Consumer Awareness of and Reaction to Electronic Cash Register and Scanner Technology in Supermarkets

by
J. Barry Mason
Department of Marketing, The University of Alabama
University, Alabama
and
Frederick W. Langrehr and Richard K. Robinson
Marquette, University
Milwaukee, Wisconsin

Findings emphasize the need for continuing research on consumer reaction to new supermarket technology including management behavior in dealing with consumer issues.

Three great electro-mechanical inventions have occurred in the history of retailing. The first was the mechanical cash register, followed by the computer. The third is the point of service (POS) terminal.[1] The essence of the POS concept is that all sales data are captured at one time through terminals on the sales floor. The data are then transmitted over a communications network for entry into a back office system for further processing. This technology represents a revolutionary development for retailers whose traditional problem has been lack of timely detailed information. Up-to-date detailed data are badly needed to combat the steady erosion of profit margins which has been caused by the proliferation of branch stores, lack of good inventory control, rapid growth of credit, rising labor costs, and the expansion of various competitive forms of retailing.

The POS systems have rapidly penetrated the general merchandise market. The total volume of sales for these systems exceeded $300 million in 1977. Annual sales of POS equipment are expected to exceed $1 billion by 1979 with an additional $1 billion being spent for computer equipment to support the POS installations.[2] Electro-mechanical cash register sales in general merchandising dropped to virtually zero in 1977 while electronic cash registers (ECRs), which were virtually unheard of in 1973, made rapid gains to a sales level of slightly less than $150 million in 1977. Sales of such equipment to supermarkets have grown even more rapidly than in general merchandise.[3] The major reason for such expansion has been the success of industry standardization programs. The food industry (manufacturers, suppliers, and retailers) has adopted the Universal Product Code (UPC) as a standard machine readable code for source (producer) marking of merchandise to be electronically read and recorded.

The objective in food retailing is to move the customer through the checkout as quickly as possible. As part of an ECR system, for example, customers place their UPC marked merchandise with labels faced down so that they can be moved rapidly across a laser beam

omni-directional scanner. The checker can use both hands to bag the merchandise and speed the checkout. Based on the UPC code, a mini-computer identifies the price of the product, retrieves and displays the price, prints a receipt, and updates the store's inventory files with each product scan.

Presently approximately 75 percent of all supermarket items are marked with the UPC code. Thus, these products are ready for electronic checkouts, including scanners. The use of electronic point-of-service cash registers in supermarkets is a well established fact; the use of scanning devices which take advantage of the UPC code to insure greater front end productivity are much fewer and consumer reactions to such systems are still virtually unknown. The use of scanner installations in supermarkets has grown from 6 in 1974 to 42 by the end of 1975, to 103 at the end of 1976, and 201 at the end of 1977.[4] Industry sources estimate that there are now 25,000 terminals in 2,500 supermarkets.[5] The cost of this equipment is rather high, ranging from $80,000 to $120,000 for an eight lane supermarket equipped with a POS system and scanning devices.[6] Hard data on productivity increases as a result of the use of ECRs and scanners are limited. A study by the Marketing Science Institute indicated that direct savings from the elimination of cash register key-punching errors and elimination of price marking on each item but not shelf marking would exceed .5 percent of sales.[7] This is sizable since the typical supermarket profit is less than 1 percent of sales. Other more difficult to measure savings include reduction in shrinkage or theft,[8] fewer cash register errors, better evaluation of promotion, better scheduling of employees, detailed analysis of the movement of key items, improved funds control, and perhaps automatic reordering in the future. Other possibilities are price-margin management, better inventory-space management, and better integrated chain communications.[9]

LITERATURE REVIEW

Commercial testing of the equipment has shown promising results. For example, one study reported that an automated front-end at supermarkets could potentially double an operator's profit.[10] In-store productivity gains are estimated to be in the 35 percent to 45 percent range once 80 - 90 percent of supermarket items are coded for the use of UPC.[11] A Marsh supermarket in Troy, Ohio, billed as the first commercial test of UPC scanning, experienced increases in productivity, labor scheduling, and a reduction in shrinkage.[12] In the 15 percent of items such as produce, deli, bakery, and store weighed meat items which probably will not be UPC coded, the store can use in-store symbol printing or can keyboard the information to the terminal at the checkout counter.

In the rush toward commercial testing and installation of scanning equipment, virtually no attention has focused on consumer reaction to such equipment. Various consumer groups, however, have indicated that they do not want prices removed from individual items.[13] They contend that shelf marking is insufficient. Indeed, several states have now passed legislation or have legislation pending which would require a continuation of item pricing even with POS and scanner systems. Ironically, four of the six states in which item pricing legislation either is on the books or has been passed are included in the top 15 states where scanners are used (California, New York, Massachusetts, and Michigan).[14] However, for the UPC program in food retailing to be most cost effective, prices would only be displayed on shelves and not individual items. Groups such as the Consumer Federation of America contend that the new checkout systems will enable

grocers to pass higher prices on the unwary consumers. Further, they contend that consumers often will not know the price of an item until they get checked out and will be too embarrassed to return the item if it is higher than they want to pay for it. The food industry's Public Policy Subcommittee on the UPC recently indicated that "some shoppers in 'prices off' stores do experience a reasonable reduction in price awareness and consciousness...."[15] The test by Marsh Supermarkets found mixed consumer acceptance of the UPC and scanning.[16] Other persons have indicated Continuing Consumer resistance to what they label as computer domination of society.[17]

PURPOSES OF RESEARCH

Specifically, the purposes of this research were to determine consumer reactions to the use of ECR and scanner technology in supermarkets. Information sought included (1) consumer awareness of the scanner system and (2) perceived advantages and disadvantages to consumers. Management recommendations for assuring greater acceptance of the new technology are also offered.

Interviews were conducted with a statistically random sample of 90 households residing within five minutes driving time of the three outlets of a supermarket chain in a midwestern SMSA which uses ECR and scanner technology in its supermarkets. The five minute driving time radius was chosen because research seems to indicate that this is the radius from which supermarkets typically draw the majority of their customers.[18] The scanner technology has been installed at the outlets for approximately two years. Over 75 percent of the households sampled had patronized the scanner equipped outlets for longer than three months. This period of patronage, plus the fact that a majority of the consumers shop at the three outlets on a regular basis, indicated that they are familiar with the supermarkets' methods of operation. The chain operates as a modified warehouse food outlet. Most merchandise is not price marked, as is typical with scanner equipped outlets. Individual item prices are stored in a backroom computer and are automatically retrieved by the scanner at the point of checkout. Most merchandise is shelf-marked and shoppers can mark the price on individual items with markers provided for them.

FINDINGS

Consumer Awareness of the Technology

The level of consumer awareness of such a system is one way of determining their reactions to the technology. An indirect measure of consumer awareness of the new technology was used. Specifically, consumers were asked if they noticed anything different about X Supermarket's checkout system compared to that of other outlets at which they had shopped. As observed in Table 1, approximately half of the sample reported that self-bagging was the most unique aspect of the outlets. Less than one-third of the sample initially mentioned scanning as a unique feature. When the researchers probed further and asked if anything else was unique, the combined total of persons mentioning scanning was less than 50 percent. Finally, shoppers were asked "How are the prices added-up at the checkout at the X Supermarket?" Eighty-six percent of the sample correctly indicated that electronic scanning was used. Fourteen percent of the respondents did not know how the price totals were obtained. Thus, most consumers seemed to have accepted the system or at least were aware of its existence. Quite possibly the presence of ECRs in department stores and similar outlets may have caused them to lose their novelty for consumers and they may simply see scanning as an extension of the more familiar technology,

Table 1. Perceived differences in Supermarket X versus a conventional outlet.

Perceived Differences	Initial Question		Responses to Probing	
	Number	Percent	Number	Percent
Self-bagging of groceries	44	49	23	26
No express lane	--	--	3	3
Different type of sales receipt	4	5	7	8
Scanner	28	31	15	17
Other	12	13	6	6
Nothing	2	2	36	40
Total	90	100	90	100

even though scanning is still used on a very limited basis.

Perceived Advantages

Sixty-eight percent of the shoppers indicated that they saw advantages in shopping at outlets using scanner technology. The majority, 53 percent, mentioned faster checkout time, as shown in Table 2. This is remarkably close to the

Table 2. Consumer perceived advantages of scanner technology.

Perceived Advantages	Number	Percent
Takes less time at checkout	32	53
The bill is more accurate	14	23
The receipt is more informative	13	21
Other	2	3
Total	61	100

53 percent of consumers reporting faster transactions in an experiment by Marsh Supermarkets.[19] Additionally, increased accuracy in price reporting, as noted by 23 percent of the respondents, and a more useful and detailed cash register receipt, as reported by 21 percent, were perceived as other advantages. The detailed cash register receipt allows the consumer to much more readily check prices and similar information on items purchased. The receipt gives the specific brand or item description and size of the items purchased in addition to the price of the item. Specifically, the consumer no longer sees an entry entitled "Grocery--99¢." Rather, the receipt reads, "Sunmaid Raisins--15 oz.--99¢."

A majority of consumers perceived this receipt as being more informative than a conventional receipt. As further presented in Table 3, over 40 percent of the consumers also found the receipt more useful. Perceived advantages of this scanner receipt are evident since 25 percent of the consumers altered their behavior and used the receipt in new ways, primarily to compare prices.

Perceived Disadvantages

In spite of the unique perceived benefits by consumers from shopping at outlets with the scanner technology, approximately one-third expressed some dissatisfaction which seemed to be primarily related to the price marking of individual items. Specifically, 63 percent of the consumers expressing dissatisfaction

Table 3. Respondent perception of the usefulness and informativeness of the scanner cash register receipt.

	Number	Percent
Perceived Informativeness		
Much more informative	37	41
Somewhat more informative	20	22
No different	31	35
Somewhat less informative	2	2
Much less informative	--	--
No opinion	--	--
Total	90	100
Usefulness		
Much more useful	16	18
Somewhat more useful	21	23
No different	46	51
Somewhat less useful	1	1
Much less useful	--	--
No opinion	6	7
Total	90	100

indicated that they had noted inconsistencies between cash register tape prices of individual items and shelf-marked prices. Several possibilities for error come to mind. The typical supermarket carries 6,000-8,000 items, with the prices on many of the items changing almost daily. The constant updating of the price changes in computer storage presents possibilities for error. Additionally, shelf marking by store employees also introduces the possibility for error. Mismarking of items has long plagued the supermarket industry. In the early 1970's, the FTC filed complaints against such outlets as A&P, Kroger, Fisher Foods, Food Fair, and Shop Rite, charging them with mispricing of advertised items. Also, in a recently announced consent order suggested by Safeway in April 1977 and provisionally accepted by the FTC in January 1978, the chain is required to sell advertised items at or below the advertised price. Specifically, Safeway must:

1. 'clearly and conspicuously' mark each advertised item with the price no higher than the advertised price

2. in the case of over-priced marked scanner items, post the advertised price clearly at the point-of-display

3. make sure each unit of an advertised item is charged out to customers at or below the advertised price

4. post 'at or near each doorway affording entrance' a copy of the advertisement and a notice telling customers to check the prices they are charged for advertised items and to report errors to store personnel

5. set up a surveillance program to make sure the consent order is complied with.[20]

The findings in this research and the findings by the Federal Trade Commission indicate that in spite of productivity and profitability gains which apparently will be forthcoming to management from scanning, price accuracy on individual items needs to be improved. This problem may be a stumbling block to achieving maximum productivity gains by management from the use of this technology. As noted earlier, some states have already passed legislation requiring price marking of individual food items. In the absence of continuing a voluntary program of individual item marking federal legislation is likely which would require the industry to place the price on each item.[21] Recent research to determine the realities of food retailing in the 1980's found, when surveying a nationwide sample of senior executives in food retailing, that 82 percent believe lawmakers will

eventually look favorably on UPC methods. Likewise, 84 percent believe the consumers will also accept these methods, but a majority, 51 percent did, however, forecast some consumer group interference with the utilization of the UPC scanning technology.[22]

DISCUSSION

The essence of ECR and scanner technology should be improved marketing decisions. Various studies have shown major reductions in cashier errors and greater price accuracy on individual items when retail prices are composed from a central source. Clearly the technology also presents the opportunity for new kinds of research data in a time frame which has previously been unavailable. Management can receive feedback on ads, promotions, and similar dimensions of strategy and quickly determine which strategies have and have not worked in time to take remedial action. For example, studies can include product mix and shelf allocation analyses, private label evaluations, information on new products, and inventory control over such problems as over-stocking and out-of-stock.

However, some problems do seem to remain in consumer acceptance of the new technology even though the reaction overall seems to be relatively positive. Specific suggestions for managerial action to insure greater acceptance include:

1. Full preparation of consumers for the acceptance of the new technology before it becomes operational in the outlet. Such a program was followed by Steinberg's, one of Canada's largest supermarket chains. They installed UPC scanning and eased customers into the system over a two-month period. Initially they had only two automated checkout lanes in use. Bag stuffers were used to explain the benefits of the system. Customers were provided grease pencils at the entrance of the store to price mark items if they so chose. They were also allowed to scan some items by the use of a scanning device placed in the back of the store. By the end of the second month, price marking was discontinued with no adverse effects on sales and no adverse customer reaction.[23]

2. Seek the assistance of consumers in alleviating problems of mismarking. Voluntary programs such as that provisionally agreed to by Safeway in the consent order with the FTC seem to be common sense and represent a program which would generate consumer goodwill by actively encouraging them to report errors and inconsistencies.

3. Develop detailed educational programs for unionized employees. The failure to include union representatives in plans for the automation of some supermarket functions with the potentially decreased requirement for labor can lead to unnecessary strikes, employee slowdowns, poor morale and similar problems.

4. Set up training programs to make sure all store employees are completely familiar with the technology. Incentive programs should be considered to eliminate employee errors in price marking.

5. Take every opportunity through public relations programs and various other consumer education efforts to stress the advantages to consumers of faster checkout time and cost savings which, when the systems are fully operational, may be reflected in lower prices to consumers. Stress also the greater price accuracy of the system once management is confident that the electronic system of recording prices has fewer errors than item marking.

Additional opportunities for research are clearly present. These include, among others:

1. The need to pinpoint more accurately the increases in employee productivity and dollar savings to management.

2. An evaluation of union reaction to increasing automation of the supermarkets.

3. The development of the profiles of consumers most prone to shop outlets utilizing such equipment to determine if they differ from a general cross-section of food shoppers.

4. Research on such topics as item price elasticity, effectiveness of alternative advertisements, impact of in-store displays, evaluation of cashier efficiency, shelf allocation studies, movement of new products, and similar experiments can and should be conducted.

In summary, the researchers generally agree with the statement of Patrick W. Collins, president of Ralphs Grocery Company, Compton, California, that "I must say that for both the retailer and the manufacturer it (electronic scanning) is the most important new development and the most important research tool every developed in marketing research."[24] The new technology with its superior data capturing skills opens up a wide array of research opportunities and improved management strategies.

FOOTNOTES

[1]Irving Solomon, "The Future of Electronic POS," Stores, April 1974.

[2]Joseph S. Wilkinson and William G. Mitchell, "POS Systems Revolutionize Retailing," Journal of Systems Management, April 1976, p. 34.

[3]"Key to POS Market...the Door is Never Locked," Electronic News, Section 2, Monday, May 6, 1974.

[4]"201 Scanners Now in Use, FMI Reports," Supermarket News, January 16, 1978, p. 33.

[5]"Scanning Gains Ground," Chain Store Age Executive, February 1977, p. 21.

[6]"When Will Scanning Catch Up With EPOS?" Chain Store Age Executive, February 1976.

[7]Gordon Bloom and Ronald C. Curhan, Technological Change in the Food Industry (Cambridge, Maryland: Marketing Science Institute, December 1974), p. 26-27.

[8]At a recent loss prevention conference sponsored by the Food Marketing Institute, it was observed that use of ECR and scanner technology in reducing shrink can yield savings which will return the cost of the system, approximately $125,000, within four years. "Urge Retailers Keep Tabs on ECR Results," Supermarket News, February 6, 1978, p. 35.

[9]"Collins of Ralphs Says Grocery Checkout Scanner is Valued Research, Marketing Tool," Marketing News, November 18, 1977, Vol. 11, p. 1; also, Morris L. Mayer and J. Barry Mason, "Point of Service Revisited," Retail Control, April 1977.

[10]"How Scanning Will Boost Front End Productivity--and Backroom Output," Progressive Grocer, May 1976.

[11]"Scanning Gains Ground," op. cit.

[12]"UPC Scanner One and One-Half Years Later," Chain Store Age Executive, February 1976.

[13]Gerald Grinnell, "Trends in Grocery Retailing," National Food Review January, 1978, p. 18.

[14]"201 Scanners," op. cit.

[15]"Universal Product Code and Item Pricing," Focus on the Food Markets, May 3, 1976, New York State Cooperative Extension Program, p. 2.

[16]John P. Hebert, "UPC Experiment Provokes Little Consumer Reaction," Computer World, February 2, 1976.

[17]Murray Aboff, "Industry Encouraged to React to Changing Family Patterns," Supermarket News, January 16, 1978, p. 20.

[18]"Shoppers on the Move: Behavior Proves Consistent," Stores, March 1975, p. 6; "Who Shops Convenience Stores?" Progressive Grocer, November 1976; J. A. Brunner and John L. Mason, "The Influence of Driving Time on Shopping Center Preference," Journal of Marketing, Vol. 32, April 1968, pp. 57-61.

[19]"UPC Scanner One and One-Half Years Later," op. cit.

[20]Marilyn W. Reeves, "Safeway Consent Settles Ad Price Case," Supermarket News, January 16, 1978, p. 1.

[21]"Grocers May Head Off Item Pricing Law, But the Cost Will be Stiff," Progressive Grocer, May 1976, p. 40.

[22]Danny N. Bellenger, Thomas J. Stanley, and John W. Allen, "Food Retailing in the 1980's: Problems and Prospects," Journal of Retailing, Vol. 53, Fall 1977.

[23]Nancy Farench, "Properly Prepare Customers, Employees for Scanning," Computer World, November 12, 1975.

[24]"Collins of Ralphs," op. cit.