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Status of Checkout Technology

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The author describes the various types of computerized checkout systems available and the relative merits of these systems.

Lower food prices and faster checkout service still rate 1, 2, respectively, in the desires of consumers for improving food marketing, according to a recent survey of over 1,000 shoppers in California, reported last week. The rise in retail food prices has provided the inpetus for consumer complaints. These complaints have created considerable pressure for the retailer to stop passing on price increases and to provide additional shopping information.

At the same time, the retailer has been faced with virtually no increases in productivity as expressed in sales per man-hours (SPMH), while labor expenses (including fringe benefits) have increased in 1971-1972 by .3 percent of total store sales (9.5 percent for SMI, 11.38 percent for chains and 8.1 percent for NARGUS members). Payroll expense accounts for approximately 52 percent of total operating expenses, (52.8 percent on total gross margin) as reported in the operating results of food chains for 1971-1972. At a recent convention, a spokesman for a major chain reported that wages accounted for 63 percent of store expenses and that the front-end accounts for 26 percent of the store labor. Thus, the retail food industry finds declining margins subjected to external consumer pressures and internal economic pressures.

Management continually seeks to improve operating methods and reduce operating costs in order to survive these countervailing pressures. Reductions in operating costs will benefit the consumer if they are reflected in lower prices, or reduced price increase rates, or in more services at the same price.

The computerized checkout system appears to offer retailers the best possibility of reducing operating costs. The Kroger Company recently announced a 45 percent increase in front-end productivity with a fixed-scanner computerized checkout system. At the same time, the Jewel Company announced a net average hard savings on sales before taxes of .32 percent using an electronic register. A 1970 USDA study reported improvements in checkout throughput of 19 percent with a hand held optical scanner, in a laboratory evaluation, and an estimated store savings of 1.2 percent of sales, exclusive of the wealth of management information generated. An Ad Hoc Industry Committee, with the help of many leading chains and equipment companies indicated that computerized checkout systems with scanners should lead to a net savings before taxes for retailers equal to 1.0 to 1.5 percent of sales, essentially due to quantifiable productivity savings.

Since the earlier USDA study, many significant developments have taken place to make the computerized checkout systems the most talked about development in the industry today. I would like to briefly discuss a number of these developments before examining the various types of equipment available and the relative merits of the systems.

The first is the Universal Product Code. The Ad Hoc Industry Committee has concluded that a ten digit all numeric mixed code would be the most pragmatic solution to the code structure issue.

This means that each manufacturer would be assigned a five digit identification code and he in turn would assign a five digit code to each of his products. The ten digit code represents a compromise between manufacturers and retailers and is compatible with the drug and national health items code. Additional attention is being given to encourage manufacturers to assign low digit numbers to fast moving items to enable firms with manual input electronic registers to utilize the code. A computer can be programmed to fill in the zeros automatically, and an operator would only have to punch in the numbers in the code, permitting manual checkout, as well as automatic scanning.

The Distribution Number Bank, which has been given responsibility for assigning the codes to the manufacturers and retailers has registered over 400 firms. Seventy-five percent of which are manufacturers with the balance being retailers and distributors. About 60 percent of the dry grocery volume has been registered. DNB has predicted that 50 percent of the grocery items will be source symbol marked by the end of the next year.

The second major development has been the adoption of a machine readable symbol for the UPC. The symbol has an oversquare bar code configuration and will have a nominal total size slightly smaller than 1.5 square inches. The symbol has a 10, 11, 12, and variable (up to 30) digit length format and can be omni-directionally scanned in the 10, 11, and 12 digit formats. As indicated the symbol also includes a numerical version below the bars. This enables a checker to keypunch an item into the system where the symbol is not electronically readable because of scuffing or lack of scanning equipment. The probability of error is only one in one billion in its use in the total system.

Before discussing the various types of systems available today it may be desirable to briefly define a few of the more common terms.

ECR - Electronic Cash Register, either a free-standing unit or one used as part of a computer-based information system. It uses electronic circuits rather than metal gears to get the job done. The ECR works faster, more quietly and keeps track of more totals.

Hardware - The physical components of any computer system (the computer, the terminals, etc.).

Hard Savings - Measurable dollar and cents savings you can achieve through the use of the ECR or complete systems.

Minicomputer - The backroom brain of the electronic systems, provides for information accumulation and retrieval; can gather information from all terminals and present store totals.

P.O.S. - Point of sale, refers to the cash registers or terminals at the checkout area.

Scanners - A device that records the UPC symbol and relays the information to the minicomputer. Can be either fixed or hand-held. The former is favored by supermarkets, while the latter is preferred by department stores.

Soft Savings - Savings available through electronic systems, but which are not easily measurable. (e.g. improvements in display and sales space, additional product movement data, etc.)

Software - The programming that goes into the computer and determines what it does.

UPC - Universal Product Code.

UPCS - Universal Product Code Symbol.

In considering the types of systems and equipment available today, several distinctions in classifying equipment should be made. The first distinction concerns the P.O.S. equipment. Some firms use the term to mean electronic checkouts, but not all point of sale equipment is electronic. The conventional cash register is also considered P.O.S. equipment.

The method by which information is captured should also be defined - whether

it will be entered through a keyboard manually or by a scanning device.

Another distinction should be drawn between using free standing electronic registers (possibly with an optional summarizer) or a complete electronic store system with terminal and processor which might utilize 1-3 minicomputers.

If you are considering scanners, a distinction should be made between hand-held vs. fixed scanners and if fixed whether they be of the slot, window or Raster varieties. Additional system being tested involves voice recognition.

Now lets consider the features of the various general types of electronic check-out systems. I would like to discuss free standing units, electronic store systems, and scan systems.

Free Standing:

The first consideration is a free standing self-sufficient electronic register. It should be modular in design in that it would be capable of being tied in with future expanded checkout processing systems. It offers the capability of taking advantage of the increased productivity possible with a ten key keyboard. It provides automatic computation of tax, coupons and stamps, and change. In addition it provides the basic department and dollar information necessary to maintain control of your business. Most can also be connected to a remote cash drawer, an electronic digital scale, coin dispenser, and display.

To a free standing register you may want to add an optional summarizer which can accumulate and combine information from all registers in the store. Or you may add two minicomputers and software processing capabilities in place of the summarizer. This combination would allow for consolidating in-store reporting, on-line price lookup and inventory control, credit control and in-store central data collection. It could also provide off-line batch data transmission to a central point for additional data accumulation and manipulation. Finally one might add scanning capability to the free standing unit when a sufficient number of products are symbol marked to make scanning feasible.

Thus the basic advantages of the free standing unit are: fast, easy, quiet, 10 key operation, may be customized, provides automatic tax computation, and modular to be connected with an optimal summarizer or other equipment.

The price for systems available today ranges from about $2,800 to $4,200 per register.

Electronic Store Systems:

The electronic store system is essentially similar to the operation of the free standing registers plus minicomputers and software processing capabilities with additional information storage. In addition a separate terminal may be included in the managers office or a service area for management information on store operations and to handle administrative details. This provides the managers with information for monitoring cash control at each register, and for reporting general store activity. Data may be retrieved from the system at any time without interrupting customer service, or normal store operation. It permits tracking of store activity from the department level to the item level at any time and can retrieve data on daily and/or weekly operations for each register or all registers or for individual checkers. Some firms locate a terminal in the back-room to handle receipt of vendor deliveries. It can also be adapted to provide data for accounts payable so that a record is maintained of all merchandise received by source and at what cost.

A great capacity for storing and providing information upon demand is a "soft" feature of all computer connected systems. It is "soft" in that there is no way to calculate its value to the store operation in dollars and cents.

The principal advantages of electronic store systems are: they are fast, easy to operate, quiet, provide a wealth of store reporting information, can handle coded

merchandise, adaptable with electronic scales, provide check authorization capabilities, schedule employees, and have data transmission capabilities.

Price - $30-55,000 (8 terminals, 8 electronic scales, and a computer for about $50,000 - or a 10 line store for $45,000).

Scan Systems:

The major difference between electronic store systems and scan systems is the manner in which information is captured. Scan systems use an electronic scanning device for entering data as opposed to manual entry through the keyboard. The scanner reads a coded symbol representing the product code identification and relays this information to the computer for price lookup and relays the latter to the register display and customer tape. At the same time it deletes the item from store inventory.

Like the electronic store systems, the scan systems can provide a wealth of product movement, cash transaction and other operating data for the store management. Faster data entry through a scanning device makes some operations more efficient and accurate, thus encouraging the development of additional management information reports. Scanning reduces miss rings at the register, eliminates the need for price marking and remarking, facilitates the development of automatic ordering and inventory control systems.

Two important considerations in selecting a scan system include the type of scanning device used - whether hand-held or fixed. While hand-held scanners will improve productivity and may have slightly better initial consumer acceptance, tests seem to indicate that fixed scanners result in greater productivity increases. While the hand-held scanners are primarily of the electro-optical wand type the fixed scanners are either of the laser type, electro-optical, or magnetic. The fixed scanners may be mounted in slots in the checkout counter for the merchandise to be passed over or mounted on the side for it to be passed by.

All scanning systems have a manual input capability for merchandise that is either not coded or has a code that has been rendered unreadable. Accuracy in reading symbols approximates 100 percent for systems that have been tested to date.

Prices for scan systems presently start in the $100,000 range although no specific prices have been announced at this date.

Firms that have announced the development of hand-held scanners include Data General Corporation (Dymo), Pitney Bowes-Alpex, ADS Anker, Singer, and Charecogn. Firms announcing the development of fixed scanners include Zellweger (Litton-Sweda), RCA, Pitney Bowes-Alpex, Scanner Inc., and Singer.

Until most grocery items are source symbol marked retailers will need to consider the use of in-store labeling devices in order to effectively operate the scan systems. Firms that have developed in-store labeling devices include Scanner Inc., Data General Corporation (Dymo), and RCA.

Benefits of Scan Systems:

Fastest, easy to operate, quiet, increased productivity, can provide more information, more accurate, benefits of others plus.

Now lets briefly consider the results of tests on three types of computerized systems and then look at considerations for independent store operators in determining whether systems might be applicable for their operations. The three types of systems include an electronic store system - Bunker Ramo's ESIS that was developed by Jewel Co. and Nuclear Data, Inc.; a hand-held optical scanning system - Charecogn; a fixed scanning system - the RCA Kroger test.

ESIS:

ESIS consists of a manual input fully electronic system adaptable to scanning, but does not presently have a scanning operation. There are presently installations in over 54 Jewel stores and they are increasing them at a rate of 2-3 per week. In addition, there are installations in

several other food and drug chains with an estimated 650 terminals in operation.

A typical installation of this system consists of a master computer, two terminal processors or "slave" computers, and the terminals at the front-end. A ten terminal system costs about $45,000.

The data input device is a ten key keyboard with 20 other keys and possibilities for up to 45 key positions. Improvements in checkout productivity with manual entry systems are directly related to keyboard design.

As with all computer systems, ESIS offers better control of cash as it is handled at the register, transferred to the safe and sent to the bank. Fast, accurate accounting is now possible. The computer could be programmed to sense light, smoke, breaks in security, and temperature changes in freezers and to notify appropriate officials.

Jewel is presently experimenting with the placement of a terminal in the backroom for direct delivery responsibility. Receipts of vendor deliveries are quickly recorded, stored in a disc storage unit, accummulated for the week, and then accounts payable data is generated from memory.

Employees also check in and out with the computer which then compiles necessary time and attendance records for all store personnel.

The original minicomputer for ESIS cost approximately $12,000 and now costs only $3,500.

I will compare savings available with this system after briefly describing the other two types.

Charecogn:

The Charecogn System utilizing the hand-held optical scanner was evaluated in the laboratory by USDA. A detailed description of it and some of the pros and cons of computerized checkout systems are included in the USDA report, which is available upon request.

Lack of adequate financial resources is probably the main reason this system has not undergone store tests at this time. An improved version of the scanning device is being used in other applications than in retail store checkout operations.

Therefore, I cannot give you any cost estimates on the system at this time. Earlier prices were in the neighborhood of $100,000 plus some developmental expenses.

RCA-Kroger:

The RCA Kroger test has been underway in Cincinnati for about 40 weeks. It utilizes fixed lazer beam scanners mounted in the checkout counter and a symbol composed of concentric circles. The test store does approximately $3.7 million sales annually with 10,000 line items. It serves a middle class neighborhood where food stamps comprise less than five percent of the volume of business. They are processing through the registers 131,000 line items per week - 121,000 of these labeled at the store. All hand applied except meat and produce which are auto labeled. The checker can scan and bag merchandise simultaneously although they are experimenting with an extended checkout counter utilizing one checker and two baggers. Preliminary reports indicate the baggers cannot keep pace. Over three million items have been scanned without a miss read.

Lets compare results reported for the systems.

In comparing test results for the different systems, it should be remembered that the studies were conducted separately under different circumstances and by different researchers. The base figures of the items being measured may not be exactly the same.

For example, in considering checker training, Kroger reported a reduction to five hours of formal training needed to operate the RCA scanning system, but did not indicate the previous time required.

Assuming the normal training time was 40 hours, this represents a reduced checker time of 84 percent. The USDA Charecogn study estimated a reduction from a maximum of 92 hours to 27 hours with one training program to a reduction of from 32 to 12 hours with another. The average reduction was 71 percent, but again this was based on projections resulting from a laboratory test. Jewel (ESIS) indicated a reduction in training time of 70 percent to either 7 or 12 hours depending upon whether a touch system or non-touch system was used.

ESIS which is the only manual entry system being compared does not provide estimates on reductions in checkout error. The USDA test estimated a 57 percent reduction and Kroger indicated that checker error was one-fourth of what it had been previously.

In considering improvements in productivity and savings, it should be reemphasized that the published figures may not be measuring precisely the same activities. Jewel (ESIS) has indicated a 25 percent improvement in rings per minute whereas the USDA study indicated a 52 percent improvement in ring-up time. The USDA-Charecogn study demonstrated 19 percent improvement in checkstand productivity whereas Kroger indicates an increased productivity of 45 percent. In an Alpha Beta Acme test, Data checker reports a 14 percent improvement in productivity. The productivity figure for ESIS is not available.

In terms of hard savings resulting from installing these checkout systems, Jewel (ESIS) indicates they have averaged 0.32 percent on sales. The range, which represents before tax savings was 0.22 to 0.37 percent of sales. The USDA-Charecogn test projected estimated savings of 1.16 percent on sales. No figure was reported for Kroger. The Ad Hoc Industry Committee projected estimated hard savings ranging from 1.0 to 1.5 percent on sales with scanning systems.

Other benefits that have been reported from store tests include: ESIS reports a reduction of 37 hours per week or nearly 50 percent in the money room operation per store and a 50 percent reduction in time required to count coupons.

RCA indicates a saving of 6½ hours per week in bookkeeping operations and a 55 percent reduction in time required to make price changes. It now requires seven hours. RCA also indicates a reliability factor of 99.97 percent with their scanning and labels.

Data checker indicates that they can check all registers for cash flow in .35 seconds by depressing one key.

One of the big question marks surrounding the adoption of electronic store systems and particularly scanning systems has been the degree of customer acceptance.

Jewel conducted a survey of some of its customers after the ESIS system had been installed. They found that 70 percent were indifferent, 29 percent were favorable, and only one percent were negative.

The Charecogn test was a laboratory test and this did not attempt to measure customer acceptance, although the many shoppers that viewed demonstrations of the system were impressed.

Kroger conducted a series of tests of acceptance on the RCA system. Shoppers rated the layout, checkout speed and overall system as better than very good. A reduction in congestion and improvement in shopping ease were rated good, but the lack of adequate price information scored between poor and good. Kroger had removed all item pricing and was relying on the shelf pricing and aisle scanners for customer label verification. On balance, customer acceptance appears to be good to very good.

Some other benefits that will accrue from electronic checkout systems in

addition to current product movement data include:

Shelf space allocation: Sales volume per item can be compared with the amount of shelf space allocated.

Department profitability: The department's contribution to net profits and return on investment can be readily calculated.

Labor scheduling: Accurate sales data and customer counts by register, store, time of day, and day of week over a period of time would help in labor scheduling.

Consigned goods identification: A clear identification of all consigned merchandise sold at the store will improve management control.

Shrinkage: Computer can be programmed to provide periodic reports on shrinkage rates by item or section.

Advertising and promotion: It will be possible to evaluate the impact of price specials and special displays immediately.

Pricing decisions: Impact of price change readily available.

New item evaluation: Obtain quick accurate assessment of new item performance.

Out-of-stocks: Improved product inventory control procedures should help reduce out-of-stocks.

Selecting product mix: Produce movement data will help determine the optimum assortment of merchandise needed.

Statistical data: Wealth of information for other special purposes and studies.

While the potential benefits of electronic checkout systems appear to be great, individual store operators and chains should proceed cautiously before acquiring any system. The decision to select specific equipment should be made only after carefully analyzing your specific needs and determining what capabilities you think the system should have.

For example: one large chain estimates that the cost of refurbishing a 20,000-25,000 sq. ft. store can reach $250,000 depending upon how much equipment is replaced at the front-end. While indicating this, they have recently canceled orders for mechanical registers.

In construction planning, whether for a new store or to remodel an old one, there is considerably more work involved from a store engineering viewpoint, than just putting in extra duct work.

Different checkout counters require different wiring depending upon the power features and whether you plan to use either split or conventional checkstands.

A decision needs to be made concerning the location of the computer(s), disc storage unit, or special purpose terminals. Considerations will include available space, location for convenience and accessibility as well as special environmental requirements--e.g. low humidity, or special sprinklers for fire insurance protection.

A decision needs to be made concerning the use of standby power sources. Jewel uses low cost natural gas turbine generators, although other power sources such as batteries might be adequate for short term operation of the system.

Some other important considerations in selecting equipment might come under the heading:

CAVEAT EMPTOR

The emphasis on selling electronic checkouts and systems is <u>intense</u>!

There are many sellers, which will drive prices down. We no longer have a virtual monopoly with two or three giants, but have at least 15 firms vying for a share of the market.

However, since some of these firms have never been involved in sales of POS equipment before, care should be taken to evaluate their plans for servicing and standing behind the equipment they sell. For a retailer to invest a great deal of

money in equipment and have a supplier fail would be catastrophic. Equipment manufacturing firms with considerable financial backing are still struggling with the decision of whether or not they wish to remain in this market. The supplier must be responsible.

Computers are not alike. They differ in the information gathered and in the way they can be programmed. Consequently you should determine your needs for specific types of information before buying.

Some advocates of electronic store systems have said "There is no reason to buy mechanical registers today". This wording may be a bit strong and premature.

The best way to determine this is with careful planning. Make someone responsible for evaluating your present needs and have him evaluate the equipment that is available to meet these needs. He should investigate and compare several systems. Then select one or more stand alone or free standing systems and conduct in-store tests. Study the test results carefully. Review the results in comparison with the desired criteria. If favorable, implement a full store test. If the results are still favorable gradually phase the system into other stores.

Finally, the electronic checkout will not make you a better merchandiser, nor will it manage your store, but it will provide you with more and better information on which your decisions can be based.

WHAT IS THE FOOD DISTRIBUTION RESEARCH SOCIETY?

In May 1960, a group of interested educators, government researchers, and food industry people met to discuss their many mutual problems. The open, frank discussion sparked the enthusiasm of those involved and annually thereafter, the group informally sponsored the Food Distribution Research conference at various universities throughout the United States.

The need for more formal organization was recognized and at the 1967 conference the Food Distribution Research Society was officially formed.

The need to coordinate food distribution research and its implementation has brought together, as members of the society, a group of concerned persons dedicated to progress in this particular industry.

Purposes of the Organization

The Society organizes and holds conferences, meetings, symposiums, etc. of leaders in the field of food distribution research, and provides an atmosphere wherein ideas, methods, technical developments, and problems can be freely discussed.

Research

The Society encourages research by defining research problems of the industry; by providing guidelines and direction for developing and implementing food distribution research; by coordinating efforts of research workers; by feeding back research needs to researchers.

Information

The Society serves as an information clearinghouse for past, current, and future food distribution research, and provides channels for exchange of information.

Implementation

The Society encourages implementation of research findings through communication of research results to users, through training, and through encouragement of application and implementation research.

Professional Advancement

A major goal of the Society is to gain increased recognition for the field of food distribution research, thereby enhancing the roles of those involved in it.