It is even possible for whole farm communities to sustain losses as synthetics displace agricultural raw materials. Economic activities associated with production of the displaced agricultural product are reduced or no longer needed. Community labor is no longer required to harvest, transport, store, and process the displaced agricultural product. Wholesale and retail sales of farm production items like fertilizer, insecticides, and fuel may decline if farmers cannot adjust to declining markets.

Reduction in the use of farmlands and other economic activities associated with agricultural production could lower the taxes which rural areas depend on for revenues. In this situation they could reduce their community services or develop new revenue sources by encouraging economic activities not based on agricultural production.

Agricultural processors also feel the effects of synthetics as they replace farm products. Some plants become idle. Other facilities may be used at less than capacity. Some processors may have to relocate their plants or re-equip them to produce synthetic materials.

In summation, the food and nonfood markets for synthetic products are different from each other. The use of synthetics in foods will be limited in future years. Foods produced naturally are still cheaper than those synthetically produced. Besides, consumers recognize that the nutritional qualities of agricultural foods are still a bargain. The future of synthetics in nonfood markets presents a different picture. Synthetics have been gradually gaining an increasing share of the total nonfood market. But efforts toward improving the quality and reducing the cost of agricultural products in conjunction with the development of new products and processes will tend to moderate the rate of market penetration by synthetics.

Farmers, rural communities, processors, and marketers are adjusting to new market situations that affect the use of agricultural products. Farmers are changing their production patterns, improving the quality of their products, and increasing their efficiency. Rural communities are seeking and developing new economic activities that are not dependent on agricultural raw materials. Processors and marketers are developing new products and improving old ones. With these types of adjustments, agriculture can meet the challenge of synthetics.

HOW THEY SAVED THE SOUP: THE TECHNOLOGY OF MARKETING

A GAME OF CHESS can be confusing unless you know how the various pieces move, and what they can do. The same is true about the serious game of marketing food. As users of food, we are intimately affected by marketing. But most of us are not fully aware of the moves of the marketing pieces or how we are involved.

Marketers profit when they buy foods from farmers, and change them in some way to provide satisfaction to us—users of the food. But, just as chess is easily learned and yet difficult to master, so indeed are the fundamentals of food marketing easily seen but often obscure. Its changing nature makes the industry complex, but also adds to its interest.

To illustrate changing technology in marketing and its impact upon our lives, let's explore three basic elements in the food marketing system—containers, computers, and convenience foods. These three C's of change play a major role in food marketing today.
Containers tie in closely with transportation changes, and the two together are extremely important in this country where much of our food is raised in areas distant from where it is consumed.

Computers are devices that allow us to think faster. With them we can count, remember, and recall faster and more effectively. Our food marketing system becomes more efficient with their use.

Convenience foods are a way of shifting preparation or processing time or labor from kitchens to factories. Where workers can specialize, there are distinct labor savings. First, let's discuss food containers with special reference to their use in transportation.

MODERN PEGASUS

In chess, a knight moves over the tops of other pieces. The similar movement of a jet cargo plane suggests that we think of one as a winged white knight. This modern day Pegasus could even be considered as a winged container.

How containers become mobile and are used to satisfy apparently simple consumer desires is best illustrated in a fictional—but potentially realistic—situation. Consider the can of mushroom soup at your local supermarket and how it got there.

At 8:07 one Tuesday morning the sales manager of a Pennsylvania mushroom growing firm receives a telephone call. It is from the purchasing agent of a California soup company whose firm has an emergency: "Can you ship us 22,500 pounds of fresh mushrooms tonight so they will arrive at our West Coast plant by noon tomorrow?"

Mentally, the sales manager pictures the air trip across country. He foresees two truck hauls—one from the mushroom farm to the airport and the other from the western airport to the mushroom processor. Two trucks and one plane will have to be loaded and unloaded. That's a lot of miles, a lot of handlings, many containers, and a lot of mushrooms—especially since the mushrooms have not yet been picked. He replies, "I'll call you back."

For a busy 45 minutes he checks current shipping schedules, prospective orders from nearby processors, and inventories. At the same time his office associate calls the cargo plane terminal and arranges for shipment. They check to see that their own truck and driver are available that night. Then they reserve a truck and a driver at the California end of the route. They also arrange for additional pickers, who will be assigned work stations as soon as the order is confirmed.

The sales manager returns the call, "We can have 22,500 pounds of fresh mushrooms arrive at your dock by noon tomorrow." The sales manager stresses that the price per pound of this particular air-shipped load will be considerably higher than if the same mushrooms were shipped by truck. The buyer assures him that air shipment is necessary because of the time element involved.

After the two men discuss grade and size, and types of containers, they agree upon the price.

This is an unusual order. Generally, the mushroom growing firm ships its West Coast orders by refrigerated trucks. So, the time pressure begins. At seven that morning the regular picking crew had begun filling their 10-pound plastic picking baskets. Now at nine o'clock extra pickers start work. By two that afternoon, the miner-lamped girls have harvested enough mushrooms to fill the special order.

A driver, skillfully weaving his tow tractor through the dark corridors, has been continuously hauling rubber-tired wagon loads of filled baskets to the refrigerated workroom. There white-uniformed girls sort, trim, grade, and pack the earthy-scented fungi into light-weight containers.

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These specially designed baskets move along a conveyor belt where a series of automated machines check-weigh, label, lid, pack them into their master cartons, and palletize them. A pallet is a rigid wooden frame on which packages of merchandise are packed together. This makes a unit load that can be handled by a fork truck.

While some women are still picking part of the mushroom order, other workers have started packing some for shipment. Mushrooms ready to go are placed in a room where vacuum equipment cools them to retain their freshness. By nightfall, the mushroom workers have the whole load chilled and ready for shipment.

A fork truck places the pallet loads into the prechilled refrigerated trailer. The driver, after getting his last minute instructions from the sales manager, heads his 40-foot trailer for the airport. His load will fill two-thirds of the plane's cargo hold.

The cargo plane stands by with attendant loading crew and specialized loading equipment. It, too, like the trailer, has been chilled to keep the mushrooms in near perfect condition. Warehousemen stack the filled cartons into dome-roofed shipping containers that resemble eskimo huts and are called "igloos" by the crew.

In a matter of minutes the crew has loaded the plane with its 12-igloo load, and by 11 p.m. it is winging westward. A five-hour trip puts the mushrooms at the San Francisco airport in the middle of the night. There the night crew quickly unloads the pallets from the plane and repacks it with a mixed load of artichokes, cut flowers, and lettuce destined for Newark.

Meanwhile, our perishable mushrooms have been loaded onto another refrigerated truck that had been arranged for the previous day. When readied, the driver starts his dawn run to the soup processing plant. Well before the Wednesday noon deadline the 11 1/2 tons of 24-hour-old mushrooms have arrived at the plant, and soup company warehousemen store them in refrigerated rooms. They are in prime condition and ready to be processed into cream of mushroom soup.

Several months later, a Tucson woman buys a can of mushroom soup—one from that particular day’s soup pack. To her it is an everyday occurrence, the hot item for tomorrow's lunch. The only container she comes in contact with is the 10 1/2-ounce soup can. But the many larger containers used in getting mushrooms from the Pennsylvania farm to the California processor assure her family of their bowl of mushroom soup. Because the fresh mushrooms were so quickly and carefully handled, the can of soup she now buys, months later, has the food quality she expects.

The West Coast food processor needed mushrooms to keep his 1,000 dozen cans per hour soup line operating. The purchasing agent for the company was not able to procure this large a quantity from mushroom growers nearby. Because of the speedy service, this hypothetical soup factory was able to maintain its production schedule—so important in modern day food processing operations.

Had it not been for the high speed transportation network, that day's 283,000 10 1/2-ounce cans of mushroom soup might not have been packed.

So, even though in this case airfreighting was considerably more expensive than comparable truck shipping would have been, the manager of the soup plant was justified in paying the extra transportation cost for the mushrooms.

Not only did he keep his soup line operating, but in doing so he was able to prevent lost mushroom soup sales that might have occurred if some grocery stores were to run out of stock. It is vital to a food processor to keep his brands stocked on store shelves. It is important to homemakers, as well.

Although the example we have discussed is partly fictional, it illustrates how various containers expand
the usefulness of transportation. Food packages not only make flying of food possible, but they are also necessary in many other marketing chores such as storing, advertising, and handling. Let's review some of the containers used in our mushroom story.

The mushrooms were picked into one type of basket. After being sorted and graded, they were packed in 10-pound plastic containers that keep bruising at a minimum.

These baskets were placed in master cartons that also protect the delicate contents. The pallet on which the cartons were loaded is a form of container as well.

Each truck handling the pallets, probably five or six in all, we call a wheeled box. Finally, the plane itself is a flying container. Then there's the 10½-ounce can. Two dozen of these cans were packed in a cardboard carton. These cartons were grouped on pallets for ease in storage and shipping.

The wheeled basket used by the woman in the Tucson store was a container, as was the brown bag used to pack her groceries. Her kids' tummies were the final containers these mushrooms had been aiming toward.

Special containers and the shorter travel time involved in air freight cut down on spoilage losses. Shipping damage may be less. If air freight rates become more competitive, and availability of service increases, additional foods may be shipped by air. All will need special containers.

So much for plane containers. How about containers used by our railroad system?

Like the consumer who finds economy in buying a large jar of jelly, a giant bag of potato chips, or jumbo boxes of dog food, so also trainmen like to use large food containers. Their new sizes include the 100 ton "big john" and 125 ton whopper-hopper railcars, Super C, and rent-a-train.

Yet another development somewhat new to food handling, although old hat to potato and grain carrying, is the unit train. All cars carry the same merchandise. Picture a trainload of purple plums from Idaho to the East Coast. Or one train, 50 hopper cars, of Montana wheat, carrying 5,000 tons to market.

Having their runs well planned in advance, these series of rolling containers reach their destinations with a minimum of stops.

Speaking of potatoes, an all steel car has been designed for the bulk shipment of potatoes. It is refrigerated with temperatures automatically controlled at either 40°F or 60°F, depending on whether the potatoes are to be table stock or "chippers." The car, still in experimental stage, holds 167,000 pounds. This is in contrast to the usual refrigerated car that holds 36,000 to 40,000 pounds.

A new concept, now being increasingly used for food, is the piggy back train. The idea is to use a highway truck trailer as a container, and ship it on a rail car. The advantages of country pickup, loading, unloading, and city delivery are obvious. Whole trains may be composed of these special flat cars. At present, these cars operating on American railroads carry 1 1/2 million truck trailers each year. Of course, not all of them carry food.

The newly-developed covered-hopper is also a container—so large that it covers a whole flat car. An advantage is that it may be taken off the car for loading, storage, or even for moving by other transportation means.

This hopper unit can carry over 100 tons of items like sugar, grain, or molasses. With loading through top hatches that can be battened down when the container car is full, the design minimizes contamination and loss as well as handling costs. At point of delivery, trap doors at the bottom of the hopper allow the contents to flow from the container-hopper into storage bins or tanks. Its future use is still uncertain since equipment to handle it is expensive.

Giant rail cars complement and bring about other rail innovations. Grain arriving at elevators in the new, larger railcars requires more time to
Left, fresh strawberries grown through plastic sheeting are picked in field, then rushed by truck to airport. Above, strawberries pass through an airline's Los Angeles terminal on way to east coast by jet. Below, cargo handler nets pallet load of strawberries for air shipment.
Fresh produce is either netted on pallets like cargo in foreground, or placed in “igloos” like one inside hatch of plane. Some growers prefer to lease their own igloos for direct loading at farm.

unload. So engineers invented large hydraulic lifts that tilt over a fully loaded railcar sideways and empty it in seconds. Another car is raised at a 60° angle, and its 100 tons of grain flow out one end of the car into a storage bin.

Handling innovations preserve the benefits of the large cargo carrying units. Hence, changes in food containers almost always lead to other changes in the food marketing system.

Most changes in containers and their handling methods take place behind the scenes. Thus, when a mother buys a cake in her local bakery she is mostly concerned with the quality, convenience, and price of the pastry she takes home to her family.

Package changes take place, nevertheless, for this is the way our American industrial system operates. Most container changes, no matter where they occur, lower marketing cost, provide some service that previously was impossible, or improve the product. So the cost, variety, and convenience of the housewife’s cake purchase depend somewhat upon the size or the shape of the containers that may have hauled the wheat in each stage of its movements.

The satisfaction she gets from the cake also depends on whether the egg handlers used specially designed containers, or whether or not the sugar in the cake’s icing was hauled in a hopper car. She is involved in the con-
COMPUTERS

Meanwhile, back to our chess game. The shiny white rook of modern food marketing, the computer, does not march forward one pace at a time as a mere pawn. In the last decade it has been striding forward in seven league boots. As one reflects on the computer's outer space accomplishments, we wonder whether it may do as much for our "inner-spaces"—our digestive system.

Computers promise a million-fold increase in man's capacity to handle information. Although just beginning widespread use in food handling, their potential in this field appears rewarding.

Perhaps more than any other single innovation, computers have the power to change our food marketing system beyond present comprehension. They have capacity to bring new orderliness to food distribution—previously inefficient because of its complexity and widespread geographical nature. Here are some current uses of computers.

Farmers are beginning to use computers for various farm tasks:
- They figure market averages that farmers hear on market newscasts.
- Farmers benefit by their weather predictions.
- They specify the blend of feeds used by broiler producers and cattle feedlot operators. Leased wire access to them helps these livestock managers find which feed ingredients to use—the ones that give them the lowest cost mix at the specified nutritional and caloric levels.
- A seed grower checks viability and genetic inheritance traits. In other laboratories, computers combine with electronic mechanisms to provide precise instrumentations.
- Processors and handlers find many uses for computers.
  - Millers use them to help tear wheat apart into its various protein, starch, gluten, and other components. Then, millers use computer formulas to assist putting the flour together again in the desired proportions.
  - A fruit cold storage warehouse computerizes management methods.
  - A meat packer uses computer services to determine various proportions of a carcass to be divided into the many cuts.
  - The soft drink industry finds wide use for computers in sales statistics, payrolls, billings, marketing statistics, sales analysis, and market research.
  - Computers process salary checks of food company employees.
  - A vegetable processor uses his computer to calculate acres needed to contract.
  - A citrus cooperative uses one to check inventory, sales distribution, and production statements.

A piggyback train load of refrigerated trailers moves into the Chicago area.
Food promoters, product developers, and sales agencies find them useful in getting news of their foods to the public.

A milk plant distributor computerized his delivery men's sales. Processing of billing gives milkmen more time to attend to customer needs.

Computers help a grocery manager decide how to manipulate stock on his shelves with the products most likely to be bought. This system, called COSMOS, is a means of planning the most effective merchandising for each product. The grocery manager thus is able to maximize revenues per unit of costly shelf space.

Computers help a food processor plan market strategies in his next market promotion.

A promoter uses his computer to analyze results of new foods in test markets.

In making a new food, recipes may be programmed mathematically by a computer. This new food development method is now being used to conceptualize analogs or "meat-substitute" type foods from soybeans.

A housewife of the future may use computer services in planning her week's meals—taking into account her husband's paycheck, the children's food likes, and the family's nutritional needs. In this way, both the meal and the food budget could be really balanced—in many ways.

Sometimes in a game of chess two pieces team up to increase their effectiveness. In marketing we also see interesting combinations of computers at work:

- At an airport cargo terminal, computers direct the breaking out of "hula huts," "igloos," or other palletized cargoes of food. The computer senses individual shipments and then directs them over computer-controlled conveyors to waiting trucks. These trucks make preassigned deliveries—based upon computer-selected schedules—which minimize delivery time and costs.

- Shipments of perishable foods concern marketers if there are sudden shifts in consumer buying patterns or delays in arrival of shipments. In these cases the marketing men need to know the precise whereabouts of their supplies that are in transit. Keeping tabs on a particular railcar, as it winds its way across a maze of trackage, would be virtually impossible were it not for the computer's ability to store and retrieve the necessary information at a moment's notice.

Color sensing devices, located trackside along the rail system, note the passing of each uniquely color-coded railcar. They then relay the pertinent information to the computer which, on command, provides necessary information to the marketer so he can do his planning.

**IMPACT OF CONVENIENCE**

If, in our game of food marketing, knights stand for airplanes, and rooks signify computers, what then might a queen symbolize? In chess, she sweeps clear across the board and can overcome in combat any other piece. So in food marketing the change having the greatest impact is the increased emphasis on convenience.

In foods, convenience is anything that saves time or labor on the user's part. It could be a new container, like a strip pull can or a multiwall pouch. Or it may be the newly-developed instant sweetpotatoes that don't have to be cooked. It may even be a deboned pork loin or a cooked rump roast.

An everyday example of a convenience food that has been around for decades is bakery bread. Bread has changed its coat of convenience over the years. First it was unwrapped, then wrapped, then sliced, then made in sandwich size, and so on. We take other convenience pastries for granted: ready-made doughnuts, cakes, pies, cream puffs, and tarts as well as rolls, muffins, buns, and biscuits. Even cracker and bread crumbs now are purchased ready made. Many bakery items may now be purchased ready to bake.

Other common examples of old
standby convenience foods that save
the user's time and labor include:
dried soups and stews, casseroles, free
flowing brown sugar, a variety of
snacks, dips, and instant hot cereals.

Meat convenience items are so
handy that we forget that the "good
old preconvenience days" were also
work-filled days for the food preparers
of that age. Imagine, if you will, a
modern man curing bacon or ham for
his family's use. Can you picture his
modern wife stuffing sausage or stirring
scrapple? How many make ketchup,
apple butter, or even root beer at
home these days?

Formerly, most food preparation
people worked in the kitchen of the
place where the food was served. Now,
relatively more people work in the
"kitchens" of food processing
plants.

This is what convenience foods are
all about: some of the food preparation
work is done at central places where
the work may be done more efficient-
ly—and generally at lower costs. Ad-
vantages of this changeover from home
kitchen to processing plant are not
always obvious, but they are there
nevertheless. How are the various
groups of people affected?

The housewife
has less work to do in
her kitchen. She now can prepare her
meals faster and they involve less skill
on her part. This leaves her a choice of
working, if she chooses, or engaging
in recreational activities, or even doing
other housework.

Because she now does little or no
preserving (canning, drying, curing,
pickling, or freezing) of the family
food, this also gives her more free time
for other activities.

Members of her family now eat a
greater variety of foods than they
would if all were prepared or processed
by mother. Because they eat more
processed foods than formerly, their
eating patterns change.

The farmer
now sells more of his
produce to processors. In many cases
the processor arranges with him on
what to grow, when to plant it, how
to take care of it, when and how to
harvest it, and where to deliver it. The
processor may even supply the farmer
with some of the capital, equipment,
labor, seed, feed, or livestock.

Thus, the modern farmer is tied
much more directly to the processor
who is more quality-, quantity-, and
economy-minded, as well as uniform-
ity-minded.

The processor, in turn, is tied more
closely to the wants and desires of the
consumer. He performs more of the
preparation chores formerly performed
by food workers in the kitchen—
housewife or chef, as the case may be.

Now a team of food researchers
design the food and its container. Economists test it in the market and
make estimates of its future volume.
Food engineers buy or build equip-
ment to produce it. Finally, after
many other steps, specialized workers
prepare the food by preserving, cook-
ing, seasoning, coloring, and other-
wise making it table-ready.

The processor finds that in order to
get the quality, supply, and uniformity
he wants, he needs some control of
food production. Thus, he may con-
tract some raw product ingredients
(as broilers, peas, or potatoes), or he
may grow his own product (for ex-
ample, large scale mushroom proces-
sors have their own mushroom farms).

Institutions use convenience food in
increasing quantities to save labor.
Although many convenience foods are
designed with the housewife in mind,
some convenience items attain their
market success in the away-from-home
eating market.

Restaurants, institutions, plant and
school cafeterias, hospitals, and dor-
mitories use dehydrated potatoes,
portion-controlled meats, vegetable
flakes, frozen vegetables, and dairy
products that are specifically manu-
factured to save labor in away-from-
home kitchens. This has happened
because in recent years keeping kitchen
help—whether it be in a hotel or fast
food unit—is a primary problem.

Labor governs, in some degree,
which foods are served in these
establishments. Workers do this not
by taking management's role, but by being expensive and/or unavailable. Management of food service units shun foods that require a great amount of preparation labor. A transition from kitchen labor to convenience items may be illustrated.

A plant cafeteria, with a food preparation staff of 10, prepares 2,500 entrees a day for employees of the factory. If, for some reason or other, one cafeteria worker quits, what happens?

In the usual course of events another person would be hired to replace him. But kitchen help is not easy to find, because of low wages, long hours, and the hard work. The
manager seeks another alternative. The cafeteria cannot serve 10 percent fewer meals to adjust to the 10 percent decreased size of the work force, so it adjusts another way—by buying more prepared foods. Simple!

The particular convenience foods the manager selects depend on the degree of preparation of the foods he is now using, the ones available to him as substitutes, the particular job of the man who left, and many other factors.

If the man who quit was a vegetable peeler, it would be natural to substitute prepared potato products and frozen vegetables. Fortunately for this imaginary cafeteria, there are many processed potatoes and frozen vegetables available.

Hundreds of partially or fully-prepared products of this type are available to institutions. Some items are canned, some frozen, and others dehydrated.

A frozen turkey roll may replace a whole turkey that formerly had to be thawed, stuffed, and baked. The kitchen could make use of cut up chicken pieces rather than whole broilers. A deboned, fully cooked ham may be used instead of a standard ham. Prefried bacon substitutes for regular bacon. Already breaded veal cutlets may be purchased. Many institutional kitchens have discontinued all meat cutting.

Rolls can be purchased from a bakery rather than baked at the plant. Instant iced tea mix becomes a regular menu item. The cafeteria can use dehydrated or frozen prepared scrambled eggs. Ready made soups, stews, hash, and countless other mixes are available to institutional outlets.

Generally, substitutes raise the cost of food purchased. But in substituting labor-saving items in each meal's menu, the manager of the cafeteria finds he now can do without the tenth man who has been replaced by prepared foods. The kitchen manager maintains about the same level of service to the same number of customers, by having some service work done outside his own kitchen.

This is a remarkable achievement, and is possible because of the wide range of convenience foods available. Institutional managers do it out of necessity. Housewives also do it, because they would rather do other things than work in a kitchen—if given a choice. Now they are being given this choice.

Like the positions and pieces in our heroic-size chess game, the convenience queen, container knights, and computer rooks constantly bring changes into our lives. The pace may slow, then quicken, but in food marketing one innovation follows another. The game of food marketing becomes more interesting as we learn more about it.

LONG, LONG BATTLE AGAINST BIG ODDS:
THE DIARY OF A NEW LOW-CAL FOOD

In our food system a striking achievement is taking place. This is the increasing number of new foods being placed on the market. Arising from our expanding technology and drive for progress, these innovative items appear at our grocer's as if by magic.

If we look closer, however, we find that workers in the food industry use a lot of imagination and years of diligent efforts to get these new foods developed and on the supermarket shelves. How does all this take place?

To see what happens and how long it takes, let's follow the developing and marketing of one new food. Our example is the market genesis of a new low-calorie bread—the realization of a fat man's dream. Does this sound