

RESEARCH INTO THE CONSUMER ADOPTION OF NEW SERVICES TECHNOLOGIES: A CRITICAL REVIEW

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Consumer research into new technologies in the retail services area has evolved from unsophisticated industry studies. Focusing on point-of-sale scanning systems, various research studies are reviewed following an indication of the more general conceptual bases which could be relevant internationally. Some proposals are made to encourage more theory-driven research.

Keywords: adoption, diffusion, innovation, retail technological services

INTRODUCTION

The literature on innovation and new product marketing and the general diffusion of innovations is becoming increasingly comprehensive.¹ However, while disciplines such as rural sociology have long studied new ways of doing things rather than just new 'things', the attention of marketing writers has tended to focus on the creation and dissemination of tangible additions to consumers' standards of living.

Recently, there has been greater interest in the consumer services sector, in which many new technologies have appeared. However, there has been little analysis of the appropriateness to this sector of the existing theoretical concepts and research approaches involved in the study of the adoption process. Further, the transnational nature of many of the promoters of the new technologies and the increasingly common consumption patterns throughout the world indicate the likely relevance of experiences in other countries to the probable course of events in a particular country. A case in point is the introduction of point-of-sale scanners in grocery stores since 1974, beginning in the USA and now in more than 20 countries throughout the world. An associated feature of scanning has been the tendency to reduce the proportion of item price-marking (IPM), and hence to emphasise the changes in consumer behaviour involved.

The technological basis of the scanning system is the assignment of a unique identification number to each consumer product, and the

printing of the number in the form of a striped symbol on the label or package of each item. At the retail checkout, the operator passes each package over a light-beam scanner. An in-store computer interprets the symbol, looks up the price and item description in its memory, and transmits these back to an electronic cash register at the checkout. Here the price and description are displayed to the customer and printed on a detailed receipt tape.

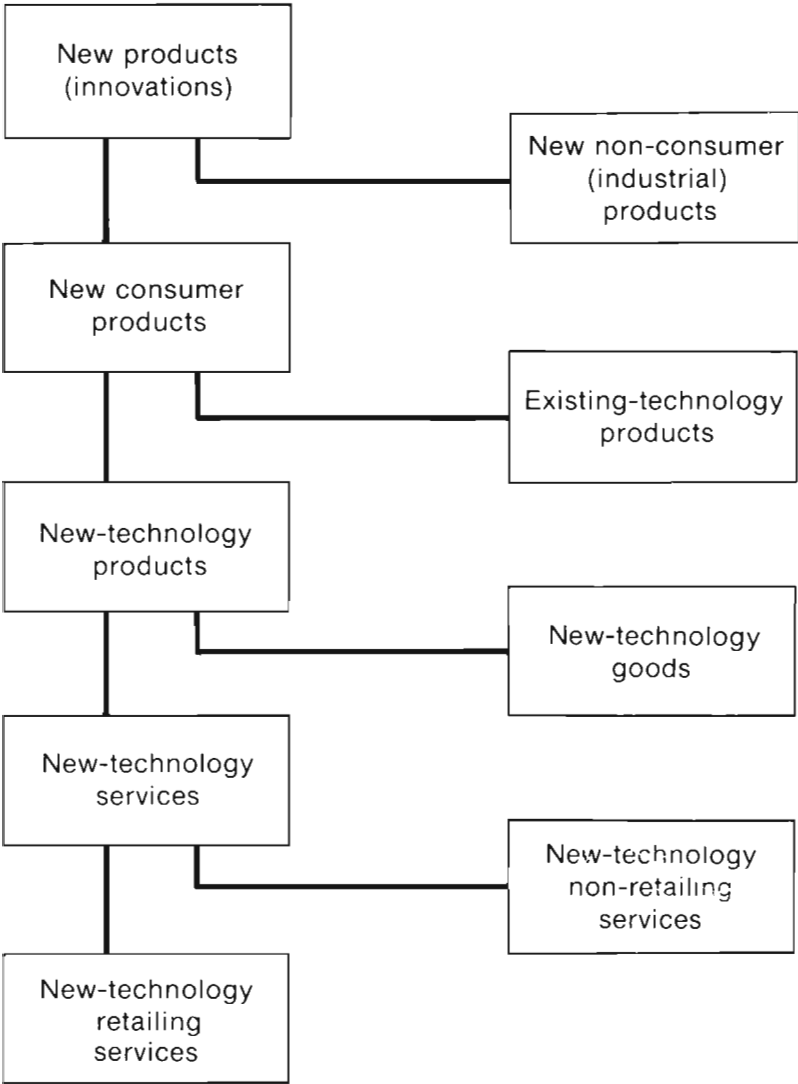
Point-of-sale scanning systems can provide, directly or indirectly, many benefits for consumers. Some of these benefits are: faster checkout, fewer errors at the checkout, an elaborated receipt tape, an improved visual display at the checkstand, possible lower prices, opportunities for more personalised services, and a better availability of products. While retailers will gain some productivity advantage directly, the main benefits to retailers and manufacturers will be derived from the data captured by the scanner-computer linkage.²

It is not necessary to price-mark each individual item if scanning is operating and if each product carries a symbol. Rather, the scanner will identify the product by its symbol, and retrieve the price from a computer file. This technological opportunity has obvious economic implications in terms of the resources released from the activity of item price-marking. However, questions have arisen from some sources regarding the implications for consumer behaviour and welfare of the cessation of item price-marking. These issues arose early in the evolution of scanning and have plagued its introduction to varying degrees in each country.³

Some of the supposed areas of possible disadvantage to shoppers include: the inability to ascertain the price of an item, even if the price is marked on the shelf; the inability to compare the prices of various products, particularly if the products are located in different parts of the store; the inability to verify that the price displayed at the point of selection is the same as that charged at the point of purchase or recorded on the receipt tape; the ease with which retailers may increase prices because of the obviation of the need to mark every item; the dampening effect on price awareness because products stocked at home are not reminders of price as they are consumed; and the inability to add prices as products are selected during a shopping trip, with implications for budgetary constraints. Supposedly-associated ramifications are consumers' concerns regarding the future of personal service and their questioning — as citizens — about the employment effects of the technology and aspects such as privacy provisions.

The economic importance of the new scanning technology is large. For example, the cost of installing scanning equipment is approximately \$10,000 per checkout (or about \$100,000 per store). In the USA, more than 11,000 stores have installed scanning, with Japan

Figure 1.
Defining the Research Field



also having several thousand 'scanstores' and many other countries having more than 100 scanstores.⁴ Obviously, the US investment alone already exceeds one billion dollars.

The cost of item price-making varies, but is generally estimated at more than one-tenth of one per cent of sales. Recognising that grocery retailing net profits after tax often amount to only one per cent of sales, the potential importance in retailer decision making of item price-marking is clear. Not only might consumers who value item price-marking shop elsewhere if it were reduced, but there might also be so much agitation for its retention that laws may be passed prohibiting any reduction. To further define the current research area, partially to distinguish it from previous research, a draft schema has been developed and is outlined in Figure 1.

The major focus of this paper is the consumer research aspects of new technology retailing services, particularly scanning and item price-marking. There is also some reference to new banking services, such as interest-paying checking (NOW) accounts and electronic funds transfer (EFT) at the point-of-sale (POS), and to automated teller machines (ATMs) and other topics, such as telemarketing (including videotex) and earlier technologies, such as in-store self-service and vending operations.

No direct attention is given to new technology non-retailing services, such as foetal monitors, as a more restrictive definition of retailing will be used than that used by Kotler, who would have classified hospitals as retailers.⁵ While there is agreement with Kotler's definition in general, the intention here is to focus on those institutions traditionally called 'retailers', while extending the coverage to 'near-retailers', such as banks, and eventually to all institutions "involved in selling goods or services directly to final consumers for their personal, non-business use" (the expanded set of retailers).⁶

CONCEPTUAL ANALYTIC APPROACHES

At least five reasonably distinguishable, although obviously related, areas of study provide some guidance for the current research topic. These areas may be termed (a) diffusion of innovations, (b) technology in the services sector, (c) patronage/store choice, (d) information processing, and (e) cross-cultural behaviour.

Diffusion of Innovations

While much of the research to be discussed has aspects of explicit relevance to the applied dimensions of the topic, the essence of the research is the theoretical notion of innovation and particularly the diffusion of innovation. However, as has been asserted by Rogers, the

innovation process should be more broadly conceptualised and hence researched, including its six main phases, viz. (i) needs/problems, (ii) research (basic and applied), (iii) development, (iv) commercialisation, (v) diffusion and adoption, and (vi) consequences.⁷ Many aspects of this process have been examined in relation to the early years of scanning in North America, but there has been no comprehensive study with an international perspective.⁸ Rogers summarises those variables found to be relevant to the rate of adoption of innovations as follows.⁹

- I. Perceived Attributes of Innovations
 1. Relative advantage
 2. Compatibility
 3. Complexity
 4. Trialability
 5. Observability
- II. Type of Innovation-Decision
 1. Optional
 2. Collective
 3. Authority
- III. Communication Channels (e.g., mass media or interpersonal)
- IV. Nature of Social System (e.g., its norms, degree of interconnectedness, etc.)
- V. Extent of Change Agents' Promotion Efforts

By concentrating on new technology retailing services, it is feasible to investigate a rarely-studied area of innovation diffusion, the 'contingent authority innovation decision'.¹⁰ This concept differs from the usual situation where consumers have the option to adopt (or reject) an innovation, as in the case of the introduction of video cassette recorders. Rather, consumers may have the innovation (scanning with reduced item price-marking) imposed on them by an authority or outsider (the retailer operating their current supermarket) and are faced with the decision to accept (adopt) or reject the innovation after trial. There are many ramifications of this situation, such as the apparent violation of the usual order of the stages in the process of knowledge-persuasion-decision-implementation-confirmation.

A major element in the process could be the perceived relative continuity of the innovation, in Robertson's sense, especially in view of the extent of behaviour modification involved.¹¹ For example, if a discount supermarket which had a low level of item price-marking introduced scanning, or a full-service supermarket introduced scanning alone, the innovation might be classified as 'continuous' or

as having a low disrupting influence on established patterns. But if the full-service supermarket simultaneously reduced the level of item price-marking, then a 'dynamically continuous' innovation with more disruption to established patterns might have occurred, although shoppers in the discount operation would not perceive it as such. Analogous logic could be applied to innovations such as NOW accounts (continuous), and ATMs (dynamically continuous, or perhaps even discontinuous).

Technology in the Services Sector

In a major overview, Collier has categorised the startling extent to which automation has penetrated, or will penetrate, the following services sectors: financial services, utility/government services, communication/electronic services, transportation services, health care services, education services, restaurant/food services, wholesale/retail trade, hotel/motel services, and leisure services.¹² Collier distinguishes six categories of automation, ranging from primitive fixed sequence robots through to sophisticated, totally automated systems. Point-of-sale scanners are classified in the second-lowest category, as variable sequence robots, because their limited set of operations can be modified (programmed) slightly to accept changing information (different products, etc.). Financial sector ATMs are regarded similarly.

According to Stevens, innovations which occur in retailing are the result of: (1) improving efficiency (and/or effectiveness) in performing the functions involved in moving goods, people and information, and (2) substituting one type of movement for another.¹³ The rise of various retailing forms, such as vending, self-service, supermarkets, and videotex, can be related to these propositions. Point-of-sale scanning can be seen to offer improvements in moving goods (across the checkout) and information (into the register, onto a visual display at the checkout and onto an improved receipt tape), and to involve replacing the movement of goods bearing item price marks held/inspected by people, with people simply locating/inspecting shelf price marks.

Stevens contends that a careful analysis of past innovations reveals three basic consumer benefits of retail innovations — a better assortment of goods and services, more convenience, and lower prices. One of these benefits must be increased with no decrease in the other two, or an acceptable trade-off of benefits must be accomplished (for example, less assortment but more convenience) for any change in retailing to gain consumer acceptance.

Of further interest is the question of the relevance of research which characterises the adopters of new-technology goods. Jain and Etgar,

and Green, Langeard and Favell have investigated the relationship between innovation in goods and innovation in services, with generally mixed results suggesting that the earlier adopters of new goods are not necessarily the first to patronise new types of retail outlets.¹⁴

Patronage/Store Choice

Numerous studies have examined, directly or indirectly, variables which might influence a shopper's choice of store.¹⁵ However, none of the studies (going back more than 10 years in the *Journal of Retailing* and other major journals) has reported a comprehensive examination of the place of scanning-related attributes in shopper decision making (such a study is nearing completion by the present author). While the speed of checkout was sometimes included as an aspect of some research, the focus was usually (and perhaps appropriately) on variables related to convenience, price levels, product assortment, product quality, etc. Features such as price-marking (item or shelf), receipt tapes, and cash register displays of transaction data were generally ignored. Whether aspects of technology were included in such variables as 'atmosphere' (modernity, etc.) is unclear.

Olshavsky and Granbois suggested that extended search and evaluation typically does not precede store patronage, thereby challenging the validity of the intricate models of decision making being proposed elsewhere.¹⁶ Engel and Blackwell seem to be partially in agreement, noting that the retail store-choice decision can be one of high involvement or low involvement.¹⁷ Under low involvement there is an abbreviated decision process, with alternative evaluation following choice rather than preceding it as is the case under high involvement. The similarity of this proposition to that implicit in Rogers' notion of contingent authority innovation decision making, is notable.¹⁸

Information Processing

According to Tornatzky and Klein:

While so-called primary attributes of innovations can be measured 'objectively', the meaning of the objective measure of the characteristic is subjective, that is, in the mind of the perceiver Perceptions are always evaluated in reference to some internalised system of values or cognitive framework; the result is a subjective rating of the significance of the 'fact'.¹⁹

This general selectivity or idiosyncratic nature is thought to be operative at all stages of information processing, involving the interaction of memory with exposure to stimuli and subsequent

attention, comprehension, yielding/acceptance, and retention.²⁰ Thus, differences may be expected in the responses of shoppers to some or all of the attributes of the new technology, particularly the provision of pricing data. Some results from the unit pricing and related literature may be relevant.²¹

Cross-cultural Behaviour

The theory of cross-cultural buyer behaviour advanced by Sheth and Sethi emphasises the perspective of multinational corporations (MNCs) in the diffusion of innovations.²² While retailing tends to be less the domain of MNCs than other areas of commercial enterprise (with the exception of grocery retailers such as Safeway, or fast food retailers such as McDonalds), the suppliers of goods and services to retailers are quite often MNCs, such as computer/cash register marketers, the manufacturers of grocery products, and accounting and consulting firms. Thus, a two-stage process may be relevant to the current research topic. First, the diffusion and adoption of the pre-requisites to scanning are necessary, involving infrastructure elements such as pre-packaged products merchandised via self-service outlets with an emphasis on speed and accuracy. Secondly, factors such as the scale of operation, supply-side competition, and demand-side preferences and economic capabilities operate to indicate the desirability of obtaining the direct productivity benefits and indirect informational benefits of installing scanning. The first stage has been examined in relation to supermarkets by Goldman for less developed countries, and by Langeard and Peterson for a developed country (France).²³ Aspects of the second stage have received attention, as in an examination of some cross-cultural differences in the adoption of retail services.²⁴

STUDIES OF SCANNING

In terms of sheer size, some of the major studies of scanning have been produced by governments.²⁵ However, these reports tend not to contain original empirical research, although they do serve an integrative function. Some government reports do include empirical results, and two are considered later.²⁶ Probably the most numerous studies, and yet the most inaccessible, are commercial reports, usually prepared for individual retailers. While some information is available, only three studies are considered here.²⁷ The research which will be discussed most critically is 'academic' research, performed by persons affiliated with academic institutions and reported in the public or academic literature, although sponsorship of the research may have been derived partly from commercial interests. Ten studies are reviewed, although several others are available.

Three studies adopted what is primarily an information processing approach. In the USA, Harrell, Hutt and Allen surveyed nearly 3,000 shoppers who patronised a mixture of scanstores and non-scanstores, with either a low level or a high level of item price-marking (IPM).²⁸ While shoppers in all stores displayed a high level of price awareness, there was a small but significant difference in favour of the performance of shoppers in high IPM stores compared with low IPM shoppers regarding the correctness of price estimation. In Australia, a similar but smaller-scale study did not find appreciable differences in shopper price consciousness.²⁹

In the USA, a laboratory experiment conducted by Zeithaml resulted in an 'exact-price recall error' of 17.5 per cent for the IPM treatment group, compared with 21.3 per cent for the no-IPM treatment group.³⁰ This result was significant at the 0.05 level but not at the 0.01 level. Unfortunately, several aspects of this study cast doubt on the usefulness of the results. For example, all the experimental subjects usually shopped at stores with high IPM, so the importance of prior or post experience with low IPM was not addressed. Similarly, because of the factorial design used, four levels of legibility of shelf labeling were employed (upon which subjects had to rely for pricing information in the absence of IPM). Uniformly good shelf labels would have produced a more certain result.

Harris and Mills investigated the sources and usage of price information, and the attitudes to technology and retailing of 485 Californian shoppers drawn from six scanstores and six non-scanstores.³¹ While it was found that 88 per cent of respondents favoured the retention of IPM, 30 per cent of all respondents claimed to be confident that the prices paid at the checkout would be accurate if shelf price-marking replaced IPM. Two major constraints on the usefulness of this study were its inclusion of only supermarkets which had high IPM, and its restriction of analysis to successive bivariate cross-tabulations. While this research included elements of information processing, response to technology, and patronage decision making, the last aspect of store choice was approached only inferentially because direct questions were not asked. The researchers were not to arouse the suspicion in shoppers that the store was actually contemplating a reduction in IPM, and this may have been a constraint.

While most of the research into scanning and IPM has adopted the perspective of shoppers being free to exercise their patronage choice behaviour as an expression of their degree of satisfaction with the various retailer offerings, some research has examined the degree of support for legislative controls as demanded by some vocal community elements. In the USA, Langrehr and Langrehr conducted

a telephone survey among 193 shoppers, many of whom had shopped in a low IPM store.³² It was found that 42 per cent of respondents favoured a law compelling IPM, while 46 per cent were against it, and 12 per cent undecided. However, of those respondents who had actually shopped in a low IPM store, 80 per cent opposed mandatory IPM.

In an Australian study, 1,937 household interviews were conducted with grocery shoppers.³³ At the time of the fieldwork (May 1980), no scanstores were operating and few stores had low IPM. Thus, it was difficult to convey adequately to respondents the dual technology/IPM scenario. However, at the risk of introducing additional non-sampling error, substantial effort was made to explain the concept to interviewees. As a result, a clear majority (58 per cent) of respondents saw no need to engage in IPM. Those respondents who felt that IPM was necessary in a scanning environment were reminded that if the people working in the shop did not have to mark a price on each item, then there would be some savings made. Respondents were asked whether, if the shop passed on some of these savings, say, by letting the customer save \$20 per year, they would still want to see IPM. Approximately one-quarter of those previously wanting IPM were prepared to accept this hypothetical trade-off of \$20 per year in savings. This brought the cumulative proportion of all respondents seeing no further need for IPM to almost 70 per cent. Those respondents (30 per cent) persisting in their wish for IPM were invited to nominate how much they would want to save per year before they would agree to no IPM. A further 10 per cent of all customers were prepared to trade-off \$200 or less per year (four dollars per week) for IPM. The residual 20 per cent of the sample generally refused to yield to IPM, or found it difficult to estimate a dollar value or to believe that savings would really accrue to them.

Respondents were divided on the issue of a government forcing shopkeepers to put a price mark on every individual package (39 per cent in favour, 54 per cent against, and seven per cent uncertain). However, the majority rejected compulsion provided that clear shelf price marks were provided with the new system. Freedom from interference, economic and practical aspects, and the redundancy of IPM were supporting reasons for the majority, while those favouring government action stressed the information aspect and their lack of trust in the system. Statistically insignificant relationships were found between attitude to mandatory IPM and virtually all the variables examined in the study. However, weak relationships were suggested in terms of those respondents favouring government action also tending always to find prices before selecting items and tending to comparison shop more frequently. The main relationship found to be clearly significant (p less than 0.001) was that between favouring government

compulsion and favouring the retention of IPM, irrespective of government action. This was an unsurprising result — what was interesting was that 29 per cent of non-retentionists were in favour of government coercion, while 42 per cent of those in favour of retaining IPM were against government action. Clearly, the spectre of government intervention arouses different, and probably interacting, predispositions.

A similar result was found by Langrehr and Langrehr when responses to technology in general, scanning in particular, and IPM as a related aspect, were sought from 246 Milwaukee shoppers.³⁴ The majority reactions to technology and scanning were positive, and were negative to reduced IPM (as found also by Langrehr and Robinson).³⁵ But the suggestion that controls were necessary to slow the rate of technological change was rejected by most respondents.

Pommer, Berkowitz and Walton undertook a shopper intercept study seeking the co-operation of 393 shoppers in the mail-back of a self-completion questionnaire containing 33 attitude statements plus some demographic questions.³⁶ A response rate of 41 per cent was achieved. All the respondents were shoppers at three mid-west USA scanstores with high IPM. All the attitude statements dealt with scanning or IPM, factor analysis of which yielded four factors — price removal, checkout service, price and cost benefits, and receipt tape utilisation. The statements loading highly on each factor were successively cross-tabulated with each demographic variable, showing that, for example, those respondents least likely to object to low IPM would be younger, or working in professional/managerial positions, or warehouse-store shoppers. While this study contributed to a deeper understanding of the topic by virtue of its factor analytic approach, the absence of shoppers experienced with low IPM or not currently preferring to shop at a scanstore constituted a substantial limitation. Only 17 per cent of respondents considered that scanning was an influence in their store choice.

In a study of patronage decision making, Shaw and Aitchison offered a mail-back self-administered questionnaire to shoppers at four Australian shopping centres, each centre containing a scanstore with low IPM.³⁷ A sample of 250 shoppers provided data on 172 questions about their activities, interests, opinions, and demographics, oriented towards variables thought relevant to supermarket shopping. Respondents were clustered into five segments revealing key dimensions, including political orientation, price consciousness, and technological predisposition. Multiple regression analyses investigated the relationships between some important attitudes and highly-correlated predictor statements, while factor analysis and chi-square tests examined other aspects of the data. Confirmation was provided of the likely difficulty of marketing an

innovation when confronted by target segments differing markedly in their value systems and related multi-attribute decision models.

The two government and three commercial research studies mentioned earlier provide little conceptual background material to their research and make no major claims to theoretical contributions for their results. Most questions relate to acceptance/rejection of the technology and to the identification of potential problems. While the results vary markedly across the studies from New York, Ottawa, England, and New Zealand, it is clear that some shoppers (and often most shoppers) dislike reduced IPM but appreciate the improved checkout speed, receipt tape, etc. Equally apparent is that there is no massive store switching, in either direction, following the introduction of scanning and reduced IPM. Further, there is the suggestion from those rare studies with a longitudinal component that reduced IPM is less of a problem over time.³⁸

DISCUSSION

According to Monroe and Krishnan:

Some of the major shortcomings of traditional attempts to synthesize knowledge include: (1) methodological deficiencies of the literature search process, i.e. incomplete literature searches; (2) qualitative and judgmental reviews without analytical rigor; (3) literary and chronological reporting style; (4) highly uncritical reviews; (5) lack of definitive results.³⁹

The relevance of some of these criticisms to the preceding section will be apparent, and it is the present author's intention to assemble sufficient research detail — both in terms of the quantity of studies and the quality of the data provided — to enable a formal 'meta-analysis' to be performed, i.e. the statistical analysis of the summary findings of many empirical studies.⁴⁰ However, in the interim, it is appropriate to comment on the apparent status of the research area.

An obvious deficiency in the accessible scanning research is the lack of longitudinal studies, and the related lack of control of the effect of prior experience on the reported cross-sectional results. Thus, research is required to examine the extent to which shoppers altered their overt behaviour (especially patronage) in response to the new technology, particularly compared with either their covert or expressed intentions. If store-switching did not occur, then what was responsible? Possible hypotheses relate to the trade-off nature of patronage decision making, the non-confirmation of negative expectations, and problems with research instruments in terms of their validity in assessing reactions to complex innovations.

The decision-making process can be analysed according to the way in which aspects of the situation may be given money values or otherwise traded-off, such as the inconvenience of having to travel further to a non-scanstore than to the currently patronised scanstore, or the difficulty of judging whether overall product prices are cheaper in one store than in another. The use of hybrid conjoint models is being examined in this connection by the present author as one contribution to the introduction of more comprehensive modelling and multivariate analytic techniques in this area.

With the exception of the information-processing oriented studies, such as that by Zeithaml, there is generally an inadequate appeal to theory to guide the research.⁴¹ In particular, the contributions of Rogers and others on the diffusion of innovations are — at best — incorporated implicitly in the studies.⁴² With the increasing internationalisation of the research, the diffusion concepts deserve greater attention. For example, while Japan has had more scanstores than any country other than the USA for several years, only now is a major supermarket chain trying reduced IPM. Apparently, low IPM has been regarded as incompatible with accepted Japanese shopper behaviour to such an extent that it was not thought that Japanese shoppers would perceive sufficient offsetting advantage of scanning. Whether the apparent Japanese attachment to IPM qualifies as a moderating norm of the social system, in Rogers' sense, is debatable.⁴³

An example of a theory-driven research study could be the investigation of the shopper profiles of scanstores, depending on whether the scanstore was either a new store which opened with scanning and low IPM, or whether the store converted to scanning after previously having operated with or without low IPM. While many other variables could be involved in store choice (or few, if Olshavsky and Granbois are followed)⁴⁴, the influence of scanning/IPM in two types of Rogers' innovation-decision situations — the 'optional' and 'contingent authority' — could be examined.⁴⁵ The new store (optional) situation parallels the usual 'new goods' offer facing consumers, and it could be expected that the initial customers (innovators and early adopters) would exhibit different characteristics from those shoppers who, coincidentally, patronise a store which converts to scanning. Related aspects are the longitudinal changes in shopper profiles for various stores, which may be further related to the continuity of the changes which occur in existing store operations, such as whether there was high or low IPM prior to scanning.

Rogers' concern with the needs/problems which motivate innovations and the consequences of those innovations can also be addressed.⁴⁶ For example, the first scanstore in Papua New Guinea, opened in 1985, was prompted by the desire to reduce shrinkage

(losses due to theft, damage, errors, and perishability). Scanning has also begun in other countries which have limited local manufacturing of consumer goods and few supermarkets, but which have a substantial proportion of their merchandise imported already marked with scannable symbols.

An important potential consequence of scanning with low IPM is the effect on the utilisation of price data in consumer decision making. Critics of low IPM suggest that desensitisation to price will occur, with consequently more economically irrational decisions being made. Longitudinal studies, making due allowance for the likely presence of segments which vary in their basic price salience, are clearly required.

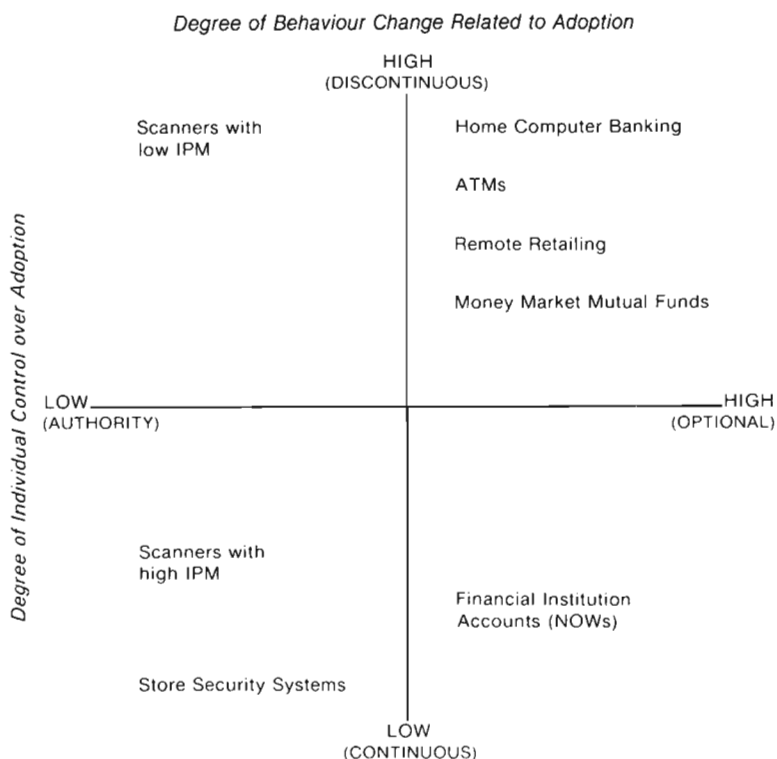
CONCLUSION

Consumer research into new technologies in the retail services area has grown out of pragmatic and methodologically primitive commercial research. There is a need for a greater volume of research which draws on and then evaluates existing conceptual approaches from related areas. In particular, the literature on the diffusion of innovations contains many useful and important suggestions for the construction of an appropriate theoretical framework. For example, if Rogers' three levels of individual control over the adoption of an innovation (optional, collective, and authority) are related to the perceived degree of continuity of an innovation, then a resultant depiction (Figure 2) has four quadrants.⁴⁷ The southeast quadrant contains those innovations which require the least behaviour change and where the consumer has the most control over adoption. Savings and checking accounts that are slight modifications of previous offerings fit here. The southwest quadrant contains those innovations where consumers have little control over adoption and use, but the changes have little impact on their behaviour. The changes at the retail checkstand best fit here. The northeast quadrant contains those changes that the consumer has control over adopting, but which require major changes in behaviour or new behaviour. Home computer retailing and ATMs are sited here.

The northwest quadrant contains those innovations/changes to which consumers are least likely to react positively. Here they must change their behaviour and have less control over the decision to adopt the change. Reduced item price-marking in supermarkets may well illustrate this type of change. Low IPM can require behavioural changes, and consumers must now obtain and use price information from different sources. For example, without item price-marking by individual shoppers, price checking of the store shelf-listed price and computer-stored price at the checkout is difficult. Consumers also have little or no direct control over whether an individual store or

chain item price marks. They do have the choice of shopping at a different chain — unless all chains reduce IPM.

Figure 2.
Behaviour Change and Individual Control



Can anything be done to increase consumer acceptance of low IPM? Giving consumers some control over their environment might be one possibility. For example, shoppers could be given their own price markers. This would enable those who wanted IPM to mark their purchases. Further, Zeithaml found that consumers were more efficient in their shopping if they could refer to a list of brands, sizes, and unit prices.⁴⁸ Thus, a list of this sort could be of use to the consumer even if low IPM were in place.

NOTES AND REFERENCES

1. E.g., David F. Midgley, *Innovation and New Product Marketing*, Croom Helm, London, 1977; Everett M. Rogers, *Diffusion of Innovations*, Free Press, New York, 1983.
2. Robin N. Shaw, 'Will code scanning revolutionize research?', *Australian Marketing Researcher*, 3, Summer 1979, pp. 22-7.
3. Robin N. Shaw, *Universal Product Code Scanning Systems: The Retail Experience 1974-76*, Department of Agricultural Economics, Cornell University, Ithaca, New York, 1977.
4. Food Marketing Institute, *Scanning Installation Update*, Food Marketing Institute, Washington DC, 1985; International Article Numbering Association EAN, *Annual Report 1983*, EAN, Brussels, 1984.
5. Philip Kotler, *Marketing Management: Analysis, Planning, and Control*, Prentice-Hall, Englewood Cliffs, New Jersey, 1984.
6. *ibid.*, p. 565.
7. Rogers, *op. cit.*
8. Shaw, *op. cit.*, 1977.
9. Rogers, *op. cit.*
10. *ibid.*
11. Thomas S. Robertson, 'The process of innovation and the diffusion of innovation', *Journal of Marketing*, 31, January 1967, pp. 14-19.
12. David A. Collier, 'The service sector revolution: the automation of services', *Long Range Planning*, 16, 6, 1983, pp. 10-20.
13. Robert E. Stevens, 'Retail innovations: a technological model of change in retailing', *Marquette Business Review*, Winter 1975, pp. 164-8.
14. Arun K. Jain and Michael Etgar, 'Overlap in retail outlet and product innovator characteristics', *Journal of Retailing*, 53, Summer 1977, pp. 63-74; Robert T. Green, Eric Langeard and Alice C. Favell, 'Innovation in the service sector: some empirical findings', *Journal of Marketing Research*, 11, August 1974, pp. 323-6.
15. See particularly *Journal of Retailing*, 60, Spring 1984, *passim*; Theo M.M. Verhallen and Gert Jan De Nooij, 'Retail attribute sensitivity and shopping patronage', *Journal of Economic Psychology*, 2, 1982, pp. 39-55; Stephen J. Arnold, Sylvia Ma and Douglas J. Tigert, 'A comparative analysis of determinant attributes in retail store selection', *Advances in Consumer Research*, 5, 1978, pp. 663-7; Robert A. Hansen and Terry Deutscher, 'An empirical investigation of attribute importance in retail store selection', *Journal of Retailing*, 53, Winter 1977-78, pp. 59-72, 95; Jay D. Lindquist, 'Meaning of image: a survey of empirical and hypothetical evidence', *Journal of Retailing*, 50, Winter 1974-75, pp. 29-38.
16. Richard W. Olshavsky and Donald H. Granbois, 'Consumer decision making — fact or fiction?' *Journal of Consumer Research*, 6, September 1979, pp. 93-100.
17. James F. Engel and Roger D. Blackwell, *Consumer Behavior*, Dryden Press, Chicago, 1982.
18. Rogers, *op. cit.*
19. Louis G. Tornatzky and Katherine J. Klein, 'Innovation characteristics and innovation adoption — implementation: a meta-analysis of findings', *IEEE Transactions on Engineering Management*, EM-29, February 1982, pp. 28-45.
20. Engel and Blackwell, *op. cit.*
21. Noel Capon and Deanna Kuhn, 'Can consumers calculate best buys?' *Journal of Consumer Research*, 8, March 1982, pp. 449-53.
22. Jagdish N. Sheth and S. Prakesh Sethi, 'A theory of cross-cultural buyer behavior' in Arch G. Woodside, Jagdish N. Sheth and Peter D. Bennett (eds), *Consumer and Industrial Buying Behavior*, Elsevier North-Holland, New York, 1977, pp. 369-86.

23. Arie Goldman, 'Transfer of a retailing technology into the less developed countries: the supermarket case', *Journal of Retailing*, 57, Summer 1981, pp. 5-29; Eric Langeard and Robert A. Peterson, 'Diffusion of large-scale food retailing in France: supermarche et hypermarche', *Journal of Retailing*, 3, Fall 1975, pp. 43-63, 80.
24. Robert T. Green and Eric Langeard, 'A cross-national comparison of consumer habits and innovator characteristics', *Journal of Marketing*, 39, July 1975, pp. 34-41.
25. See, for example, Director General of Fair Trading, *Micro-Electronics and Retailing*, HMSO, London, 1982; Working Party on Electronic Checkout Systems, *Report to the Standing Committee of Consumer Affairs Ministers*, South Australian Department of Public and Consumer Affairs, Adelaide, 1983.
26. Senate Standing Committee on Consumer Protection, *Universal Product Code: Final Staff Report*, New York State Senate, Albany, New York, 1976; Ministry of Consumer and Commercial Relations, *Interim Report on Computerized Checkout Systems in Food Supermarkets in Ontario*, Ministry of Consumer and Commercial Relations, Toronto, 1980.
27. Field Research Corporation, *A Survey of Reaction to the New UPC Checkout System Among Gemco Shoppers*, Lucky Stores, Dublin, California, 1975; Barbara Walman, 'What do customers think of scanning?', and J.E. Penney, 'The successful combination of people and technology', papers presented to the Electronic Point-of-Sale Conference, Melbourne, October 1984.
28. Gilbert D. Harrell, Michael D. Hutt and John W. Allen, *Universal Product Code: Price Removal and Consumer Behavior in Supermarkets*, Graduate School of Business Administration, Michigan State University, East Lansing, Michigan, 1976.
29. Moira H. MacKinnon and Timothy G. Kitching, *Price Awareness and Comparative Shopping Behaviour in Two Stores: Some Implications of Price Removal for Consumer Behaviour* (M. Admin. project, Department of Administrative Studies, Monash University 1979).
30. Valerie A. Zeithaml, *Consumer Response to Grocery Store Price Information* (DBA thesis, University of Maryland, 1980); *idem.*, 'Consumer response to in-store price information environments', *Journal of Consumer Research*, 8, March 1982, pp. 357-69.
31. Brian F. Harris and Michael K. Mills, 'The impact of item price removal on grocery shopping behavior', *Journal of Retailing*, 56, Winter 1980, pp. 73-93; Brian F. Harris and Michael K. Mills, 'The impact of item price removal in scanner supermarkets', *Journal of Consumer Affairs*, 16, Winter 1982, pp. 362-83.
32. Virginia B. Langrehr and Frederick W. Langrehr, 'Do consumers want controls on item price removal?', paper presented to the 25th Annual Conference of the American Council on Consumer Interests, 1982.
33. Robin N. Shaw and Rosalie E. Gibbs, 'Shopper behaviour, price information, and new technology', *Australian Marketing Researcher*, 5, March 1981, pp. 25-33.
34. Frederick W. Langrehr and Virginia B. Langrehr, 'Consumers' reactions to technology in general and to a specific technological innovation', *Journal of Consumer Policy* (forthcoming).
35. Frederick W. Langrehr and Richard K. Robinson, 'Shoppers' reactions to supermarket price scanning and shopper price marking', *Journal of Consumer Affairs*, 13, Winter 1979, pp. 370-9.
36. Michael D. Pommer, Eric N. Berkowitz and John R. Walton, 'UPC scanning: an assessment of shopper response to technological change', *Journal of Retailing*, 56, Summer 1980, pp. 25-44.
37. Robin N. Shaw and John L. Aitchison, 'Consumer behaviour and new technology: an analysis of supermarket scanning and item price-marking' in *Theme Papers — Proceedings of the Management Educators' Conference*,

- Queensland Combined Management Schools, Brisbane, 1984, pp. 104-28.
38. Walman, *op. cit.*
 39. Kent B. Monroe and R. Krishnan, 'A procedure for integrating outcomes across studies', *Advances in Consumer Research*, 10, 1983, pp. 503-8.
 40. Gene V. Glass, Barry McGaw and Mary Lee Smith, *Meta-Analysis in Social Research*, Sage Publications, Beverly Hills, California, 1981.
 41. Zeithaml, *op. cit.*, 1982.
 42. Rogers, *op. cit.*
 43. *ibid.*
 44. Olshavsky and Granbois, *op. cit.*
 45. Rogers, *op. cit.*
 46. *ibid.*
 47. Robin N. Shaw, Frederick W. Langrehr and Virginia B. Langrehr, 'Diffusion of innovations: international research into new technologies in the consumer services sector' in Chin Tiong Tan and Jagdish N. Sheth (eds), *Proceedings of the Association for Consumer Research International Meeting in Singapore*, National University of Singapore, Singapore, 1985, pp. 90-4.
 48. Zeithaml, *op. cit.*, 1982.