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Report to the Congress; by Elmer B. Staats, Comptroller General.

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The cost of food distribution is an important element in food costs. Processed and fresh products for retail sale are transported in shipping containers to their destinations. The variety of container sizes and shapes has made it difficult to develop efficient handling techniques. Findings/Conclusions: Modularization, a concept that geometrically relates food shipping container sizes to one another, offers a way of reducing food costs. This concept has been used in European countries with good results, but little has been done in the United States to implement such standardization. If used, it would permit more efficient transportation and handling of goods, eliminating wasted space and resulting in less damage to goods. Because of diverse package sizes and large capital investments in the packaging industry, modularization can involve high initial equipment costs, but costs can be reduced as size changes are coordinated with new products and normal equipment replacement. Manufacturers would bear the greatest burden of conversion costs and benefit least, while wholesalers would benefit most. Conversion to the metric system would simplify geometric relationships which could help in modularization. If the food industry should convert to the metric system, some manufacturers may design new packages in modular units. Increased food system efficiency could lead to lower food prices, but with neither Government nor industry promoting modularization, this is unlikely. Recommendations: The Department of Agriculture should initiate the advancement of modularization and enlist the participation of the food industry. Such an effort should include: identifying and quantifying costs and benefits of modularization, determining the most feasible method to coordinate modularization with industry changes, exploring with the food industry what further steps may be necessary, and obtaining the assistance of the

National Bureau of Standards. The U.S. Metric Board, when formed, should consider modularization in actions to change food package sizes. The Congress should examine the status of efforts to coordinate metrication and modularization and examine food industry progress toward modularization. (HIW)

BY THE COMPTROLLER GENERAL

Report To The Congress

OF THE UNITED STATES

Redesigning Shipping Containers To Reduce Food Costs

The Federal Government spent an estimated $10.3 billion for food in fiscal year 1977. This amount can be reduced by using "modularization"--a system geometrically relating the size of food shipping containers to one another. Benefits include reduced damage, increased productivity, and possibly lower prices to the consumer.

Benefits from this system have been realized in European countries, but little is being done within the United States.

To encourage Government-industry awareness of this efficiency opportunity, GAO recommends that:

--The Department of Agriculture take the initiative in advancing understanding of modularization.

--The U.S. Metric Board consider modularization in any metrication actions to change package sizes in the food industry.

--The Congress include testimony on modularization efforts in any consideration of food marketing and prices.

CED-78-81

APRIL 28, 1978

COMPTROLLER GENERAL OF THE UNITED STATES
WASHINGTON, D.C. 20548

B-114824

To the President of the Senate and the
Speaker of the House of Representatives

This report discusses redesigning food shipping containers to increase efficiency in food distribution to reduce the cost of food to both Government and the consumer. It reviews the activities and views of several agencies, including the Department of Agriculture; the National Center for Productivity and Quality of Working Life; and the National Bureau of Standards, Department of Commerce, regarding this redesigning, which is called modularization.

We made the review to assist the Congress in identifying opportunities to reduce food costs.

We made our review pursuant to the Budget and Accounting Act, 1921 (31 U.S.C. 53), and the Accounting and Auditing Act of 1950 (31 U.S.C. 67).

We are sending copies of this report to the Director, Office of Management and Budget; the Secretaries of Agriculture and Commerce; the Chairman, U.S. Metric Board; and the Executive Director, National Center for Productivity and Quality of Working Life.

Comptroller General
of the United States

D I G E S T

Modularization, a concept that geometrically relates food shipping container sizes to one another, offers a way of reducing food costs in the United States.

The Federal Government, wholesalers, and retailers, as major purchasers of food, can benefit substantially from this system in

--increased productivity,

--reduced damage, and

--possible cost savings.

Modularization has been used in European countries with good results. However, little has been done in the United States to implement the concept. If this standard system of food packaging were used, it would permit more efficient transportation and handling of goods. Small, medium, and large cartons of food could be loaded and interrelated onto the same platform, or pallet, thus eliminating wasted space and allowing more efficient transporting of goods and less damage by

--relating all container sizes to one or more basic unit load sizes,

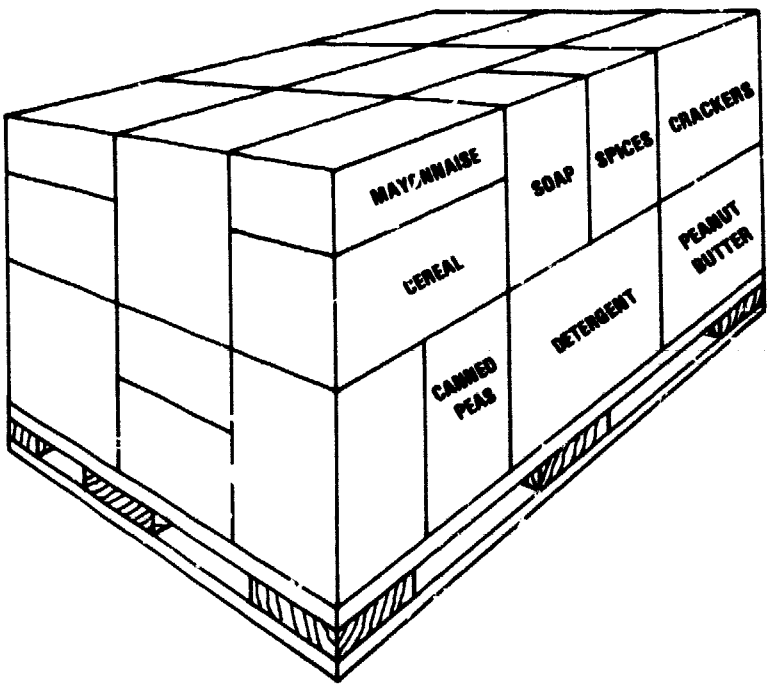
--relating all container sizes to other container sizes, and

--limiting sizes so that they may be easily related.

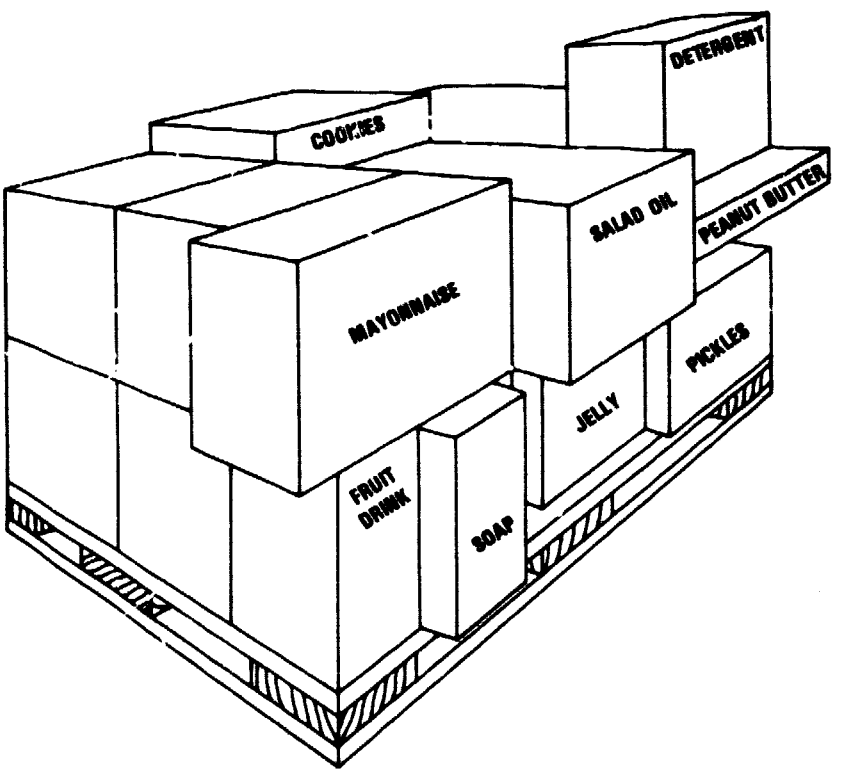
See the following illustrations.

Because of diverse package sizes and large capital investments in the packaging industry, modularization can involve high initial equipment costs. However, the costs can be greatly reduced as size changes are coordinated with new product introductions and normal equipment replacement. Conversion costs would be borne primarily by the manufacturer,

A MODULAR PALLET LOAD



A NONMODULAR PALLET LOAD



who will benefit least and who fears loss of marketing flexibility. The wholesaler and retailer, who do not purchase such equipment, would benefit most. The latter two have recommended that the Government actively promote modularization because of its role as the largest single food wholesaler and retailer customer.

THE FEDERAL GOVERNMENT'S ROLE IN MODULARIZATION

In 1975 the Congress enacted the Metric Conversion Act. The possibility of this conversion can provide for simplified geometric relationships which would be a direct application of modularization. If the food industry should convert to the metric system, some manufacturers may design new packages. Simultaneously designing these packages in modular units would be cost effective and involve little or no extra capital cost.

Increased food system efficiency could lead to lower food prices, increased purchasing power of Federal funds for food programs, and more food eligible for purchase at any given funding level. But with neither Government nor industry promoting modularization, this is unlikely.

RECOMMENDATIONS

The Department of Agriculture, as the principal agency responsible for food, should initiate the advancement of modularization and enlist full participation of the food industry. Any such effort should include:

--Identifying and quantifying the costs and benefits of modularization.

--Determining the most feasible method to coordinate modularization with industry changes, such as new product introductions, normal equipment replacement, and possible metric conversion.

--Exploring with the food industry what further steps may be necessary to spur progress.

It should also obtain the assistance of the National Bureau of Standards.

The U.S. Metric Board, when formed, should consider modularization in any metrication actions to change package sizes in the food industry.

MATTERS FOR CONSIDERATION BY THE CONGRESS

The Metric Conversion Act directs the U.S. Metric Board to encourage standardization organizations to promote rationalization or simplification of packaging relationships and the reduction of size variations. GAO believes modularization provides such an opportunity. In any future consideration of metrication in the food industry, the Congress should examine the status of efforts to coordinate metrication and modularization to determine if this opportunity is being used.

Modularization promises important benefits for the food system. This could result in lower food prices--a subject of concern to the Congress. In any future consideration of food prices and food marketing, the Congress should examine food industry progress toward modularization as a means of increasing food marketing efficiency and reducing food prices.

AGENCY COMMENTS

The Food Safety and Quality Service of the Department of Agriculture concurs with the theme of the report and believes that modularization would reduce food costs and that the Department is the logical lead agency.

The Science and Education Administration, Department of Agriculture, says that the report is essentially correct in its analysis of modularization and its benefits. Department officials have been considering changing specifications for standardized containers to be used in Federal procurement operations and plan to do so where feasible.

Contents

ABBREVIATIONS

AMS	Agricultural Marketing Service
ANSI	American National Standards Institute
ARS	Agricultural Research Service
ASCS	Agricultural Stabilization and Conservation Service
DOD	Department of Defense
ERS	Economic Research Service
FPLA	Fair Packaging and Labeling Act
FTC	Federal Trade Commission
GSA	General Services Administration
ISO	International Standards Organization
MH	Material Handling
NAFC	National Association of Food Chains
NBS	National Bureau of Standards
SIAS	Standards Information and Analysis Section
SMI	Super Market Institute
SSRG	Swiss Society for the Study of Rationalized Materials Handling
USDA	U.S. Department of Agriculture
VA	Veterans Administration
VPS	Voluntary Product Standards

CHAPTER 1

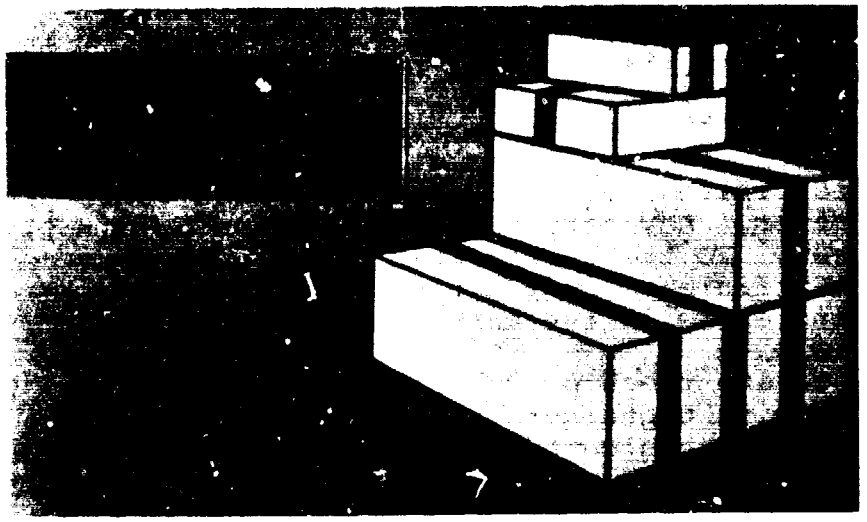
INTRODUCTION

According to Bureau of Labor Statistics' data, food distribution productivity declined at an annual average rate of 1 percent between 1970 and 1975 and ranked 60th of 64 industries studied by the Bureau. A key element of the U.S. food system is the movement of products from the farm to the consumer. Latest U.S. Department of Agriculture (USDA) data shows the cost of marketing U.S. farm-produced food as 67 cents of every $1 spent. The total marketing bill was $116 billion for 1976, compared with $57.1 billion 10 years earlier. Key components of the marketing bill rise each year. To the extent that the food system can be made more efficient, cost savings will occur which can offset increases in the marketing bill for food.

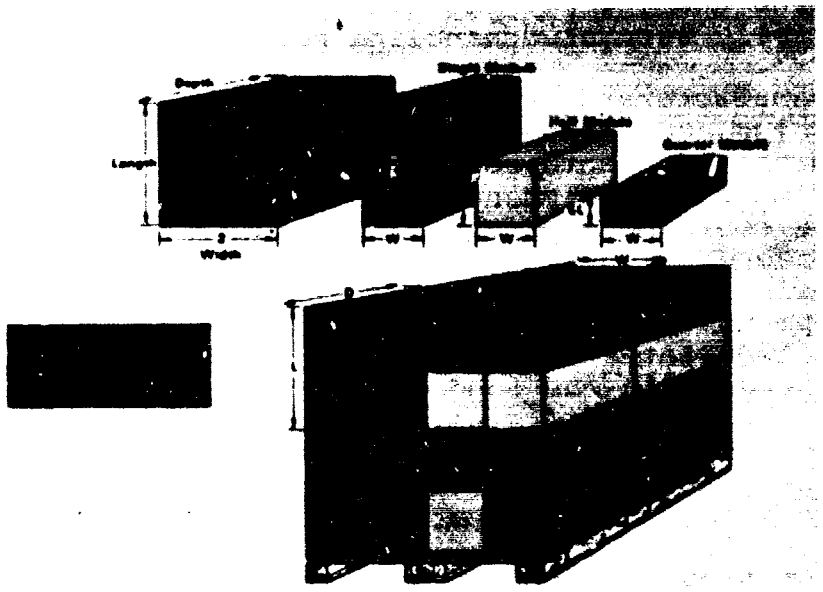
Processed and fresh products for retail sale are transported in shipping containers to the point of ultimate sale--the food store. These containers come in a wide variety of sizes and shapes, and few are identical. In addition to many individual products being packaged in different size containers, some same size product may come in a variety of shipping container sizes. The variety of container sizes can inhibit productivity growth and forestall technological improvements because they require additional steps in warehouse handling and make it difficult, if not impossible, to develop fully automated handling equipment.

Food manufacturers have considerable capital invested in food processing and packaging equipment. To reduce the number of different containers would require adjustment or replacement of this equipment at considerable expense. This expense could be substantially reduced if changes in sizes were coordinated with other normally occurring industry changes, such as new product introduction and normal equipment replacement. With the future possibility that the United States may convert to the metric system, the rate of change in the food industry, if it also adopts metrication, may accelerate as products are packaged in metric sizes. Rationalizing the variety of sizes, through a concept known as modularization, can be accomplished as part of size changes for any other reason. Failure to explore the full benefits and costs of this rationalization and, if found justified, to develop a plan to establish and implement a modular system can result in the loss of a significant opportunity to improve food system functioning and ultimately generate savings to both the Government and individual consumers in the purchase of food. These explorations may

THE MODULARIZATION CONCEPT



A NON MODULAR PALLET LOAD



A MODULAR PALLET LOAD

require Government to act as the catalyst to unite the parties that must cooperate in any modularization effort.

WHAT IS MODULARIZATION?

Modularization refers to sizing shipping containers in geometric proportion to each other. Illustration I shows the concept graphically. Modularization has been defined to include:

--Relating all container sizes to one or more basic unit load sizes, such as a pallet.

--Relating all container sizes to other container sizes by standard fractions of the unit load size (1/2, 1/4, 1/8).

--Limiting sizes so that they may be easily related.

Modularization offers an opportunity to improve the operation of the food distribution system, both in the Federal Government and the private sector, by

--increasing productivity,

--reducing product damage, and

--improving space utilization.

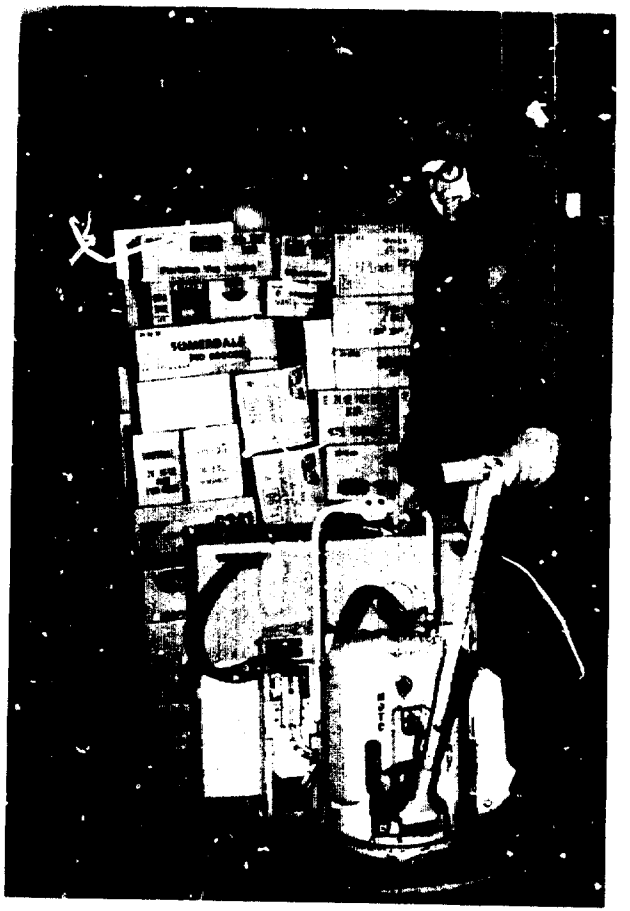
Shipping containers are designed to encase the primary consumer packages they contain, leaving as little empty space as possible. Currently substantial diversity exists in the number of food industry shipping containers. An actual count of shipping container sizes by the A.C. Nielson, Co. showed 2,587 different shipping containers in the dry goods section of a warehouse stocking 5,000 items. These shipping containers come from the manufacturer in uniform unit loads since a load consists of only one container size, as shown in Illustration II. At a wholesaler or retailer warehouse different carton sizes are mixed in preparing shipments to individual food stores, which are the final link in the food chain. This mixing, shown in Illustration III, affects food distribution system efficiency.

ILLUSTRATION II

LEAVING THE FOOD MANUFACTURER, THERE IS NORMALLY ONLY ONE PRODUCT ON A PALLET, RESULTING IN A LOAD THAT IS STABLE, HAS LITTLE OR NO WASTED SPACE AND IS EASY TO ASSEMBLE.

Courtesy Progressive Grocer Magazine

ILLUSTRATION III



AT A WHOLESALER OR RETAILER WAREHOUSE MANY PRODUCTS ARE MIXED TOGETHER FOR SHIPMENT TO INDIVIDUAL FOOD STORES, WITH THE DIFFERENT PRODUCT CARTONS NOT FITTING TOGETHER WELL, LEADING TO UNSTABLE LOADS, INEFFICIENT USE OF SPACE AND MORE WORK IN ASSEMBLING SHIPMENTS.

Courtesy Food Marketing Institute

Several USDA studies on the shipment of fresh produce and meat show that shipping containers in use today don't make the most efficient use of space and conclude that standardization offers substantial savings. Government, as a major purchaser of food, both directly and through cash grants, can benefit from any savings generated by modularization, as can consumers. Federal agencies involved in food distribution productivity, such as USDA and the National Center for Productivity and Quality of Working Life, or in standardization efforts, such as the National Bureau of Standards (NBS), can be catalysts for cost-saving improvements. This report will assess Federal efforts to achieve modularization, review its potential, and discuss possible impediments.

SCOPE OF REVIEW

In conducting this study we met with officials of USDA, the Department of Defense, NBS, General Services Administration (GSA), Office of Management and Budget, and the National Center for Productivity and Quality of Working Life to discuss Federal involvement. We also spoke with representatives of the Departments of Labor; Commerce; the Interior; Transportation; Justice; Health, Education, and Welfare; and the Veterans Administration (VA); which also purchase food. To review the potential for modularization, we interviewed 12 food retailers, 8 food wholesalers, 20 food manufacturers, and 4 packaging material manufacturers. Firms were chosen from various geographic areas of the country and to include large and small firms. We interviewed Government and industry officials in two countries--Sweden and Switzerland--about their experience with modularization. We met with officials of the Department of Justice and the Federal Trade Commission (FTC) to discuss possible impediments and to explore the antitrust aspects of industry standardization efforts. We also met with officials of the American National Standards Institute (ANSI), a federation of organizations and companies interested in standards.

CHAPTER 2

POTENTIAL BENEFITS OF MODULARIZATION

In the private sector, most wholesalers and retailers we interviewed said modularization would increase productivity, reduce damage, and improve space use. Improved productivity was forecast for order selecting and truck loading and unloading with further gains possible from the greater automation that modularization would permit. Manufacturers also predicted some benefits, including decreasing loading time in shipping and receiving and reducing inventories of product or packaging materials, but felt that they would bear the costs of converting container sizes to a modular system with most benefits going to wholesalers and retailers.

In balance, however, if the overall food system stands to benefit from modularization, we believe it merits further consideration.

WHOLESALERS/RETAILERS EXPECT MOST GAINS

Responses about benefits were grouped under three headings:

--Productivity gains.

--Reduced damage.

--Better space use.

Opinion varied as to potential savings within these areas. One company representative felt increased selecting line productivity would provide one-half of the savings, and improved truck-space use and damage reduction would each account for one-quarter. A spokesman for a second company felt warehouse space savings were the most important benefit and then damage reduction and an overall efficiency increase. A third ranked damage reduction as the greatest benefit, followed by efficiency in warehouse and truck space and faster inventory control. A representative of a large wholesaler noted that distribution comprises 85 percent of wholesaler operating costs, with 50 percent of that for order selecting. As such, he views modularization as the single most important influence that could affect the wholesale grocery industry.

Many benefits expected

Table 1 summarizes the benefits anticipated by wholesalers and retailers. Improved selecting is forecast to be one modularization benefit. Grocery warehouses usually receive merchandise in complete pallet loads, that is, one product filling an entire pallet. Received goods are then stored. Individual stores' shipment orders are prepared by selecting desired quantities from storage and placing them on pallets or rolling carts. This is known as order selecting. In preparing orders, a selector must assemble an array of shipping container sizes which do not fit together well. Building stable pallet or cart loads takes time as does using space more efficiently. These delays cause the selection of fewer cases in a given period.

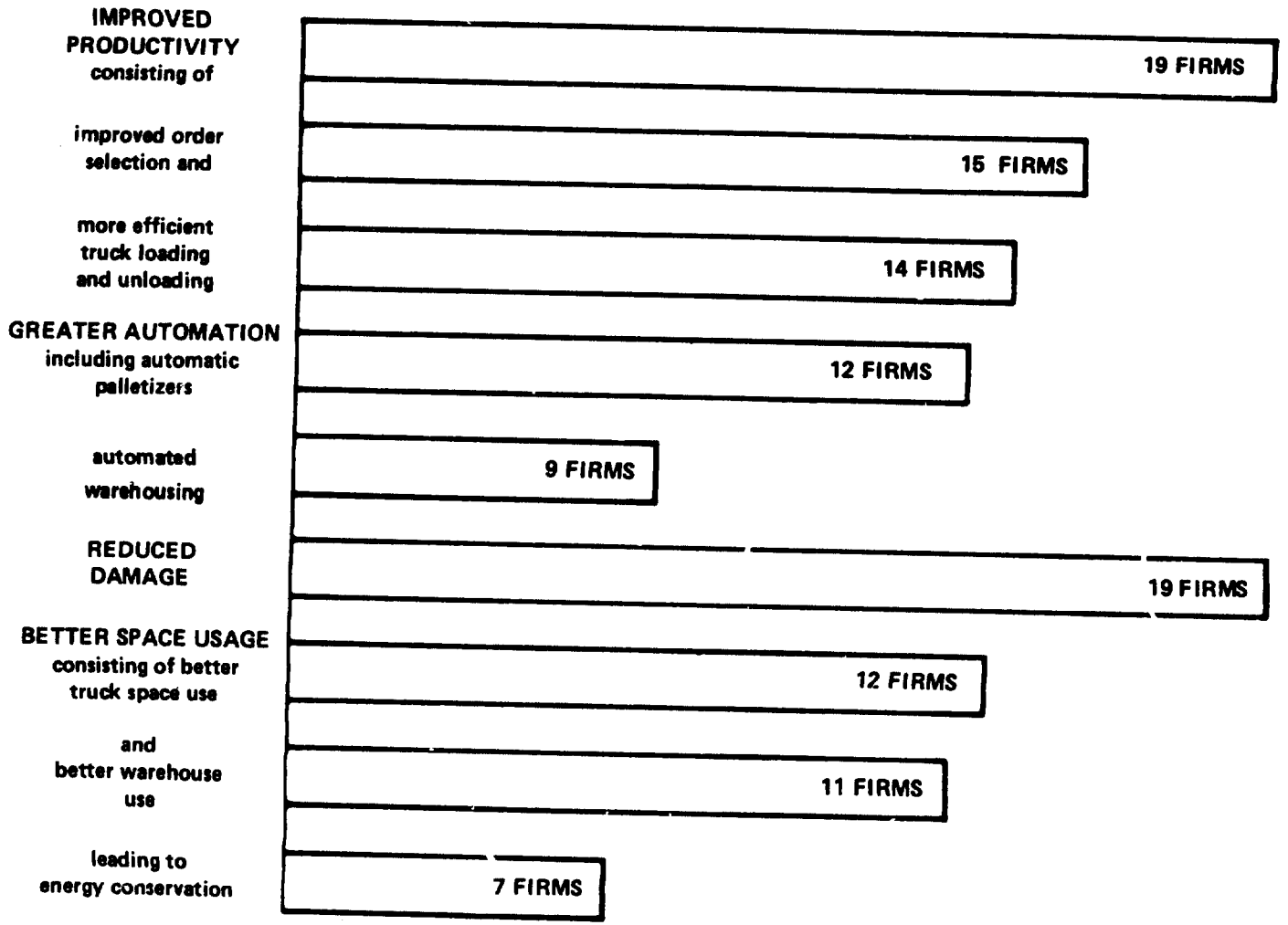
Comments point toward quicker assembly of pallet loads and less time building and rehandling loads to maximize cart use as a result of modularization. Several firms estimated potential productivity improvement. One could see 8- to 12-percent improvement, or an increase of 10 to 15 cases handled per staff hour. Another predicted a 10- to 15-percent selecting time savings. A third firm predicted 20-percent improvement, which would save a penny a case in order selecting.

A study entitled, "An Examination of the Effect of Modularization of Secondary Containers on Productivity in Grocery Distribution," conducted by Arthur D. Little, Inc., for the National Association of Food Chains, examined potential benefits of modularization.

The study estimates a possible 10- to 16-percent improvement in gross productivity in manual warehouses. For mechanized warehouses, where cases are removed from a conveyer belt onto a pallet, the study estimates a minimum 15-percent savings potential for order assembly with potential savings as high as 50 percent. The study notes that one distribution manager with a mechanized warehouse said that order assembly productivity goes up 25 percent during peak summer months when sales of soft drinks, which have few carton sizes, are high.

Another anticipated benefit is more efficient truck loading and unloading. A sample of comments indicated this would decrease loading dock hours and thus reduce overtime and lead to more efficient loading and unloading due to more stable loads. The previously mentioned Arthur D. Little, Inc., study also addressed loading productivity, estimating an improvement of loading activity between 20 to 50 percent.

TABLE I. WHOLESALER/RETAILER BENEFITS OF MODULARIZATION BASED ON INTERVIEWS WITH 20 WHOLESALERS AND RETAILERS[1/]



[1/] Many firms indicated benefits in more than one area, so totals should not be considered as adding.

Automation seen promising

An automatic palletizer is a machine that aggregates containers in a fixed pattern and loads a pallet. Food industry manufacturers use them to automatically palletize containers of the same product. One retailer said palletizers now handle four container sizes. For modular containers he predicted they could handle 15 to 20 related sizes. Almost two-thirds of the wholesalers and retailers interviewed thought modularization would make automatic palletizing more likely.

Automated warehouses use machines to select and palletize containers, increasing the speed of order selecting. The food distribution industry has built some semiautomated warehouses which automatically select products and route them by conveyor belt to a loading point. Products are then removed manually and stocked on carts or pallets. Modularization, according to almost half the wholesalers and retailers interviewed, would increase chances for automated warehousing. One retailer said automated warehousing has been unsuccessful to date due to the many different container sizes in the industry. One wholesaler estimated automated warehousing and palletizing could increase the order selecting rate from 180 to 400 cases an hour. Based on this, we could estimate annual savings of $4.9 million for this company.

The Arthur D. Little study found order assembly as the bottleneck operation in both the mechanized and automated warehouses studied. The report states that:

> "Cases are manually taken off the conveyor and hand stacked on pallets or carts or even on the floor in the trailer. The two leading producers of 'automated warehouses' indicate their systems cannot operate at peak or even at reasonably high speeds because the order assemblers cannot keep pace with order selection, whether it is batch picking or automatic. Obviously, productivity could be substantially increased if this operation could be mechanized with automated palletizers and limitations to order selection speeds would be potentially eliminated.
>
> "Warehouse equipment and automated palletizer manufacturers indicate with good reason that with approximately 2,400 sizes of cartons in the grocery distribution center, it is quite impossible

to contemplate automating this procedure. They also indicate that if a system of modularization could provide a reasonable number of sizes, such as 20 to 30, current technology could be applied to palletize the orders automatically * * *.

"This technology is already in use in plants that use as many as 15 different shipping container sizes, though variations of carton size are usually limited to three or four per automated palletizer. The object is obviously to provide a mixed pallet load in products that cannot be shipped in full pallet quantities.

"Typically, an automated palletizer costs between $30,000 and $40,000. One machine usually replaces two men earning $10,000 to $12,000 per year. Hand loading is rated by the palletizer manufacturers at 12 cases per minute but is much lower if loading onto pallets. Existing automated palletizers average about 36 cases per minute. On a single shift basis, the unit is paid off in an 18 to 24 month period; on a two shift basis that would be cut in half.

"For a grocery warehouse with modular secondary case sizes, it would be necessary to develop new equipment to handle as many as 15 or 20 different case sizes simultaneously on a single unit."

It should be noted that this report was dated August 1974, so dollar figures today are probably higher.

Modularization may provide a range of distribution system efficiencies. In addition to automated warehousing and palletizing, it increases the possibility of shelf "cartridge loading," that is, automatic shelf stocking, and more efficient use of automated warehousing equipment since each slide could always be stocked. Computers would track products in each slide. Additionally, other improvements may result from fewer sizes.

Reduced damage likely

Wholesale and retail product damage is a serious concern in the food industry. Our recent report "Food Waste:

An Opportunity To Improve Resource Use," CED-77-118, September 16, 1977, estimates wholesale and retail loss in 1974 of $6.2 billion. This includes both breakage and spoilage. The report notes that some more important wholesale and retail factors are

--damage of commodities in bags and bales and

--broken containers.

Almost all wholesalers and retailers contacted said they believed modularization would reduce damage, especially by eliminating package overhang and creating more stable loads. Overhang occurs when a load extends beyond the edges of the pallet. In addition, package damage from tears in bagged goods and other breakage would decrease if packages were modular and pallet space was used more economically. The Arthur D. Little study addresses damage. It recognizes that modularization will not eliminate all damage but estimates a potential reduction in total warehouse damage of 21 to 29 percent. Some savings are also expected from reducing store delivery damage for most shipment methods.

Better use of trucks and warehouses

Better use of trucks and warehouses is another predicted benefit. Hopefully, modularization would increase load amounts carried by trucks up to State roadway regulation weight limits. If a truck reaches the maximum permissible weight before it is completely filled, it is said to be "weighed out." Even with modularization, a truck in this situation could not hold additional load because the extra weight would exceed the limit. On the other hand, if a truck is filled before reaching this weight limit, it is said to have "cubed out." In this case, if merchandise could be more efficiently loaded on trucks, more space could be used without exceeding the weight limit.

Some of those responding cited statistics on how many trucks now "cube out" before they "weigh out." One said that 10 percent of trucks weigh out, and 30 to 40 percent cube out; another that its trucks were weight limited on 75 to 80 percent of runs. A third firm said its cube space was limited on more than 50 percent of miles driven, and it expects more load per unit mile with modularization.

Some wholesalers and retailers anticipate more efficient cube space use not only in trucks and warehouses but also in railcars and frozen storage warehouses. Seven firm representatives also listed energy conservation as a byproduct of modularization.

Other benefits and comments

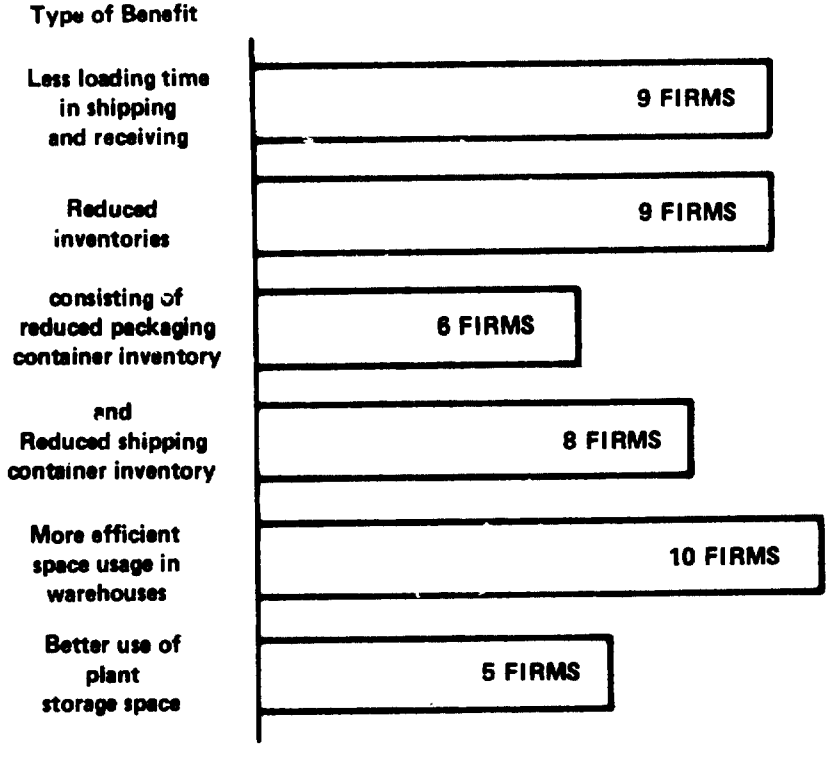
Besides commenting on damage reduction and better space usage, wholesalers and retailers had other suggestions. One respondent said a trial warehouse using modular containers could demonstrate benefits; another stated modularization would be "a point of minimum interference," that is, a level at which "commonality" (commonness, universalness) can be introduced into the food industry without significantly limiting companies' freedom to design package shapes or sizes and also allowing for various wholesaler handling procedures. Any additional standardization restrictions would create tremendous industry opposition.

Certain firms introduced other benefit ideas. One hoped for better inventory control because carton faces would be easier to see. Another expanded on a backroom space idea and suggested modules programed directly to the sales floor be used to form a prepriced standard display. Shelves would be constructed to accept a standard case or half case facing. Another firm agreed that better retail shelf use will result if the primary package changes with modularization. Still another representative believes modularization may eliminate the pallet and the secondary carton and eventually lead to shrink-wrapped unitized loads of primary packages. This would save money and energy.

MANUFACTURERS LESS OPTIMISTIC ABOUT BENEFITS

Table 2 summarizes manufacturers responses on benefits. Manufacturers' feelings on benefits potential were split. Of 19 firms answering, 8 hoped for some benefits, and 11 saw none or no significant benefits. Even manufacturers who saw some benefits in modularization felt their industry would bear the cost while most benefits would go to wholesalers and retailers. One firm, which listed benefits in warehousing transportation and less damage, stated direct costs for the manufacturer would be greater than direct benefits, and, therefore, before implementation, manufacturing industry benefits must be evaluated.

TABLE 2. MANUFACTURERS BENEFITS OF MODULARIZATION BASED ON INTERVIEWS WITH 20 FOOD MANUFACTURERS[1/]



1/ Many firms indicated benefits in more than one area, so totals should not be considered as adding.

More efficiency in loading operations

Despite the manufacturers' reservations, they will accrue many real benefits from modularization. One benefit would be a decrease in loading time in shipping and receiving. One manufacturer said that one driver earning $5 an hour operating a forklift could load a truck trailer in about 45 minutes with a palletized load of standard size secondary containers. However, without modularization, this process requires five men working 2 hours each to load a trailer with irregularly sized boxes. Here modularization would produce a labor cost savings of $45 a truck load. Another manufacturer said that palletizing one of its products would increase output from 1,000 cases an hour to 4,000. However, this change would have little impact since this product represents only 5 percent of total sales.

Other benefits noted included reducing trailer turnaround time and increasing products per delivery vehicle, thereby increasing truck space efficiency.

Longer production runs seen

A major part of the manufacturing process is running the production line to produce a product. The more of a particular product run through a line, the more per unit cost is reduced. If modularization reduces the number of product sizes, longer runs will be possible for any given product.

Although manufacturers had few comments on longer production runs, the potential cost-saving impact is evident. One manufacturer did state that longer production runs would decrease costs for secondary containers because of fewer secondary container sizes. Another said it would benefit from longer production runs because can sizes would be changed less often. Eliminating one can by modularization could save this firm as much as 20 percent in production costs; two cans as much as 30 percent.

Reduced inventories expected

Of 10 firms responding about reduced inventories, only 1 felt product, packaging, and shipping container inventories were independent of the modularization and standardization of secondary containers. All the others saw inventory benefits.

Those commenting felt modularization would reduce processed product inventories, in part because of more efficient distribution and because if modularization reduced

the number of can sizes, labels and label inventory would also be reduced. One large corporation representative felt that packaging inventory savings would be minimal, with a rough estimate of $1 million out of $3 billion in sales.

With respect to reduced shipping container inventories, reduction could cut 5 percent from total product cost for one firm. This would be the effect of using only one container size. Another stated that if container printing is done in-house and modularization leads to fewer sizes, some savings are possible. Three others mentioned inplant printing of containers as a possible savings factor.

Other benefits to manufacturers

The manufacturing firms cited a number of other potential benefits from modularization, including more efficient space use in warehouses and better use of plant storage space. One firm hopes for "astronomical" savings at distribution centers. Another noted that better warehouse use will result from less "underhang" (empty pallet space) and less "overhang," permitting more efficient slot design. One estimated up to a 10-percent savings in plant storage space.

In the area of reduced packaging machinery investment, three firms said they hoped for such benefits from modularization. One said its investment would decrease as a direct function of fewer primary and secondary container sizes. Another sees a 10-percent investment reduction, totaling about $25,000.

One company has replaced cumbersome equipment once used to form cylindrical packages with lines and fill stations adaptable to standard rectangular shapes. The manufacturer estimates up to 300-percent increased "throughput."

Modularization may also produce energy savings and lower refrigeration costs. Refrigerated storage will be more efficient in that increased product density will require less energy for refrigeration.

One manufacturer said that if wholesalers save because of modularization, the manufacturer will gain a public relations benefit by switching to modularized products, thus showing concern for wholesaler problems and helping to improve wholesale operations.

System benefit crucial

Based on our interviews, it appears that food wholesalers and retailers will benefit from modularization while food

manufacturers will bear the costs. The result is likely to be that the food system as a whole will benefit but not all segments. In that event those segments that will not benefit (i.e., manufacturers) may be reluctant to change in order for the other segments (i.e., wholesalers and retailers) to benefit. We believe that if the food system benefits, then modularization merits further exploration, regardless of the benefits' distribution.

PACKAGING MATERIAL MANUFACTURERS SEE ONLY A FEW BENEFITS

Like the food processing manufacturers, packaging material manufacturers also see only a few benefits to their industry from modularization.

Four such manufacturers were questioned. Three saw few advantages from modularization. One of them hopes for fewer damage claims attributed to defective containers. Another said that anything which reduces fiberboard weight would save dollars and be beneficial.

One company representative said the secondary container industry is a job shop operation. Containers are custom-made to customer specifications. Since customers now require a variety of container sizes and strengtns, the container industry would have little trouble adapting to standardized secondary containers. Two other producers concurred.

CHAPTER 3

IMPLICATIONS FOR FEDERAL EXPENDITURES

The Government had estimated expenditures of $10.3 billion for food in fiscal year 1977. This included $3.5 billion in direct Federal purchases and $6.8 billion in cash grants under such programs as food stamps and the school lunch program. Certain agencies, including USDA, DOD, and GSA, warehouse and distribute food. Consequently, the Federal Government should benefit from improved efficiencies made possible by modularization.

We were told that modularization could lead to improved productivity, increase the efficiency of mechanized equipment, maximize warehouse use, and reduce product damage in Government food distribution. Other agencies, including VA and the Department of the Interior, purchase some food from local vendors. Food is purchased through retail and wholesale channels with Federal funds in the form of food stamps and as cash expenditures under grants to governmental entities for the school lunch and other feeding programs. To the extent that modularization benefits are reflected in food prices the purchasing power of Federal dollars will improve.

THE FEDERAL GOVERNMENT USES SEVERAL FOOD PURCHASING METHODS

Government food purchasing involves food distributing, which is similar to the function of commercial wholesalers and retailers which redistribute and market food as it comes from manufacturers.

The Government distributes food in several ways. For instance, food may be shipped in bulk from manufacturers to a central distribution center for redistribution. GSA uses this method. Food purchased in bulk from the lowest bidder is sent to a depot and redistributed when requisitioned. Currently at VA the Marketing Division for Subsistence purchases bulk nonperishable goods, such as canned and frozen items. The Marketing Division redistributes them after storage. The Office of Human Development of the Department of Health, Education, and Welfare also buys food in bulk from USDA. The latter distributes the food to specific projects. The Federal Government may buy food in bulk from manufacturers and ship it directly to its place of consumption. USDA's Domestic Donation Program purchases food from manufacturers through open bidding. Food is delivered to States which then distribute the food. Some States require school districts to receive goods at

rail depots. Other States may have central distributing warehouses where school districts pick up food.

Many Government agencies purchase food from local vendors. Seven agencies we talked to said they purchase all or part of their food requirements from local sources. At VA all perishable goods are bought locally by individual VA hospitals. Two Department of the Interior sources (the Bureau of Indian Affairs and the Bureau of Reclamation, Youth Conservation Corps Camps), said they purchased food either from local vendors or Government sources, such as GSA, the Defense Personnel Center, or the Defense Supply Agency.

LITTLE FEDERAL INFLUENCE ON CURRENT DIMENSIONS

The Federal Government has little influence on current container sizes. Even when container sizes are specified by agencies such as USDA or DOD, we were told that manufacturers may elect not to bid on the order, and agencies may have difficulty in meeting their needs. For these reasons, Federal Government agencies we questioned overwhelmingly accept commercial container sizes in food purchases. We were told that, with respect to modularization, agencies cannot require industry to provide them with modular containers and often are captives of the industry.

Most USDA specifications are by weight

At the Department of Agriculture, the Agricultural Stabilization and Conservation Service (ASCS) purchases price support commodities, such as dairy products, processed grain, salad oil, and shortening. Package sizes are restricted by weight. Limiting package sizes maximizes loading ease and insures product safety. Package sizes specified are normally available commercially. Variation in product density makes specifying compatible weights and sizes difficult. The only USDA size specifications we noted were dimensions for canned goods. However, these too conform to current industry production.

Again, in the Domestic Donation Program, size based on weight is important. ASCS purchases food directly from manufacturers and specifies product weight and the number of cartons per case. The agency does not specify shipping case dimensions or those for inner cartons.

USDA has authority to develop standard sizes

Within USDA, authority exists to voluntarily develop standard sizes in cooperation with industry. The Agricultural Marketing Act of 1946 grants this authority, but USDA prefers industry set standards without Government involvement. Marketing orders can also specify container sizes.

The Agricultural Marketing Service (AMS) has been active in standardization in the fresh fruit and vegetable industry. Within the last year, AMS proposed establishing an Advisory Committee on Container Standards for Fresh Fruits and Vegetables. The purpose of the Committee, as stated in the Federal Register, Vol. 42, No. 5 of Friday, January 7, 1977, is as follows:

> "Pursuant to section 9(a)(2) of the Federal Advisory Committee Act (Pub. L. 92-463), and after consultation with the Office of Management and Budget, the Secretary of Agriculture has determined that it is in the public interest to establish an Advisory Committee on Container Standards for Fresh Fruits and Vegetables.
>
> The purpose of this committee will be to study the problems associated with voluntary container standards and to recommend ways to reduce the number of different shipping containers used for fresh fruits and vegetables to encourage uniformity and consistency in commercial practices and to promote more efficient handling of said shipping containers. The committee will include representatives of all segments of the fresh fruit and vegetable industry including producers, packers, carriers, wholesalers, retailers, and consumers."

Despite these efforts, the Committee was not established because of current Presidential efforts to reduce the number of Advisory Committees.

DOD'S EFFORTS IN FOOD MODULARIZATION

In addition to USDA activities, the Department of Defense, Defense Logistics Agency, has carried out certain modularization functions.

Modularization has history in DOD

The modularization concept has been considered at DOD since the Korean War. Defense is the only agency we found which has studied using modularization. Pallets designed by the Army in 1952 were used principally for shipments overseas. The pallet was first used by the Defense Supply Agency to save funds and hand labor. A pallet pool was established with customers who requisitioned goods.

The U.S. Army Natick Laboratories in Natick, Massachusetts, and formerly the Quartermaster Food and Container Institute for the Armed Forces in Chicago, Illinois, issued studies and technical reports relating to modularization. As early as February 1959, the Army was investigating container board and cube characteristics of end-opening and top-opening cartons to evaluate their placement in standard and diagonal packing patterns. A number of reports on modularization were issued in the 1960s and into the 1970s reflecting the Army's desire to use modularization.

Efforts to modularize food containers unsuccessful

Despite DOD's years of activity in modularization, it has had far less success in the food area than with general supplies which are packaged in modular containers. This is due to the agency's heavy reliance on commercial sizes. Officials told us that they lack the market power, that is, are not an important enough customer, to require the industry to provide them with modularized food products. They further stated that they would be unable to procure supplies if they did require modularization because they would receive no bids from suppliers. They consequently feel that they are dependent on the food industry to adopt modularization. However, DOD has had little success in persuading industry to consider uniform container sizes.

GOVERNMENT WILL BENEFIT FROM MODULARIZATION

The Federal Government stands to benefit significantly from modularization as a food distributor and by an overall increase in the efficiency of the nationwide food system.

Modularization will increase distributing efficiency

According to the two largest food purchasing agencies, USDA and DOD, modularization will produce a number of advantages for the Federal Government as explained below. The

Government buys food, warehouses it, and then ships it on for eventual consumption. To the extent that modularization makes the food system more efficient, the Government can directly benefit in its own distribution program.

Speaking for DOD, representatives cited several efficiencies. For instance, food industry modularization would allow DOD to optimize the cube in containerizing products in ships. It would maximize warehouse use, increase efficiency of mechanized equipment, reduce goods damage, improve productivity, create less overhang, and provide certain consumer benefits. As previously noted, however, industry must first address the problems of modularization.

Feelings at USDA favored unitizing shipping containers to accrue increased benefits for the Federal Government. These would include reduced pilferage, damage, and individual handling of containers. It would also increase chances for a better transportation rate. Some steamships give better rates for unitized cargo.

Purchasing power of Government money will increase

Several Federal Government programs provide money for food and some Federal food is procured locally through wholesalers. These grant programs either give money directly to consumers for food purchases or give it to States or other groups which then purchase the food. According to our report, "Food Waste: An Opportunity To Improve Resource Use," fiscal year 1977 estimated Federal obligations for the actual purchase of food for USDA feeding programs in an institutional setting, including cash grants to the school lunch programs, school breakfast program, summer feeding program, child care food program, and special milk program, totaled $1.8 billion. The food stamp program had an additional estimated obligation of $5 billion.

Food is purchased in these programs through wholesale and retail channels. To the extent that increased food system efficiency made possible by modularization is reflected in food prices, the purchasing power of Federal funds in these programs will be increased, allowing more food to be purchased at any given funding level.

CHAPTER 4

FOOD PACKAGING MODULARIZATION IN SWEDEN AND SWITZERLAND

Two countries, Sweden and Switzerland, are implementing modularization and have achieved benefits. In Sweden, a group of the largest marketers (wholesalers and retailers), joining in the ERFA Group, are developing a more rational approach to handling goods to achieve shipping and distribution savings, as the major force in modularization. As a result, Sweden is benefiting from more efficient storage space use, reduced transportation costs, and a decrease in product handling and reduced damage. A minimum of approximately 1,000 items are presently packaged in module transport packages out of an estimated 6,000 to 7,000 different food items sold in Sweden. In Switzerland, the Swiss Society for the Study of Rationalized Materials Handling (SSRG) consisting of industrial and commerical associations and individual firms interested in rationalizing materials handling at all levels, is the chief proponent of modularization. Migros, a major retailer and manufacturer, has led others to adopt a modular system because of its importance in the Swiss industry and its own acceptance of the system. Switzerland has achieved benefits through less costly handling, storage, and transportation as well as an increase in output capability and damage reduction. It is estimated that about 90 percent of all Swiss transport packages have been adapted to some extent to the European pallet, the module base.

MODULARIZATION IN SWEDEN

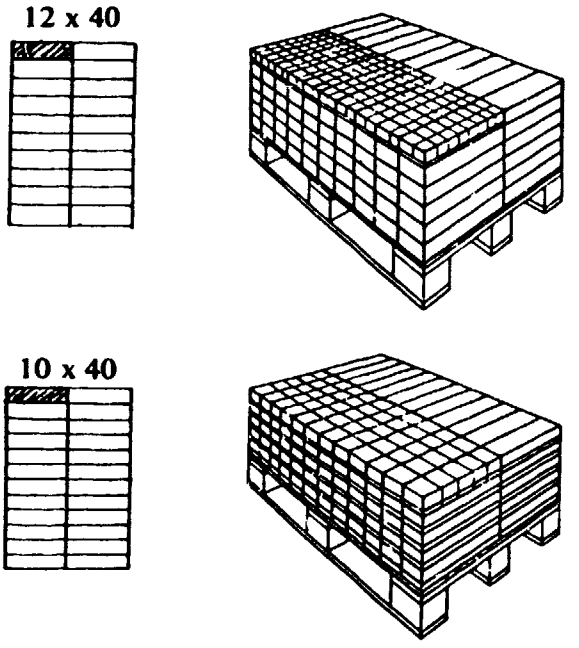
Since Swedish food handlers have to some degree standardized and modularized their handling equipment and transport packages, we chose to visit some of them to study their implementation of the system. During our fieldwork, we spoke with representatives from the Swedish Standards Institute, food processors, a wholesaler, a retailer, a packaging research center, trade organizations, a prostandardization group, and others. An estimated 6,000 to 7,000 food items are sold in Sweden.

In 1968, a group of Sweden's largest foodstuff marketers (wholesalers and retailers), who dominate the Swedish food market, joined in what is called the ERFA Group to develop a more rational approach to handling goods. The ERFA Group showed that shipping and distribution costs were a major part of food marketing costs and that savings could be

realized through the cooperation of the major food distributors in Sweden. The emphasis in Sweden has not been on standardizing consumer packages (the package around the individual food item--the primary package) but rather on modularizing transport packages (the secondary package). Before 1967-68, the system for handling foodstuffs was mostly hand-to-hand and consequently handling costs were high. Prior to 1965 no standard packages were used. Transport packages were any size the producer felt he needed.

The ERFA Group decided that the prerequisite for rationalized handling was the coordination of food handlers and the acceptance of standard transport packages. The Group favored the standards issued by the Swedish Standards Institute which had chosen to build a packaging system based on the European pallet.

Early in 1950, the European pallet was proposed as the basis for a standardized packaging system. However, it was not until 1965 that work began on standardizing transport packages. The Swedish Standards Institute has since prepared a standard for modular transport and consumer packages. This standard explains how the modular system works. It is a system of consumer packages, which are modules of the transport packages, which in turn are modules of the European pallet. It first describes the various transport packages and their dimensions which are modules of the European pallet and then describes the dimensions of consumer packages recommended for each of the modules. An illustration follows. The standard also shows recommended pallet patterns for stacking transport packages to insure stable loads.



Examples of "ideal modules" in retailing for ready-for-sale shop packages on European standard pallets 120 x 80 cm.

The ERFA Group has taken the work of the International Organization for Standardization (ISO) and the Swedish Standards Institute and popularized it. Due to its membership and contact with all seqments of the Swedish food industry, it was well suited for this task. The ERFA Group has worked at refining the system to incorporate modularization from producer/manufacturer to the retail store shelves. This includes warehousing, distribution, goods reception and storage, and store display. The ERFA Group has pushed for producers to cooperate with the voluntary standards. It has been particularly interested in getting producers and manufacturers to prepare transport packages that can be placed directly on store shelves without having to remove each consumer package and then place each one on the store shelf. This procedure saves much retail handling time. In conjunction with this, the ERFA Group has both pioneered this packaging as well as designed the retail shelves to accommodate it.

The following illustrates the point that it is not enough just to build transport packages which are modules of the pallet. The advantages of standard packaging can be maximized by also designing the package and filling it so it will fully utilize standardized shelf space. Illustrations IV and V demonstrate this.

ILLUSTRATION IV

It is wrong to display the long side of the sales pack—the retailer must be able to use the full shelf deptn.

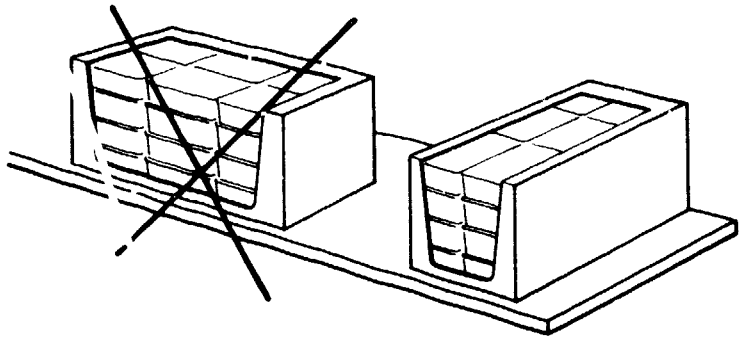
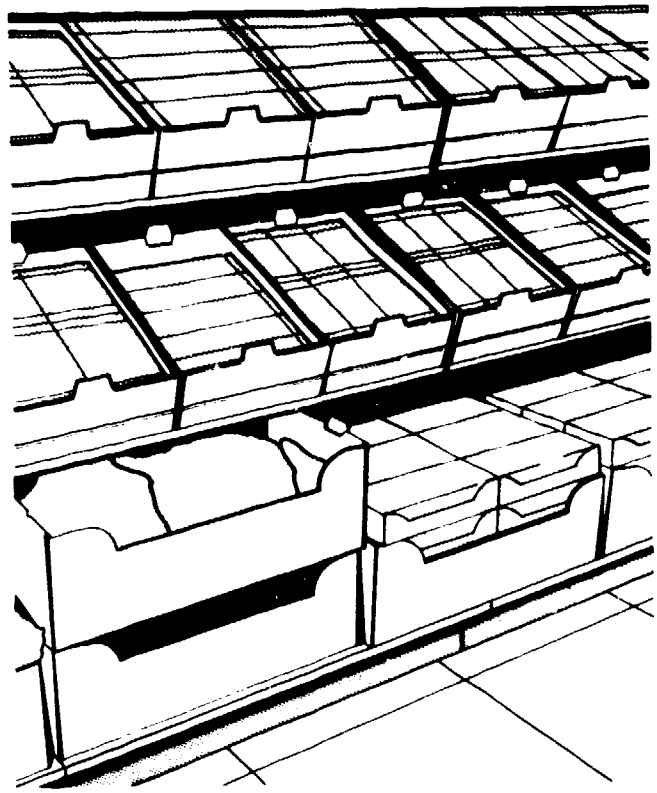


ILLUSTRATION V



Small transport units, e.g., for perishable goods of various kinds, must also be incorporated in the common standard system. Here are some examples of small display units.

Full implementation still 10 years off, but at least 1,000 items are modularized

Implementing the modular packaging principles has been going on since 1965 and is by no means complete. An ERFA Group representative estimated that it would take another 10 years before the Swedish food industry had fully adopted the principles of standardization/modularization.

Within the guidelines presented by the ERFA Group, Swedish firms have acted independently and so are at various stages of incorporating these principles in their operations. Statistics are not available to show how advanced Swedish food handlers are, yet it is apparent that the vast majority have not converted to a modular system. This is not to say that they are opposed to such a system or that converting to a modular system is entirely out of the question. In principle, at least, it appears that standardization/modularization is widely accepted.

Estimates vary greatly on the number of food items presently packaged in module transport packages. At a minimum, approximately 1,000 are currently packaged this way, and about 10 to 20 percent of retail stores have adopted the ERFA Group's shelving design. Heavy, high volume items such as milk, flour, and sugar are best suited for modularization because they require much handling.

Producers incur most costs

Producers incur most of the costs involved with converting to standardization/modularization. It is important to note that to minimize these costs, producers normally make such conversions, to the greatest extent possible, in conjunction with other production modifications. It is also important to note that producers are aware of the benefits of standardization/modularization and that these are considered when changes are made. In the past, marketing people were vehemently opposed to standardization/modularization because it limited their packaging possibilities. These prejudices are changing. Appendix I discusses the experience of several food producers.

Since the modularization system in Sweden is based on the European pallet which has been used by wholesalers for some time, wholesalers have not had to radically adjust their operations.

MODULARIZATION TODAY--
BENEFITS BEING ACHIEVED

In Sweden today the concept of standardization/modularization is widely accepted. However, much remains to be accomplished in its practical application. The developing and standardizing of handling equipment is, perhaps, Sweden's biggest achievement to date. With such a base to build upon, the standardization/modularization of transport packaging becomes easier.

General acceptance and use of the European pallet throughout the Swedish food industry has had a profound effect on the industry's packaging and handling system. The Swedish modular system has been designed around it as has other handling equipment and retail display shelves.

It will be some time before the modular system is widely adopted. No doubt some producers are waiting for the right time to convert. At least a few, according to an official of the Association of Grocery Suppliers, are awaiting the outcome of developing international considerations. For example, the Commission of the European Communities has recently proposed legislation to regulate the weights and volumes of packaged products. According to an official from the Swedish Standards Institute, the Commission proposal could destroy Sweden's work on modularization because it is more difficult to standardize weights and volumes of products and at the same time to standardize their packaging. An official at the U.S. Mission to the European Communities told us, however, that the Commission proposal, if adopted, is optional for the member States. Whether a product has to be packaged according to the proposed standards depends on the member State that imports the product.

Benefits identified by various officials

As most see it, the anticipated benefits of a modular food packaging system will be the cost savings. The ERFA Group's literature emphasized the cost savings in transportation, storage, handling, and display if modularization were adopted.

According to an official from the Swedish Standards Institute, the benefits from modularization include less handling between producers and retailers, better space use, and less product damage during shipment and storage because loads fit the pallet--less overhang exists and loads are more stable. An official from the Association

of Grocery Suppliers stated that the fundamental reason for standardization is the cost savings to be gained in the distribution system.

Actual benefits to those who have adopted the modular system cannot always be quantified because of the wide range of products produced. However, it is apparent that food handlers who have made the switch are enjoying many of the anticipated benefits.

As a result of modularization, Semper AB, a manufacturer, has realized the following savings:

(1) Damage losses have been reduced. For example, damage costs on baby food were 2 percent before modularization and after conversion only 1/2 percent.

(2) Handling has been reduced and made more efficient.

(3) Transportation costs have been cut approximately 15 percent.

(4) Material costs have been cut because less variety of products but in larger quantities are being ordered and quantity discounts are being received.

ARLA Milk Central, Sweden's largest milk producers' association, has found the modular Tetra Brik Paks much easier to handle than other milk containers. Retailers have also benefited by reduced handling. In the larger stores, the milk trolleys or tetratainers are rolled into display coolers and require no other handling. Modular trays and crates also reduce handling for smaller shops.

Swedish retailing is only now reaping some of the benefits of standardization/modularization. Most of this has come because of the introduction of the sales package concept and standardized store shelving to accommodate "sales ready" transport packages.

One company, Ahlen and Holm, owns three department stores called Ahlen's, as well as 70 other department stores, grocery stores, and supermarkets. Half of its sales are in foodstuffs. Ahlen's stores have incorporated the ERFA Group's shelving designs. Full and half pallet loads of high volume items such as Coca Cola and other selected items are displayed on the selling floors. Transport packages designed as sales packages are displayed as received. Foodstuffs such as canned goods in cardboard trays are

displayed in the trays. In Ahlen's stores the best sellers are given the best exposure.

The ERFA Group's current focus is on the proper design of module sales packages and their positioning on retail store shelves. According to an ERFA Group official, present sales packages contain too many individual consumer packages. He said about 80 percent are too big and turnover too slow. Producers naturally want more exposure through large sales packages. The ERFA Group believes that the better sellers should have more selling area. It, therefore, wants the size of the sales package to be correlated to their sales experience. For example, a baby food which sells well should be packaged so that three jars face the selling side, but one which does not sell very well should be packaged to show only two. The ERFA Group official said that about 1,000 items are packaged according to the ERFA Group's format.

As for acceptance of the ERFA Group's store shelving format, about 10 to 20 percent of the stores use it.

LESSONS FOR THE UNITED STATES BASED ON THE SWEDISH EXPERIENCE

The Swedish modularization experience is somewhat fragmented in that the degree of implementation for various food items varies, and some remain untouched. Several lessons exist, however, for future use:

--A commonly accepted base standard must exist from which to build a modular system.

--Once the base standard is adopted, other standard requirements should not be introduced if they will cause the packaging to be a size other than a module of the base standard, or if application of the other requirement will result in wasted space in the module. Imposing weight and volume standards on packaged food items could have caused these effects on modularization.

--Modularization is not readily accepted because it requires a basic change in an ongoing process.

--Initial objections to modularization, such as limited packaging flexibility, can be overcome through educational literature and demonstrating benefits. Semper AB showed that customers were very receptive to the first items which were put into modularized packages.

--Implementation is best achieved when built into a new product's design.

--Implementation of modularization for existing products is best achieved costwise when part of another production-line change--for example, when molds for glass jars are replaced because of excess wear.

--Conversion must consider the prerequisites of the customer and marketing chain--for example, multi-service frozen foods must be packaged with popular institutional oven sizes in mind.

--Conversion must consider international trade requirements, if appropriate--for example, the proposed European Communities packaging standards and how member States may implement the standards.

--Greatest benefit is gained by converting heavy, high turnover items, such as sugar and flour, since they require most handling.

--Tangible cost savings are achieved even when only some products are modularized.

--To maximize benefits from modularization, the entire marketing chain for individual items must be modularized--from producer to retail store shelf. For example, if the retail store does not install shelves which accommodate modular packaging dimensions, the shelf space is not properly used.

MODULARIZATION IN SWITZERLAND

Swiss food handlers have made great strides in converting to a modular system of transport packages. Because of Swiss legal restrictions, we were not allowed to contact Swiss businessmen and had to rely on American Embassy personnel in Bern to do so. Therefore, unless otherwise noted, testimonial evidence in this report was obtained by a Commercial Assistant from the American Embassy, Bern, Switzerland. Nevertheless, this unusual procedure proved workable because it yielded the information we sought. Our own contacts included those with representatives of the ISO, the Swiss Federal Health Service, and the Swiss Federal Railway. There are about 10,000 different food items in the Swiss marketplace.

Swiss modularization is primarily a private effort

The Swiss system is based on the European pallet. According to the Secretary General of SSRG, the European pallet was first adopted by the Swiss Federal Railway in the 1950s when a study team returned to Switzerland from the United States with the idea of the pallet. The study team had been sent to the United States to study ways of improving Switzerland's transportation system. At that time pallets were nonexistent in Switzerland.

At about the same time the European pallet was introduced, SSRG was begun. This privately financed association, established in 1954, consists of industrial and commercial associations and individual firms interested in rationalizing materials handling at all levels. SSRG has several subgroups which are responsible for a certain product area, such as food or textiles. The recommendations developed by it are made known to the Swiss Society for Normalization which represents Switzerland's views on standardization at the ISO.

SSRG is active in studying packaging and transportation matters and has published brochures describing the Swiss pallet pool and a modular packaging system based on it. The SSRG has been the chief Swiss proponent of standardization/modularization according to a Swiss Federal Railway official.

The Swiss modular system is based on the standards developed by the ISO. This system had designated a module 400 mm by 600 mm and its multiples and submultiples as the building blocks for use on the European pallet. Compliance with the system is voluntary. Migros, because of its great importance in the industry has, by its acceptance of the system, pushed others to adopt a modular system. Migros has approximately 444 stores and 78 specialty stores as well as processing plants for such products as soft drinks, chocolate, bakery goods, cooking oil, and so forth. It has its own canneries, warehousing, and pallet pool operations. There are no Swiss laws governing transport package size. Acceptance of the system by Swiss food handlers is voluntary. An official of one of Switzerland's producers of one-way transport packaging estimates that about 90 percent of all one-way food transport packages are adapted to the European pallets to get as close to the standard as possible. About 500 items are actually packaged in module one-way transport packages.

Modular returnable transport crates are increasingly adopted

The use of modular returnable transport crates was pioneered by Migros, a vertically integrated food handler. The use of the modular plastic crates has greatly expanded within the past 6 years, especially for items having relatively fast turnover, such as beverages, dairy products, meat, and fruits and vegetables. High turnover is needed to justify an investment in plastic crates.

The Secretary General of SSRG estimates that about 80 percent of the beverage producers use modular crates. To go along with these crates approximately 66 percent of the bottles used are European.

The modular crates measure 400 mm by 300 mm and 400 mm high which makes them modules of the European pallet. To accommodate the various bottle sizes on the market, the interior of the crates are configured differently. Outside dimensions remain the same.

Some brewers are also using the same modular crate sizes for their beer. About 50 percent of Switzerland's bottled beers are transported in modular crates. Most of those using the plastic modular crates are supplying large retail chains and individual retailers. The others are still using wooden crates but are slowly replacing them with the plastic.

The dairy industry uses modular plastic crates, one-way cardboard transport packages, and roller pallets. The dairy industry, according to the Secretary General of SSRG, is about 70-percent modularized.

Today, a move exists within the dairy industry to form a modular crate pool similar to the European pallet pool. Since most modular crates are used for shipments to other plants and cooled warehouses as well as to retail stores, negotiations have begun between manufacturers, packers, and retailers to create such a pool. The pool is expected to be formed within the next 5 years.

Fruits and vegetables, according to the Secretary General of SSRG, are increasingly being stored and transported in modular plastic crates. Approximately one-third of the total volume of fruits and vegetables is transported to the retailer in such crates. Retailers, cooperatives, and the large chain stores are the driving force behind this development. They try to convince farmers to use modular crates for packing products in the fields.

Meat too is being packed and transported in modular crates, according to the Secretary General of SSRG. Approximately one-third of the largest meat producers and packers use modular crates. For large quantities, the European pallet is still being used. One of the largest meat producers is making the transition to modular crates. According to an SSRG official, most of the meat industry is likely to follow.

The Commercial Assistant for the American Embassy in Bern said that because canned foods are predominantly cylindrical they are often not transported in modular transport packages. SSRG has recently completed a study that compared the advantages of a round tin to that of a square tin. Each tin had the same contents but different dimensions. It was found that, among other things, railway costs were less for square tins.

IMPLEMENTATION OF THE SYSTEM SPANS MORE THAN A DECADE

A Migros official said that Migros adopted the European pallet in 1963 and at the same time decided to introduce the first European pallet module sized 400 mm by 600 mm. Their total investment was 16-million Swiss francs ($6.7 million). In 1966, Migros introduced the multiple-way plastic module crates. It had done most of the design work and tests in cooperation with plastics manufacturers. The resulting modules are used today by most industries. Today, Migros has 3-million plastic modules representing a total investment of 25-million Swiss francs ($10.4 million). Five module plastic crates were initially developed and used by Migros. According to the Migros official, both the Swiss Association for Normalization and SSRG sanction these module sizes. Since the introduction of the five module sizes, Migros has added eight new modules. Each is specially designed for special product lines such as meat, bottles, bakery goods, fruits and vegetables, and so forth. Each can be stocked without loss of space on other module sizes as well as on the European pallet.

According to a Migros official, fast moving items, such as those mentioned above, are best suited for the module crates because of their fast turnover. These fast turnovers are necessary to justify the capital investment.

Migros has also promoted the European bottle, a 1-litre container used for soft drinks and mineral water. Today, it is used throughout the beverage industry without too many exceptions. The bottles are interchangeable between bottlers.

Verbandsmolkerei-Bern is part of one of Switzerland's largest dairy concerns, producing and distributing about 200 different dairy products, including milk, cream, yogurt, desserts, beverages, and so forth. Its entire range of products are distributed in modules of the European pallet. Verbandsmolkerei-Bern joined the European pallet pool 8 years ago by purchasing six pallets. Today, it owns over 5,000 European pallets.

Verbandsmolkerei-Bern totally converted to the modular system in conjunction with construction of a new plant. It has invested heavily in the purchase of modular plastic crates which are similar to those used by Migros. According to a plant director, it also spent 600,000 Swiss francs ($250,000) to adapt trucks and handling equipment to the system.

All Verbandsmolkerei-Bern packaging has been adapted to the dimensions of the European pallet. Either the products are themselves modules or are fitted into modules. The 1-litre milk brik, for example, is itself a module. Products such as yogurt, which are not themselves modules, are sized to fit within module trays.

An official of Verbandsmolkerei-Bern stated that during the past few years, most of Switzerland's dairies have adopted the module system and equipment pooling will occur in the near future.

Dairy products, which are either not transported in modular plastic crates or on the roller-type pallets are transported in modular, cardboard one-way transport packages. Today, about 15 percent of Verbandsmolkerei-Bern's production is sent this way. However, this will be converted to crates in a few years.

According to a Verbandsmolkerei-Bern official, the firm has spent over 643,000 Swiss francs ($267,916) on module crates. Exact data on costs to adapt machinery is not available. However, when cups for sour cream were newly designed and machinery converted, it cost 100,000 Swiss francs ($41,667). In addition, Verbandsmolkerei-Bern had to purchase 35,000 additional module crates at a cost of 160,000 Swiss francs ($66,666).

Tobler Chocolate is part of the Interfood Group, one of the leading Swiss chocolate manufacturers. An official of the company said that while the European pallet is used, Tobler only uses module crates for loose candy, which accounts for about a third of its output. Packaged candy transport packages are fitted on the European pallet as well as possible since they are not modularized.

According to an AMI official, AMI Teigwaren manufactures pasta. In 1965, it studied adopting the European pallet in its operations. The study showed that to make full use of the European pallet's advantages, all transport packages for its 60 products had to be modularized. After a planning period of over 1 year, the company stopped production for 1 month (official company vacation) in August 1976 to convert its equipment, warehouse facilities, and transportation equipment. The change had the following consequences:

--Customer packages had to be adapted to the dimensions of the closest transport package, without changing the weight. This has required technical changes to be made on production machinery. As a result, the pasta was shortened, and the packages thickened.

--Consumer packages were reduced from 35 to 15.

--Transport packages were reduced from 15 to 5. The five transport packages were specially developed by SSRG for use by pasta manufacturers. These package sizes are based on the European pallet but are not modules. When palletized, they use between 94 and 98 percent of the pallet's surface.

Exact figures on conversion costs are not available but estimates range about 250,000 Swiss francs ($104,166). This figure does not include the cost for constructing the new storage facility.

Benefits cited by various company officials

A Migros official stated that much of Migros' conversion to a modular system has occurred simultaneously with new equipment and new technology introduction and, therefore, neither the costs nor the savings can be quantified. However, the benefits of the new system have been noted.

At the production level, the following advantages have been recognized:

(1) Less time loss (about 20 percent) in adapting packaging lines for different items since packaging is more standardized.

(2) Higher packaging speeds on packaging lines.

(3) Savings in one-way transport packaging material (cardboard, wood).

At the warehouse level, the following benefits were achieved:

(1) Use of modular packaging has allowed self-supporting pallet loads which can be stacked one on the other. The space increase has been calculated at about 10 to 15 percent.

(2) Stability of whole and mixed pallet loads is easier to achieve.

With regard to transportation, the following benefits have been achieved:

(1) Handling capacity (loading, unloading, and so forth) has been increased by about one-third.

(2) Dead time has been reduced, thereby reducing losses, mainly for highly perishable items, such as fruit.

(3) Damage losses have been reduced.

The pallet has increased the load capacity of trucks. However, because of the legal maximum weight limit, all this extra capacity cannot be used. The maximum weight for trucks is 28 metric tons. The maximum length for trailers and trucks is 18 meters.

At the retail level some modular plastic crates are used to display the items they contain. This is true for 80 percent of all beverages and about 50 percent of the dairy products sold by Migros.

Verbandsmolkerei-Bern has derived similar benefits. An official spokesman noted the following benefits of modularization:

(1) Production output can be increased from 1,000 kgs per man-hour to 1,800 kgs.

(2) Modularization led the company to improve its retail delivery trucks by equipping them with rear hydraulic lifts. As a result, only one man is required per truck rather than two. The cost to adapt trucks and handling equipment was approximately 600,000 Swiss francs ($250,000), which is the annual savings for the release of 20 men at a yearly salary of 30,000 Swiss francs ($12,500).

(3) Product damage during warehousing and transportation has almost been eliminated.

(4) Transportation volume has increased by 25 percent with one man per truck rather than two.

Tobler Chocolate, according to one of its officials, has benefited most from use of the European pallet itself and to a lesser degree from the modular plastic containers within the production plant.

An AMI Teigwaren official sees the following as benefits achieved by conversion:

(1) Due to fewer product items and packaging sizes, production output was increased 15 percent.

(2) Savings have been achieved on packaging material.

(3) Stacking (interlocking) on European pallets allows full use of available space (up to 98 percent) and, thereby, permits the loading of 100 kgs more on each pallet.

(4) Because of the new stacking capacity, a 15-percent higher storage capability was achieved.

(5) Goods are not damaged on pallets, even if they are stacked on each other.

(6) Transportation capacity increased.

LESSONS FOR THE UNITED STATES FROM THE SWISS EXPERIENCE

In our opinion, the following factors deserve attention in any standardization/modularization effort.

--The standard adapted should, to the greatest extent possible, comply with international standards if access to foreign markets is desired.

--A widely used common base, such as the European pallet, is a good starting point. Food handlers in the United States, because they are so diversified, may not have a commonly accepted base, thus making the selection difficult.

--Once the base standard has been selected, the entire system can be built around it.

--Transition to the new system could take time because of the costs involved in making the change. However, a "snowballing" effect may occur as more and more firms make the change.

--Certain food items, because of their weight and turnover, are better candidates for early transition to modularization.

--Some may be reluctant to accept the modular system because it may restrict their options in product presentation.

--Implementing the new system seems to be least costly if incorporated in the initial process or carried out in conjunction with other required production or facility changes.

CHAPTER 5

POTENTIAL COSTS OF MODULARIZATION

Although manufacturers are expected to bear most costs, the timing of changes can substantially reduce them. Equipment will have to be changed to produce the new containers required by modularization, either through replacement or adjustment. Since modularization can be coordinated with other changes, timing is critical. Changes usually occur for new product introductions, normal equipment replacement, and other reasons. With U. S. consideration of metric conversion, change may accelerate, providing a unique opportunity to coordinate metrication with modularization. This possibility was suggested in several of our interviews.

WHOLESALERS/RETAILERS EXPECT FEW COSTS

Wholesalers and retailers see few costs in adopting a modular system if pallet sizes remain unchanged. Many of those contacted recognized that manufacturers will bear the cost of modularization. They also appreciate manufacturers' concern that modularization could limit packaging flexibility.

In reply to our questions, wholesalers and retailers predicted few or no costs to them for implementing modularization. Rather than incurring costs, modularization will create increased warehousing efficiencies.

MANUFACTURERS TO ABSORB SIGNIFICANT COSTS

With regard to the costs of modularization, food industry feeling points toward the food processing manufacturers, who either see direct costs outweighing benefits or no benefits at all to them from modularization. One manufacturing representative believes wholesalers will benefit most and feels return on that company's investment will not be reasonable.

Equipment adjustments anticipated

Seventeen manufacturers stated they would incur costs for either replacing or adjusting equipment during modularization.

Comments indicated that alterations would depend on equipment flexibility, which varies by plant and product. Width provides the least flexibility. Package shape affects height flexibility. If modularization required

changing product thickness or size, costs for changing molds would be substantial.

Other variables noted in estimating flexibility of adaptations included the point that equipment changes depend largely on primary package changes. If package changes are small, then associated costs will be also. One rule of thumb is the simpler the machine, the easier it is to adjust. Unique product characteristics must also be considered, such as the molding needed to shape a candy bar. This would be expensive to change.

Table 3 on the following page summarizes comments concerning equipment changes by broad category.

Timing most critical factor

Timing will be the most crucial factor affecting modularization costs. Within the manufacturing industry, change occurs constantly. New products are always being introduced while others are being withdrawn. Because these changes will occur regardless of modularization, the industry will profit by combining such changes with modularization to minimize costs. In addition, metric system conversion, should it occur in the food industry, could accelerate change by leading to an entire range of metrically sized primary and secondary containers. If these package sizes were also modularized, costs would be even further reduced.

Six of the 14 manufacturers addressing this problem felt modularization and metrication should be coordinated to reduce possible incremental costs. In emphasizing this, one spokesman said sequential modularization and metrication would double costs. Other possible coordinated changes might be regulatory compliance or new product introduction.

One large food processing manufacturer believes first time modularization costs might be enormous. For this reason, all elements that will increase productivity should be brought together, thereby decreasing the marginal cost of each. The manufacturer further proposed that to prevent marketing disadvantages all food industry members should accept the same metric conversion schedule to force adoption of an acceptable modularized primary package. 1/ He also

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1/ It should be noted that metric conversion will be voluntary, and all members of the food industry may not follow any established schedules.

Table 3. COMMENTS ON EQUIPMENT CHANGES ANTICIPATED BY MANUFACTURERS

Product preparation equipment	Primary packaging equipment	Casing and conveyor equipment
3 see no major changes	5 noted that primary packaging equipment is adjustable within certain limits but if changes are too great, costs will be incurred. Adjustment is far less costly than replacement.	8 anticipate few if any changes to existing equipment
3 said product molds would require change	3 predicted significant costs for changes	1 stated that casing equipment is flexible and can be modified within reasonable limits because adjustments are made by turning cranks and no new parts or costs are involved
1 said introducing each new product normally requires an entirely new plant processing line, so no extraordinary modularizing costs would be incurred	1 canner estimated that about a billion dollars in can making equipment exists and it is unlikely that this industry would readily change	1 said casing equipment would require only normal maintenance costs to change and anticipated no conveyor changes.
2 said product preparation equipment changes would depend on primary package changes; if the latter does not change the former will not	1 canner speculated that reducing the number of industry can sizes would cut costs between 20 and 30 percent	1 noted casing equipment is made to accommodate change
		3 foresaw major cost expenditures

proposed that modularization be industrywide for a particular product, such as margarine, and he recommends that retailers express a need for modularization.

Manufacturers expressed other views on the incremental costs of modularization. According to one, modularization should be evolutionary, involving orderly changes that will not disrupt the market for equipment, materials, and paper products, such as labels. Another corporation stated it seldom needs to modify primary packages, and, therefore, its long-term conversion costs will be low. One company would achieve significant savings in incremental costs if modularization were phased in over 20 to 25 years because most primary packages would have been changed by then. This firm favors modularization if savings could be demonstrated and would convert if implementation were long term. However, substantial costs would be incurred if implementation occurred in 3 to 5 years because of what this company calls "premature" package changes.

Coordinating modularization with new product introductions can also minimize or even eliminate costs. One manufacturer representative told us that if a new product were initially designed to conform to a modular system, there would be no costs for modularization.

Manufacturers wary following universal product code experience

Many manufacturers refuse even to discuss the modularization concept due to adverse experience with past industrywide programs. For example, a spokesman for one firm believes manufacturers were sold a "bill of goods" on the universal product code. This is the bar code on many products in supermarkets, which can be "read" by an optical scanner, permitting use of computer-assisted checkstands. Manufacturers were told that retailers needed the code, and, as a result, they invested in it heavily. Yet to date implementation of the equipment needed to use the code has been slow. However, concern does exist that modularization could produce similar results.

Modularization and small business

Two small manufacturers remarked on the costs of modularization to firms of their size. One anticipates the average cost of conversion will be disproportionately high for smaller companies, which may then be forced out of the industry. Another seeks gradual and noncompulsory

change for fear that small business will be excluded for lack of investment capital and manpower. Smaller companies worry that implementation for larger manufacturers will be more orderly and less costly, thus creating a disadvantage for the smaller company. They also see mechanical change cost as an obstacle.

MARKETING CONSIDERATIONS KEY

Marketing is a key factor in the food industry. In contemplating modularization, marketing must be considered to determine if modularized food products will continue to attract consumers and protect a firm's market position.

Seventeen manufacturers indicated key marketing factors relating to packaging and its attractiveness. Basic among them were size and shape, which were tagged by 12 and 11 producers, respectively. A key consideration is the amount of shelf spacing afforded a product in the supermarket. This is affected by package size and shape. Artwork and color each received votes from 10 manufacturers. Label artwork and appeal were mentioned by eight manufacturers. One firm mentioned primary packaging material (such as glass, tin, and aluminum). Another manufacturer said modularization would affect package lettering, an important component of this firm's package identification. Letter height and overall package shape might be altered.

Other commentors said package opening ease and product accessibility are important in gaining a competitive advantage in the product's allocated shelf space, and front panel size is very important in determining the amount of artwork and color and the effectiveness of the product's shelf position.

Two firms felt package size was not a marketing concern, and one of them felt the same about shape. As can be seen, opinion varies substantially as to what is considered a key marketing consideration.

Loss of marketing flexibility feared

Seven companies interviewed suggested modularization would limit marketing flexibility. One firm said it would not want compulsory standardizing of the primary package facing because it had once tried shrinking package size to conserve shelf space and materials, and, as a result, its market position was eroded. Another producer sees standardization as limiting industry initiative. Such

limitation could change the entire marketing concept, and businesses might have to compete differently. One other manufacturer concurred by saying modularization would minimize creativity and competition and restrict development of new items and new containers and that certain products might sell better in container sizes which do not yet exist. This particular business thrives on such specialization.

The loss of the primary package facing apparently has been a manufacturing concern for some time. In the 1950s and early 1960s, several firms inaugurated a packaging approach called "unicube." Marketing personnel insisted that primary packages use at least the same face area as the competition. Engineering personnel directed marketing to furnish volumetric requirements for each product. A computer program then produced all possible dimensions for the primary package which could produce a "good cube." Marketing personnel then selected from the possibilities. Finally, another computer program combined primary and secondary packages into a pallet pattern.

It is important to note that considerable standardization currently exists in food packaging today based on our visual inspection of a local supermarket. Canned goods are packaged in a limited number of can sizes, especially soft drinks and beer. Paper products have limited size variety. Paper towel rolls are all of one length and toilet paper rolls are of a second to fit the standard holders for these products. Similarly milk cartons are in standard sizes as are many other dairy products. Competition in these products does not appear to be hampered by packaging similarities.

Manufacturers fear competitive disadvantage

The food manufacturing industry is concerned that the first firms to modularize may suffer a competitive disadvantage. Five of our sampling group expressed this fear. According to one, marketing presents many obstacles to modularization. If all processors modularize simultaneously, then no problem will occur. However, staggered standardization may cause difficulties. For instance, if one company introduces a new product with less shelf facing than the competition, marketing people will see this as a decided disadvantage. This manufacturer affirmed that it must be shown that modularization does not create competitive disadvantages. Another firm worried that modular sizes, conforming to sizes currently used by one particular company, would give that company an advantage.

CAN MODULARIZATION PROVIDE A COMPETITIVE ADVANTAGE?

The previous discussion indicates industry concern for the effect of modularization on marketing. We wonder, however, if modularization can also provide a positive marketing tool. While no one has adopted a modular system, firms in the food industry have made important package changes which have been influenced, at least in part, by marketing strategy. One firm recently replaced its cylindrical packages with more standardized rectangular cartons in order to achieve a marketing advantage. This firm saw an opportunity to present a new marketing concept to an industry which has had no substantial container configuration change in the past 100 years. A second firm introduced the litre bottle, replacing the large bottle size widely used in its industry. The motivation was marketing, and the litre bottle was the key element in the strategy.

PACKAGING MATERIAL MANUFACTURERS EXPECT FEW COSTS

Potential costs to packaging material manufacturers were evaluated based on replies from four producers. Three of the four manufacturers interviewed see their industry as a job shop which sets up and prints containers as they are ordered. All four manufacturers stated that their equipment is flexible and may be adjusted easily. One reaffirmed that container-making machines are adjustable, and any manufacturing costs for standardized modular containers would be similar to present startup costs now incurred to produce an order. Therefore, this company does not expect extraordinary costs if customers request modular containers. However, despite its equipment's potential for handling numerous cartons, with unlimited equipment adjustments, a second producer expects incremental costs for the dyes and plates which are used to make primary packages. A third producer stated its machines can make infinite adjustments in 1/4-inch increments.

One firm told us that major container manufacturers use computer programs to best fit containers for shippers' needs. First use at the time of product introduction allows the program to optimize primary package shape and adjust shipping containers to fit a pallet. This firm further believes that metrication will offer an opportunity to redesign primary containers which could, in turn, support modularization.

CONCLUSION

Cost fears may be unwarranted

The costs of the new container-making equipment required by modularization are of great concern to manufacturers. However, they can be minimized through coordination with other changes occurring in the industry, such as new product introductions and normal equipment replacement. Failure to coordinate change could double costs as one manufacturer noted in discussing sequential modularization and metrication. Coordinating change, as another manufacturer stated with respect to new product introductions, can eliminate costs for modularization. Timing will be the most crucial factor affecting modularization costs and can serve to minimize them.

CHAPTER 6

CURRENT STATUS OF MODULARIZATION

Representatives of industry and Government see little current movement toward modularization. Wholesalers and retailers feel blocked by manufacturers, and the food manufacturers themselves fear significant costs and few benefits from modularization. Major standards-making organizations see little food industry modularization efforts.

We asked food industry group representatives what they perceived as the greatest obstacle to modularization and what would be necessary to spur modularization.

WHOLESALERS/RETAILERS SEE MANY OBSTACLES

Manufacturers were the obstacle cited most often by wholesaler/retailers. Nine in the group said manufacturers would be a major deterrent since they would incur the costs and receive few benefits. One spokesman frankly admitted that wholesalers and retailers will reap the benefits of modularization.

Of the group interviewed, five wholesaler/retailers feared antitrust prosecution would result from industry-wide modularization efforts. But one firm representative believes the antitrust law will not inhibit progress but provide direction for further discussion of modularization. Antitrust implications are discussed in chapter 7.

Marketing concerns were again named as possible obstacles. One of four firms believes marketing may lose its dominance because of modularization. Another sees the major marketing concern as competition for shelf display.

Five respondents perceived a lack of communications and need for a systemized approach to modularization. One wholesaler/retailer said communications regarding modularization benefits are sparse. Big companies will have to realize that someone must take the first step. Another firm said the whole industry is ignorant of potential benefits. One other called for conclusive data on system costs and benefits.

Regarding current industry movement, nine wholesaler/retailers perceived no significant activity. In fact, one believes secondary case sizes are increasing. Another said that over the last 15 years talk has prevailed over action. Two wholesaler/retailers felt modularization was coming slowly. However, one of them said no major activity or changes were occurring now.

Suggestions for advancing modularization

Wholesaler/retailers had recommendations for getting modularization moving, including an active part of the Federal Government in its role as the wholesaler/retailers' largest customer. Modularization could begin with all segments of the food industry conferring to discuss costs and benefits and then agreeing on further action. The Grocery Manufacturers Association, the National Association of Food Chains (NAFC), and the Supermarket Institute (SMI) 1/ could plan an equitable scheme for distributing costs. It was suggested that perhaps a Government agency could develop data on costs and benefits and confer with the top 10 food producers (those which generate most container volume) and the NAFC and SMI. The National Center for Productivity and Quality of Working Life might sponsor such a conference.

COSTS MAJOR OBSTACLE FOR FOOD PRODUCERS

Food processing manufacturers see varied costs blocking modularization, with a total of 10 of the 20 interviewed citing costs as a major obstacle.

Marketing considerations, including customer satisfaction, were noted by five. Firms believed that industry consensus on modular sizes would be difficult to achieve because of the variety of shapes and sizes within the industry. One manufacturer believes food industry product diversity may be an obstacle. What is good for one product may not be good for another, so it is difficult to obtain agreement on what is best for the entire industry.

Ten food processing manufacturers are unaware of current movement toward modularization within their industry. One manufacturer, however, knows of individual efforts to better use the 48" by 40" pallet. Another said movement toward modularization will not occur until specific benefits and costs can be presented. This company would be willing to further investigate the modularization concept. A third spokesman said demonstrating that modularization will not be costly and will not increase consumer prices would spur progress.

1/NAFC and SMI have merged to form the Food Marketing Institute.

Manufacturers also offer suggestions

Modularization could be achieved in various ways. One firm believes large chains must agree on standard size cans, cartons, secondary containers, and pallets to provide guidelines for manufacturers. Chains can specify packaging and shipment procedures. This firm also calls for a consumer survey of preferred packaging sizes. Another recommendation favored increased industry awareness of modularization and more information about its effects. Too many unknowns now exist. Furthermore, a third firm believes a top level industry committee must elaborate on possible system productivity gains.

PACKAGING MANUFACTURERS SEE VARIOUS BLOCKS

One packaging material manufacturer said the greatest obstacle to modularization is lack of marketplace demand. Additional obstacles could be the enormity of modularization, the large canning industry investment, marketing considerations, and the possibility of favoring large companies. Another packager says his customers, the food processing manufacturers, are the biggest obstacle.

One packager sees little movement toward modularization. Two had recommendations for spurring progress, either by showing total system cost savings or through a competitive study to show modularization is profitable.

INDIVIDUAL EXECUTIVES SPEAK OUT ON MODULARIZATION

At recent meetings involving discussion of future trends in the food industry, modularization was mentioned. The president of one large food chain urged consumers to support industry efforts to increase efficiency in warehouses and thereby increase productivity. Standardizing shipping containers would help in this effort.

Speaking at another meeting of supermarket leadership, a second chain store executive said manufacturers seemed tied to packaging their products in multiples of 12, yet other multiples might create packaging which is more adaptable to efficient handling. Changing case counts could create stronger, firmer packages; eliminate pallet overhang; and produce a solid cube which could withstand transportation and handling without damage.

He cautioned fellow retailers that in the future

> "awkward sizes of retail packages may make their products candidates for elimination from retail shelves * * *. 'Big packages with small products will most likely be the ones to go when a space squeeze comes.'"

Furthermore, manufacturers should get involved by standardizing container sizes to reduce labor costs and enable greater warehouse automation. Modularizing container sizes may also become a major consideration for chains with automated warehousing.

INDUSTRY COMMITTEE MAY ENCOURAGE MODULARIZATION

Grocery wholesalers and retailers recently formed a Secondary Shipping Containers Committee. Manufacturers are not participating. The committee will be primarily concerned with product damage, particularly in relation to bags and bales. The committee urges companies which redesign containers to reduce damage to consider modularization. At some future time, the committee will concentrate on modularization itself. Until then, it will consider modularization with its other activities.

STANDARDS DATE BACK AT LEAST 2,000 YEARS

According to the Congressional Research Service, standards' use has a long history. The Romans standardized design and construction of military roads. A standard for armor was set down in 17th Century England to control continual altering of fashion in arms and armor.

In the United States, voluntary standards for manufacture and supply of industrial goods and services have been evolving throughout this century. Working with industry volunteers in the 1920s and 1930s, a Department of Commerce program reduced sizes and designs of many different items, including certain food products. Milk bottle designs were reduced from 49 to 9, preserve jars from 40 to 9, jelly glasses from 25 to 7, and mayonnaise and related products from 25 to 5. Commerce Department standardization efforts slowed during the Depression and have proceeded less rapidly ever since.

CURRENT STANDARDIZATION

In the United States today, standards are developed by about 580 groups in the private sector and by various

Federal Government agencies. A major non-Federal standards organization is the American National Standards Institute. One Federal agency which participates actively in standards development is the National Bureau of Standards of the Department of Commerce.

American National Standards Institute

ANSI is a federation of organizations and companies interested in standards. The institute performs three major functions in standards making:

--Coordinates the voluntary development of national standards.

--Establishes national consensus standards.

--Participates, by membership, in international standards-making organizations, including serving as the designated U.S. member of the International Organization for Standardization as designated by that Organization.

ANSI has approved, as American National (consensus) Standards, about 6,500 privately developed standards.

ANSI addresses package standardization and can initiate standards development

ANSI has a number of Material Handling (MH) committees. They address a variety of physical distribution standardization activities. MH 10 is the Committee on Packaging Dimensions. Among other things, its scope is to develop a series of packaging dimensions, performance levels, and testing methods to facilitate unit load handling within a distribution system. We were told that the food industry has little participation on this committee. ANSI, through its Standards Management Boards, examines areas that might benefit from standardization and can initiate standards development projects.

In relation to the food industry, ANSI believes Government could be the focal point for standards making. Food industry diversity is seen as too complex for any private group to take the necessary steps to achieve modularization.

NBS

The Department of Commerce's National Bureau of Standards, as the name implies, is concerned with standards. Within NBS two programs are concerned with establishing product standards.

One operates under the Fair Packaging and Labeling Act (FPLA) of 1966 (15 U.S.C. 1451 et. seq. 1976). The other, according to NBS officials, is the Voluntary Product Standards (VPS) program. It develops standards through a formal consensus process.

Informal procedures under FPLA

FPLA gave the Department of Commerce responsibility for a voluntary program to standardize and reduce the number of package sizes for consumer commodities. This was intended to make consumer price comparisons easier. NBS has responsibility for the program within the Department. The program has reduced the number of package quantities based on weight, volume, or square feet. Under the program, NBS claims that the number of sizes has been reduced for a variety of products, including candy, cereals, cheese, peanut butter, macaroni products, and instant tea.

In the opinion of one program spokesman, little interest exists at NBS in modularization. However, he felt modularization would not occur without Government involvement. In his opinion, the FPLA provides insufficient leverage for moving toward modularization. He believes food industry modularization would benefit the consumer by providing fewer package sizes from which to choose. This kind of reduction was the intention of the FPLA.

Formal voluntary standards

The NBS Voluntary Product Standards Program does not compete with the private sector in formulating standards. They only develop standards that the private sector cannot or will not develop. If the food processing industry wanted voluntarily to establish packaging standards for their industry, they would have to follow certain procedures for developing voluntary product standards. Concurrent with this process is one to obtain ANSI listing for the new standard. We were told that the Justice Department had reviewed the NBS procedures some time ago and had stated that if NBS procedures were followed, no antitrust problems would exist.

Standards can be set for many different product characteristics, including performance, sizes, and quality. NBS encourages the private sector to develop needed standards. Even though VPS standards are voluntary, many become mandatory when used in referencing laws, contracts, and codes. Approximately 97 percent of current industry standards were developed privately, and the remaining were done by NBS, producing a total of 25,000 industry standards, according

to Bureau estimates. The NBS VPS program has formulated about 600 industry standards, with about 100 still in effect. This represents less than 1 percent of all current industry standards.

A representative of the VPS program endorsed modularization as having important benefits but noted it currently lacks the support to begin work.

Standards Information and Analysis group includes economic viewpoint

The Standards Information and Analysis Section (SIAS) of NBS has a program concerned with the economic analysis of standards. This activity was established to better understand standards system problems and the economic impact of standards. One program aim is to encourage economic analyses of standards before or during their development rather than after promulgation. So far, SIAS has not conducted any economic analysis of specific standards but has focused on identifying areas in which research has been done or is needed and is studying issues involving a number of standards.

Productivity Center not active in modularization

The National Center for Productivity and Quality of Working Life is an independent establishment of the executive branch established to focus, coordinate, and promote efforts to improve the rate of productivity growth. One of the Center's concerns has been private sector efforts, which have for some time included improving food distribution productivity. The Center's predecessor, the National Commission on Productivity, undertook limited work in modularization and warehousing efforts. These were dropped after the Commission could not get necessary support from food manufacturers. Although Center personnel have discussed modularization, they have never really studied it. They are currently funding one study by the California Grape and Fruit League, to analyze the possibility of shifting from slip sheets to pallets for transporting products. If the shift occurs, implementing unitized loads and modularization would be considered.

Metric Act calls for metrication to be coordinated with other changes

The Metric Conversion Act of 1975 (15 U.S.C. 205a, et. seq. 1976) declares

"That the policy of the United States shall be to coordinate and plan the increasing use of the metric system in the United States and to establish a United States Metric Board to coordinate the voluntary conversion to the metric system."

GAO believes that the Congress intended that the Federal Government, through the mechanism of the U.S. Metric Board, act as a planning and coordinating focal point for voluntary conversion to the metric system. The act contains no requirement for compulsory conversion to the metric system, and the decision to convert is a voluntary determination under the act. The Board's functions and powers are to advise and carry out a broad program of planning, coordination, and public education to implement metric conversion. The act and its legislative history reveal that the Board will have no compulsory power. Instead it is to serve only as a focal point for voluntary conversion to the metric system of measurement. In this regard, it appears that the Board is not to advocate metrication. The Board is to assist various sectors of the economy in the conversion process when and if those sectors choose on their own initiative to undertake conversion. "To coordinate and plan" as stated in the act is part of the process of assisting conversion to metric.

The act specifies that the Board is to encourage the activities of standardization organizations in promoting, among other things, rationalization or simplification of relationships, reduction of size variations, and increases in economy.

The Metric Board has not yet come into existence. The administration submitted Board nominees to the Senate in October 1977.

Increased efficiency in food distribution is a responsibility of USDA

The Agricultural Marketing Act of 1946 (60 Stat. 1087) gave USDA the responsibility to engage in research and other activities to improve and facilitate the marketing and distribution of agricultural products. Section 202 of the act states:

"The Congress hereby declares that a sound, efficient, and privately operated system for distributing and marketing agricultural products is essential to a prosperous agriculture and is indispensable to the maintenance of full employment and to the welfare, prosperity, and health of

the Nation. It is further declared to be the policy of Congress to promote through research, study, experimentation, and through cooperation among Federal and State agencies, farm organizations, and private industry a scientific approach to the problems of marketing, transportation, and distribution of agricultural products similar to the scientific methods * * *.

"In order to attain these objectives, it is the intent of Congress to provide for (1) continuous research to improve the marketing, handling, storage, processing, transportaton, and distribution of agricultural products; (2) cooperation among Federal and State agencies, producers, industry organizations, and others in the development and effectuation of research and marketing programs to improve the distribution processes; (3) an integrated administration of all laws enacted by Congress to aid the distribution of agricultural products through research, market aids and services, and regulatory activities, to the end that marketing methods and facilities may be improved, that distribution costs may be reduced and the price spread between the producer and consumer may be narrowed, that dietary and nutritional standards may be improved, that new and wider markets for American agricultural products may be developed, both in the United States and in other countries, with a view to making it possible for the full production of American farms to be disposed of usefully, economically, profitably, and in an orderly manner."

We were told that USDA currently relies on industry to perform much of the marketing research. However, most industry marketing research is involved in product enhancement or product differentiation, thereby ignoring systemic industry problems. As noted in congressional testimony:

"One of the most promising potentials in research is to improve the way successive steps of the marketing system are put together. This involves more than one segment of the industry. Firms in industry are concerned only with their own function and do not furnish resources for research that affects the entire market system."

Examples can be cited in which increased efficiency in the producing sector have been partially offset because of inefficiencies in the distribution sector.

Within USDA, two agencies concerned with food system efficiency are the Agricultural Research Service (ARS) and the Economic Research Service (ERS). One objective of ARS is to improve the methods of packaging, handling, transporting, and distributing agricultural products to the consumer. ERS carries out a national program of economic research and analysis relating to the production and marketing of farm commodities, dealing with the more aggregative issues cutting across commodity lines.

ARS has conducted several studies of standardization of shipping containers. One study, "Standardization of Shipping Containers for Fresh Fruits and Vegetables," was done to demonstrate the amount of container proliferation which had occurred in the 10 to 15 years since marketing orders specifying container sizes were removed. The study found that a proliferation of container sizes did exist and most did not efficiently fit the most commonly used pallet. The study concluded that millions of dollars might be saved in the costs of marketing fresh fruits and vegetables.

A second study, "Standardizing Container Sizes For Shipping Fresh Meat Products," was an effort to move the meat industry to think about and study standardized containers. The study found that most shipping containers used for fresh beef and pork could not be handled efficiently on the pallet currently in use. It concluded that standardization of shipping containers could mean savings in handling and storage costs, as well as reduced packaging material inventories, and should be of much help in order selection and delivery.

At present ARS is conducting two projects concerned with sizing containers and pallets to fit transportation equipment for fresh produce. We were told that ERS was not doing any work in modularization.

CONCLUSION

An important opportunity may be lost

Representatives of industry and Government see little current movement toward modularization. Wholesalers and retailers feel blocked by manufacturers, and manufacturers fear significant costs and few benefits. ANSI believes food industry diversity is too complex for any private group to achieve modularization unilaterally. Federal agencies, including USDA, NBS, and the National Center for Productivity are aware of modularization but are not

now addressing it. Yet several Federal agencies also cite the lack of industry support as the obstacle to modularization activity. The Metric Act recognizes the opportunity to coordinate metric conversion with other changes which will promote increases in economy. We believe modularization provides that kind of opportunity, but under current circumstances, no one will address it, and the opportunity will be lost.

CHAPTER 7

ANTITRUST AND MODULARIZATION

Some in the food industry view antitrust doctrine as an obstacle to modularization. Despite this, neither the Justice Department nor the Federal Trade Commission share this view. Thousands of voluntary standards have been developed in the United States yet only a small number of antitrust cases have been brought in this area. The key factor from an antitrust standpoint is the potential effect of the standard. Both Justice and FTC have offered guidelines on standards-making procedures to permit avoidance of any antitrust hazard.

Modularization is a standardization activity. Any antitrust considerations involving standardization efforts will therefore apply equally to modularization. Given the concerns expressed in many of our interviews with company officials, it is important to explore the current thinking on this subject.

CONCERN WITH ANTITRUST APPEARS UNWARRANTED

Food industry fears antitrust prosecution

Manufacturers and wholesaler/retailers we questioned noted industry fear of antitrust complications as a major obstacle to modularization.

One wholesaler/retailer representative explained his involvement in industry modularization meetings. He said several committees had been formed in the past to discuss modularization, but efforts were terminated each time because of the antitrust risk. One meeting sponsored by a major trade group broke up when legal advisors recommended consulting FTC. Later, the same trade group tried to plan another meeting, but the need for legal guidance prevented it from ever being held.

Despite these fears, apparently no one in the industry had checked out the antitrust implications, either to confirm or dismiss their fears. Moreover, another wholesaler/retailer believes antitrust laws will not inhibit progress but will direct the way modularization discussions proceed in the future.

Little antitrust activity

Despite industry expressions of concern with the antitrust hazard, the view from the Justice Department is quite

different. In a speech at ANSI's 51st Annual Meeting, a Justice official noted that one hears statements that antitrust doctrine poses a major obstacle to effective private standards-making activity. The official went on to state:

> "I must confess a certain inability to comprehend the contention. How precisely does antitrust doctrine deter desirable private standards making activity? We have thousands of private standards which have existed in this country for some time and yet only a very small number of antitrust cases have been brought against such activity. This is enough to raise considerable doubt as to the validity of such contentions. In fact, I am forced to conclude that such contentions are either based upon a misconception of antitrust law and theory or represent an attempt by certain industries to use antitrust as an excuse for inaction dictated by private economic considerations."

Over the years thousands of standards have been developed in the United States. It is estimated that more than 20,000 voluntary standards exist. In addition, the Federal Government has issued about 40,000 specifications and standards. Most of these were for DOD. With these thousands of standards, only a small number of antitrust cases have been brought against such activity, as noted in the Justice Department address.

Antitrust viewed in terms of standard's effect

The legal test for standardization in terms of antitrust violations according to the Justice Department is the potential effect of the standard. In the previously mentioned Justice Department speech at the ANSI meeting, the speaker stated:

> "The potential benefits of industry standards are clearly so substantial as to preclude the application of a rule of per se illegality, instances of price-fixing agreements excepted. On the other hand, joint industry standards present sufficient antitrust dangers to preclude a rule of per se legality. As a result, we are left in a situation where the legality of private standards making activities will turn upon the potential effect of the standards. The joint establishment of and

subsequent adherence to a standard would undoubtedly be held to constitute the agreement which is a prerequisite for proving a violation of Section 1 of the Sherman Act. However, let me emphasize that it is not the concerted form of action which is the critical factor, but rather the competitive effect of the joint action. Merely stating that private standards activities may involve antitrust danger, however, would neither be very illuminating nor helpful. For the critical questions from the view of private industry is whether the risks are so high as to make it unwise to engage in such activity and whether there are steps which can be taken to substantially lessen the likelihood of antitrust violation. You will no doubt be happy to hear that we in the Department of Justice feel that the risks are not that great if certain precepts and procedures are followed."

Getting together to discuss standardization, according to Justice Department officials, is not illegal because the parties are merely meeting, and there is no effect at this point.

Advice provided in a variety of formats

Both Justice and FTC have means by which parties can avoid antitrust. These have been provided in a variety of forms.

Following issuance of an advisory opinion in 1971 about a certification program, FTC promulgated 16 CFR 15.457, which sets forth general principles. An FTC official noted that it should not be taken as law but as FTC's position as of 1971. The official noted that it has never been used as a strong enforcement tool. Some of these principles are still valid although others are not. This section of the Code of Federal Regulations, 16 CFR 15.457, states in part that:

"(e) In order to balance the need for development of self-regulation plans against the possible anti-competitive potentialities of such plans, the Commission set out some of the matters which must be considered in an evaluation of any program, as follows:

"(1) Standardization and certification programs must not be used as devices for fixing prices or

otherwise lessening competition. See e.g., Milk and Ice Cream Can Institute v. F.T.C. 152 F.2d478 (7th Cir. 1946).

"(2) Standardization and certification programs must not have the effect of boycotting or excluding competitors. See e.g. Silver v. New York Stock Exchange, 373 U.S. 341 (1963).

"(3) Standardization and certification programs must not have the effect of withholding or controlling products. See, e.g., Standard Sanitary Mfg. Co. v. United States, 226 U.S. 20 (1912); National Macaroni Manufacturers Ass'n v. F.T.C., 345 F.2d 421 (7th Cir. 1965).

"(4) Construction or specification standards should not be used except in exceptional circumstances and never when performance standards can be developed.

"(5) Any organization sponsoring, adopting, administering, or enforcing standards must insure that its standards reflect existing technology and are kept current and adequately up-graded to allow for technological innovation.

"(6) When certification is involved, no applicant for certification may be denied certification for any of the following reasons: (i) That he is a nonmember of any association or organization; (ii) that he is a foreign competitor; or (iii) that he is unable to pay the fee or cost charged for certification. See Advisory Opinion Digest No. 152, 1 CCH Trade Reg., Rep. Para. 1718.10 (December 13, 1967), 16 CFR 15.152.

"(7) Fees charged in connection with participation in a standardization or certification program must be reasonable as related to the direct or indirect cost involved.

"(8) Membership in groups or organizations sponsoring, promulgating or administering standardization or certification programs must be open to all competitors, domestic or foreign.

"(9) Due process must be accorded all parties interested in or affected by a standardization or certification program, including suppliers, manufacturers, distributors, customers, and users.

Due process includes, but is not limited to, the conduct of timely hearings with prompt decisions on claims representing standards or the denial of certification.

"(10) Standards and certification programs, unless otherwise clearly required by considerations of safety may not be used to reduce, restrict or limit in any manner, the kinds, quantities, sizes, styles or qualities of products. See e.g., the consent decree in United States v. General Electric Co., 1954 Trade Cas. paras. 67,714, 67,794, 67,795, 67,796 (D.N.J. 1954).

"(11) The exercise of the responsibility of validating any proposed standard should include a determination by a laboratory or other appropriate entity independent of those immediately affected by the proposed standard that the criteria set forth in such standard are meaningful and relevant. See, e.g., the consent decree in United States v. Southern Pine Ass'n, 1940-43 Trade Cas. para. 56,007 (E.D.La. 1940).

"(12) The function and responsibility of determining whether any product is to be certified under any program involving certification should be performed by an appropriate organization independent of those immediately affected by such program. United States v. Southern Pine Ass'n supra.

"(13) Representations made by standards organizations with respect to testing procedures, standards, etc., must be truthful. See, e.g., In the Matter of Parents' Magazine Enterprises, Inc., FTC Dkt. No. C-1133 (1966), 70 F.T.C. 1116.

"(14) In cases involving a challenge to standards, the burden of proof respecting reasonableness is upon those who develop and enforce the standards. Kestenbaum, Antitrust Questions In Voluntary Industry Standards, p. 10, address prepared for delivery before the National Association of Manufacturers Marketing Conference (October 9, 1969).

"(15) All standards must be voluntary.

"(16) Certification programs should avoid the use of single standard, "pass/fail" systems and, in lieu thereof, employ graded systems which preserve consumer and user options.

"(f) The Commission stated that the listed criteria were by no means exhaustive, but demonstrated the many factors which make it difficult to approve a standard certification program. The Commission directed its staff to commence an in-depth study of the subject to determine whether it is possible for the Commission to make a meaningful contribution to the development of a satisfactory and legal program.

"(g) For these reasons, the Commission felt it was not in possession of sufficient information to enable it to make all of the determination essential to an evaluation of the program. It therefore declined to act on the request for an advisory opinion."

Paragraphs e(4) and e(10) would appear to be a prohibition against modularization because they discourage actions that would lead to simplification, which is what modularization would accomplish. We were told by FTC staff members that paragraph e(4) should not be viewed as a prohibition against simplification and that modularization could be thought of as an exceptional circumstance within the meaning of e(4). Standardization, rather, must be examined case by case. Paragraph e(10) has become outdated, according to FTC staff, and is not likely to be continued.

FTC staff studying standards

FTC staff are currently studying standards' development and certification. They are examining standards-making procedures and the effect standards have had. The result of the study will lead to the proposal of a trade regulation rule for standards' developers to insure that developed standards do not restrain trade or deceive consumers. It is anticipated that ultimately a trade regulation rule on standardization will be promulgated to provide guidance. Violation of that rule will be a violation of the Federal Trade Commission Act.

Some pointers provided by FTC and Justice

The following points were noted in our discussion with FTC staff as steps an industry standardization group should take in developing a standard:

--Identify all potentially interested groups.

--Notify, at the least, representatives of the groups and make it as easy as possible for them to participate. One possibility is to hold hearings around the country. Another is to make information available so people can respond by mail.

--Allow everyone to input whatever they want. Don't exclude people.

--Majority rule should not be sufficient. The decision process should be a consideration of costs and benefits.

--Provide an appeals procedure for people not satisfied with the decision.

--Allow a reasonable implementation period.

--Insure that capital equipment costs will not force firms out of business.

In our discussion with Justice Department officials several points were listed as steps for avoiding antitrust hazards. They were:

--Insuring that everyone is represented to protect against a charge, that competition was not allowed.

--Insuring that standards are no more restrictive than they have to be.

--Having an adequate theoretical and/or technical basis for a standard so that it can be reviewed by the courts.

No advance assurance likely

The Justice Department has a business review procedure for people seeking guidance. Anyone can write to Justice requesting an "expression of current enforcement intentions" of a proposed activity. It must be a proposed activity, not one which is underway. In effect, the requestors are asking if we undertake this activity what will you (the Department of Justice) do today. Justice's response does not preclude it from taking action later. It merely states that given current thinking it won't take action, assuming it is not initially opposed to the

proposal. It is in effect an opinion. We were told that since meeting to develop standards is not illegal, the Department's opinion would probably say that it was all right to meet.

The FTC is not a likely source of specific guidance at this time. We were told that, as previously discussed, with the Commission developing a trade regulation rule which will provide guidance for industry standardization efforts, separate advisory opinions on specific situations were unlikely.

Government participation offers no antitrust protection

Government can participate in developing standards in two ways. These include:

--As a participant in the process.

--As the requestor or orderer of a standard.

We were told by a representative of the Justice Department that the only Government involvement of absolute legal significance is that of orderer. Both Justice and FTC representatives stated that neither Government participation in standards making or requests that standards be developed give antitrust immunity to private parties. Therefore, if the Government were involved as part of an industry effort, the same considerations would apply as for a sole industry effort. However, the Justice Department representative noted that Government participation might be used to rebut anticompetitive charges and could discourage anticompetitive discussions.

CHAPTER 8

CONCLUSIONS AND RECOMMENDATIONS

The consensus of Government and food industry officials is that modularization has many benefits. No quantification of cost savings, however, is currently possible in this embryonic area as no one has conducted quantitative studies. Sweden and Switzerland report having benefited from modularization. Timing is critical since modularization can be coordinated with other changes to reduce costs. The possibility of U.S. metric conversion can provide a unique opportunity for coordination. The Metric Conversion Act calls for using metric conversion to take advantage of opportunities to promote rationalization or simplification of relationships, which we believe applies to modularization.

Despite this potential, little effort is underway by either Government or industry. Based on our assessment, we believe that modularization merits further action. In view of the fact that neither Government nor industry is addressing modularization, a significant opportunity is being overlooked. We believe this should be remedied by designating an appropriate agency to serve as the modularization catalyst.

CONCLUSIONS

Modularization promises important benefits for the food system. The consensus of wholesalers and retailers was that modularization would bring gains in productivity, reduced damage, and better space use. Further gains are possible from the greater automation modularization would permit. Manufacturers also predicted some benefits but felt that they would bear most costs for converting containers to a modular system. The food system as a whole is likely to benefit although benefits will not be evenly distributed.

The Federal Government, as a purchaser and distributor of food, will benefit from the improved efficiencies made possible by modularization. The Government had estimated expenditures of $10.3 billion for food in fiscal year 1977, including $3.5 billion in direct purchases and $6.8 billion in cash grants under such programs as food stamps and the school lunch program. Modularization could lead to improved productivity, increase the efficiency of equipment, maximize warehouse use, and reduce product damage in Government food distribution. To the extent that modularization

benefits are reflected in food prices, the purchasing power of Federal dollars spent for wholesale and retail food will improve as will the purchasing power of all consumer dollars.

Sweden and Switzerland are implementing modularization and have achieved benefits. Sweden is benefiting from more efficient use of storage space, reduced transportation costs, a decrease in product handling, and reduced damage. At a minimum, approximately 1,000 items are presently packaged in modular transport packages from an estimated total of 6,000 to 7,000 different food items sold in Sweden. Switzerland has achieved benefits in less costly handling, storage, and transportation as well as an increase in output capability and reduction in damage. It is estimated that about 90 percent of all Swiss transport packages have been adapted to some extent to the European pallet, the module base. The benefits these countries have gained from modularization may be examples of modularization benefits available to the U.S. food system.

Manufacturers are expected to bear most costs, but the timing of the changes can substantially reduce these costs. Equipment will have to be changed to produce the new containers required by modularization, either through replacement or adjustment. Since modularization can be coordinated with other changes, timing is critical. Changes usually occur for new product introductions, normal equipment replacement, and other reasons. With the United States considering metric conversion and a future possibility that the food industry may elect to convert, the pace of change may accelerate, providing a unique opportunity to coordinate metrication and modularization. This possibility was suggested in several of our interviews. The Metric Conversion Act directs the U.S. Metric Board to encourage standardization organizations to promote rationalization or simplification of packaging relationships and the reduction of size variations. We believe modularization provides such an opportunity.

Little current movement exists toward modularization despite its potential. Modularization has been the subject of discussion in the food industry, but little activity is underway to either study or achieve it. Wholesalers and retailers feel blocked by manufacturers, and the food processers themselves fear significant costs and few benefits. Federal agencies are not now addressing modularization, although NBS, USDA, and the National Center for Productivity and Quality of Working Life are aware of it. Federal agencies that

purchase food stand to benefit from modularization, but they have little influence on current container size because they believe they do not make large enough purchases. The American National Standards Institute, a private standards organization, believes food industry diversity is too complex for any private group to take the necessary steps to achieve modularization. Yet several Federal agencies also cite a lack of industry support as the obstacle to modularization activity. The result, in our opinion, is that no one will address modularization, and this opportunity will be lost.

The Congress assigned USDA responsibility to engage in research and other activities to improve and facilitate the marketing and distribution of agricultural products. This responsibility is contained in the Agricultural Marketing Act of 1946. Improvements in marketing and distribution can be reflected in lower food prices to the consumer, a subject of concern to both USDA and the Congress. Key components of the bill for marketing food rise each year. Modularization, through improving the efficiency of the food system, can reduce the cost of food marketing and, as such, aid the consumer. With neither Government nor industry addressing modularization, this is not likely to happen.

Antitrust doctrine is viewed by some in the food industry as an obstacle to modularization, but neither the Justice Department nor FTC share this view. Thousands of voluntary standards have been developed in the United States, yet only a small number of antitrust cases have been brought in this area. The key antitrust factor is the potential effect of the standard. Both the Justice Department and FTC have offered guidelines on standards-making procedures to avoid any antitrust hazard.

RECOMMENDATIONS

We recommend that, because the Department of Agriculture is the principal agency responsible for food, the Secretary of Agriculture take the initiative in advancing food industry-related modularization. Any such effort should include:

--Identifying and quantifying the costs and benefits of modularization.

--Determining the most feasible method to coordinate modularization with industry changes such as new product introduction, normal equipment replacement, and possible metric conversion.

--Exploring with the food industry what further steps may be necessary to spur progress.

We further recommend that the Secretary obtain the assistance of NBS concerning those aspects of modularization relating to developing standards.

Since the Metric Conversion Act directs the U.S. Metric Board to encourage standardization organizations to promote rationalization or simplification of relationships and the reduction of size variations, we recommend that the Chairman, Metric Board, upon assuming office, consider modularization in any metrication actions to change package sizes in the food industry.

MATTERS FOR CONSIDERATION BY THE CONGRESS

The Metric Conversion Act directs the U.S. Metric Board to encourage standardization organizations to promote rationalization or simplification of packaging relationships and the reduction of size variations. We believe modularization provides such an opportunity. In any future consideration of metrication in the food industry, the Congress should examine the status of efforts to coordinate metrication and modularization to determine whether this opportunity is being utilized.

Modularization promises important benefits for the food system. This could result in lower food prices, a subject of concern to the Congress. In any future consideration of food prices and food marketing, the Congress should examine food industry progress toward modularization as a means of increasing food marketing efficiency and reducing food prices.

AGENCY COMMENTS AND OUR EVALUATION

The Food Safety and Quality Service of the Department of Agriculture concurred with the general theme of the report, stated that modularization would reduce food costs, and believed that USDA is the logical lead agency for modularization.

The Science and Education Administration, Department of Agriculture, stated that the report is essentially correct in its analysis of modularization and its resulting benefits. USDA notes that widespread changes in packaging can be achieved only with full industry cooperation. It states that some incentive for change

would result from specifications for standardized containers being used in Federal procurement operations and that Department officials have been considering such specifications and plan to require them where feasible.

The Science and Education Administration believed that the report summary does not appropriately express the balanced view found in the text. They also feel the report can be strengthened by underscoring the fact that many manufacturers see modularization as a threat to product identification which results from unique packaging. We believe that the summary contained in the digest, while necessarily brief, addresses both the benefits and costs of modularization. We further believe that the report reasonably addresses the marketing concerns of manufacturers with respect to product identification.

EXPERIENCES OF SELECTED SWEDISH FIRMS

In our review in Sweden, we spoke with several producers and food handlers to learn of their experiences in converting to a modular system. Each tells a part of the story.

GENERAL FOOD ITEMS

Semper AB is a manufacturer of baby foods, breakfast foods, frozen foods for catering establishments, powdered milk, cheese, and an assortment of other food products. Today, 90 percent of its products are packaged in module transport packages. Semper began converting in 1971. Its goal is to package all its products in modular transport packages. However, reaching the additional 10 percent may be too expensive or contrary to other requirements.

Semper AB's Packing Group was responsible for the conversion. Its first task was to decide on the number and dimensions of transport packages its module system would contain. It decided on five module size transport packages, each a module of the 800-mm by 1,200-mm pallet.

The Packing Group chose to convert the powdered products first because these are packaged in cardboard and so were easiest to change. Next, they had to convince marketing people of the soundness of their idea. The marketing people were against the idea at first because they felt it was too restrictive.

The actual implementation consisted of changing the dimensions set in the package folding machines for each production line. Eight production lines were operating for the powdered products. Each cost about $670 to convert. Installation took about 1 day. Customer reaction to the new packages was positive.

Converting consumer packages, such as jars and cans, is a much more expensive proposition, so Semper AB usually incorporates conversion of these with other mandatory changes. For example, the molds used for making glass baby food jars have a life expectancy of 2 to 3 years. So, when the mold had to be replaced, Semper replaced it with a mold suited for making jars for the modular system. Therefore, no additional costs were incurred related to modularization. The feeding lines of its two production lines had to be changed at a cost of about $1,000.

The old transport package for baby food jars, which was a cardboard box, was replaced with a cardboard tray covered with shrink wrap (clear plastic), which can be removed before

APPENDIX I

placing the transport package on the store shelf. This change was going to be made anyway so that conversion costs are not attributable to the modularization. Today, approximately 50 percent of its products are packaged in transport packages that can be used as sales packages. All baby food is packaged this way. Products packaged in metal cans have not been converted because of conversion costs.

In designing institutional frozen food packages, two considerations were foremost in the minds of the designers, namely the size of the European pallet and the cooking areas of the popular institutional oven in which these products would be cooked--the ovens are not modules of the pallet. It was finally decided that the primary consideration for the packages should be the oven size. Therefore, these products are not totally adaptable to modularization although they come close. Other Semper products, which make up the 10 percent which are not modularized, often must comply with other customer prerequisites, so they cannot be modularized.

Since Semper's warehouse was equipped to handle the European pallet, no changes had to be made there or in its trucks. Semper makes all its deliveries to wholesalers on the European pallet. Since Semper offers a rebate to wholesalers if they purchase at least half a pallet load (a full pallet with a half load), no wholesalers buy less than this amount.

MILK

ARLA Milk Central is Sweden's largest milk producers' association, accounting for 60 percent of its milk production. It is owned by 40,000 farmers. Aside from fresh milk, ARLA produces butter, cheese, yogurt, sour milk, cottage cheese, and powdered milk. About 20 percent of ARLA's milk is delivered to large stores and 80 percent to smaller ones.

The milk trolley, measuring 800 mm by 600 mm, and the roller pallet, or tetratainer, measuring 600 mm by 400 mm, are used for 50 percent of ARLA's deliveries. The milk trolley holds 360 liters of milk and the tetratainer 180. For smaller orders, plastic crates and trays are used. The crates account for about 30 to 35 percent of the deliveries, and the trays account for about 15 percent. Cardboard trays are used to a smaller degree.

Today, 65 percent of ARLA's milk is packaged in modular packages called the Tetra Pak and the Tetra Rex Pak. The other 35 percent of its milk is packaged in the Pure Pak containers like those used in the United States. These are not modularized.

According to a company official, the change to the Tetra Pak was not immediate. ARLA began the switch from glass bottles in the 1950s with the introduction of the American Pure Pak. It was not until 1961 that the Swedes introduced the Tetra Pak.

There are two basic differences between the three container types, namely their tops and the container dimensions. The Pure Pak and the Tetra Rex Pak have an elevated top, and the Tetra Pak has a flat top. The Tetra Pak and the Tetra Rex Pak are shaped like bricks and are modularized. The Pure Paks are not modularized. Soon Pure Pak will manufacture a flat top container at ARLA insistence and that of other Swedish milk producers. In order to stack both the Tetra Rex and the Pure Pak containers, a sheet of cardboard is placed between layers.

The Tetra Pak comes in the following sizes: 1 liter; 3 deciliter; 2.5 deciliter; and 2 deciliter. The Tetra Rex Pak comes in only two sizes: the 1 liter and 2 deciliter. The Tetra Pak is called the Tetra Brik. Its flat top makes it the most advanced modular package. The milk trolley, the tetratainer, the plastic and cardboard trays, and the plastic crates used for the Tetra Brik are all designed as modules. To illustrate how the system works, consider the 1-liter brik. The milk trolley holds 360 1-liter briks, the tetratrainer holds 180, and the 200-mm by 400-mm tray holds 12. The other brik transport packages are similar, with small dimensional va iations.

According to an ARLA official, ARLA prefers the Tetra Brik because it is easier to handle than the Pure Pak and less costly because it would reduce different tray types. A recent study shows that it would be more economical for ARLA to use only the Tetra Brik. However, ARLA does not want to be solely dependent on one package supplier and so will continue to use the Pure Pak as well.

ARLA owns its own trucks and makes direct deliveries to its customers, which include restaurants, stores, and hospitals.

BEER AND OTHER DRINKS

Pripps produces approximately 150 different items, including approximately 11 name brands of beer, besides its own brand, plus soft drinks, mineral water, and juices. Most items, such as Coca Cola and Carlsborg Beer, are produced under franchise rights.

APPENDIX I

In the 1870s, Swedish breweries agreed on a standard returnable bottle size, which remains today. Pripps developed their own pallet: a square measuring 1,080 mm by 1,080 mm. Pripps' beer crates are also squares holding 25 returnables bottles. A pallet holds 45 crates--9 crates per layer with 5 layers. Returnable beer bottles make up about 62 percent of the market, throwaway cans about 35 percent, and one-way or nonreturnable bottles about 3 percent. The one-way beer bottles are presently packaged in modular transport packages.

Pripps started using the one-way beer bottle in the 1960s, but a market never developed. According to a Pripps official, the time to consider standardization/modularization is during design. No incremental costs occur for standardization/modularization if done at the outset, but once a system has been set up, it becomes very costly to change. When Pripps entered the one-way beer market, it chose to use a bottle that fits the modular system. It did the same when it decided to market beer in a plastic bottle and two additional soft drink bottle sizes. All of these products are transported in modular crates on European pallets.

Pripps uses the beer pallet (1,080 mm by 1,080 mm) for 60 to 70 percent of its products and the European pallet for the remainder. Pripps has its own trucks, which are designed to handle the beer pallet, and makes its own deliveries. If Pripps must use external transportation, it will usually use the European pallet.

APPENDIX II

UNITED STATES DEPARTMENT OF AGRICULTURE
SCIENCE AND EDUCATION ADMINISTRATION

OFFICE OF THE DIRECTOR
WASHINGTON, D.C. 20250

February 3, 1978

Mr. Henry Eschwege, Director
Community and Economic
Development Division
U. S. General Accounting Office
Washington, D. C. 20548

Dear Mr. Eschwege:

Appropriate members of the United States Department of Agriculture have reviewed the GAO draft report, dated January 18, 1978, entitled "Redesigning Shipment Containers in Order to Reduce Food Costs." Comments are summarized as follows:

1. The report is essentially correct in its limited analysis of the need for modularization and the benefits that would flow therefrom.

2. The summary of the report does not appropriately express the balanced view found in the text.

3. The report could be strengthened by underscoring the point that many manufacturers see modularization as a threat to product identification through unique packaging.

4. Container standardization must be achieved before cost effective modularization can be accomplished.

In the past, the Department has conducted a few studies to determine the advantages of container standardization and modularization. The investigators who have done this work believe that, in some areas, sufficient benefits would accrue to justify adoption of these techniques. It is recognized that widespread changes in packaging could be achieved only with the full cooperation of industry. Some small incentive for change can be given through specifications for standardized containers to be used in Federal procurement operations. Officials of the Department have been considering this and plan to do this where feasible.

We thank you for the opportunity to comment on this report.

Sincerely,

Ralph J. McCracken
Acting Associate Deputy Director
Federal Research

Enclosure

APPENDIX III

UNITED STATES DEPARTMENT OF AGRICULTURE
FOOD SAFETY AND QUALITY SERVICE
WASHINGTON, D.C. 20250

Mr. Bill Gahr
Assistant Director, Food Staff
U.S. General Accounting Office
441 G Street, NW.
Washington, DC 20548

FEB 16 1978

Dear Mr. Gahr:

We have reviewed GAO's draft report "Redesigning Shipment Containers in Order to Reduce Food Costs" and are pleased to share with you our views on the recommendations which appear in your draft.

The Food Safety and Quality Service (FSQS) concurs with the general theme of your report and believes that modularization in food packaging and shipping would indeed reduce food costs. Your draft (p. 90) makes three specific recommendations: (1) that the Department of Agriculture (USDA) take the initiative in advancing modularization as it relates to the food industry; (2) that the Department consider consulting with the National Bureau of Standards (NBS) in connection with standards development; (3) that the Metric Board consider modularization along with metrication actions taken in connection with changing food package sizes.

Recommendation I

The FSQS believes that USDA is the logical lead agency in modularization in the food industry. The specific suggestions appearing in this recommendation lie within the jurisdiction of other agencies of the Department. Our agency could assist in modularization activities in connection with our commodity purchases for the national feeding programs. Also, FSQS is the lead agency in the Government-wide quality assurance program. Both of these activities require rather exacting standards, and if container modularization figured in the specifications, the effects on the industry could be profound.

If modularization is to become a salutary force in the American food industry, the cooperation of all those in the industry will be required. At present, as your report states, commercial size containers are acceptable under the food purchase contracts we let.

Recommendation II

The Food Safety and Quality Service would be willing to cooperate with NBS in a standards formulation hearing on modularization.

APPENDIX III

Recommendation III

We believe that although metrication should be the central role of the Metric Board, it would be wise to instruct the Board to also consider modularization when it proposes changes in the practices of the food industry.

We welcome this opportunity to assist you with your study of this intriguing idea.

Sincerely,

Robert Angelotti, Ph.D.
Administrator

APPENDIX IV

PRINCIPAL OFFICIALS OF THE DEPARTMENT OF AGRICULTURE RESPONSIBLE FOR ADMINISTERING ACTIVITIES DISCUSSED IN THIS REPORT

	Tenure of office	
	From	To
SECRETARY OF AGRICULTURE:		
Robert Bergland	Jan. 1977	Present
John A. Knebel (acting)	Oct. 1976	Jan. 1977
Earl L. Butz	Dec. 1971	Oct. 1976
Clifford M. Hardin	Jan. 1969	Nov. 1971

(09701)