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Case for the readable code

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How does the new UPC system work?

The Case for the Readable Code

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The housewife will soon be noticing some unusual changes when she visits the local supermarket. Product labels will not be marked with the price; instead, the price will appear on the shelf on which the product is found. When the customer reaches the checkout lane, she will not hear the noise of keys being punched on a mechanical cash register. Instead, the checker will pass each item across a slot in the checkout counter, and the price will appear instantly on the display screen of an electronic point-of-sale terminal. This system will speed up the flow of traffic through the checkout lane.

All of these changes are part of the new technology being adopted by the supermarket industry.

Supermarket executives face shrinking profits. Rising prices, coupled with increased operating costs, have caused their net to fall below one percent of sales over the past year. Many large chains have reported losses.

Can anything be done about reduced profits? One answer may be to use the Universal Product Code (UPC), recently adopted by the supermarket and food manufacturing industries. UPC may not only reverse this downward trend in profitability but benefit consumers as well. When it is combined with increased automation at the checkout counter, in fact, the system may well revolutionize the food distribution process to the same extent that self-service supermarkets did more than 25 years ago.

The UPC concept is not new. The idea of assigning a unique identification number to each product in a grocery store was first discussed in the 1930's. But it was not until an ad hoc committee was formed under the sponsorship of seven trade associations* in October, 1970, that real progress was made. The committee, comprised of eight food retailers/distributors and eight manufacturers, spearheaded a 30-month effort that culminated on April 3, 1973, with the adoption of a machine-readable symbol—the last step required to establish the UPC program. The program's main features include:

A numbering system consisting of 10 digits to identify each product. The first five digits identify the manufacturer; the second five digits identify the item.

The machine-readable code symbol, consisting of black and white bars to be read optically at the checkout counter.

A Uniform Grocery Product Code Council (UGPCC), a non-profit corporation of 21 industry members, established to administer policy and procedures for the UPC. In order to obtain numbers, manufacturers, retailers, and distributors are required to become members of UGPCC and pay a membership fee.

The Distribution Number Bank, a corporation hired by the UGPCC to assign and maintain manufacturer code numbers and operate an inquiry service.

Food chains are installing electronic checkout systems to increase productivity and profits. (See accompanying article on their early use by Jewel.) Systems installed today, however, still will not be able to take full advantage of UPC for a number of reasons, primarily because manufacturers are just beginning to apply numbers and symbols to products. It probably will not be practical to place this scanning equipment at the checkout counter until approximately 50 to 75 percent of all items are encoded by the manufacturer. (The cost of applying symbols at store level is prohibitive—about 14 times as great as the cost at the time of manufacture.) Studies estimate that wide scale encoding of grocery items will take place by 1975-1976.

Meanwhile, scanning equipment which can read the UPC symbol has only recently been available commercially. During the past 18 months, the Kroger Company and

*Cooperative Food Distributors o America, National American Wholesale Grocers' Association, National Association of Food Chains, National Association o Retail Grocers of the United States, Supermarket Institute, Grocery Manufacturers o America, and National Association of Convenience Stores.

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Safeway have experimented with such equipment and have demonstrated the technical feasibility of scanning systems.

Impact of UPC

Here is how store operations will change when the majority of manufacturers apply machine-readable symbols and food retailers become equipped with scanning systems.

- Labor hours for individual package marking and remarking at the retail level will be reduced. Most food retailers are expected to use shelf price labels (with a computer inquiring price from the machine-readable symbol at the checkout lane). This will eliminate individual package marking for most merchandise.
- Errors in ringing up sales will become less frequent with the automated reading of product code symbols by the scanning device.
- Reductions in key stroking operations at the register will increase checking and bagging productivity. Most products can either be passed across a slot (or read by a hand-held "wand"), and the item number will automatically be entered into the register. One checkout system, demonstrated at the Supermarket Institute Convention in May, 1973, stationed the checker at the end of the checkout lane, where items were passed across a slot and bagged in one motion.

Annual savings from a scanning system using only shelf marking can be significant. McKinsey & Co., in their work for the ad hoc committee, estimated that a store with a weekly sales volume of $60,000, assuming 75 percent of all items were encoded by the manufacturer, might expect these annual savings:

Reduced payroll costs	
Checker labor	$34,000
Marking and remarking	12,000
Recording, store report preparation, etc.	12,000
Reduced mis-rings	6,000
Gross savings	64,000
Added costs	
In-store marking	6,000
Equipment costs	23,000
	29,000
Net savings	$35,000
Net savings as percent of sales	1.12%

An increase in net profits of more than one percent of sales represents a dramatic improvement, and in the view of most retailing executives easily justifies the implementation of UPC and front-end automation. Other anticipated improvements are:

- More timely and accurate measures of the effectiveness of advertising and promotion by both the retailer and the manufacturer.
- Improved evaluation of the effect on individual item sales of shelf location, shelf space allocation, pricing policy, and competitor actions.
- Improved store inventory control, including more detailed merchandising information on perishable merchandise, the ability to pinpoint stock shortages by item, and reduced out-of-stock conditions.
- In high-volume stores with limited front-end space, an increase in sales due to higher register productivity.
- Reduced customer waiting time at the checkout lane.
- Improved control of direct store deliveries.

In addition to the installation of electronic registers by a number of supermarket chains, several equipment manufacturers either have come out with new scanning systems that can read the UPC symbol or are well along in the development of such systems. By the fall of 1973, grocery manufacturers with a combined annual sales volume of more than $52 billion had become members of UGPCC and had been assigned UPC manufacturer numbers. Even now products are beginning to appear on the shelves of supermarkets with UPC symbols printed on the package.

The ability of individual supermarket chains to capitalize on this rapidly developing technology varies widely. Some chains have developed detailed action plans. Others are just beginning to realize that they could be faced with a major competitive disadvantage within the next two to three years as their competitors adapt to UPC and front-end automation.

How to Use The New Technology

The adoption of UPC and front-end automation means more than simply installing electronic registers and scanning equipment, and applying UPC symbols to products. Each chain must evaluate its own needs. The new technology must enhance a company's ability to achieve its objectives rather than constrain it because of a uniform application of technology. This will undoubtedly result

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How to Handle the Transition to UPC

A major technological breakthrough creates practical problems of implementation. How will the transition to UPC and front-end automation be handled in the supermarket? Both individual companies and industry associations, such as the Supermarket Institute, are addressing themselves to such questions as these:

How should the UPC Code be used during the conversion period?

Almost all supermarket chains now use internal product numbers to:

1) control inventory at the warehouse level,

2) order merchandise from the warehouse for delivery to the store,

3) enter product codes at the checkout counter, when electronic registers are in use.

These supermarket systems normally involve some type of manual key stroking to enter the product number. Since it is not practical to key stroke a 10-digit product code (11 digits with a check digit), there is a major problem in using the UPC Code until scanning can be introduced at the point of sale. In the meantime, it may be necessary to maintain dual numbering systems.

How should merchandise not coded by the manufacturer be handled?

Many food chains are handling non-food merchandise. Some manufacturers of non-food products may need to be educated about the need to encode their products, particularly if the majority of their sales are to general merchandise retailers who have not yet adopted a UPC system. Otherwise, a significant amount of non-food merchandise will have to be encoded in the store. Perishable merchandise, such as produce, bakery, meat, and delicatessen products, presents a different coding problem. Unless the individual chain decides to pre-package these items, it does not appear feasible to apply a symbol to most of this merchandise. This undoubtedly means that some perishable merchandise will have to be key stroked at the point of sale, thereby reducing the productivity of a scanning system.

What will be the impact on customers?

UPC and front-end automation will cause a number of changes that must be carefully assessed in terms of their impact upon the customer. A significant education effort will undoubtedly be necessary to gain acceptance of the following:

- Longer lines at the checkout counter (because of fewer machines) but faster customer movement through the line.
- An absence of price marking on each package.
- An inability to follow the visual display of prices at the point of sale due to rapid movement of packages across the scanning device.
- More pre-packaging of perishable products so that a UPC symbol can be applied.

What new information systems and operating methods will be needed?

The real benefits of UPC and front-end automation will be realized only by capitalizing on the information made available. This will mean that new techniques will have to be developed in many areas: scheduling of store personnel, store reordering and inventory controls, cash controls, allocation of shelf space, measuring advertising effectiveness, customer check-cashing, direct delivery controls, etc.

Ultimately, UPC and front-end automation offer a potential for computerized perpetual inventory records being maintained for each item at store level. This could mean that the current retail inventory method will no longer be required to control dollar inventory investment at store level. It may become desirable to return to a cost method of inventory valuation—representing a significant departure.

What new personnel training efforts will be needed?

The introduction of new equipment and new systems will require a major training effort. Store managers, for example, will have to become familiar with the procedures involved in operating the in-store computer system, including updating price changes and initiating the system at the start of each day. Obviously, the checker training program will undergo substantial restructuring. Perhaps most important, management personnel at all levels will be obliged to learn to use many new systems to realize the benefits.

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in several different approaches to using UPC and front-end automation. Some guidelines are, however, applicable to any company. Four important ones to remember are:

- A key person in management should be assigned primary responsibility for planning and implementing the program. He, in turn, will assign responsibility for subprojects to various functional heads. Many supermarket chains have already done this.
- A detailed plan to cover the changes needed in systems and operating methods should be set up to include a timetable and individual responsibility. There are many steps that should be taken prior to the installation of electronic registers. Others can only be done following installation, while still others must wait until scanning equipment has been ordered or installed.
- The selection of checkout equipment, including electronic registers, electronic scales, check stands, and even new types of shopping carts should be made carefully. The equipment, for example, must be compatible with future requirements for scanning. In addition, the selection of electronic registers must consider memory size, redundancy, backup capabilities, compatibility with a central chain computer system, and, of course, the economics of acquiring and operating the equipment.
- Finally, a careful evaluation must be made in advance of the costs and benefits of alternative approaches to *systems* as well as to equipment. The implementation of UPC and front-end automation, in addition to meeting the needs of the business, must also be justified on a cost/benefit analysis which realistically assesses incremental benefits and costs. This means, for example, that the costs associated with manual techniques which are inefficient

Chicago Store Takes the First Step

For most stores, the first step in adapting the UPC program will be the installation of electronic cash register systems. The Jewel Companies, Inc., diversified retailers of Chicago, is already realizing net savings of 0.25 percent of sales in stores where the automated checkout system has been in operation.

One of the first stores to be selected by Jewel was managed by Rocco Colletti, now North Area employment manager.

"We began with one automatic checkout lane," Rocco recalls, "but we soon expanded to nine stations, plus three outlying stations for drugs, cosmetics, and photography. The result was better record-keeping and controls—it was the dream of every store manager come true."

How did customers and salesclerks on the floor take to the new system?

"During the transition, we used both the old and new systems simultaneously. Before we had all the lines computerized, we actually had customers wait in line to use the computerized checkout. We pointed out to them that other lines were open, but they wanted to go through the computerized lanes. Actually, they accepted the equipment faster than we anticipated."

"For a few customers, it was an adjustment," says Rosann Henricksen, now assistant service manager. "One lady asked me to do the total again on an adding machine. Of course it came out the same."

should be adjusted to the lower cost levels associated with more efficient manual systems. One supermarket recently installed electronic cash registers and discovered that it could have managed easily in the past with two fewer check stands and mechanical cash registers in each store—and could have achieved it simply by changing its scheduling of front-end personnel.

Once the system is implemented, the program must be monitored closely to insure that it moves forward on schedule and that the benefits of UPC and front-end automation are being realized. Both planning and monitoring will involve the chief executive officer of the supermarket chain. Considering the impact of UPC and front-end automation, however, he will probably find no other subject commanding his attention that can exert such a profound change on the future of the company he directs. △

Who Helped Develop UPC Program?

Organizations that participated in the development of the UPC program included McKinsey & Co., Inc. (acted as consultants to the ad hoc committee), the Graphic Arts Technical Foundation (assisted in evaluating printing alternatives), Battelle Memorial Institute Laboratories (evaluated various code symbols), the Massachusetts Institute of Technology (evaluated the potential for technology obsolescence of the UPC program), several manufacturers of automated checkout equipment, lawyers (worked with the federal government to assure anti-trust laws not violated), and food retailers, wholesalers, and manufacturers.

It was also a new experience for the checkers. "At first I was afraid of the equipment," says Mary Caniano. "It was all so new. But I learned fast."

Nor did it take long to convince Mary and Rosann of the system's advantages. "I believe I increased my daily checkout figure by 20 percent," says Rosann. "I couldn't believe I checked out that many more people in the same amount of time. In addition, I work on a 40-hour base, and I found it less fatiguing mentally and physically."

Explains Rocco, "You can get readings on business flow at any time during the day, and at the touch of a button. This enables you to do a better job of scheduling checkers for peak loads during the day."

The 20-percent increase in checker productivity stems mainly from use of the "touch system" with a 10-key electronic keyboard (with department keys clustered around it) as well as from reduced training time, automatic sales tax computation, and the ability to enter multiple-unit sales of the same item as a single entry.

The increased information automatically available from the electronic equipment reduced the hours needed by Rocco and his people for:

— Balancing cash and non-cash paper to register totals for each checker and each register.

— Preparing totaled lists of checks cashed, which avoids listing and totaling them manually when preparing bank deposits.

— Calculating retail coupon redemptions, which eliminates up to 15 hours per week of monotonous sorting, counting, and totaling of as many as 12,000 coupons in a large store.

"The reports we need can now be done in half the time," says service manager Camille Bialas. "In fact, I have cut the time for reading department totals from 20 minutes to five minutes. I no longer need to go from key to key, from machine to machine. One station, one report code, and I can get all my readings ready to use without ever leaving the service desk."

The installation of electronic checkout systems also provided Jewel with improved controls for store operations. Controls at the checkout lane were achieved by both programming logic checks of potential overrings and validating the customer's check cashing privilege through a customer identity number lookup.

"We were able to cut in half our average number of bad checks, as a result of the instant check verification from the register," reports Rocco Colletti. "And also, by the use of item code entries, selected sale items were individually monitored for the real story of their success."

Store manager controls also enabled him to monitor sales at any time for any register, as well as determine the amount of cash in the registers at any time, when to transfer cash to the safe, and how much.

Faster checkout and better record-keeping—the research of yesterday is becoming the reality of today. And the people who benefit, the customers and the people at Jewel, give these automated systems their highest marks.