Revolution was in full swing, and wherever he turned new factories were being built. The need for manpower to staff all of these new manufacturing facilities became so great that many women entered those new plants to work alongside their husbands, sons and brothers. As a result of these long hours away from home working, dietary deficiencies began
to spring up throughout the populace.¹

Concerned citizens became alarmed and began seeking a workable solution for this problem. Out of all the research done, the problem of providing factory workers with a quick and nutritious meal was solved. Out of necessity, what we today call convenience foods were created. It first came in the form of the dry soup mix. This represented the start of modern convenience foods.

There is a close connection between the preparation of various food products for preservation and that of convenience foods. Food to be preserved by any of the various processes of preservation has to undergo certain preliminary processes such as peeling, cutting, shredding, slicing, washing, blanching and pre-cooking. In addition to having certain foods available out of season, such products represent considerable convenience in their use at any time. Freezing of foods as a means of preservation of surplus commodities goes back to about 500 B.C. when cooling in snow and natural ice or in the air in cold climate, a process called "weather freezing" was practiced. As early as 1550 the use of chemicals to lower the freezing point of water was known and practiced.

¹"Frozen Prepared Foods -- Convenience or Necessity," by Hans Roth, p. 2.
The ammonia compression machine brought frozen foods to a level of importance around 1870. It was Clarence Birdseye who developed the quick freezing concept in 1923. He recognized that the final quality of frozen foods depended on proper selection, handling, preparation, freezing, storage and distribution. He also recognized the fact that storage freezing, meaning the use of storage freezer to freeze foods, was detrimental to the quality of the final product. In order to achieve a quality product the freezing process had to be quick, sort of like a shock. When frozen in this manner, only small ice crystals formed inside the cell structure of the food product, thus minimizing destruction of cell structure and consequent loss of moisture. Contrary to high heat and radiation methods, freezing doesn't cause any loss of nutrients and vitamins.

Today, the most often applied and also the most versatile method of food preservation is freezing. Frozen ingredients, such as vegetables, fruits, fruit juices and seafoods have enriched our table for many years and are more or less accepted, if not taken for granted.

No precise date is available as to the actual beginning of the practice of freezing foods for the purpose of preservation. Since the Incas knew of it and practiced the method, we must assume that the practice is rather old and wherever the climate was such that ice was formed during part of the year. Man's inquisitive mind had obviously
discovered long ago that food supplies could be kept much longer when frozen.

Fish was first commercially frozen in or about 1865 by surrounding surplus catches with ice and salt. With the advent of ammonia compressors which allowed the creation of an environment of relatively low temperature, food freezing took a great leap forward. Crayogenic freezing, a process by which liquified gases such as nitrogen or carbon dioxide are directly blown over the product to be frozen, takes place at a level of nearly 200° F. below zero. Foods frozen at such low temperatures suffer a minimum of cell destruction and dehydration. Result, a better product when reconstituted.

When we speak of convenience foods, and frozen foods in particular, it is important that we distinguish between the varieties and types of products. Categorizing processed and pre-fabricated may be a little difficult because they overlap in many instances. The first universally accepted frozen foods are the products which have been processed to a degree, but are still considered ingredients that require additional work by the cook. They are called efficiency foods. Examples are: pre-cut roasts, steaks, cutlets, preboned and cut chickens, peeled potatoes, pre-cut and pre-washed salad greens, canned and frozen vegetables, frozen fish, whole and fillets, shrimp, crab and other seafoods.

There are three types of efficiency foods to be considered. One, of course, is nature's own: apples, eggs,
milk, watermelon, grapes, tomatoes, etc. These foods are ready to eat and require little or no added production costs to make them into finished consumable products.

Second, there are those foods which are processed and treated so as to reduce perishability and remove processing stages for the food service operator, while maintaining natural characteristics. Examples of these are frozen oil-blanched potatoes, canned or frozen vegetables, frozen preportioned cuts of meats, dehydrated milk and eggs.

A third type of efficiency food is that food or a combination of foods which are changed from their original form into completely new products. For example, Jell-O gelatin, Jell-O pudding mixes, dry cereals, cake mixes, dehydrated and canned soups, macaroni, ice cream, butter and canned and frozen prepared foods.

The key is technology -- for processing, storage and distribution. Technology as applied to food must reproduce a product that can be equal to or better than the one it is intended to replace.

A key factor concerning the development of efficiency foods is the continuing purchase of these products by the food service operator. The main reason for the continuance of production is the fact that the product can be reproduced

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many times, on a continuing basis, to the satisfaction of the food service operator. Customer acceptability is the first main consideration. An efficiency food has to be desired.

It must also be affordable. The product must demonstrate the ability to be equal to or less than the cost of the replaced product or products, or affect cost in some other way.

The product must be consistent in quality; it must duplicate itself time and time again. This is the crucial test for an efficiency food. Once it has been accepted, it must be consistent.

Another important element in the evaluation of efficiency foods is the development of equipment and systems to accommodate these foods. The frozen prepared entree is a tremendous development and is now receiving much attention since Clarence Birdseye developed the concept in 1930. These products have taken so long to be accepted because the necessary equipment and systems had been lacking. With these problems becoming solved, many restaurant companies are now using these products exclusively and are very successful.

Efficiency foods reach their greatest significance in the area of labor time saved. It is important to view efficiency foods on a menu in their entirety. It is up to the food service director to take advantage of the many available products and interpret the new opportunities made possible
into systems. All the functions of a food service program must be analyzed and measured as a comparison of production with cost in energy, time, and money.

Many questions pertaining to efficiency foods have been raised in the past and even now. Has too much emphasis been placed on efficiency foods, and not enough on layout and design as well as time and motion studies? Have the food service operators accepted absolute systems that were conventional ten years ago? Has the layout and design of food service facilities progressed as rapidly as food technology? Has the entire spectrum of efficiency foods been studied as part of a food service system?

Efficiency foods cannot be viewed as a whole by themselves but rather as instruments and tools which will enable the food service operator to take a new look, a new approach toward providing efficient and more than satisfactory food service to the public he serves.

This new approach will take a direction in the area of recognition of food service, and not food manufacturing, on-premise. The nature of the food service operation of tomorrow will most likely be very similar to a retail store where the food service operator will be interested in merchandising, service, and customer satisfaction, rather than in the production of food and all its inherent problems, problems that will be left to the food manufacturer.
Next we recognize pre-fabricated products. They can be identified by the fact that they are prepared to some degree but additional cooking and accompaniments are still needed. Examples are stuffed chicken parts, legs, breasts, breaded and browned or with the skin on ready to bake, breaded meats and fish, dry mixes for soups, sauces, salad dressings, puddings, mashed potatoes, as well as certain pre-cooked roasts.

Finally, there are the fully-cooked entrees which are fully prepared, packed with sauce and ready to heat and serve. These are frozen products, which are actually the most popular in this category, but also retorted canned foods which can be stored on the grocery shelf. These are very well-known in Europe.

Efficiency ingredients and foods make it possible to offer seasonal foods all year round and seafoods far remote from the coast at relatively reasonable cost. Pre-fabricated products have enjoyed reasonable acceptance for a number of years, even among top chefs, because this kind of product alleviates some of the labor problems while leaving the chef with various options regarding the type of sauce, garnish and presentation in general. In other words, he can easily make the dish look like something he concocted himself. This helps the food service industry cater to the heavy demands by the public on such marketable products.
SECTION II
DEVELOPMENT OF CONVENIENCE FOODS

Product Development

Upon entering a discussion on the use and application of convenience foods, we must first know how such products are developed.

First, there must be an idea. Ideas are usually generated by need. Ideas often are generated at the most unexpected moments and in unexpected places. However, before an idea can be turned into a product, it has to be sorted out and measured against need; availability of raw materials; cost; and, of course, ability to manufacture. If a product is so complicated that only "make from scratch" methods can be used to manufacture it, the cost will make the product too costly for use. From the conception of the idea, we enter the stage of experimentation, raw material evaluation and availability research, preliminary costing, formulation and initial sample preparation.

Next, packaging is chosen, researched and designed. Samples are modified, evaluated, redesigned if necessary, or perhaps dropped. All steps are painstakingly documented, no small task for a chef who is accustomed to measuring
Many hospitals are now leaning heavily toward fully prepared and pre-plated meals in one-way containers which can be heated in a microwave oven, eliminating almost all of the cooking with the exception of very special diets.

Commercial airlines are also heavily involved in the use and development of specially designed food products for service in flight. Bulk packed, fully prepared components are re-constituted on the ground and pre-plated in combination with components prepared by the caterer. In other instances, complete meals, pre-plated and frozen in plastic one-way containers popped into the airline dish while still frozen are re-constituted in flight by the cabin personnel shortly before serving. The ultimate and very successful test for the concept of pre-plated meals was the feeding of the Apollo astronauts during their return from the moon.3

This is a look at how convenience foods got their start and some of the developments that have taken place over the years.

3"Frozen Prepared Foods -- Convenience or Necessity," by Hans Roth, p. 3.
just about everything by eye.\textsuperscript{4} But, since uniformity is a part of the value of convenience products, only accurate documentation will make duplication and continuous mass production possible.

Once the products are available, it must overcome the chef's own critical evaluation. If it is evident to the chef that the basic concept of the proposed product idea is not workable, he may not allow the first stages of the development to be initiated. If the concept needs additional development, it must thus go back to the drawing board.

Once this level has been reached, it's time that management had a look at the product itself. The following questions will then have to be answered:

1. Is the potential new product compatible with the aims of management?

2. Is it producible?

3. Will the marketplace accept the new product's concept, price and quality?

Occasionally, a customer will supply a recipe. The source of which can be anything from a magazine to a restaurant meal that appealed to him. Occasionally, three or more modifications are necessary before a consumer accepts a new product. Only then can formula and method be finalized.

\textsuperscript{4}"Ready Made Convenience Foods," by Phil Parrott, p. 3.
Formal costing takes place, usually by computer. Label design is next. The proposed label with the ingredient statement is sent to the U.S.D.A. in Washington, D. C., together with the finalized formula with application for approval.

Once the label is approved, test runs are scheduled and conducted. Any major changes after this point are again subject to government approval. Ingredient statements on labels with ingredients listed in descending order on frozen food products, especially fully-cooked entrees, can be quite lengthy, but make worthwhile reading for any buyer of such products, be he a veteran or newcomer.

If the name of a product such as an omelette or scrambled eggs is based on a specific ingredient such as ham, a one-ounce amount of ham must be in the product, otherwise the product has to be called "ham flavored." There are other requirements concerning ingredients, which state that only approved quantities of a certain ingredient can be used in the product.5

The U.S.D.A. is represented in the plant by an inspector whose responsibility is to observe that all federal regulations are observed, part of which is the strict observation of product formulation and product specifications, as well as

sanitation. All machinery before being installed has to be approved by the U.S.D.A. At regular intervals all production must stop and the sanitation crew takes over. No wooden or textile materials are allowed in the plant because they are said to be hard to keep clean and considered breeding grounds for dangerous bacteria.

It is in the interest of the packer or processor to establish quality control and production standards on a level where cooperation with government agencies is easy and becomes routine. Part of this effort is a strict program of quality control which starts long before a product leaves the assembly line. Raw materials receive close scrutiny as to conformity to specifications such as fat contents of meats, weights and other points of inspection established by management. Sanitation standards are so high that most food service establishments trying to operate under the same conditions would probably be out of business within a few months. A microbiological laboratory where raw materials as well as finished products receive a full scale bacteriological scrutiny is constantly maintained. Any deviation from established standards is a cue for a full scale investigation of conditions of the plant and all procedures.\(^6\)

Making of a Menu

A study of operations using convenience foods indicates that the successful ones do not rely exclusively on convenience foods. Instead, they have a menu that is made up totally of "convenient" foods; all kinds of foods that are easy to prepare.

These types of operations use convenient, easy-to-prepare foods exclusively, thus saving an immense amount of cooking time and labor. These foods may be fully prepared frozen foods. Also included are hamburgers, chops, steaks, corned beef, lobster tails, eggs, frozen foods, pancakes, spaghetti, roasts, ham, bacon and even peanut butter. Together with salad ingredients, simple appetizers and desserts, these items comprise a menu of foods that do not require cooking and seasoning talent or much manipulation. Some operations have even virtually abandoned vegetables or a choice of salad.

Foods that are ordinarily hard to prepare, that require cooking skills or time, are called "made dishes" by old-fashioned dieticians. These foods, in sauces, are the major part of the new convenience foods. They are the ones that in a conventional manner might take the most time and the most skill to prepare. They are also the ones that are not ruined by slight overcooking and which hold up well in storage.
The rest of the operating menu is made up of "convenient" foods. Thus, if a food product is neither easy to prepare nor available frozen, it is not on their menus. Successful operators know that a menu of only frozen foods, in sauce, doesn't sit well with the average customer. It is simply boring. Customers want plain, unsauced items along with the sauced ones. The plain unsauced items that have experienced the largest growth are the ones that require easily learned skills to prepare. So the broiler and the fryer come into their own.

Menus in convenience foods operations indicate that not more than 25 percent of the entree menu is made up of prepared, packaged, frozen foods in sauce. But this 25 percent of the menu required about 60 percent of the labor required for cooking. The main things that are being eliminated are a skilled chef, and a lot of man-hours. These operators are using trained help, but of a lesser degree.

Savings With Convenience Foods

Operations which use convenience foods have specific savings in:

Labor
Space
Equipment
Reduction of food waste
The savings occur when users of convenience foods follow a complete logic of convenience foods uses: 1) planning a simplified menu requiring few foods, 2) planning the delivery and storage of these foods, 3) reducing the number of variables in preparation, and 4) therefore simplifying work and job descriptions.

**Kitchen Workers: New Types of Individuals**

Operations utilizing convenience foods do not use people who are conventionally skilled, but use people which are trained to do their simplified jobs. These people are not given the old food service designations of chefs, but simply are called fry cook, pancake cook or pantry worker.

During all of this, a new concept of providing a "flying squad" of capable workers in a kitchen was developed. These workers moved as a team from one work station to another, getting timed jobs done. It has been shown that 20 percent of most kitchen jobs are preparation of the type that could be done in advance to good effect. The team could be taught to prepare food; that is, wash, peel, cut, portion, heat or re-heat in ovens or steam-cookers or fryers or broilers; and serve. All these tasks could be taught in a few weeks with a level of skill that is quite suitable for individual operations.

This has become a general rule in many food service operations. With new convenient foods there isn't as much
work to do at any one station. The important thing to remember is that the work has to be planned out carefully. Management must take its role seriously. Through this type of thinking and development of teamwork, many desirable things happen: Fussiness about status diminishes. Anyone can do any particular job in the kitchen, cutting down on personnel emergencies. Idle time goes down. Labor costs are lower. All important things to consider and a major tool used to increase efficiency, profits and customer satisfaction.

Changes in Equipment

Changes, on the whole, have not been as great as had been expected. Vegetable preparation equipment is gone for the most part. Meat cutting equipment is also gone on the whole. The objects that became major factors in kitchen equipment were the steam cooker, the steam-jacketed kettle, the convection oven, quartz ovens, microwave ovens, standard ovens, and deep fat fryers. These pieces of equipment are chosen after a particular operation considers what is needed in terms of the volume of food that must be prepared for service at one time. This is distinctly dependent upon the number of persons who come to a place for food at one time.

The basic concept about these new types of equipment is that the kitchen is work-station oriented. This means that:
- Holding refrigerators are located where reheating is done.
- All utensils are available at a work station because employees do not have time to look for the piece of equipment they need at any specific time.
- The operations use matching utensils and carts to avoid food transfers, and matching modules in refrigerator, carts, ovens, and serving units.
- Conveyors and other materials handling equipment are used to avoid having people running back and forth.  

**Successful Planning for Convenience Foods Use**

Successful users of convenience foods are defined in two ways.

1) Individual restaurants and food service operations produced by one or two food processors who have gone in and worked and trained them and their people. These surveyors have worked out menus and systems for their customers.

2) The chain systems, the large commercial or hospital or food organization that has spent an immense amount of time and money to research the problem.

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Handling the problem properly means:

1) Menu planning for a market.
2) Finding an acceptable and consistent quality of food.
3) Developing a new kind of internal organization.
4) Establishing goals by top management.
5) Training people, and coordinating equipment and serving systems.
6) And, above all, time and executive confidence to work out problems.

Few people have ever gone into convenience foods use quickly without pulling out just as quickly. Many food service managements used to, and still look for a simple formula: The food, the equipment, the system that meets all needs. There simply isn't any such formula.

Organizations that have been successful in developing systems have usually developed them internally. The most successful users of convenience foods have been large food service organizations that manufacture their own food. These include: Interstate Hosts, Manning's, Clark's, Hot Shoppes, Howard Johnson's, Schrafft's, and Stouffer's.

These companies were and still are successful because they knew exactly what they wanted in the food products to match their market and to match their serving system. They extended their commissary from the use of fresh food to the use of preserved food. To accomplish this, they used
in-depth staffing and examined all the factors involved.

Planning to use convenience foods in any organization involves doing the following:

1) Determine which segments of the institutional market his convenience food is for. Each segment has its own style in terms of food quality, facilities, customers, density of traffic, etc. These factors affect the formulation of product, the size of portions, the type of packaging, the method of reheating, etc. The market is highly segmented.

2) Price the product realistically, in terms of both food and labor costs. Standard markups are not useful any longer.

3) Dovetail relatively simple forms of unprocessed food into his menu, and develop plans for operations and use of equipment into a set of workable directions for personnel.8

**Outlining a Study Plan**

The following is a plan that could be used by a company to evaluate their use of convenience foods. It would include:

1) Setting goals for the study.

2) The organization of an actual study with:
   - Decisions about food.

- Criteria for setting up experiments in individual locations in different parts of the country.
- Setting up experiments with cooperative personnel.

3) Designing menu plans for types of operations.

The above steps are the initial phase. The first jobs to be done in terms of operations include:

4) Outlining the duties of the location manager.

5) Providing actual operating advice and employee assignments.

6) Formulating forms for record-keeping and work charting.

7) Pricing.

The next steps involve coordinating the groups of people involved.

8) Meeting with managers and supervisors to get their cooperation.

9) Leaving open the probability of changes to be made in the tentative set-up in accordance with their suggestions.

10) Providing for additional detail which included coordination of equipment and food supplies, the assurance of adequate refrigeration on the premises, the absolute necessity for planning garbage disposal.

11) Working with employees directly.
The usual actual test period for these above procedures involve six weeks in each location operating with a three-week cyclical menu. This requires: 1) Training before the test actually starts and during the first few days; 2) Written daily reports from the manager of forms provided; 3) Time and motion studies during the fourth week which would be a report of the first week's menu; and 4) final reports. The final report, besides getting some over-all feelings from the managers and the employees and on customer response, requires:

12) Evaluation of the cost of serving the new menu.
13) Suggesting changes in labor patterns.
14) Suggesting changes in equipment.
15) Suggesting changes in pricing.

And finally, an over-all evaluation of the test and test situation is prepared, including areas open to further study and a suggestion of an over-all plan as a result.  

**Sum Up**

There are definitely no simple answers. Every company or organization making a success of convenience or ready foods must devote immense effort and study of the problem.

Convenience foods are only part of the whole convenient food picture. A menu has to include convenient foods.

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The whole operation has to be re-taught when convenience foods are introduced. Savings will result from the use of less skilled people, from work scheduling, and from rationalizing the use of equipment and space.

A body of information is being accumulated on how to best use convenience or ready foods. Questions still have to be answered in order to set up successful operations. And, finally, top management has to answer the basic questions about the food service operation's goals and markets.
SECTION III
INTRODUCTION OF A PRE-PREPARED FROZEN FOOD PROGRAM

Pre-prepared frozen food is the term given to food which has been processed fully and held in a frozen state for a period of time without any deterioration in quality. It is reconstituted to order. This system has been studied and investigated in depth for many years by a wide variety of educational institutions, food services, hotel and consulting companies. The process they have made and then developments have been evaluated very closely by Hilton International.

The food service industry has been aware of the potential of a pre-prepared frozen food system for many years. Several universities have conducted in-depth research projects and made their findings and recommendations available. Some hotel companies have even tried implementing a system of their own but have not been 100 percent successful. It is easy to see why there were failures. "Convenience foods," the term under which the product is known in the industry has become a "negative" word, because no attempt was made to convince personnel and consumers of the advantages or quality of the product. A belief that it was impossible to produce a combination of pre-prepared frozen foods and traditional foods were also a major stumbling block. Advantages and applications of a pre-prepared frozen food system have become obvious and
have led to the conviction that such a program could be tailored for application within a company.

In an attempt to summarize the benefits and advantages of using frozen prepared foods for a food service establishment, emphasis must be placed on showing that each individual establishment has its own very special list of problems. No statement made can be taken as absolute and acceptable across the board. We are now aware that the many faceted labor situations are greatly responsible for the forward surge of the pre-cooked concept of frozen foods. Availability of talent and skill; and of course productivity all of which have an influence on the bottom line when it comes to dollars and cents. Then there is better inventory control. One factor only seldom mentioned is a certain independence from erratic delivery schedules in remote areas. A reasonable inventory can be established as a safety factor against late deliveries. Still there are many otherwise very objective observers who still feel that this kind of convenience does not justify the use of pre-prepared food products, no matter what the claims are on quality and other advantages. In this respect, many of the things said today are relative. The decision to use frozen prepared or prefabricated foods or any other product bearing the label convenience has to be based on properly researched facts. Any kind of labor saving device, food or otherwise, can hardly be justified if the labor it is supposed to replace is still present, but
not active. It must also be said that many operators of food service establishments do not really know how much it costs them to produce any given item they carry on the menu. This is not to say that they do not know their labor costs; that is easy to find out. All that is really done is balancing the total dollars against the total volume of sales. An examination of all the factors involved will allow us to arrive at a workable formula which will allow us to determine how properly chosen convenience foods in concert with in-house production can help to solve some of the existing problems and improve total food service. Many establishments are still hampered in their efforts because proper storage is not yet available to them. Besides an environment of at least 0°F, frozen food storage must be spacious enough to allow proper inventory control and stock turnover.

Most frozen efficiency and convenience products can be reconstituted from either the frozen or the thawed state, the duration of course depending on the degree of defrosting or the initial temperature of the storage freezer. It is of considerable importance that a sales history of all items be established and maintained allowing proper pre-thawing under refrigeration, especially ready to heat bulk packed items and of course oven ready roasts and pre-cut steaks. Every packer supplies reconstitution instructions and in many cases service suggestions. However, for utmost efficiency and reliability, each user should conduct his own
experiments and tests, allowing him to evaluate what is best for his particular type of operation, his staff and equipment.

Packaging, of course, is as important as any other aspect of frozen food produced. In order to assure success of the product, packaging must be easy to handle and easily disposed of. Cumbersome packaging can quickly neutralize the convenience built into the design of the product. The development of packaging will cost as much if not more than the product it is supposed to pretest and sell. Today packaging is still wasteful. The most fanciful dream of packaging engineers is an edible package or container. We already have one that is 100 percent edible - the ice cream cone. The crepe could also be a possible candidate for this distinction. Experiments are in progress to make a wrap or pouch made of edible starch resembling clear plastic which will dissolve into practically nothing when heated.

There are a number of other advantages in implementing a pre-prepared frozen food program.

1. Over-production and wastage are eliminated, since the prepared items are reconstituted to order.

2. A greater consistency in the product is achieved since items are produced in quantity of not less than 100 portions and according to tested standard recipes.

3. Continuous production is allowed irrespective of hotel occupancy, thus maximizing potential utilization of payroll.
4. It concentrates the highly-paid experienced cooks in the central production of the kitchen, and potentially on one shift only.

5. It results in greater portion control.

6. It increases productivity substantially, since there is no interference for the preparation of a la carte orders.

7. It allows greater utilization of equipment, since the workload is spread out.

8. It has the potential to save energy, since it is no longer necessary to keep all burners and ovens lit.

9. It is more nutritious. The Journal of Food Science states that "using cooked and immediately served food as a base of 100 percent, frozen food reheated in a microwave oven had a nutritional value equal to 94 percent of immediate service food. Food prepared and served by the conventional method and held for one hour after preparation had a value equal to 78 percent of that immediately served food." \(^{10}\)

These are the more prevalent advantages which can be utilized when incorporating a pre-prepared frozen food system.

It is essential to recognize that pre-prepared frozen foods are not miracle workers, and basic criteria and standards must be established and followed closely. Firstly, the final product will only be as good as the raw ingredients

\(^{10}\)"Nouvelle Cuisine and Pre-Prepared Frozen Foods." Food and Beverage Trends. October 1977, p. 3.
purchased. Secondly, although the reconstitution can be handled by unskilled personnel, the preparation requires as much skill as the preparation of a la carte items.

A pre-prepared frozen food program can be used to complement an a la carte kitchen, relieving some of the pressure during service hours. It will complement and go hand in hand with the new cooking style made popular under the name "Nouvelle Cuisine."

Prior to introducing and implementing a pre-prepared frozen food program, a number of important factors must be considered and evaluated during the planning stage:

1. Customer acceptance.
2. Availability of suitable working conditions and facilities.
3. Capital in equipment in relationship to savings in payroll, increased productivity and potential of improved service to guests.
4. The acceptance of the program by the personnel involved.\textsuperscript{11}

The importance of the last point must be stressed since the ultimate success of the whole program is likely dependent on the full cooperation and support of all personnel, from cooks up to management. In addition, it is essential that a full test series be run and evaluated by all concerned prior to any implementation of the program.

\textsuperscript{11}"Nouvelle Cuisine and Pre-Prepared Frozen Foods." Food and Beverage Trends. October 1977, p. 4.
Objectives of a pre-prepared food project are to establish basic guidelines needed by anyone considering the implementation of such a program. Therefore, it is essential to investigate all aspects from recipes, modified starches, equipment requirements and sanitation to freezing and reconstitution methods.

The pre-prepared frozen food program is an on-going project at the Food Research Center. In future years, more recipes will be evaluated, and developments in equipment will be monitored.

The institution of a pre-prepared frozen food program is not without problems and difficulties. Freezing does not destroy nutrients and vitamins. It is in the processing and preparation that care must be taken not to cause the nutritional value of food products to be impaired. The formulation of prepared foods does, of course, contribute a great deal to the degree of nutritional value of the food products in question. Balance is the word, here as anywhere else in the fascinating world of foods. Other services offered in addition to quality, top grade ingredients and wholesomeness include complete nutritional analysis on product destined primarily for the hospital trade. That line of fully prepared entrees is available in general diets and modified diets applicable to the needs of low sodium, low calorie, and low fibre diets. The general diet line is also applicable to the cafeteria and institutional trade including restaurants, thus
giving these establishments the benefit of that nutritional analysis. Others, besides primarily hospitals products do not yet carry nutritional information on the label. But it will be only a matter of time before this will be necessary by reasons of competition or even more likely government regulation. What the cost of such an innovation will be is anyone's guess. Many people in the food service industry are concerned about the culinary aspects of convenience foods. Will the use of pre-prepared entries and prefabricated items have such a strong impact as to eliminate fully the personal touch in food service of good restaurants?

This can be partially answered by pointing out that the individual creativity and imagination of in-restaurant food service has long been endangered by the impact of fast food operations and restaurants belonging to huge chains. Their menus are the same from coast to coast and culinary creativity is limited to items that can be prepared by the unskilled and uninspired worker.

A wise and educated choice from among the many frozen prefabricated and pre-prepared convenience products can to a great extent alleviate the jaded menu syndrome by allowing the operator an extension of offerings without increasing his labor cost or extensive building programs in the back of the house.

Many chain operators whose output is very much limited to what the broiler, fryer and griddle can produce without
much assistance from a brain trained in the culinary procedures are beginning to feel that the public is tiring of the steak and lobster syndrome. Besides that, the price of lobster and other similar seafoods are beginning to hit the consumer in his pocketbook.

The solution to this problem apparently lies with the pre-cooked convenience product allowing operators to offer an entire program of stews, pot pies and other casserole dishes which he couldn't possibly produce himself.

Others have gone even farther than that. They have established their own research facilities where a qualified individual design compatible items which in turn are then turned over to a frozen food packer for production. This is a costly way of doing it and only a tremendous volume can justify this avenue. Besides the frozen food packer is reluctant to pack products exclusively unless the volume justifies a private label operation. When General Foods began to market and merchandise Clarence Birdseye's quick frozen foods, they had to overcome a widespread public aversion to cold storage foods. Many leaders in the food industry labelled the advent of quick frozen foods as a "passing fad." Authorities and doctors will tell you frozen foods cannot give you all the fresh food vitamins. Restaurants began stating that they did not incorporate frozen food deception. Thereafter the American Medical Association publicly announced the inclusion of frozen fruits and vegetables in its list of
accepted foods. Restaurants retracted their statements and apologized to the industry.

Much of the stigma still left today is created by people who have had bad experiences with frozen foods because of bad judgment and perhaps mishandling of the product which resulted in bad results. Proper choice and a full awareness of what is suitable and most of all needed must precede any choice and purchase of any convenience products. Frozen foods, no matter how many problems they can solve, are not a panacea for everything that ails the industry. There are operators that should not use any frozen foods at all, perhaps the exception being some efficiency ingredients not otherwise available. Others may be careless in their choice and also application of frozen products of any category, usually with results less than satisfactory. Some types of operations, mainly those that are the most uncertain in their objections to any kind or type of frozen foods, are the ones who need help the most.

Many experts, real and self-styled, frequently voice their concern about pre-cooked and processed foods being detrimental to their efforts of educating and training new culinary talent. This is not so. Food still has to be prepared. Creative talent trained in food preparation is still needed. Our products are tools to solve problems. They are designed to fill a void. An age-old question keeps popping up. What came first, the availability of convenience foods
or the unavailability of cooking talent which in turn motivated the industry to make convenience foods available? Whatever the answer may be, it is the choice of the food service operator. He must determine what is best for him.

Reactions of chefs concerning convenience foods is very interesting. Chefs are professionals and most of them act accordingly. Making concessions for temperament, national background, degree of experience and, most important, the type of help available, the acceptance of frozen foods is quite positive. Efficiency ingredients, frozen and others are available now for almost three generations, some even longer. Prefabricated frozen have been in use for so long that most establishments using them now could not get along without. The type of establishment has a lot to do with the degree of acceptance on frozen foods. The fact is that even the most elaborate restaurants have to buy some convenience products, some even frozen. Examples include: packaged sugar, condiments, seasonings, pastries, cakes, ice cream, bread and rolls. Many seafoods such as shrimp, crabmeat and lobster tails are not available except for frozen.

Recognizing that the culinary aspect of frozen prepared and prefabricated foods demands more and more attention, many packers are adding professional chefs to their development staff. Some have even become aware that in their efforts to sell their products, a chef to chef contact is very beneficial.
Incentives that make a chef switch from in-house food service establishments to manufacturing are many. Regular and shorter working hours are very tempting although pressures are still present. One major factor, however, is the challenge to create and to develop new ideas, something that is fast disappearing from conventional chefs position. For anyone who enjoys attacking a never-ending list of problems covering the entire spectrum of food manufacturing, distribution, use and service of the product, they will find a very fertile field to endeavor.
SECTION IV
GUIDELINES FOR SELECTING FOODS

The following guidelines for selecting foods which may be included in a pre-prepared frozen food program have been compiled to help in the initial selection process. The list includes:

1. The item should be popular and appear on the menu frequently.

2. Avoid all foods with a high fat content such as pork, fatty fish, bacon and sausages. These items become rancid easily and have poor keeping qualities.

3. Avoid foods containing fresh whole milk, cream and eggs. These items tend to cause sauces to break more easily.

4. Avoid foods with a high water content, such as raw vegetables, melons and fresh tomatoes. They spoil very quickly and are difficult to store.

5. Avoid foods that will not make a solid pack or which leave air pockets when frozen. Solid packed foods retain keeping qualities longer, due to less surface area exposed to oxidation and dehydration.

6. Avoid foods with a strong or spicy flavor, since the flavor of certain spices changes strength and character.
when frozen and then reconstituted.

7. The quality of the finished product will be in direct proportion to the quality and freshness of the ingredients used.

8. To increase product safety, select, where possible, acid-based foods. A PH of 4.5 is optimum and will act as an additional preservative against the growth of micro-organisms.

9. Select foods that can be purchased advantageously in season and that have a year-round appeal.

10. Select foods that with a simple addition of garnish can serve as a base for several dishes.

11. Select low cost foods that require intensive labor which, under normal conditions, you cannot afford to produce, that have customer appeal, and are profitable menu items.

12. Select foods for which you will receive the highest dollar value per square foot of storage with the greatest raw food and labor cost savings. Usually it makes more sense to produce main courses than appetizers or baked goods.

13. Select items which have a minimum storage life of three months at -18°C.

14. Select foods which will increase productivity and lend themselves to volume production.12

As can be seen, there are many helpful guidelines in respect to the selection of foods for a convenience system.

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SECTION V

MAINTAINING AND PRESERVING CONVENIENCE FOODS

Additives

What really are additives? They are chemicals, synthetic or natural, which are added during preparation for the purpose of either improving the flavor, color, which means of course appearance and eye appeal, aroma, taste and what is one of the most prevalent reasons, to retard spoilage, thereby extending the life of the product and making it possible to ship the product to points where it is needed the most.

The word chemical is very frightening to the average consumer. Why? Our entire world is made up of chemicals, including the food we eat. Some of the compounds which must be considered poisons can be found anywhere. Some of them we actually need to live. The question is always how much and who put it there, man or mother nature? Following is an example: One of the most prevalent chemicals used in food preparation is a compound consisting of two very poisonous chemical elements; one a gas called chloride and the other a soft metal called sodium. Transferred by chemistry into a compound of which the average American consumes an average of 20 pounds per year. Frightening, isn't it? Actually, what we are talking about is common cooking salt, which has iodine added in many areas to eradicate goiter.
Vitamins, very essential to our health, occur in normal diets in minute amounts. They are chemical compounds which man has learned to synthesize. Our body is unable to differentiate between natural and synthesized vitamins. MSG is also a chemical compound which is present in many foods in natural form. Synthesized and added to cooked foods, it helps maintain natural flavors often lost in storage of the foods.

Flavor added to food products can be natural extracts as well as synthesized compounds. The latter being cheaper are used more frequently in low cost items. Colors, the most controversial and doubtful as to their value, help to make foods more attractive. Without them, most consumers would reject many food products because they didn't look attractive enough to be considered. Colors can be natural such as caramel for brown, annatto, carotline, and saffron for yellow. Others are synthesized and should only be used as boosters rather than basic colorings. Unfortunately, natural colors usually have a distinctive taste or flavor.

Much of the controversy is created by one-sided and biased reporting as well as guesswork rather than solid facts. An average person eats or drinks 1,500 pounds of foodstuff each year. Of that, all but 139 pounds is made of basic food products, vegetables, cereals, etc. Of the remaining 139 pounds, 129 pounds are sugar, salt, corn syrups, and extrose, all natural and natural ingredients needed for basic preparation. Another nine pounds consists of leavening
agents such as yeasts, bicarbonates of soda as buffers and only one pound per year per person is divided among some 1,800 so-called food additives. Many natural foods are toxic. Potatoes contain salamine and the amount an average person consumes per year would kill a horse if administered in one dose. Lima beans contain traces of hydrogen potassium cyanide, an agent used in gas chambers. Small amounts of arsenic are found in seafoods, especially shellfish.

Salt is far more widely used than MSG and cyclamates and is far more dangerous. Caffeine at a dose of about nine grams is fatal to humans. Nothing can be as toxic as avocados. Onions can cause anemia. Licorice can cause high blood pressure. Spinach and rhubarb are impregnated with oxalic and which can cause kidney stones. Carrotine contained in egg yolk, sweet potatoes, mangoes and carrots can cause jaundice. Peach or apricot pits, as well as bitter almonds, contain prussic acid, a very potent poison. Where do the health hazards end?

We are surrounded by exaggerations, physically and otherwise. This is where the real danger lies. We still don't know everything about foods and their safety, but we certainly are not performing a service to mankind by creating unnecessary suspicions and exaggerated claims. We can do with some moderation in many sectors of our lives. Being more objective and less dogmatic would certainly help.
Starches

Standard sauces have a tendency to break when frozen and reconstituted. When water is frozen and becomes ice, it expands, taking up more volume in the frozen state. This expansion of the water ruptures the cell walls of the food, thus changing the characteristics of the item. Therefore, it is necessary to use a modified starch as a thickening and binding agent in all items in the pre-prepared frozen food program. The starch currently being recommended for use of this program is Purity 69, prepared by the National Starch and Chemical Company.

Purity 69 is a modified, stabilized tapioca food starch. When used in conjunction with flour in sauces, as a thickening agent, it has the property of holding the sauce together during the freezing and reconstitution processes.  

At the moment this modified starch is undoubtedly the best available for the purposes required by the pre-prepared frozen food program. New modified starches and other types of binding agents are being developed and will be tested and evaluated at the Food Research Center when they become available.

\[13^{13\text{"Nouvelle Cuisine and Pre-Prepared Frozen Foods." Food and Beverage Trends. October 1977, p. 6.}}\]
The correct packaging of pre-prepared frozen food items is a vital part of the whole system. With proper packaging, quality is maintained for extended periods of time. Since the technique of vacuum packing is an integral part of the program, the desired package is the plastic pouch.

The pouch is a flexible bag, open on one side, made of high density polyethylene and should meet the following criteria:

1. Non-toxic and compatible with the specific food.
2. Strong but elastic.
3. Transparent, with a saran coating, which reduces penetration by ultra violet rays and is important in protecting or preserving many products.
4. Strong resistance to impact.
5. Good stability over a range of temperatures from minus 80°C to plus 180°C.
6. It must provide sanitary protection.
7. It must be impermeable to gas and odor penetration.
8. It should provide protection against moisture and fat.
9. It must be of the appropriate size and shape.
10. It should be low in cost since it is disposable. It cannot be overstressed sufficiently that although the pouches are an expensive item considering their disposable nature, cheap and inferior pouch must not be used. The extremes of temperatures that pouches have to withstand during freezing, storing and reconstitution exert a great strain on them. Unless they are strong, breakage and leaking may occur and a great deal of food will be wasted.

All these points have to be considered in order to assure proper packaging of foods.

Vacuum Packing

Vacuum packing is an integral part of the procedure for producing pre-prepared frozen foods. Vacuum packing is the process of extracting up to 99.8 percent of all air from a package. The machine then heat seals the package retaining the vacuum which has been created.

It is necessary to remove as much air as possible from the package to help prevent any oxidative rancidity during freezer storage. It is equally necessary that the area in which the seal is to be made is clean and dry. If ignored, a faulty seal could result in leakage during storage.

The procedure for vacuum packing is very simple to follow. The temperature of the item to be packed is taken

and the vacuum meter is set accordingly to permit a slow escape of air. The vacuum gauge is set according to the required strength and the impulse which heat seals the pouch is set according to the strength of the pouch. The pouch is placed in the machine at a slant to avoid any dripping of the contents. The opening of the pouch is placed under the metal rail, the lid of the machine is closed, and the air is automatically extracted, creating a vacuum and the pouch is sealed. The machine opens automatically when the process is completed.15

The vacuum packing machine used during the research project at the Food Research Center was the Multivac AG9. This machine has proven to be most reliable and satisfies all specified requirements.

Freezing

Freezing is the last process the food goes through in the production cycle of a pre-prepared frozen food program. It is also one of the most important, since incorrect freezing will lead to deterioration in the quality of the food items. The most important point to consider in the freezing process is the time taken to reduce the temperature of the prepared item to -40°C. It is essential that this reduction in temperature is achieved as rapidly as possible.

With rapid freezing, extracellular moisture is solidified so quickly that it is virtually trapped in place and forms a fine dispersion of minute, round-edged crystals. Therefore, tissue rupture is all but eliminated, and the product retains its intracellular moisture. Flavor values stay locked in the thawing. The texture and the integrity of the physical cell structure remain undamaged. On reconstitution there is little drip loss or change in physical appearance.

The other reason for rapid freezing is concerned with safety and the prevention of bacterial growth. The temperature of the items being packed is close to the critical zone (60°C.-40°C.) where the conditions are perfect for rapid growth and reproduction of bacteria. Therefore, it is essential that the temperature of the items is reduced as rapidly as possible to a level where bacterial growth is stopped. It is recommended that the temperature of the food is brought through this danger zone in no more than 45 minutes and preferably in 30 minutes.

There are several points to be noted which will help in achieving a rapid freezing process. First, there is the correct selection of the piece of equipment used. More rapid freezing will be achieved by placing the items in the freezer in such a way that good air circulation is permitted. Ideally, the package items should be placed individually on open wire racks, or by packing the items in flat packages which have a
large surface area. The time for freezing will also be affected by the original temperature and density of the item. At present the most economical type of rapid freezing is blast freezing. In this system an enclosed freon-type refrigerant provides a temperature of down to -60°C.

High velocity air is blown through the chamber by a mechanical fan, therefore, achieving rapid freezing. Purchasing criteria have been established for blast freezers and are as follows:

1. The unit must be purposely built for rapid freezing.
2. It must attain a minimum temperature of -40°C. and preferably -60°C.
3. A wheel-in cabinet facilitates rapid loading and minimizes energy consumption.
4. The unit size should be compatible with the standard size of trays and trolleys.
5. The capacity of the freezer should be compatible with the projected quantity of food to be frozen.
6. The design should incorporate a fan to circulate the freezing air.
7. Reliable technical installation and maintenance must be ensured, as the equipment can be quite sensitive.
8. The external temperature gauge must be accurate.¹⁶

These basic criteria will be extended in the future to cover technical criteria such as horsepower, voltage, amperes, insulation and refrigerant. Recommendations will be made by the Food Research Center in Montreal.

Cryogenic freezing is a totally different system using either liquid nitrogen or liquid carbon dioxide. This is the most sophisticated freezing system, which, although undoubtedly produces results of the highest quality, entails a large capital investment, more space and specialized equipment, and requires a large volume of products to be frozen. Freezing quantities of under 300 pounds proves very expensive.

Because of this point, until a smaller cryogenic system is available this system is uneconomical and even the improved quality of the frozen product cannot justify the added expense.

There are ten points which should always be followed in order to ensure a high quality frozen product.

1. Products should be properly packaged so as to protect against freezer burn, and rapid freezing, and in orderly handling and storage.

2. Food should be frozen as quickly as possible, preferably in less than one hour to minimize the size of the ice crystals and bacterial growth.

3. Products should be frozen and stored at \(-18^\circ C\) to \(-20^\circ C\). This maximum temperature is based on substantial data and a compromise between quality and cost.
4. Nothing is more detrimental to the quality of frozen food than thawing in storage. Therefore, access to the storage area must be kept to a minimum.

5. As much surface area as possible should be exposed to the circulating refrigerant or air to expedite freezing. Increasing the velocity and freedom of air circulation will further aid to the freezer's efficiency. Whenever possible avoid products with thickness in excess of 5 cms, since this prolongs the freezing time.

6. Freezers should be fitted with thermometers and frequently checked for excessive temperature, moisture and refrigerant levels.

7. Freeze only foods known to have good freezing qualities and a minimum storage life of three months.

8. Know the conditions under which raw materials were held prior to processing. Refreezing previously frozen and defrosted products is not recommended.

9. Products should be placed in the freezer on open wire shelving to insure rapid freezing.

10. Nothing should be placed directly on the freezer floor or placed where it will cover up the fan in the freezer.17

Following these points will almost always result in a product being properly frozen, thus ensuring high quality.

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Reconstitution

There are two basic methods for reconstituting frozen food - boil in bag and microwave. Each method has advantages and disadvantages, but the major difference lies in the speed of reconstitution. A microwave oven reheats single portions considerably faster than boil in bag, making it the appropriate method for a la carte service.

The boil in the bag system works as follows: whenever possible, the pouch is partly defrosted in a refrigerator to a temperature of 4°C.-0°C. prior to reconstitution. The sealed pouch is then placed in water in steam heated bain marie or kettle at a temperature of 95-100°C. The time required for reconstitution will be between 10-25 minutes, dependent upon the size of pouch, initial temperature and texture of content.18

It is very important to observe certain precautions during reconstitution. Failure to follow these instructions may result in dangerous bacterial growth and contamination.

Thawed, pre-prepared food in sealed plastic pouches should not be held in a refrigerator for longer than four hours. Also, reconstituted foods should not be kept if not sold immediately.

Microwave Oven Techniques

Microwave ovens have been in use in the food industry for about 30 years, and during that time, tremendous advantages have been seen in the technology of designing, building and use of this electrically simple piece of equipment.

The basic idea of using microwave for heating food was first conceived by Dr. Percy Spencer. While working on a radar project in 1945, he accidentally discovered that in a high energy area, a chocolate bar melted. Two years later the first microwave oven was on the market.

Microwave ovens work by friction. When microwaves enter food, they cause the liquid, or moisture molecules, to vibrate 2,450 million times a second. That fantastically fast action results in friction that causes food to heat and subsequently to cook.

Microwaves do not do their work through the direct application of heat. The microwaves are instantly absorbed directly into food, generating heat within the food. There is a misunderstanding regarding this function. Many believe that the foods cooks from the inside out. It does not. The food is cooked throughout at the same time, with more cooking on the exterior. The waves penetrate only about one-half to one and one-half inches, depending upon the density of the food. The rest of the heating occurs through conduction or transference.
There are five stages in the microwave cooking action:

1. The magnetron tube sends the microwaves into the oven cavity.

2. The metallic oven walls, floor and ceiling reflect the waves, just as light is reflected by a mirror, bouncing them back and forth in irregular patterns.

3. These waves of energy then strike a stirrer in the oven, a slowly revolving metal fan which reflects the power bounding off the walls, ceiling, back and bottom of the oven, distributing the waves so that they enter the food from all sides to cook evenly.

4. A container of the proper material allows the waves to pass into the food. Microwaves pass through glass, paper, ceramic and plastic without affecting these materials because they do not contain molecules of moisture on which microwaves work. The container in which the food is cooked does warm up, but only because the heat transfers from the food to it. Metal containers reflect the microwaves, preventing them from penetrating the food.

5. Food thus absorbs the microwaves, causing the molecules to rub against one another in that fast action which in turn cooks the food.

When heating food in a microwave oven, there are several points to consider:

1. The amount to be heated. It will take more time as the load is increased.
2. The density of the product. An oven porous texture, such as bread, will heat up much more rapidly than a dense product, such as lasagna.

3. The starting temperature of the food. Cold food will take longer to heat up than food at room temperature.

4. Shape. One thick slice will take longer to heat than two slices of the identical product and of the same weight.

5. A covered product will heat much more quickly than an uncovered one.

6. Placement. Always place the heavy load or hard-to-heat food at the perimeter of the container and the light load or easily heated food in the center of the container, because microwaves, like any other energy, have their greatest impact at the perimeter.\(^{19}\)

All of these points are helpful when it comes to using microwave ovens, since when they are used properly the microwave oven is a very efficient piece of equipment.

\(^{19}\) "Nouvelle Cuisine and Pre-Prepared Frozen Foods." Food and Beverage Trends. October 1977, p. 11.
SECTION VI

TAKING STOCK ABOUT CONVENIENCE FOODS

The leading reason operators resist the use of convenience foods is cost. This factor was mentioned by nearly half the people polled in a 1975 convenience food survey. This was a major reason among fast-food operators and college operators.

Past surveys have shown that as the price of meat climbed, so did the use of frozen convenience entrees. As the price fell, as it did in 1975, frozen food entrees also dropped.

The second most mentioned reason for decreasing convenience food usage was that there was more labor available; it was easier to find experienced people.

One of the major reasons given over the years for switching to convenience products was that they saved labor costs. Operators began examining the food to labor cost relationship in the light of present prices.

Convenience foods were about as close to foolproof as one could find. This accounted for their wide acceptance in hotel banquet service. However, with more experienced people working in the kitchens, this factor was re-examined.
With all of these facts present, it is important to remember that less than 10 percent of the operators surveyed in 1975 decreased their use of convenience products, while 43 percent increased and 47 percent remained unchanged.\footnote{Taking Stock: Convenience Foods Face New Truths in Menu Planning.} Institutions/Volume Feeding. Sept. 1975, p. 72.

This survey broke down convenience foods into frozen, canned, and dried convenience items. In the category of frozen convenience foods, the most often mentioned reason for use was taste. Another reason for use was ease of handling.

On the negative side, storage problems were by far the greatest drawback. Thawing time was also mentioned as a problem.

The greatest benefit in using canned foods was storage. The number two reason was ease of preparation, followed by longer shelf life and less spoilage.

Canned goods did not score well in the area of taste. Much research has since been done to improve on this problem.

Ease in storage and long shelf life were also perceived as advantages in using dry convenience products, while difficulty in preparation was the major drawback.

Since 1975 much has been done in the area of convenience food service. Under a promotional cooperative called FACT (Frozen Foods Action Communication Team), an extensive campaign was mounted to teach the consumer that frozen foods were high quality, nutritious, and a good value. This campaign proved very beneficial for the food service field.
From this, it appears that 1975 was the year when the convenience controversy was finally settled. Convenience foods, no matter how well publicized, will never take over 100 percent of food service, but operators will continue to find new areas where they fit into individual systems and quickly incorporate them where they fit in.

In 1978, the "truth-in-menu" controversy continued as an issue facing food service operators. Fanned by unrealistic critics who never tried to serve quality food on a budget that seemed to shrink daily in buying power, the issue of serving pre-prepared foods got more attention than it deserved in the consumer press and on TV.

Even though this happened, food service professionals had little trouble deciding when and how to fit pre-prepared entrees into their operations.

According to Institutions' 1977 Food Buying Trends Survey, only 14.8 percent of commercial operations and 12.5 percent of institutional operations use convenience entrees regularly. But in addition to the regular users, 45.7 percent of commercial and 69.3 percent of institutional operations use frozen entrees occasionally to extend menus.

Hospitals and fast-food operations were the heaviest regular users, with full-service restaurants and schools the most infrequent users. While less than a quarter of any food service segment of any food service used convenience entrees regularly, at least half the operators in every
segment used them occasionally, with 72 percent of the total industry reporting use at some time.  

It is interesting to note that to help the consumer gain the knowledge necessary to make the right choices concerning convenience foods, a complete Directory of Convenience Entrees on the market today has been compiled.

Each manufacturer's listing have been assigned a Reader Service number. Added information on package size, reconstitution techniques, packaging and pricing have also been included and this information will be forwarded to the consumer upon request. This is all a service to help benefit the food service industry on a whole.

Convenience Soups and Bases

Traditionally, the chef's stock pot has been the culinary counterpart of the wizard's magic cauldron. Following the sacred recipes of the ancients, complete with organic ingredients, the kitchen magician spent hours over his stainless-steel crucible bringing his elixir to the point of perfection. The potion was then carefully incorporated into the soups, stews, gravies and sauces.

Truly, the dependence of so much of the kitchen's output on the quality of the stock is an important matter. The

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need for stocks of consistently high quality has, in fact, given rise to the growth of one of the most highly regarded of convenience products: the flavor base.

Powdered flavor bases have been in existence for over 30 years. Their reputation has grown in this time, so much that few chefs still consider the bases convenience items. They are more often regarded as scratch cooking elements in the same category as seasonings and spices.

Thanks to the improving quality and the growing variety of soups, more operators are discovering that - with a little mixing, addition or alteration - these are products they can be pleased to market as their own. In several cases, processors have utilized feedback from operators to create new convenience soups with the appropriate modification already performed.

Suggestions, recipes and marketing procedures are being widely disseminated by the manufacturers of these soups. Such information is becoming increasingly important to multi-unit operators concerned with striking a balance between consistency of product and product diversification. Attractive to all operators, however, is the fact that even as a convenience item, soup boasts truly low food cost.²²

Appetizers

Not many operators care to admit to the use of convenience appetizers. Quite realistically, they fear customer rejection of mass-produced delicacies. And yet, it is no secret that more and more of these convenience items are coming out of the pantry closet and onto the menu.

Perhaps the greatest single influence in this direction is the ever-increasing popularity of salad/appetizer bars. Even the most reluctant restauranteur realizes that the need for variety in these presentations usually entails some defrosting or lid prying. Successful operators report, however, that confidence and creativity make for much better merchandising than fear.

It seems extremely silly to have people stand there and make appetizers, when they sell for so little on the market. The key to success with convenience products is knowing how to merchandise your strong points. An item on your menu must be made an appetizing proposition.

Vegetable Protein Analogs

Back in the early 1970's, textured vegetable protein was hailed both as the new miracle product that would solve the world food shortage and as the villain that would bankrupt the American meat industry.

To say the least, neither extreme proved correct, as often will happen.
While the use of vegetable protein products has increased, today's operators look at them more as meat enhancers than as meat substitutes.

The cost of vegetable protein is no longer the determining factor. We continue to use it because of the benefits it provides, not because it saves money. Products incorporating vegetable protein have a characteristic juiciness, a tender texture, and there is less shrinkage. There may also be some nutritional advantages.

The reasons for both the increase in usage and the change in the way vegetable protein is used are found in the events of the past five years:

The price of soy had risen to the point that dollar savings between flavored vegetable protein products that were fully processed and lower-priced cuts of meat was often minimal.

When vegetable protein was introduced into the consumer market during the meat shortage of 1973, acceptance was less than outstanding. As a result, manufacturers turned to the food service industry to market their products. This trend is likely to continue. According to a new USDA report on convenience foods, "Food technologists will continue to introduce possibilities for substitutes and analogs from various sources. Growth will probably be more rapid in food service than at the retail level because of the sophisticated managerial and technical services of the hotel/restaurant
One important turning point in the use of soy and other textured vegetable proteins was the approval by the USDA for use in school food service. Since 1971, the use of vegetable proteins in the total food service industry has grown from 12.7 percent to 25.7 percent. The biggest increases are in the institutional operations, with the number of schools using the products jumping from 21.8 percent to 64.4 percent. But even in commercial operations, usage increase has been significant.\(^\text{23}\)

While totally processed vegetable protein products have been slow in gaining a foothold, new products using a combination of meat and vegetable protein are on the upswing.

**Poultry Takes Prize for Menu Versatility**

For years the chicken was without serious competition in the egg market. Countless spheres of protein perfection were brought into the world before a creature, biologically incapable of laying an egg, decided he could do a better job. The question remains: Is the egg now better?

This remains a debatable point. But the food service operator, and his customers, now have an array of choices in the selection of egg products, involving factors ranging from convenience to chemistry.

On the most basic level, man has disposed with nature's natural casing, the shell. Merchandised in liquid and powder bulk-packs, eggs are available whole, whites only, yolks only, fortified with extra yolks or whites, and with a little milk or seasonings added, as scrambled egg blends. Among the virtues of these products are labor reduction, uniform quality, and waste is reduced since there is no danger of the rotten egg contamination which can occur when whole eggs are being broken individually into a large mass.

Not content with making the raw egg more convenient, food processors are also working on various cooked egg products. One of the more interesting fruits of their efforts is the hard-cooked egg roll. Made possible by independent cooking of yolks and whites, the result is a long whole egg cylinder of uniform thickness. It insures uniformity for all types of garnishing functions.

Another finished egg product growing in popularity is the convenience omelette.

The major recent news in the convenience egg product is the cholesterol-free egg. Manufactured by several companies, the products generally consist of natural egg whites plus cholesterol-free additives that duplicate some or all of the nutritional and cooking characteristics of the yolk. Although there is significant diversity between individual
products, the major ones contain approximately 80 percent of the protein of whole eggs and only traces of cholesteral.\textsuperscript{24}

It is essential to do extensive sampling and try everything new. To be second in this business is to be five years too late.

In regard to eggs, this is no business for chickens. After the egg comes the bird. Since the dawn of time, every culture has developed its own poultry specialties. From chicken cacciatore to Peking duck, poultry lends itself to ethnic specials with greater ease than any other entree.

Tomato sauce and spices will turn chicken parts into Spanish, Italian or Mexican specials. Use of sweet and sour sauce creates an oriental flavor. Chicken Kiev and Cordon Bleu can be purchased to allow an operation without a chef trained in classic food preparation to add gourmet specials.

Low in calories and high in customer appeal, it's no wonder poultry products continue to score high on Institution's Menu Census. While ethnic specialties are growing in popularity, fried chicken still ranks just below hamburgers at the top of the best-seller list.

Whether it's fried chicken or takeout in a fast-food operation, or Chicken Kiev to add a touch of class to a banquet menu, today's convenience poultry products offer the

opportunity to add variety while keeping tight control on costs and waste.25

To take best advantage of frozen poultry products, make sure proper storage and handling techniques are rigidly observed. These are vital to protecting freshness, texture and flavor.

Be sure your freezer is clean. Poultry can pick up undesirable odors and tastes from an unclean environment.

Once the freezer is clean, maintain temperature at 0°F. at all times. Above that temperature, shelf life decreases very rapidly. Rotating stock to ensure that the first in is also the first out is also important for poultry, as it is for any frozen food.

Poultry is a very versatile product and can do much in achieving success for operators in a frozen convenience food program. The main objective is proper utilization and use of imagination.

Desserts

Extended profit. That's what frozen, oven-ready pastry and bread dough or ready-to-serve desserts can mean.

Recipes and formulas used in these products have been tried and tested to deliver true, unchanging items with each

baking or thawing when directions are followed. Thus, kitchens in commercial or institutional operations without bakeries can still serve popular baked goods.

Manufacturers now offer basic items which, with a little imagination, become signature cakes, pies or breads, yet permit cooks freedom to create specialties.

In 1978, 70 percent of operators surveyed, indicated they used frozen baked goods either regularly or to supplement their own production. Frozen convenience in baked goods amounted to value and savings.

Institutions 1977 Food Buying Survey revealed that the heaviest users of frozen baked goods during 1978 were non-commercial operations, with a 26.2 percent increase in purchases, while commercial establishments increased in use by 27.9 percent.26

Desserts are an easy way to increase profits and customer appeal, and convenience desserts with proven results appear to be the cheapest and easiest way to accomplish this.

Single Service Buying Trends

In recent years, power cutback has resulted in some food service operations switching to paper service. The power saved by not using hot water for the dishwasher was only part of the reason. The change made people aware that

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there was something different in the way operations were being run. This paved the way to have other things which saved energy being accepted.

Even when there is no energy crisis, purchasing trends in food service operations have always reflected the lifestyle and eating habits of the American consumer. Today, this lifestyle includes quick service, food on the go, lighter meals and more frequent meals at new times of the day. All these trends point to serious consideration of the use of single service products.

In making any purchasing decision, the balance of cost, convenience and acceptability determines if single service items are suitable.

The cost of disposables is considered high by the majority of operators. Among numerous respondents in the 1978 Tabletop Survey conducted by Institutions, 70.7 percent believed the cost was higher than the use of permanent ware. Among commercial operators, the number who perceived the cost as high dropped to 56.8 percent. Increasing efficiency, saving labor and energy can make the extra expense worthwhile if they result in productive and profitable operations.

Saving energy helps justify the price of any product. Two key energy saving areas associated with the use of single-service products were noted. First energy-conserving

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microwave cooking increases the need for nonreflective paper products. Those that can go from cooking to service to patrons are especially economical.

Second, high energy demands of traditional warehousing and sanitizing equipment can often be reduced by the introduction of certain single-service items.

Cutting costs, of course, is not the only way to increase profit. Building volume is especially important.

Carryout is a highly profitable way to increase sales. Carryout business is organized, attractive and merchandisable with single-service products.

While the use of single-service products is growing, not all products are suited for all operations. Respondents to the 1978 Tabletop Survey cited strength of product, appearance, lack of insulation, poor durability and leakage as problems they had encountered. Be sure to investigate the performance of the specific brand of products you are considering in these critical areas before you buy.

The search for efficient and high quality, single-service products is continuous. As new products come on the market, purchasing patterns change. New products shown as most in demand are led by plastic products. Although they are expensive, disposable plastics highlight food attractively, make identification of contents easy, and make sturdy carryout and storage holders. This is an obvious case where cost can be justified by other factors.
Among other new products with appeal or styrofoam containers, aprons, carryout containers for soups and salads, covered entree plates, and small bowls. Products that keep food warm, that are microwaveable and that are reusable to some degree are also eagerly sought.

Most operators make changes to new products slowly. While some products are on the upswing, most purchasing will remain pretty much as it has in the past. Biggest purchasing increases among commerical operators are shown plastic flatware, paper cups, paper containers and paper napkins. On the institutional side, waxed paper, foil wrap, food bags, food wrap, and oven bags are high on the shopping list.

After the item is purchased, delivery becomes important. Most operators have deliveries made once a week so large inventories are not necessary.

In concluding here, we have seen where the trends in convenience foods have changed and how we can best utilize these convenience items into a particular operation to produce profits and customer satisfaction.
SECTION VII
AIRLINE FOOD SERVICE

Convenience foods are unprecedented in importance in the airline business. Whether food service management is looking for profit positives or for escalated efficiency within institutional domains, the system development accomplished by Continental Airlines' Director of Food Service, Phil Parrott, was a lesson in contemporary food service programming.

Parrott brought to his systems thinking almost three decades of perspective-superior resource in today's tight labor and skill market. Through long association with the hard core facilities of food service operations, he was able to isolate those areas which could be upgraded with the resources provided through the problem-solving capabilities of electric equipment manufacturers, food processors and other key suppliers.

Parrott's particular implementation of frozen prepared food systems is based on a prior understanding that quality was first and foremost the essential ingredient of his end product: The total spectrum of service which was offered aboard his airline's increasingly luxurious planes.

His competitive edge is the same as that of all
commercial food service. He believed that by opening up the behind-the-scenes working environment and by tightening the organization of all sub-systems, he could facilitate optimal service within an environment unequalled in the industry.28

Developing a Total System

Many things must be considered before a total system will happen. First, manufacturers must be inspired to believe that their product will be used if one of good quality is made, and that the operator will be willing to pay the price for quality. Second, a firm stand must be taken with the caterer when he is told that he is expected to provide a service. Third, top management must be concerned that this total system is the way to go. Fourth, the system must be planned ahead of the unions and in such a way that it will be found acceptable. Finally, food reconstitution equipment must be developed on planes.29

In planning airline food service, some fundamentals must first be spelled out and some myths dispelled. The issue of "fresh food versus frozen food" has to be cleared so knowledgeable people no long weigh in balance "fresh versus frozen."


Every sizable food service establishment uses some frozen food and in many cases even the hot food items have been frozen after initial cooking. Objective analysis shows that some of the freshest food available is frozen, and conversely that some of the least fresh food is not frozen.

So for the airlines the argument is not "fresh versus frozen food" but when and where should the food be cooked?

In future planning, the airlines can consider three separate systems of handling their food. Each method was developed to meet special circumstances, which made that particular method seem to be the sensible approach when adopted.

The first method is the so-called "casserole system" in which food is prepared at the last possible minute before flight time, held hot, put aboard hot, and held in warming ovens for serving. The second is the chilled food system, in which food can be made ready anytime up to 72 hours before need, held chilled, put on board chilled, and then heated in flight just before serving. The third is the frozen system, where food is prepared anywhere and anytime in advance, boarded frozen, and heated for serving. The advantages and disadvantages of each system follows:

1. Casserole System:

   Advantages
   - Ready to serve immediately.
   - Easiest for the hostess.
- Simplest aircraft oven.
- Less oven maintenance.
- Less training needed for hostess.
- Less space required as meals can be held in ovens before serving.

Disadvantages
- Food is seldom really hot; if it is, it is "tired."
- Less flexibility in food sources.
- More pressure on the cooks - and cooks are needed.

2. Chilled Food System:

Advantages
- Takes pressure from cooks by eliminating deadlines.
- Provides for much hotter food when served.
- Food is fresher looking because it is heated a la minute.
- More flexibility in food sources.
- Permits last minute top-off to provide for last-minute passengers.
- No extra time or care required to overcome latent heat, as for frozen food.
- Permits one-shift food preparation, saving both labor and shift differential costs.
- Permits large-batch, non-pressure quality control.
- Permits efficient use of convenience foods.

Disadvantages
- Requires a more sophisticated oven on the plane.
- Results in more oven maintenance.
- Requires that hostesses be better trained in food handling.
- Takes longer to have food hot enough to serve.
- Requires special casseroles to take high heat of the oven.
- If the crew or equipment is wrong, the food can be burned.

3. Frozen Food System:

Advantages

The theoretical ability to oven-provision in the frozen state, thereby making possible the passengers' choice of entrees without added expense because the non-selected entrees remain safe in the freezer. To function, this probable advantage requires that the crew not withdraw from the freezer any unordered food, that the freezer function properly, and that none of the leftovers be pilfered at any point en route from kitchen to kitchen. In
practice, this theory has never worked - but it is worth trying to perfect.

Disadvantages

The need to bring frozen food through the stage of latent heat puts extra pressure on the plane's heating equipment and also lengthens relative heating time. The hostesses must be even better aware of how to handle food and of what mishandling will do to food. The aircraft must have the space and facilities to hold frozen food.\textsuperscript{30}

In airline food service, it is extremely important that we not be confused or diverted by the promotional literature that we are constantly exposed to. We have long recognized the need for answers to many seemingly insurmountable problems. Yesterday the microwave oven seemed to be the total answer. Today, some cooking is done to order while in the air, exclusively for first-class passengers. The rest is all done on the ground.

There is no argument as to where food should be cooked. The real debate is which of the three food systems - hot casserole, chilled food, or frozen food, should be used. Many questions arise: Where should the food be heated? On the ground? In the air from a chilled holding temperature

\textsuperscript{30}"Inflight Convenience Foods: Their Impact on Costs." Chef Magazine, p. 91.
of 38°F.? In the air from the frozen state?

**Impact on Costs**

So much is being said about convenience foods and yet we are not quite sure what people mean when they talk about them. Some airlines include items like bread and butter in their convenience food list, for pricing purposes. Few people really consider these items as convenience food. Airlines may feel that since no labor was added to their preparation, bread and butter were convenience.

Most flight kitchens today are using nothing but convenience foods, right down to the portion packed creamer, salad dressing and salt and pepper. Today, convenience foods make possible what is being done in the air. Here are the obvious pluses:

1. The control of quality. The capacity to make one large batch under very controlled conditions, as opposed to on site preparation of small batches, day to day, that can possibly vary with the attitude of the cook and any number of other factors.

2. The availability of skills. That fact that major use can be made of good but limited skills, as compared with the skills required for daily cooking assignments, different shifts of the day, for on-site preparation.

3. High quality. Complex food items of high quality can be achieved in large batch cooking.
4. Availability of non-seasonal foods. Foods can be available even though out-of-season.³¹

There are minuses also. It is difficult to pre-plate meat, starch and vegetables together, freeze them, reconstitute them without touching them, and have them look nice.

If you take meat and gravy and dish them up separately, the dish looks more appetizing than when meat and gravy are heated together and served straight from the oven. So the pre-plate is one of the problems in the use of convenience foods. Certain foods do work well pre-plated; lasagna is one example.

Cost is another big problem. One of the pluses that people have invariably looked for in frozen foods is savings, a way to save money in the cost of the food. It really doesn't happen any more. Freezing, at best, is a preservative. It is never going to improve anything. Freezing will never improve a cheap item, package it, handle it, store it, and ship it, the added costs become disproportionate to the value of the food, and money is not saved. The handling costs far outweigh any on-site labor savings.

At one time airlines prepared foods from scratch. Then, to cut labor cost, they went to convenience. They started to pay more for the labor they retained and

³¹"Inflight Convenience Foods: Their Impact on Costs." Chef Magazine, p. 34.
consequently they began to ask for services other than food. They covered these costs by applying the old 40 percent food cost formula. The added income was used to cover new services as they occurred and this resulted in the airlines starting to hang themselves. Customers read about the labor savings and wanted to dictate which brands of foods should be used. Their logic was that the food was already cooked so all the work was done. New cost formulas were introduced (25 percent) and the airlines argued that it couldn't be done at that figure.

The picture was painted. Airlines wanted to pay less mark-up on pre-cooked convenience items that really cost more for the cooking, the plating, packaging and shipping.

Airlines couldn't afford to take less mark-up because the little bit they added to what was already a convenience item couldn't be offset by the reduced amount of money they would be receiving. The situation was further complicated by the fact that an increasing amount of caterers revenue was for plant, equipment, and services unrelated to the food itself.

The logistics were rough. Lots of labor, handling and costs were the reasons why airlines have to use convenience foods, but not as a means of cutting costs as they now exist. Today's costs are based on the complete use of convenience foods.
Airline Food Service Problems

There are many problems in connection with airline food service. They include:

Meal Counts and Orders

The basis for the final meal order-count on a given flight comes to the food service station from the airline's reservation office. The following factors contribute to passenger boarding variations from the preliminary reservation count:

1. Go-Show Passengers.
2. Misconnections.
3. No-Show Passengers.

In addition, passengers on special standby fares such as the military must be considered in compiling the final meal order.

At major airports, a quantity of supplementary meals is maintained at the commissary to insure adequate provisioning for passengers just added before take-off. But standby passengers complicate such last-minute provisioning. To cope with this, airlines have researched methods of carrying completely frozen meals on board aircraft to eliminate the last-minute confusion associated with making certain that a meal is on board for every passenger.
Deadhead Equipment

Deadheading refers to food service equipment loaded on each flight to insure equipment balance at locations where food is provisioned. The quantity of equipment used on any given flight segment varies with the passenger load and the amount of service offered. In transporting and handling this surplus equipment, there is obvious breakage and unnecessary washing.

No formal control is made of the number of pieces in transit between any two points. The problems arise from failure to provide the established equipment and from breakage and spoiling in transit and the subsequent re-washing, representing in many cases unnecessary expenditure of effort.

As airline activity increases, the handling of deadhead equipment becomes more costly, not only for the reasons mentioned but also because added floor space is needed in flight kitchens to store and process these items.

Storage Space

Space allocated for supply storage at airports is simply not adequate and too costly.

Dishwashing

The dish pantry's design and production normally depend on the rated capacity of the dish machine. Since rated capacity is rarely achieved, much wasted time and labor hours result.
Disposable Dishware

In selecting disposable utensils for in-flight use, consideration must be given to several factors, the primary one being that the ware meets with good public acceptance.

The next consideration is cost. The cost of a disposable dish should offset the costs associated with dishwashing, handling, and deadhead equipment. Another factor is the temperature range this type of dishware must withstand.

As cost factors are achieved, a new problem must be researched and resolved; the handling of disposable refuse.

Garbage and Trash Disposal

Incinerators and garbage disposals are not permitted in many areas. Airlines must develop new refuse methods to handle large volumes.

Where dumpsters are used for trash disposal, units have been developed with mechanized compressing devices that triple capacity. Other possibilities include mechanical pulverizing units, similar to garbage disposals. This system reduces trash volume by approximately 80 percent.

Research has also been made into the use of superheated incinerating systems for locations where incinerators are permitted.32

These are the major problems for airline food service. Additional problems include:

1. Packaging cutlery.
2. Ovens to properly heat food.
3. Freezing units.
4. Frozen food heating units.

This is why airline food service is such a difficult job.

Challenges in Airline Food Service

The purpose here is to define some of the elements, relate them to the state of the art, and to point out where solutions have come from.

Problem: Kitchen Manpower

The operation of an airport kitchen is always a problem. Airline unions, insisting that seniority and qualifications are synonymous, had forced the cooking job onto inept persons without sufficient pride in their trade to recognize their limitations.

Solution: More Convenience Foods

The solution was to purchase factory-produced, pre-cooked frozen foods of high quality and to turn the kitchens into assembly points charged with the task of cleaning, storing, and assembling equipment together with prepared foods.
Problem: Extreme Peak Requirements

Today, at any major catering point, it is very common to have multiple kitchen departures within an hour. Most of the food people came from the outside, kitchen design consultants were primarily experienced in hotel and restaurant needs, and because of the growth, nearly every existing flight kitchen was poorly planned and inadequate.

Solutions:
1. To eliminate the large cooking staffs and use frozen foods.
2. Re-design. Multi-unit caterers and airlines who have their own kitchens, developed and are still developing their own design specialists, fully cognizant of the growth potential and special space and flow requirements, and conditioned to the planning requirements of convenience foods.
3. Use of disposable equipment.

Problem: Equipment Distribution

One of the big differences between airline food service and other kinds is that every day dinnerware was shipped from one city to another, usually being handled at the other end by an unrelated organization.

The problem was the caliber of the personnel handling the equipment, the capability of the caterer to accept it and wash it in time for the next need, and the tendency of
the staff to board only enough to cater to the particular passenger load of the next flight. Because of these problems, every flight was supposed to carry a full set of equipment but most did not. The result was a constant imbalance of equipment, with excesses where they were not needed and shortages where they were needed.

Solution: Redistribution or Full Control
To cope with this problem, airlines began requiring weekly inventories from which they could issue redistribution instructions.

Some airlines minimized the problem by building their own facilities. Others maximized the use of disposables.

Problem: Warehousing and Freezer Space
Underestimated were the warehousing problems that disposables create, along with a needed increase in trash facilities and trash removal cost.

With the increased use of frozen foods there was inadequate planning for the freezer warehouses that the system required.

Solution: Off-Airport Warehouses
The answer was in developing off-airport warehousing services designed to the specific needs of the airlines.

Problem: Capabilities of Hostesses and of Heating Equipment
Hostesses were not trained in the technical principles of properly operating airline food service equipment. As a
result many food defects appeared from improper cooking. The blame could not be placed on the hostesses but on the industry which had not kept pace with the ever increasing requirements generated by competition.

For example, conventional mechanical thermostats that easily lost calibration and were not accurate throughout the entire range were used. Even girls with aptitude and experience didn't ever find the same conditions twice. Result - poorly cooked food and many customer complaints.

Solution: Better Heating Equipment

There was no hope of changing the girls. The only solution was to develop ovens that were idiot-proof, reliable, and capable of conditioning all types of food without damaging any.

Several approaches resulted:
1. Conduction heating system.
2. Conduction oven.
3. Radiant oven.
4. Microwave oven.
5. Thermal container-tray.

The challenges created by the scope of the operation, the high cost of airline labor, and the shortage of basic kitchen skills forced the airlines to pioneer in the use of convenience foods.

With much help in the future the airlines will continue to develop the reliability of source, the control of
quality, the desire for quality, the reliability of equipment, and the accuracy and simplicity of operation that will guarantee continued improvement.33

Airline Sanitation

There are two primary considerations that public health experts and officials are concerned with in regard to airline sanitation. They are:

1. That items processed in flight kitchens be physically clean.
2. That these items be free of disease-producing organisms.

The public health official no longer judges physical cleanliness of an item entirely by visual observation. For most items there is a special test available. This test consists of dusting a dry surface with a reagent of 85 percent talc and 15 percent safranine 0 dye, and next holding the dusted utensils under a flowing tap until no remaining trace of red color rinses off. The utensil is then drained until dry. Any red color remaining on the utensil surface indicates a soiled area, and the intensity of the red is roughly quantitative to the amount of residual soil film. Water spots do not interfere as they do not stain.34


The public health official's second concern is that the processed utensils be free of disease-producing organisms. Both utensil cleanliness and freedom from pathogenic organisms must be tested because: An unclean appearing utensil can be sanitary in that it is free of pathogenic organisms and has a low micro-organism count; a clean-looking dish can harbor excessive micro-organisms which might include pathogens; a disease-producing micro-organism.

In addition to testing the cleanliness and sanitary condition of processed items, these people are concerned with all the following problems:

1. Economic considerations:
   a. Designing a sanitation equipment area.
   b. Providing a smooth flow of many different kinds of items through the area at a speed which meets the demands and is at an economical cost.
   c. Operating economically in terms of labor requirements.
   d. Producing maximum results with minimum requirements of softened and heated water and of chemicals.
   e. Minimizing attrition to the items being processed through the equipment sanitation area.
f. Properly maintaining equipment to eliminate expensive repair work.

2. Methods of cleaning and sanitizing. A knowledge of these methods, including pasteurization and chemical treatments is necessary for effective and economical operation.


4. Government regulations. It is vital that management know the following government regulations pertaining to sanitation.
   a. Health Department regulations. To prevent the spread of communicable diseases, regular health examinations of employees are required.
   b. Federal regulations regarding hazardous use of chemicals.
   c. The Food Additives Regulations. These regulations apply to items such as: chemicals used in feeding animals, chemicals used in wrapping materials and which may be absorbed into foods later ingested by humans.  

In solving these problems management must select appropriate chemicals, equipment and handling procedures.

Since dishwashing is perhaps the most important aspect of flight kitchen sanitation, it is appropriate to consider the various detergents and cleaning agents plus the dish machine itself.

It is important to select cleaning chemicals which produce dishes, glasses and flatware that are clean, bright, and free of spots and stains. The flight kitchen manager must also decide how to dispense these chemicals and control their use.

There is no one best detergent, rinse-injector wetting agent, or pre-soak chemical. Rather, managers must choose the chemical formulations which seem best for their particular flight kitchen, both in terms of results and economy. There are, however, certain standard laboratory and field tests for evaluating the efficiency of a detergent in different areas.

To evaluate the cleaning ability of a specific dish machine detergent, a set of dishes are soiled and run through a dish machine operating under normal conditions and procedures, with only the amount or type of detergent being varied. Various detergents are compared in this fashion with the one producing the best results being selected.

Rinse-injector wetting agents are tested by running drinking glasses and plates through a dish machine under standard conditions. They are then evaluated, inspected,
and compared to standard glasses. In this way, various wetting agents can be compared to each other.

In regard to pre-soaking chemicals, the principle concern is with soaking chemicals for removing stains from melamine plastic; pre-soaking chemicals for loosening and removing soil from silver flatware; pre-soaking solutions for food soil removal, stain removal and corrosion minimization of stainless steel flatware; soak methods for removing excessive stain and metal marks from china dishes; and finally, soak methods for removing food soil and for brightening of metal serving dishes, such as the tin-lined copper pans used on some airline flights.

To be successful, the soaking chemical has to achieve its purpose rapidly, completely, and economically. Also, the utensil surface must remain unharmed to a practical degree by the soaking solution.

Chemical field test for detergents may be conducted in several ways. A new detergent may be evaluated by comparing the results obtained when it is used with results obtained with the old detergent. The two sets of data may be compared on a statistical basis. Secondly, the cleaning power of a given detergent may be measured by the number of rejects obtained at the clean end of the dish machine when using such tests as the talc-dye method.
Water Problems

Good water is essential for producing physically clean dishes—especially for preventing mineral spots, films or streaks on the utensils. The two major water problems are hardness and a high content of neutral mineral solids. These problems are further complicated in areas of the United States where water composition changes materially with the seasons. Less frequently encountered water problems include a high content of iron which can stain glassware a reddish brown and the presence of undissolved materials such as silica which can deposit on a glass surface.

Problems with water occur mostly during final rinsing, rather than in the wash solutions. Both physical and chemical methods are utilized in solving water problems. These methods include:

1. Filtration of water.
2. Removal of hardness by softening equipment.
3. Complete removal of mineral solids from water by de-ionizing equipment.
4. Rinsing with cold water containing chemical sanitizing agents so that dissolved minerals run off with the water instead of remaining on the surface due to water evaporation.
5. The use of chemical additives (usually combinations of low-foaming surface active
agents with or without chelating agents
and in final rinse water at sanitizing
temperature of $180^\circ-195^\circ F.$\textsuperscript{36}

The de-ionizing technique is an answer to all water
problems, as it completely removes solids and thus forms
chemically pure water for final rinsing.

The answer to the problem of hardness is to install
water-softening equipment. Since this type of equipment
has been highly developed, initial cost has been brought to
a reasonable level; costs of operation and regeneration are
likewise comparatively low. The problem can also be solved
by adding either acid-containing wetting agents or halo-
genated chemicals to the final rinse waters.

The Dishwashing Machine

The most important piece of cleaning equipment in
the flight kitchen is the dishwashing machine. It is de-
signed to remove physical soil from all dish surfaces and
to sanitize dishes by applying either hot water or satis-
factory chemical solutions to dish surfaces.

Since many dish machines are available today, it is
essential to obtain a machine engineered and operated in
accordance with National Sanitation Foundation standards
so as to provide complete destruction of viable pathogenic
organisms. Operating conditions specified by the National

\textsuperscript{36}"Equipment Sanitation in Airline Flight Kitchens,"
by Dr. Ralph Behm. \textit{The Cornell H.R.A. Quarterly.} May 1967,
p. 109.
Sanitation Foundation include times, temperatures, pressures, volumes and spray patterns of wash and rinse waters. These specifications are given for each type of machine, including single tank, stationary rack, hood and door types; single temperature, door type machines; single tank, conveyor type machines; and multiple type conveyor type machines.

The National Sanitation Foundation Laboratories have established both time and temperature requirements for achieving sanitization in these various types of dish machines. It has also published a set of recommendations concerning Dishwashing Machines. They include:

1. Determine dish cleanliness by visual observation or by the more definitive talc-dye test.

2. Immerse a registering, calibrated mercury thermometer in the dish machines' recirculating water tanks to determine temperatures of the water. Compare these readings with readings taken simultaneously on thermometers or gauges mounted on the dish machine. Then recalibrate the machine thermometer or gauge if possible, replace if incorrect, or record the corrective differential in an appropriate place.

3. Where practical, remove the thermometer or sensing bulb from the final rinse water
inlet manifold. Check against the standard mercury registering thermometer by immersing in a container of hot water at a temperature as close as possible to 180°F. Recalibrate machine thermometer, replace or record differential corrective in suitable place.

4. Check that all spray nozzles in the wash, power rinse and final rinse spray arms are open and unobstructed.

5. Determine that the flow pressure of the final rinse supply line is 20 pounds per square inch. The National Sanitation Foundation permits a range of from 15 to 30 pounds per square inch.

6. Operate the machine and determine that the various temperatures as corrected are being attained, that required pressures are being attained, and that proper time periods exist. Proper time period in the door type machine equipped with an automatic timing mechanism requires determination of the wash time, pause time, and final rinse time. To achieve proper timing in a conveyor machine, the conveyor or belt speed should conform with the maximum speed listed for the particular machine. The conveyor or
belt speed may be slower - at least to a degree - than the maximum specified, but it should not exceed the maximum. ³⁷

Other Sanitization Methods

The flight kitchen consultant must be conversant not only with sanitization in the dish machine, but also with other methods of sanitation. He must understand manual washing of equipment, pre-soaking techniques, and post-washing handling of items. He should know which chemicals will work under different conditions and using different procedures. The consultant also deals with environmental sanitization, area cleanliness, and odor control.

The generally accepted ultimate authority for sanitation of utensils processed by methods other than through the dish machine is the U.S. Public Health Service. In its "Food Service Sanitation Manual," the Public Health Food Service first gives specifications for sanitary design, construction, and installation of equipment and utensils. The next requirement is that "All eating and drinking utensils shall be thoroughly cleaned and sanitized after each usage. All kitchenware and food-contact surfaces of equipment, exclusive of cooking surfaces of equipment, used in the preparation or serving of food or drink, and all food storage utensils shall be thoroughly cleaned after

each use. Cooking surfaces of equipment shall be cleaned at least once a day.

In many flight kitchens, these requirements are met for nearly every item by proper pre-handling including pre-scraping and pre-soaking, followed by complete cleaning and sanitization in dish machines and equipment washing machines. The same applies to cooking utensils and other utensils contacting food surfaces in food storage and preparation area. These cooking and other utensils are pre-washed in sinks as needed and then sent through special pot machines for sanitizing; or, many utensils are simply sent through a pot machine for cleaning and sanitizing.

Other flight kitchens because of space requirements and other considerations employ manual handling methods. Special stations for handling metal tray carriers, metal drawers, plastic containers, and similar equipment have been installed in many flight kitchens. U.S.P.H.S. requirements for manual dishwashing are that the equipment and utensils shall be thoroughly washed in a detergent solution which is kept reasonably clean, and then rinsed free of such solution.

Sanitization of all eating and drinking utensils and, where required, the food-contact surfaces of other equipment and utensils should be sanitized by one of the following methods:

1. Immersion for at least 30 seconds in clean hot water at a temperature of at least $170^\circ\text{F}$. 
2. Immersion for at least one minute in:
   - A sanitizing solution containing at least 12-1/2 ppm. of available iodine in a solution having a pH not higher than 5.0 and a temperature of not less than 75°F.
   - Or a sanitizing solution containing at least 50 ppm. of available chlorine at a temperature not less than 75°F.\(^\text{38}\)

Where sinks are used for conducting these operations, a three-compartment sink must be provided. The first compartment is for washing, the second for rinsing, and the third for sanitizing. Other types of installations should be approved by the various health authorities concerned prior to installation.

Use of environmental sanitation chemicals are frequently desirable in cleaning floor, walls, equipment carriers, etc. After treatment with these chemicals, all food-contacting surfaces must be thoroughly rinsed with potable water. Labels for sanitizing chemicals must be approved by the U. S. Department of Agriculture and must bear a U.S.D.A. registration number. At the time of registration, the formula, label and label claims are usually also examined by other regulatory bodies, including the Food and Drug

Administration and the Public Health Service.

The technically trained consultant must also be conversant with the Hazardous Substances Labeling Act as it pertains to the use of chemicals and with the Food Additives Regulations.

Post-Sanitization Handling

Following sanitation, items should be properly handled to avoid recontamination with micro-organisms. Employees touching these dishes should be thoroughly instructed to wash their hands with a sanitizing soap after toilet rooms. They should wear head coverings to prevent particles from falling out of their hair onto food and sanitized dishes. Also instruct employees not to sneeze or cough in the direction of dishes and food.

The use of clean equipment carriers and carts with closure doors is recommended. Many diseases affecting human beings are air-borne, including serious respiratory types such as diphtheria, tuberculosis, septic sore throat and pneumonia.

Other disease-causing organisms are classified as water-borne and food-borne types; these include intestinal infections such as typhoid, cholera, and brucellosis. These diseases may be transferred by infected persons who do not wash their hands properly after using toilets. Thus proper handling of utensils after cleaning and sanitization is extremely important.
In all, there is much to do and consider when airline food service sanitation is the issue.

Past, Present and Future

This is based on the concepts that were developed at Continental Airlines. Their basic concept was complete dedication to the so-called convenience food, pre-cooked frozen, from entrees on down. This permitted what was called a "kitchenless kitchen," because kitchenless kitchens saved labor and space, since labor and space on airports were the only controllable food cost, and because labor and space to prepare controlled quality on site for daily consumption was a thing of the past at most major airports today.

The original in-flight food was pre-cooked on the ground just prior to the flight, boarded hot, and held hot until needed. This had many drawbacks.

Airlines want to use convenience foods to the degree that they are not required to lower their standards. The problem is not whether to use a convenience food or one that is prepared on site. The problem is, do they have the skill to prepare the food properly? Do they have the quality in the first place? If you start with quality, freeze it properly and hold it properly, the quality of the product has been held the best way known today. If this is accomplished, standards will be higher than can be met with on-site preparation, because on-site preparation requires a
few skills that are available to be spread too thinly.

Continental Airlines original kitchens were primarily cooking space and storage space. There was no way of putting anything on wheels, which resulted in much waste in both labor and space. More labor and space had to be incorporated to do the required work since they were confined to a certain area for food preparation. As time went on they devised the concept of putting everything they could on wheels, thus incorporating the kitchenless kitchen.

In developing this approach to airline catering, they upgraded the working environment for their personnel in many ways. They put their dish area as a separate area, with special air circulation to keep heat from the total area and minimize the noise in the kitchen. Complete air conditioning was incorporated in the kitchen along with reducing the clatter of pots and pans by installing rubber wheels on the modules. All of the things that used to make kitchens sweat-box type work areas were eliminated.39

This, basically, brings everything up to the present. The future is only going to be more of the same. More ways are going to be found to produce more items on a factory basis with less expensive airport labor and a minimum of expensive airport space.

The airline industry is a buyer's market and the people are looking to improve the art need to not only use as many sources as possible, but provide inspiration to as many of the sources as possible, so that they will recognize the competitiveness, the need for quality, their capability for creating quality, and will actually bring the state of the art to where it should be, and that is at a level where the customer cannot tell the difference between the so-called fresh and the factory prepared items. In the long run, the skills will be available to the factories, and they won't be either obtainable or affordable to the individual location where, for example, we might average 15,000 passengers a day at Los Angeles, and that average would peak up 3,000 passengers a day on three days a week and be considerably less on the others. The space that would be required and the manning that would be required to handle the people would be a physical and economical impossibility.  

This is why the airlines are so busy right now to develop ways to cater to the demands of the public. Convenience foods will play a large role in those developments.

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Special Diets

Among the toughest critics food service must satisfy is the hospital patient on a modified diet. To a patient, often in pain, frightened by his illness and bewildered by the machines around him, the news that his diet must be restricted can be especially disheartening.

Hospital food is an educational tool for diabetic, cardiac, and gastrointestinal patients who must modify their diets even after they leave the hospital. Appealing meals helps them not to lose all interest in food.

Planning meals with an eye on color is very important. Among the carefully planned combinations are a chicken sandwich served with a peach half and a scoop of sherbet; pear salad with grated, low-sodium cheddar cheese; and fish filet with au gratin potatoes and creamed spinach, for low-sodium diets.

Alternative cooking techniques let patients keep eating many of the foods they are used to. French toast can be baked instead of fried, and sauces or soups can be flavored with a bouquet garni instead of minced onion or garlic.
Traditionally, foods for bland diets could contain virtually no spices or roughage. While some doctors and dieticians still prefer to follow that tradition, many have decided the rules can safely be broadened. Convalescent ulcer patients can enjoy such once-forbidden dishes as sweet and sour chicken, flavored with vinegar, pineapple and peapods.

The absence of salt comes as a shock in low-sodium foods. But in its absence, many more delicate flavors can be highlighted. Spices such as thyme, rosemary, marjoram, parsley and coriander assume key importance. Burgundy and sauterne can flavor beef stew or seafood newburg, and lemon juice accents vegetables well where butter cannot be used.

In recent years convenience food suppliers have tightened their control of food content. For patients who might be harmed when the wrong ingredients are inadvertently used, many commercially prepared foods have become more reliable than on-site cooking. Suppliers have sophisticated their modified-diet recipes well beyond the simple elimination of harmful ingredients.\(^41\)

While occasional ingredient changes in convenience foods are still a hazard, improved nutritional analysis of even regular-diet convenience products allows dieticians to work those products into some modified-diet menus. Food

technology to serve both physical and psychological needs of hospitalized diners.

**Survey Report**

Reports from hospitals that have now had several years experience with convenience food service systems seem likely to generate further interest in, and adaptation of, such programs in health care.

Beyond the anticipated labor cost benefits, operators are finding additional virtues in the use of such systems. The most important is therapeutic value.

The big advantage of a chilled food program is that it allows a hospital to offer a restaurant-type menu to its patients, rather than a more limited one that is prepared from scratch with only two or three choices each day. Hospitals are able to give most patients on restricted diets, as well as the patients who can eat anything, about as much choice as they could find in the average restaurant. Patients on special diets are particularly appreciative of the selection provided since many of them have the impression that mealtime is going to be repetitious and boring.

The trend in chilled foods in the food service industry is towards an increased variety of higher quality, imaginative products.

Hospitals decide to make the investment in a physical plant specially designed for chilled food preparation because
it is clear that the processors are continuing to upgrade and expand their product lines. This results in flexibility in planning more appealing meals.

Surveys indicate that 97 percent of Denver's Lutheran Medical Center patients like food that is served at this hospital.\textsuperscript{42}

In this type of system, food is delivered to the patient attractively arranged, freshly heated and at the peak of nutritional value. This system also allows time for the dieticians on the staff to audit the next day's selections made by each patient on a restricted diet. This audit is conducted to assure proper conformance with prescribed nutritional guidelines.

Food directors collaborate in the preparation of the various menus for therapeutic diets. Generally, the calorie-restricted, sodium-restricted and soft-diet menus offer appropriate substitutes for most of the same entrees that are offered on a regular diet menu. Not only dieticians but employees, as well, participate in the taste panels which select new therapeutic diet items.\textsuperscript{43}

It is very important for patients on restricted diets to see that, with a little imagination and planning, a surprisingly varied daily menu can be put together. Hopefully,


\textsuperscript{43} Ibid, p. 67.
this will carry over once the patient returns to their own kitchen when they go home.

Case Survey: Imperial Point Hospital

Cries for "truth-in-menu" did not scare Sandra Krumray, A.D.A. director of food service at Imperial Point Hospital, Fort Lauderdale. She makes it a point to provide patients with full information about her convenience foods system.

Upon arrival at the hospital, patients peruse an information sheet entitled "Modern Convenience Feeding System, Department of Dietetics." They utilize a convenience food system that operates on a total disposable concept. Many aspects of the hospital's food program are outlined to the patient: the availability of 57 meal combinations, wine and bar, cafeteria and gourmet meal plans.44

There are so many diverse foods there, that it is a pleasure to introduce the patient to the system. This helped accomplish a homelike atmosphere.

Unusual items on the regular diet menu include popsicles, pretzels and dip, snow crab claws, and a "Super Burger" on an onion roll.

Patients that stay longer than a week can enjoy a little more excitement in their diet. They can opt for a

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gourmet lunch or dinner.

For an additional $5.50 for lunch and $8.50 for dinner per person, a patient can invite as many as three guests to a delectable gourmet meal, prepared and served by hospital food service staff. A typical gourmet dinner includes fresh shrimp cocktail, tossed salad or relish tray, filet mignon, peas with mushrooms, strawberry Romanoff and a selection of wines at additional cost.

The gourmet meal option is available only in private rooms. Since Imperial Point is in a well-to-do neighborhood, area residents who enter the hospital often choose the gourmet meals as their standard hospital fare.45

Imperial Point's dedication to variety hasn't stopped with exclusive service. Today, patients on a nonrestricted diet can choose from the cafeteria menu to break any monotony in the one-week patient menu cycle.

The cafeteria caters to both the public and employees. It promotes a "Salad Patch" salad bar.

Food service employees, doctors and nurses also order take-outs from the cafeteria for pick-up around 4:30 and 6 p.m. Orders have to be in the cafeteria by noon. This take-out service accommodates employees who may not have the time or the inclination to prepare a dinner at home. It also rids the dietetics department of leftovers.

Food for the cafeteria is prepared in the main kitchen on the ground floor. This kitchen also provides one-quarter of patient service: meat slicing and soup and cafeteria foods preparation for patients.

Three support kitchens on each of the hospital's three floors are used to heat meals, delivered to patients by dietary aids. Krumroy contends that decentralization of kitchen facilities assures patients that food arrives at the proper temperature and consistency.  

Krumroy joined North Broward Hospital District in 1970 and went to Imperial Point as it debuted in 1972. Previous work with food manufacturing companies - developing recipes for convenience foods - led her to vote for a convenience foods system at Imperial Point.

Experience has led Krumroy to insist on round plate packaging, for convenience meals to remind patients of meals at home.

Today, the hospital's menu - 50/50 pre-plated and fresh, provide patients with a wide choice. Imperial Point has captured a reputation as the place to be if you have to be in the hospital.

Case Survey: Shadyside Hospital

Battling costs, health care has propelled rapid advances in food service systems. In little more than a decade, such previously avant-garde possibilities as frozen food, disposable service, chilled plate assembly and point of service reconstitution have become well-established, thoroughly integrated procedural norms for many dietary departments.

One facility that lends itself to analysis is the 444-bed Sadyside Hospital in Pittsburgh. In 1972, Shadyside redesigned its food service facilities and went the route of total convenience. Under the direction of Stouffers Management Division, the hospital was committed entirely to the use of frozen foods in a contemporary food-service system.

One important difference between the Shadyside system and those originated five to ten years earlier, is management philosophy. At Shadyside, it is not just a matter of devising a menu around available frozen foods and then finding the right equipment. Rather, the system is based on well-defined, people-oriented philosophy. 47

At Shadyside they think in terms of service to the patients and the staff which more closely resembles hotel service to patrons. Management here is devoted to

maintaining the highest quality standards. These include quality of service, quality nutrition care, quality food and quality disposable serviceware.

One area that has become an intense source of pride and pleasure is that of menu variety. Shadyside patient services deliver more than 380,000 meals per year with impressive choices in all menu categories. Standard patient entree items include chicken breast in wine sauce, beef stroganoff and crab newburg on melba toast. Daily vegetables include honey-glazed carrots, noodles Romanoff and spinach souffle. And the dessert column lists, among others, frozen fruits, eclairs and walnut layer cake. Additionally, at extra cost, patients are offered chicken Kiev, tenderloin steak, broiled lobster tails and veal cordon bleu - all served with the appropriate wine.

Clinical dieticians are directly involved in menu development and are well acquainted with the nutritive makeup of selections.

Even though 60 percent of all meals served to patients at Shadyside fall into modified diet categories, special diet frozen foods still allow for great menu variety. Shadyside offers such low-fat and low-sodium menu items as fillet of sole, glazed breast of chicken, spiced beets and lemon fluff.
Food cost, still low today, was a modest $3.04 per patient per day in 1976.48

The use of frozen foods gives more potential for improving the overall menu. Adding unusual items is done easily without extending labor costs or equipment demands. And being able to offer a broader menu selection is a great service to the patients. It alleviates the problem of menu boredom.

In terms of production, this system relies heavily on reduced labor assembly of frozen components and adaptation of disposable ware, with emphasis on a microwave galley system for patients tray delivery.

At Shadyside, dietary aides are directly involved in both assembly of trays and patient service. Nurses distribute the trays but the aides retrieve them. This helps the aides to develop a personal connection with the purpose of their work, while patients receive extra attention.

These dietary services can provide exceptional levels of quality service while significantly reducing the work throughout the system. Without the application of frozen prepared foods, it would be impossible to serve such high quality items as quickly and efficiently and still have time for the emphasis on service and personal attention that is needed in health care institutions.

With all these benefits, there are still potential concerns. Although convenience foods add menu flexibility and reduce the physical aspects of production, convenience systems intensify the demand for management control. Errors in a convenience system are far more costly than in a scratch production system. Forecasting for freezer withdrawal, for example, must be accurate due to a limited time for product use after tempering.49

Meeting these challenges, dietary services at Shady-side provide exceptional levels of quality. Above all, this results from management's commitment to adhere to standards.

Most critical is the need for specifying and purchasing only top line products. All of personnel in the convenience food system must have full and thorough knowledge of these products for the purpose of maintaining superior quality control.

Case Survey: Hoag Memorial Hospital

Certain things must remain saved. Things such as Boston clam chowder, tuna salad, fried eggs, hamburgers and roast beef cannot be tampered with. These items must be freshly made each day in the kitchen to the same formulas.

This is the concept that Rosalie Elder, food service director of Hoag Memorial Hospital in Newport Beach, 

California has devised to handle a large and diversified market.

Elder's food service department produces food for:

a. Patients in 472 beds;

b. the 237 seat cafeteria, which served 1,500 employees and acts as the only restaurant for the entire neighborhood;

c. Special events in the hospital;

d. Catering to the adjacent, 206 seat Hoag Conference Center;

e. "meals on wheels" for the community;

f. the mental health unit's family-style dining;

g. VIP patient section which requires gourmet food service.50

Hoag's current food service evolved as have so many health care facilities that grew in increments. The hospital was built in 1952, with 50 beds. The same kitchen designed to cater to that small patient load and its attendant employees was still used when the hospital reached a 270-bed count. Even when a temporary facility across the street was annexed to bring the total to 380 beds, food service somehow muddled through in its ludicrously little space.

It was a result of that little kitchen that started Hoag Memorial Hospital on a pre-prepared frozen food program along with all other convenience foods. They had to stop baking back in 1968 because the bakers didn't have enough space to work. Pies, rolls and cakes were the first things they started buying ready-made. Frozen sheet cakes and rolls, and locally made fresh pies, plus an excellent line of breads similar to those used in delicatessens now took care of their baking needs.51

They believed that if a product was easy to make, why buy it. Elder feels her employees' time is well spent assembling tempting sandwiches and salads with eye appeal and important nutritional value.

With convenience foods, staffing has been able to remain constant. Elder starts her staffing with the number of persons required to man the tray line, along with the others needed to keep the foods supplied. Everyone who works on the tray line is responsible for other activities relating to food service for the many groups that the department caters to.

The most eminent thing as a result of this program is the relaxed and happy attitude among the employees. The number of people that the hospital's food service must feed has multiplied a dozen time, yet the same nucleus of people, 51 "Less Labor Serves More Meals at Hoag." Institutions/Volume Feeding. April 15, 1975, p. 31.
plus the part-timers incorporated can put out sizable amounts of food because of the well-planned system.

Kitchen equipment is limited in numbers but not in variety. Three convection ovens, two steamers, a range with convection oven and six warmers made it possible to prepare scratch foods as well as heat up the preponderance of bulk-packed convenience entrees.

The layout of the kitchen assures efficiency. The flow of stores and supplies has been engineered by Elder and her assistant, Chris Mooshagian. They worked with their primary supplier, a distributor from whom they buy frozen foods, meats, groceries and dry goods. His help with inventory, ordering and billing procedures has made the Hoag Memorial Hospital operation function smoothly.\(^5\)\(^2\)

An Administration that encourages the emergence from traditional, often outdated, systems has also helped the innovative food service department. Administrators involved in the program have given Elder the authority and funds to set up the kind of operation that fills the hospital's needs but keep labor costs down.

**Hospital Equipment**

By the time a hospital patient sees his tray, there is a distinct possibility that the gelatin salad will be

melted, the lettuce will be less than crisp and the milk tepid. Such complaints have made imperative development of delivery systems that segregate hot components with their attendant pellet system support units so that the heat exchange is complementary rather than derogatory.

Today's hospital environment places increasing emphasis on cost-effective methods, efficiency to eliminate food waste and raise labor output along with careful conservation of energy. Therefore it is a fair market for revolutionary ideas - including hot/cold delivery systems.

The age of the computer has transformed delivery systems beyond conveyors of nutritious food prepared in hospital kitchens, assembled on trays and carter to rooms. Also available: cooking by memory tape in the cart at the patient-floor stage.

The most advanced system described in manufacturer's terms as "cooking food in a refrigerator," has the ability to cook raw food, finish off partially cooked food or heat pre-cooked food.

An insulated cart with up to 40 full trays is simply hooked up to a chilled air unit until a heating process begins within the cart. Preprogrammed instructions from Dietary direct line retharmalysis process. Computer-process controls contain five heat selections at various temperatures for each tray. At the same time, refrigerated items remain cold. After 35 minutes, the cooked meal is ready.
A mini-computer linked with memory tape, containing all the times and temperatures for cooking food on each tray, is the heart and brain for each tray.53

One of the advantages of this system is that nurses can control the servicing after rethermalization. Menu changes may be made for specific patients as late as 40 minutes before rethermalization begins. Or, each tray may be manually controlled as needed. Control panel buttons have the capability to hold trays, keeping late trays for patients who are not in their rooms when food is served.

This system also minimizes decisions at the non-management level. With cooking and transportation taken care of, there is less room for error. And meal cost per tray averages can go down to less than $1 for entrees.

Further advantages include being able to have computer data from the system connected to existing hospital computer terminals for food service for such things as volume and inventory. Fears of complicated equipment breakdowns are allayed since hospitals are staffed with electronic maintenance crews.

Another unbeatable delivery system which lowers overall dietary costs is convenient and simple to operate centers on the cart and tray.

Specially designed motorized or manual carts carry 20 patient trays. Apparel of easy-to-read pushbuttons, color-coded for plates or bowls, keeps food hot while it's transported from the kitchen. The tray contains two heating elements (for soup or entree). Food is kept hot until served, even if there is a delay in delivery or the patient is absent from the room. There is no heat transfer to cold food on trays.

Because each cart is powered by a battery which is charged once each night, the system is energy efficient. Safe, convenient dinnerware is used with it.54

All in all, new concepts on the market today are saving hospital dietary departments many manpower hours. Initial purchase costs are defrayed in terms of labor efficiency, inventory control and the ability to serve patients nutritious, hot food.

Closing Comment

From all this we can see that hospital food service holds a very important position in our society. Many advances have been made and more are being worked on. We have looked at some very successfully run operations and the equipment that is utilized. Hospitals are finally realizing just how beneficial to the patient a good nutritious meal can be. Good health starts with good food and hospitals have begun delivering in that area.

Alpha Food Systems is an innovative organization involved in the development of totally integrated systems for the preparation and distribution of meals.

The Chill Therm System, developed by Alpha Food Systems, features a point-of-service delivery system that produces meals with exceptional food quality and nutritional levels while producing dramatic cost control efficiencies.

Alpha Food Systems offers the only complete system in the industry which includes manufacturing food service refrigeration, heating, electronic control and distribution components, including carts, trays, dishes, covers and glasses.

Alpha Food Systems operates within a total systems concept, undertaking design, planning, financing and implementation services. Also included are food systems management services to hospital administrators with the food service departments and to consultants, architects, and planning of food service facilities.
Chill-Therm Patient Food System

The Chill-Therm Patient Food System has been developed to provide food service departments with an advanced, efficient and totally integrated food delivery system. Unique in its design, and revolutionary in concept, this system features point of service preparation and distribution of meals at a nutritional and quality level unsurpassed by other systems with the Health Care Industry.

Designed with the patient and food service department in mind, Chill-Therm simultaneously refrigerates and cooks food in modular dishes on fully assembled serving trays. It utilizes insulated food beverage transporters, connective chilled air environmental systems, and computer operated controls to initiate automatic rethermalization. Chill-Therm insures maximum nutritional food quality and correct temperatures while maintaining exceptional flavor, texture, and appearance.

Chill-Therm is adaptable to heat maintenance, commercially prepared food, cook-chill, and cook-freeze food systems in existing and planned kitchens. It offers maximum use of the benefits of the chilled food assembly tray line.

Chill-Therm has also been designed to provide the needed support services required for the increasing programs in out-patient and day care which require demand feeding. Another capability is its use in satellite situations to
expand shared food service programs.

Chill-Therm increases staff productivity and morale. It places all controls under the direct supervision of the Food Service Director, and is easily the most cost-effective and efficient food delivery system within the health care industry.

Chill-Therm is a total system, permitting hospitals to cut and control costs while improving patient care and services. With today's concern for increased operating costs in hospitals, Chill-Therm provides an opportunity to effectively assist in their reduction.

The Chill-Therm System was developed to allow a covered dish to extend through a hole in a specially designed tray so that the bottom surface contacts a heater element. The food in the dishes sitting on the heater elements may be heated while the rest of the food remains chilled at 40°F. The dishes are interchangeable in the positions of the tray and can accept all foods commonly used in a hospital today.

Specific components and their use are an integral part of this system. Alphaware, reusable dishes which are modular and stickable, are incorporated. They consist of: entree; vegetable/fruit; soup/cereal; bread/dessert; beverage cup; and receptive covered.

The specially designed general diet tray is based on the Gastro-Norm Standard. The modified diet tray, half the
size of the general diet tray is ideal for surgicals, pediatrics, geriatrics, or snacks.

The delivery system consists of the Food Beverage Transporter containing heater shelves on which 20 general diet or 40 modified diet trays, or a combination of both, can be placed. It is an easy to operate insulated cart wherein fully assembled trays are readily served to the patient. This non-mechanical cart is the lightest on the market since traditional, high-maintenance, low-reliability parts are eliminated.\textsuperscript{55}

The Kitchen Environmental Unit, located in the kitchen, pre-chill carts prior to tray assembly and maintains trays at 40\textdegree{}F. The Floor Environmental Unit located in patient areas refrigerates the pre-assembled trays and provide the necessary energy to activate the heater shelves in the Food Beverage Transporter.

Selected items on fully assembled trays are automatically rethermalized at predetermined times and temperatures. This process does not require any personnel on the floor to operate this system.

This system utilized computer technology for the Transporter Memory Pack, the Manual Entry Console and the Temperature Control Unit. These components control the

\textsuperscript{55}"Chill-Therm, General Description and Specifications." Alpha Food Systems. Copyright by Anchor Hocking Corporation. December 1977, p. 1.01.
instructions for the cooking of foods on pre-assembled trays inside the transport cart.

Information Systems include manuals, training programs and related items which are provided for use in installation, maintenance and ongoing operations.

Meal Service takes a new approach with this system. When the "Meals Ready" signal light on the Temperature Control Unit illuminates, an audible signal sounds and the meals are ready to be served. The Food Beverage Transporter is disconnected from the Floor Environmental Unit and is taken to the patient corridor. Serving staff add hot water or hot coffee to trays which are then served to the patient.

The unique feature with this system is how it is able to heat food individually such as fried eggs, toast, etc., to obtain optimum quality.

There is no limit to the type of menu which can be served from Chill-Therm. The patient selects the desired item from the menu and this information is then programmed into a Manual Entry Console on the hospital's computer, whereby each item selected by the patient to be heated is assigned a heater code number. An example is toast which has been assigned a heater code of 8; fried eggs, code 3; soups, code 13.

Once the items are programmed into the Manual Entry Console, this information is transferred into a Transport Memory Pack, known as the TMP. This little memory box is
taken to the tray assembly line, ready to go to the floor with its designated trays. The TMP is the first item down the line and is placed on top of the Food Beverage Transporter at the end of the line. The address code on the TMP tells where the Food Beverage Transporter is to be taken. When the Food Beverage Transporter is connected to the Environmental Unit on the patient floor, the TMP is inserted into the Temperature Control Unit. The information on the TMP is transferred to the Temperature Control Unit, which automatically starts rethermalization at a predetermined time.

The Temperature Control Unit, through the program change control panel, has the capability of making diet changes on the patient floor that might be required for new trays, hold, or delay trays.

This whole system is based on the slow cool cookery concept which provides a much higher standard of quality for all food products. 56

Chill-Therm Step-by-Step Systems Flow Chart

1. The patient selects food from a standard menu.
2. Menu selections are transferred to the Manual Entry Console (MEC) worksheet.

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3. The Manual Entry Console programs the Transport Memory Pack (TMP) from information on the MEC worksheet. Five food selections on each individual tray can be heated at various temperatures.

4. TMP, menus, and MEC worksheets with information regarding non-scheduled trays are taken to the chilled tray assembly line.

5. The TMP and MEC worksheets for 20 to 40 patient trays are served to the Food Beverage Transporter.

6. The mnu is placed on the patient tray.

7. All foods, cold beverages and other items are placed on the patient tray.

8. The trays are loaded into the Food Beverage Transporter.

9. The Food Beverage Transporter is connected to the Kitchen Environmental Unit for chilling or holding.

10. The Food Beverage Transporter is transferred to the patient floor and connected to the Floor Environmental Unit prior to scheduled serving time. The TMP is inserted into the Temperature Control Unit.

11. The Temperature Control Unit automatically starts the scheduled cooking from programmed information in the TMP.
12. The non-scheduled meals are individually controlled to coincide with the patient's schedule.

13. The Floor Service Unit will provide hot beverages and patient nourishments, plus the capability of storing and cooking non-scheduled patient meals.

14. Fully assembled trays at proper temperatures are handled for the first time.

15. The patient is served a freshly prepared to order nutritious meal from functionally designed Alphaware.

16. The Food Beverage Transporter and soiled patient trays are transferred to the sanitizing area.57

At this, the Chill-Therm System has completed its function.

Advantages and Benefits of Chill-Therm

Before a discussion of the advantages of Chill-Therm takes place, it is necessary to understand the two methods of patient food services.

The first is the Heat Maintenance Method where the kitchen operates on a 90 to 98 hour work week. The cooking

of food is timed so that the completion of the cooking cycle coincides with tray assembly, and extensive heat generating equipment is utilized in an effort to get food into a heat retention device at temperatures up to 180°F.

Every effort is made to load trays with both hot and cold items as quickly as possible just prior to serving time, but while the heat retention devices attempt to maintain hot foods hot, there is little or no attempt to maintain the cold foods. The heat maintenance method requires a large staff and creates three daily peak periods of production which pressures the staff and taxes the facilities. Typical heat maintenance methods are bulk food, pellet, hot-cold carts, insulated trays and lastly, a plain tray with no temperature retention capabilities.

The second method is the Chilled Food Method where the kitchen production operates on a 40 or 48 hour work week, cooks food and then chills or freezes the food for later use. Tray assembly for the three daily meals can be accomplished in an eight-hour period by a small, full-time, assigned staff, using the previously cooked and stored food. For the tray line, all food should be chilled or tempered and maintained at 38°F. The trays are then loaded into a cart and the cart is refrigerated. At meal time the entree and soup are removed from the tray or holding rack, re-thermalized, and then matched with the correct patient tray. Items which cannot be rethermalized are cooked individually.
on the patient floor. Chilled food heating devices include microwave or convection ovens, integral heat, and infrared or induction units.

Chill-Therm is able to utilize the advantages of a chilled food system while avoiding its disadvantages. Chill-Therm does not require handling the entree or soup, nor does it require a floor kitchen. It also maintains, simultaneously, hot items hot and cold items cold.

Advantages of Chilled or Frozen Food Production:

1. Eight-hour, five-day week production schedules, which permit higher staff utilization, eliminate shift overlapping and reduce supervision.
2. Increased food production, efficient BTU utilization and increased labor productivity.
3. Optimum use of skilled and unskilled production staff and the elimination of peak work loads.

Chill-Therm is adaptable to on or off-premise cook-chill or cook-frozen production systems.

Advantages of Chilled Tray Assembly and Distribution:

1. Less staff due to eight-hour, single-shift operation, and the elimination of part-time help and extra supervision for the evening meal.
2. Increased productivity and efficiency due to assignment of specific workers to tray lines.

3. Less energy requirements for equipment and air conditioning with a chilled food tray assembly operation.

4. Elimination of timing problems associated with the coordination of hot production and tray assembly.

5. Diminishing pressures which reduce mistakes on patient trays.

6. Increased assurance of quality and safety, as all perishable foods are refrigerated.

Chill-Therm is designed for a chilled tray assembly operation.

Advantages of Chill-Therm:

1. Fully assembled trays are automatically re-thermalized while being refrigerated.

2. Staffing requirements on patient floors are eliminated.

3. Changes and handling of late, delayed, hold or transferred trays are easily expedited.

4. Traditional pantry or floor kitchens are eliminated.

5. Less than one square foot of recessed area per patient is required.
6. Modified diet trays increase the utilization of carts.

7. Alphaware's maximum flexibility is realized in preplating, tray arrangements, sanitizing and storage.

8. Foods are rethermalized and held at correct serving temperatures when necessary.

9. This system provides more direct control of food quality and temperature.

10. Items remain at their correct serving temperature until served.

11. Boiled, poached, and fried eggs, toast, and steaks can be rethermalized with excellent results in Chill-Therm.

12. Chill-Therm is more cost efficient than other chilled food heating or heat maintenance devices.58

Benefits of Chill-Therm

Chill-Therm provides exceptional cost and patient benefits, ranging from reducing food production, tray assembly, and point-of-service heating and distribution costs, to dramatically increasing patient satisfaction and morale. Chill-Therm is unique in its proven ability to control labor,

food, and energy cost while improving food quality and patient service.

Benefits for Patients

1. Meals are served with hot foods hot and cold foods cold.

2. Maximum nutritional food values are obtained through slow, gentle cooking in a refrigerated environment.

3. The system provides a means of obtaining food of excellent taste, appearance, texture, and consistency.

4. Once trays are fully assembled with all menu items and checked in the kitchen, they are never handled again until served to the patient. Rethermalization is automatic.

5. The continuous refrigeration of meals from preparation to patient serving assures high quality and safer foods.

6. A greater variety of hot foods can be offered since the system is capable of cooking raw foods, finishing partially cooked foods, and heating pre-cooked foods.

7. Patients can receive up to five individually heated food selections per meal, each selection heated to the proper temperature required.
8. A more hygenic meal is possible since food is handled under refrigerated conditions by trained personnel.

9. Elimination of tray assembly on patient floor results in fewer mistakes, better control of diet intake, and happier patients.

10. Chill-Therm could shorten patient stay by stimulating patient's appetite thus increasing value of feeding therapy.

11. Alphaware was designed with most types of patients in mind. Eating and drinking from Alphaware is a pleasure for it enhances the appearance of all foods.\textsuperscript{59}

Benefits for Administrators

1. Overall daily operating costs are substantially reduced resulting in long-term savings realized after payback of the initial investment.

2. Computerization of system assures that technological improvements can be easily incorporated into the control system, thus eliminating obsolescence.

3. Reduced patient complaints since there is a high standard of food quality, appearance

\textsuperscript{59}"Chill-Therm, Patient Food System." Alpha Food Systems. Copyright by Anchor Hocking Corporation. December 1977, p. 2.03.
and temperature.

4. Peripheral computer controls can be easily interfaced with this system. This produces added control mechanisms which are becoming a requirement due to government regulations.

5. Shorter patient stays increases the opportunity for the hospital to provide more medical services to more people, maximizing the use of hospital equipment, resources, and medical staff.

6. It will assist in developing increased acceptance and awareness of the importance of dietetic and food services by the medical staff.

7. This system utilizes minimal space on patient floor and can be operated by non dietary personnel.

8. A comprehensive training program for all personnel handling or operating this system will contribute to a smooth start-up, greater pride and less maintenance.

9. Good food service stimulates positive public relations for the hospital.

10. Improved working conditions reduces staff turnover, increases staff moral and attracts
better employees.60

Benefits for Staff (Dietary and Nursing)

1. A sense of accomplishment and job satisfaction in fulfilling patient's dietary needs which speeds up and improves their recovery often results.

2. Working days for food production are reduced to five, with most early and late hours eliminated.

3. With an eight-hour chilled tray assembly line shift, work conditions are substantially improved.

4. Meal time assembly pressures are eliminated and work is more evenly spaced out.

5. Alphaware has been designed to be light, modular and easy to handle for portioning, tray assembly, dishwashing, and storage.

6. The cart is easily maneuverable, light and compact and its low profile insures full visual control.

7. This system was designed with the staff in mind and includes recognized safety devices and precautions.61


61Ibid, p. 2.04.
System Component Specifications

The Chill-Therm Patient Food System consists of the following components:

1. Class I Components - Refrigeration, heating, control and distribution components.

2. Class II Components - Reusable components which hold food and beverages that are placed on trays and served.

3. Class III Components - Single-use components that are used in distribution process or placed directly on the food tray and served.

4. Class IV Components - Informational, Operating, Procedural, Maintenance and Training Manuals, and Computerization Programs used in the installation, use, and maintenance of Chill-Therm Patient Food Systems. 62

Chill-Therm Planning

Chill-Therm has been designed to be used in any health care institution. This system can be installed not only in completely new facilities but in existing facilities and expanded or renovated facilities as well. This capability offers numerous planning advantages.

Upon completion of interest in Chill-Therm, Alpha Food Systems conducts a pre-proposal survey within the institution to discuss the operational requirements and equipment needs of the Food Service Department. The results of this survey help to determine how Chill-Therm can best be implemented to obtain maximum benefits and realize the substantial savings that are available.

There are many ways Chill-Therm can be adapted to a hospital's food service operations and facilities. With a chilled food program and an eight-hour assembly line, one set of trays are pre-assembled while another set is being assembled, requiring storage for two sets of trays.

Tray storage is accomplished by these means:

1. Utilization of a two cart system.

2. Use of one Food Beverage Transporter, one open tray rack and one enclosed tray rack. With this method the trays being assembled are stored in the open tray racks in a roll-in refrigerator. Soiled trays are collected in the enclosed tray racks to expedite the return of the Food Beverage Transporters to the assembly line.

3. Operation of a single cart system, or one Food Beverage Transporter. Tray assembly has to be completed prior to meal time. Although the need for double tray storage
is eliminated, the opportunity to realize the savings of operating on eight-hour tray assembly is lost.63

The advantages and disadvantages of a double cart, or single cart with an open and closed tray rack must be weighed against each other to evaluate the overall effect of each relative to the philosophy of operation of the food service department. Once this has been defined and the type of trays to be used has been decided, the number of Food Beverage Transporters and other class components can be determined.

To insure that food quality and temperature will be maintained, Alpha Food Systems highly recommends that each hospital has a minimum number of kitchen environmental units for chilling the contents of a Food Beverage Transporter after tray assembly. The number of KEU's can be as high as one per 20 patient beds with a double cart system.

Each Food Beverage Transporter for a specific meal requires a Floor Environmental Unit. A Floor Environmental Unit can be installed on the patient floor or in the main kitchen.

Each Floor Environmental Unit requires power and controls to be supplied by a Temperature Control Unit. One Temperature Control Unit can operate one or two Floor

Environmental Units; therefore, if a location has seven Floor Environmental Units, four Temperature Control Units will be required.

The number of Transport Memory Packs is determined by the type of cart system in operation. With a double cart system, or a single cart system with an open and closed tray rack, two TMP's are required. With a single cart 12 hour tray assembly line, only one TMP is required.

The method programming the TMP is determined after the pre-proposal survey is completed. A Manual Entry Console, or a Computer Menu Programmer can be utilized.

The continual need for frozen food storage, hot water, hot coffee, and the ability to handle nourishments, requires that provisions be made for a unit similar to the Floor Service Unit. Alpha Food Systems recommends one Floor Service Unit for each Floor Service Center.

The Food Beverage Transporter has been designed to accept the Transport Utility Rack, which can be used for a number of purposes. Known as a Nourishment Beverage Transporter, it is loaded with nourishments and taken to the Floor Service Center and connected to the Floor Environmental Unit at non-meal times. At meal times, it is disconnected after meal serving times.

Alphaware requirements are determined by the type of production method used by the food service department. This could include cook-freeze, cook-chill, or convenience food
systems, which may be used with a pre-plate or bulk chilled tray assembly program. With a double cart system, three sets of trays and five sets of dinnerware are provided initially. In addition to patient service, Alphaware can be effectively used in the cafeteria for staff feeding, on a regular cafeteria tray.

Each hospital installing Chill-Therm receives:

1. Complete and comprehensive information manuals.

2. Training programs to cover installation, start-up, recurrent and new employee training, along with maintenance instructional guides.  

It offers a complete and proven system to say the least.

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The Chill-Therm Inflight Food System is being developed to provide airlines with an advanced, efficient and totally integrated food delivery system.

Unique in design and concept, and incorporating proven technology from Chill-Therm's advanced patient food system, the Inflight Food System will feature a simplicity of service not available with any other inflight food service equipment.

Designed with the passenger and caterer in mind, Chill-Therm simultaneously refrigerates and heats foods in individual dishes on fully-assembled serving trays. It will utilize a chilled air correction and a computer controlled conduction heating system to automatically rethermalize each meal.

Chill-Therm provides meals that have exceptional flavor, texture and aroma, and a nutritional quality that is unsurpassed by other methods within the airline industry.

And, with today's concern for reducing and controlling costs, Chill-Therm can most effectively assist the airline industry in decreasing operating costs through its total systems approach to inflight food service.65

Features

1. Pre-assembly of complete meal trays, from the caterer to the passenger, thus no assembly inflight.

2. Foods are heated or cooked for service automatically through the use of computer controls.

3. Boiled, poached and fried eggs, toast and rare to well done steaks are rethermalized excellently in Chill-Therm.

4. System components are designed to interface with current catering operations.

Benefits

1. Meals are served at correct hot and cold temperatures.

2. Eye-appealing meals with exceptional flavor and a high degree of retained quality and nutritional value are achieved.

3. It permits efficient expedient meal service inflight.

Advantages

1. The assembly of trays inflight are eliminated.

2. It reduces galley space requirements by 21 percent and increases above counter space by 56 percent.

3. It reduces the amount of equipment handled by caterers.
4. It reduces inflight weight required to provide meal service.

5. Energy is used more effectively with this system.66

Final Generalization

The Chill-Therm system is a proven, efficient and economical way to utilize the use of convenience foods in two of convenience foods heaviest markets: patient food service and inflight food service. With the knowledge and outlined plans illustrated in these systems, convenience foods could make even greater contributions in the food service industry. Hard work and dedication are the key to the success of these systems.

SECTION X
FOOD SERVICE INDUSTRY CHANGES

The last ten years have seen substantial changes in the character, goals and operating methods of the food service industry in the United States. The momentum for change is still on the increase and one may safely predict that the food service world of 1984 will bear little resemblance to its counterpart of ten years earlier. The reason for this prediction is that we have witnessed a quantum jump in food service techniques as a result of the effective application of new technology and management techniques to solve economic, marketing and operational problems in mass feeding.

Industry statistics show that the food service industry is a rapidly growing industry (9.5 percent average annual increase over the last ten years) with an increasing labor force but with a painfully slow increase in labor productivity as compared to two closely related industries - the food processing industry and retail food distribution.67

Why have the food processing and retail food distribution industries been more successful than the food service

industry in increasing the productivity of their labor force. Clearly, because they have been quicker to adopt equipment, packaging techniques, distribution methods and information systems designed to improve continually the efficiency of their operations. Only lately has the food service industry begun to do likewise, and the statistics ten years from now should show the degree of success encountered in increasing productivity. By 1980, food service sales will be $44 billion and over 50 percent of food dollars will be spent outside the home.

Until 1967, the food service industry in the United States was exempt from the minimum wage legislation applicable to other industries, hence the low productivity of its labor force was to a large degree compensated by the low wages which it paid. When the exemption was lifted, the search for methods of increasing productivity began in earnest.

There has also been an equal desire on the part of chain operators to find methods of reducing the level of culinary skill needed in order to:

1. Permit rapid expansion of facilities;
2. Improve the uniformity of food quality;
3. Provide centralized management control over widely scattered food service facilities;
4. Provide an ability to respond quickly to peak or seasonal loads;
5. Reduce investment in facilities;
6. Improve working conditions for employees.68

How can these objectives be obtained? How can labor be made more productive, and at the same time working conditions improved? How can food cost be reduced, and at the same time food quality improved and made more uniform? There is no single answer which can be given, but we will look at some approaches which if taken may provide some workable solutions.

Methods for Increasing Worker Productivity

1. Reducing Preparation Labor
   a. Modern Labor-Saving Equipment. Equipment such as continuous fryers, broilers, steamers or water cookers offer a means of efficient significant reductions in preparation labor.
   b. Centralization of Preparation Labor. The concept of labor centralization is the application of mass production techniques such as those used by the manufacturing industries to the preparation of products to be used in food service. In order to utilize assembly line techniques successfully from an economic standpoint it is necessary that production be on a large scale, so that high efficiency, labor-saving equipment can be utilized and its

cost, as well as the cost of the indirect labor and overhead, spread over a large volume of production. Centralization of production labor can be achieved either through the establishment of control kitchens, or through the purchase of commercially manufactured convenience foods, or a combination of the two.

c. Central Food Preparation Facilities. Many factors must be considered before making the crucial make or buy decision, and this decision should never be made without a systems analysis of the operation involved. Among the factors to be considered are:
1) Cost of constructing and equipping a food preparation facility.
2) Based on the actual menus in use, the cost of preparing the quantity of meals required to supply the total system.
3) Distribution costs.
4) Total savings and years required to amortize initial investment.

Factors other than cost are frequently involved and these include:
1) The inability to procure from outside sources the menu items used in the form required, quality, quantity, packaging, etc.
2) Lack of confidence in the ability of outside sources to maintain on a continuing basis the
quality, nutritional value and microbiological safety of the foods required.

3) Desire to maintain individually of recipes even if similar items could be procured less expensively from outside sources.

4) Anticipated difficulty or inability of outside sources to supply all the points in the system.  

6. Commercially Prepared Foods. In the U.S. there exists today an adequate number of commercial suppliers of prepared foods to enable limited menu establishments, fast food operations, schools, hospitals, to draw entirely upon precooked or raw, ready-to-cook, portion-controlled foods for their menu needs. Thus convenience foods, whether produced centrally in a captive operation or purchased from outside sources, bring to the point of usage built-in labor which reduces the on-site labor costs.

e. Improving the Utilization of Labor. Food service operators have long been aware of the fact that one of the reasons for the low productivity of their labor has been the inability to maintain an even work load throughout the day. As a result, there are periods of the day when a kitchen is necessarily

overstaffed in order to have a sufficient labor at hand for peak periods. Where very large kitchens are involved, it has been demonstrated that efficiency and productivity can be raised by the computer programming of labor assignments and work scheduling. Such a system entails the division of work functions along very specific lines to achieve maximum utilization from all personnel. All measuring and weighing of ingredients is carried out in ingredient rooms and ingredient batches scaled to the requirements of production units are delivered at the work stations just before they are needed, as dictated by the computer print-out, and the exact form in which they are required by the cooks. The cooks, therefore, have no function to perform other than cooking and have no need to leave their work stations since everything is brought to them and carried away, including the necessary utensils.

2. Reducing Distribution Labor

Frequently overlooked by food service managers is the high cost of distributing food ingredients and prepared foods. In many cases the labor cost involved is in fact concealed in the food cost.

Some alert institutional wholesalers have taken advantage of these opportunities for labor saving by marketing a broad range of institutional foods and non-food sup-
plies and discounting their prices based upon large quantity deliveries. The resulting saving to the food service operator permits the increased investment in refrigerator and freezer storage space to be recovered in a reasonable period of time.

3. Reducing Serving Labor

As one considers the options available for reducing serving labor, there are a number which have proven economic to the operator and acceptable to the clientele.

a. Vending Machines.

b. Self-Service Operations.

c. Reduction of Dishwashing Costs.

1) Disposable.

2) Reducing the number of pieces of China used.

3) Automated Equipment.

4) Centralized Dishwashing.70

Methods for Reducing Food Cost

Food cost also can be reduced in a wide variety of ways. Included are:

1. Limiting the Menu.

Offering a limited menu simplifies purchasing, storage, and preparation, and speeds up service, while at the same time improving food yields on preparation and reducing food waste.

2. Quantity Purchasing

Non-commercial as well as commercial food service operations of the multi-unit type have found ways of combining their total purchasing volume advantageously to secure lower food and non-food supply prices for their individual establishments.

Multi-unit operations scattered within a country can, through a central purchasing office, effectively use their combined buying power in dealing with supplies companies having national distribution.

The possibility of a multi-unit operation reducing its food cost by eliminating wholesalers, purchasing directly from manufacturers and establishing their own storage and delivery system should never be overlooked.

3. Reducing Food Waste

Even in a seemingly well run food service operation, food waste in preparation may account for 10-20 percent of food cost. Several approaches exist to attack this problem.

a. Food Preference Studies.

b. Better Forecasting. Improved forecasting of meals to be consumed can result in reduced waste on days when traffic is slower than expected and increased sales when customers demand exceeds the daily norm.

c. Centralized Preparations.
d. Commercial Convenience Foods. While commercially prepared main dishes might not cost less than on-premise prepared dishes if food cost alone is considered, this is often not true in the case of vegetables. Frozen french fried potatoes, dehydrated mashed potatoes and frozen vegetables may save money on food cost alone, when factors such as seasonal cost fluctuation, yield variations and preparation waste are considered.

4. Computer Assisted Menu Planning

The use of computer programming techniques to achieve lowest food cost in planning a menu cycle designed to fulfill certain nutritional goals while providing sufficient variety, have been successfully used to reduce hospital food costs by better than 20 percent. Basically, the computer is programmed with the menu choice, their recipes, nutritive value and certain constraints and raw material prices are fed into the computer as they change. The computer can provide at any given moment the menu cycle which represents the lowest possible cost achievable given the various requirements and constraints.

5. Management Information Systems

The scheduling of production in a central food preparation facility can be governed by detailed consumption data received from each of the satellite feeding units. When using a computer system, over-production and waste are thus
avoided. Commercial multi-unit operations can monitor sales of specific dishes in each of their units and quickly respond to lagging sales on a particular menu item by eliminating it from the menu and thus reducing the food waste involved in maintaining it.\footnote{71}{"Changes in the Food Service Industry." The Cornell H.R.A. Quarterly. May 1974, p. 19.}

**Summary**

Some of the opinions that exist for reducing labor cost and food cost in food service operation have been briefly discussed. Their selection and application must be tailored to the requirements of the individual operation. To judge these requirements, to analyze them and to assess the technical and economic feasibility of the proposed solutions require a degree of interdisciplinary competence in which operations research and analysis, food technology and food engineering are expertly represented.

This is the degree of sophistication which the more forward looking elements within the food service industry have recognized as being essential in order to cope effectively with the task of bringing the industry fully out into the Twentieth Century. As the years bring us closer to the Twenty-First Century we can be certain that the food service industry will not only have caught up with the pace of our time, but may at long last develop new technology of its own!
SECTION XI
WHAT THE FUTURE HOLDS

This is, of course, pure speculation on my part. One thing is certain, any leveling off in population growth as well as increased worldwide food production must be supported by a substantial decrease in waste in order to fend off world-wide starvation. Transportation costs are, like everything else, increasing at an alarming rate. Therefore we must stop hauling garbage around the globe. Remove waste material from food at the place of origin. Past experiences have proven that efficiency ingredients such as flour and rice shipped to areas in need of help were not well accepted because no one knew what to do with them. Perhaps in the future, it will be feasible to fully prepare foods at their place of origin and preserve them by freezing or other methods yet to be discovered and thus provide wholesome meal components fully prepared and ready to heat and eat. Shifting to commissary or factory-type basic preparation to feed the captive patron - those people who, because of the nature of their activities, are forced to eat their meals at a given place, time, or function will become more common as problems previously mentioned become more prevalent and more serious. In contrast to the captive patron, we have an ever-
increasing number of citizens who choose to eat out voluntarily. Theirs is the choice from among a large number of establishments ranging all the way from fast food operations to the plushest restaurant imaginable, depending upon his taste, education, ego, and, of course, willingness to spend money. With this huge spectrum of food service establishments, there will be used hundreds, if not thousands, of so-called convenience food products, most of them readily accepted and no even noticed any longer. Quality and price will determine whose products will be on the market. No one really knows how far operators will go to choose price over quality. The old adage "You only get what you pay for," is truer here than elsewhere. There are really no bargains. What is being sold is not really convenience, but work already performed; convenience is only an added bonus generated by proper application of the product.

New food sources must be developed and use of formulated foods will constantly increase. Aquaculture, the growing of aquatic species on both fresh and salt water and harvesting them as an additional alternate to present food supplies from the oceans and lakes of the world, will be on the upturn. There will be a greater utilization of various technological strategies; new and refined methods of processing and distribution; nutrient fortification and establishment of some kind of international food reserve system with greater awareness of the cultural food patterns and needs of various population groups.
Nutrients will not be provided by pills. Besides lacking acceptable characteristics of food, pills cannot possibly supply all the necessary calories.

In the field of food preparation we will see an increase in the application of preprocessing and chemical technology. We will also see the need for a drastic reduction in waste, especially between the points of production and consumption of food, a goal best achieved by preprocessing food products before they get into the hands of the unqualified, unskilled and uncaring.

Among predictions for the future, more and more people will again grow their own food. Some in back yards, others on terraces or even window boxes. These activities will in all likelihood not alleviate the threat of starvation in the future of mankind. Our best bet will be on food technology and the inquisitive minds of dedicated men and women to come up with answers to questions and problems that haven't even yet been thought of.
SECTION XII
CONCLUSION

In concluding this paper, I have seen for myself just how the convenience food service industry has originated and developed throughout the years. The only thing I can say right now is that it is an exciting industry, it has come a long way, it has many more things on which it can grow, and only time will tell how it reacts to growing demands and pressures. I feel the more educated people become in the area of food service, the better the industry will be as a whole.
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