



Understanding consumer motivation and behavior related to self-scanning in retailing

Consumer motivation and behavior

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Implications for strategy and research on technology-based self-service

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Abstract *Self-scanning technology is being tested by major supermarket chains as well as other types of retailers across the world, but the success of the new technology from the consumer's perspective is not yet clear. This study investigates consumer reasons for both using and avoiding self-scanning checkouts with a view to addressing these practitioner issues. In addition, the study advances theory on consumer motivation and behavior related to technology-based self-service in general. Factors driving preference or avoidance of self-scanning checkouts include attributes of self-scanners, consumer differences, and situational influences. Reasons for preference of other types of technology-based self-service over traditional service alternatives are also explored to determine motivational and behavioral patterns across service contexts. A combination of research methods is used to investigate these issues and offers richer findings than any one method used alone. Implications are discussed for managerial strategy as well as for future research.*

Recent advances in technology have created a surge in “technology-based self-service” delivery options ranging from in-room hotel checkout and automated airline ticketing by telephone to Internet shopping (Dabholkar, 1994a). In banking, for example, although automated teller machines (ATMs) were not well received when first introduced more than 20 years ago, technology-based self-service options now include telephone banking, Internet banking, smart-card banking, and home banking via television, in addition to the ATM (Prendergast and Marr, 1994). Such developments are changing the way service firms and consumers interact, and are raising many new research issues for investigation (Dabholkar, 2000).

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Like the ATM in its early years, retail self-scanners first introduced in grocery stores nearly two decades ago were not well received at the time. However, unlike ATMs which were eventually accepted, self-scanning checkouts were met with stubborn resistance. In fact, self-scanning in retail stores represents a classic case of a technology-based self-service that failed on its first inception. It is possible that this option was introduced at a time when consumers were simply not ready to change their behaviors to adopt a new way of shopping. Or, it may be that unlike the ATM, this particular technology-based self-service was viewed as requiring too much effort on the part of the consumer.

The modern consumer is much more technologically aware and comfortable, and supermarket chains are beginning to experiment again with self-scanners (Hennessy, 1998). According to the Food Marketing Institute, 18 supermarket chains in North America had self-scanning lanes in 1998 (*Discount Store News*, 1998a), and by 2004, nearly half of the grocery retailers in the USA will offer some form of self-scanning to consumers (*Chain Store Age*, 2002). That may be an optimistic estimate perhaps; by the end of 2000, 14 percent of grocery retailers in the USA with 11 or more stores offered self-scanning (Rohland, 2001), and currently about 20 percent offer self-scanning along with the traditional checkouts (Forster, 2002).

The phenomenon is not restricted to the USA; Costco is testing self-checkout systems in Canada (*Discount Store News*, 1998b), and NCR reports interest in stationary self-scanners from supermarket chains in The Netherlands and Germany (Hunt, 1998). Not that Europe has been behind the USA in this area. Handheld self-scanners have been used by preferred customers in major supermarket chains in several European countries since the mid-1990s – Albert Heijn in The Netherlands, Safeway in the UK, SuperQuinn in Ireland, Metro in Germany, and Monoprix in France (Ross, 1997).

Nor are supermarket chains the only retailers to try self-scanning checkouts. Walmart is currently testing four different self-checkout systems and estimates that even the smallest machines in each supercenter would add a cost of more than \$20 million (Bowden, 2002). Kmart, before filing for bankruptcy, had reported satisfactory usage from all of the self-scanners it was testing (*Chain Store Age*, 2002). Retailing consultants predict that if self-scanning checkouts become widely accepted in supermarkets, the next service industries to consider these systems will be drugstores and home improvement chains, given their on-going problems with recruiting and the long lines at their checkouts (Grant, 2001).

Given the expense and difficulty related to retaining a sufficient number of reliable employees, retailers in general, and supermarkets in particular, are viewing self-scanners as a smart alternative to their constant hiring and training woes. Furthermore, if successful, self-scanners represent a huge source of potential savings at a time of economic uncertainty. However, it is not at all clear if these investments are paying off at present. Although the

number of US consumers who have tried self-scanning checkouts increased from 6 percent in 1999 to 16 percent in 2001 (McDonald, 2002), this increase is not a huge jump and is below industry expectations. Target, for example, is refusing to jump on the bandwagon of self-scanning (even though its supercenters sell groceries), based on a firm belief that customers value the human touch at checkouts (Grant, 2001).

In fact, early tests have shown mixed results as some shoppers seem willing to try the self-scanners and others studiously ignore them (*Discount Store News*, 1998a). Feedback from customers suggests that some shoppers like the shorter lines and privacy (*Chain Store Age*, 2002), but others find the systems difficult to use and feel uncomfortable with the machines screaming instructions at them (Wisely, 2002). As stationary self-scanners can cost as much as \$90,000 (Grant, 2001), before investing money in this particular technology-based self-service option on a large scale, retailers need to determine its future potential through systematic, in-depth research on consumer reasons for using or avoiding self-scanning checkouts.

It is our objective to conduct research that provides the needed answers for this pressing practical issue not only in the supermarket industry, but for retailing in general. In addition, the results should be useful for understanding consumer evaluation and use of other technology-based self-service options, and thus serve to advance theory in the services marketing field.

The only academic research on consumer perceptions of self-scanning is a study by Anselmsson (2001). He examines determinants of perceived service quality for grocery and library self-scanning in Sweden and indicates what is important to consumers in evaluating this form of service delivery. His research includes attributes of technology-based self-service as well as consumer characteristics. We build on Anselmsson's research in a number of ways. The grocery store used as an empirical setting in his study only offers self-scanning checkouts so that consumers do not have a choice as to service delivery options. We broaden the investigation to include a choice situation and to probe consumer reasons for both using and avoiding the grocery self-scanning checkout. Anselmsson's study includes qualitative research which is used as a guide for his quantitative study. We use a different approach in that we base our quantitative study on past theory and simultaneously conduct a qualitative study to allow comparison of the efficacy of different research methods. The data in Anselmsson's study were collected through mail surveys. Our interviews are conducted in the field to draw on the immediacy of the setting to invoke more relevant responses. Finally, we include possible situational influences on the use of self-scanners, which were not considered in Anselmsson's study.

Past research on technology-based self-service (e.g. Dabholkar, 1996; Meuter *et al.*, 2000) has found that perceived attributes of the technology and consumer preferences regarding interaction with the employee play a role in whether or

not consumers will use such options. The methods used to study technology-based self-service have included rigorous multivariate analysis of survey data and critical incident techniques.

This study uses a combination of research methods to determine the factors that influence consumers to use (or avoid) self-scanning checkouts. Survey methodology and quantitative analysis are used to examine the relevance of factors found to be important in past research on technology-based self-service. In addition, tightly structured interviews and detailed content analysis are used to extract factors that are important to consumers in using or avoiding the self-scanning checkout. The comparison of results from different research methods has interesting implications for future research methodology in services marketing.

The factors investigated encompass perceived attributes of the self-scanners, situational influences, and consumer differences in terms of related behaviors and demographics. The study provides meaningful strategic implications for retailers as well as advances theory in services marketing that can be applied to a host of other service industries where technology-based self-service options are offered or being considered.

Conceptual framework

Today, consumers can choose between a variety of technological options to perform services for themselves; at the same time, companies can employ technology at various stages in the service delivery process to improve the quality and productivity of their service offering (Blumberg, 1994; Quinn, 1996). Providing these technological innovations for self-service is challenging the notion that provider-client interaction is an essential feature of service delivery (Prendergast and Marr, 1994) and is raising a host of significant research issues that need to be investigated (Dabholkar, 2000; Lovelock, 1995; Meuter and Bitner, 1998).

In implementing technology-based self-service, many service firms hope to offer better service to consumers. But what do consumers see as the constituents of better service? Dabholkar (1996) proposed that speed, control, reliability, ease of use, and enjoyment are all important attributes to consumers in evaluating and using technology-based self-service. She found ease of use, control, and enjoyment to be strong determinants of perceived service quality in her study on touch screen ordering in fast food restaurants. Although speed was not found to be significant, its effect may have been masked by the inclusion of waiting time in her study. Similarly, the effect of reliability may have been masked by its high correlation to control. In fact, Dabholkar's (1994b) earlier research found performance, encompassing reliability and accuracy, to be an important determinant of evaluation and use of technology-based self-service.

Other researchers also support these five attributes. Studies have found speed to be an important determinant of preference for self-service in general

(Bateson, 1985) and self-scanning in particular (Anselmsson, 2001). Similarly, research on self-service (Bateson, 1985) and on-line shopping (Hoffman and Novak, 1996) shows that consumers perceive increased control in using such options and that it positively affects their evaluation. In a discussion on automated self-service, Evans and Brown (1988) suggest that reliability of the technology plays a critical part in consumer acceptance of such service options. Finally, studies on the adoption of computer technology (Davis *et al.*, 1989; 1992), preference for self-scanning (Anselmsson, 2001), and evaluation of on-line shopping (Childers *et al.*, 2001) show that ease of use and enjoyment are important aspects for using such options.

Consumers who regularly use self-scanning are likely to think all of these attributes important. They would view self-scanners as performing well on these attributes and this would guide their preference and use of the option. Based on the literature, we therefore propose the following hypothesis related to attributes of technology-based self-service.

H1. Compared to those who do not plan to use it regularly, consumers who plan to use self-scanning regularly will:

- (a) perceive it as faster;
- (b) perceive it as offering greater control;
- (c) perceive it as more reliable;
- (d) perceive it as easier to use;
- (e) perceive it as more enjoyable;
- (f) prefer it to the traditional checkout.

But what are the attributes important to those who prefer the traditional checkout? Are they concerned about speed, control, and so on, and believe the traditional checkout performs better on these attributes, or do they have other reasons to avoid the self-scanning checkout?

Anselmsson (2001) found that only 25 percent of the respondents thought self-scanning was faster than employees scanning the purchases. It is possible that only those who prefer self-scanning will view it as faster, whereas those who prefer the traditional checkout will perceive self-scanning as slower. In addition, if the technology is cumbersome or complex, or if the consumer is not technologically proficient, the self-scanning checkout could actually increase the service delivery time. On the other hand, both groups may view the self-scanning checkout as faster, but the second group may have other reasons for choosing the traditional checkout, such as the human interaction involved.

The same type of possibilities exist for the other attributes. For example, consumers may see self-scanning as reliable but still prefer the traditional checkout in order to interact with an employee. Or, they may think the traditional checkout is actually more reliable. Consumers who prefer the traditional checkout may feel greater control in using that option, or control

may not even be an important factor in their evaluation. Given the lack of theory on consumer avoidance of technology-based self-service based on specific attributes of such options, we plan to investigate possible reasons for avoidance through content analysis.

Although speed is closely associated with service quality for many services (Sellers, 1990), Ledingham (1984) suggests that efficiency and speed are more important to consumers who use technology to serve themselves. Other consumers, however, value human interaction above anything else in service delivery (Cowles and Crosby, 1990; Dabholkar, 1996; Prendergast and Marr, 1994). In contrast, consumers who prefer technology-based self-service may actually wish to avoid interaction with a service employee (Anselmsson, 2001; Dabholkar, 1996; Meuter *et al.*, 2000). Thus, consumer attitudes toward interaction with service employees are likely to influence their use of technology-based self-service. We hope to discover this relationship through our content analysis and propose the following:

H2a. Consumers who like self-scanning (and use or plan to use it) will wish to avoid interaction with service employees.

H2b. Consumers who dislike self-scanning (and have not used it or plan not to use it) will value interaction with service employees.

Greater familiarity with technology results in more favorable attitudes toward using technology-based self-service options in general (Dabholkar, 1992; 1996). Further, once consumers become used to a particular technology, they more readily adopt other technologies (Dickerson and Gentry, 1983; Korgaonkar and Moschis, 1987). Thus, attitudes toward using technology in general (which are linked to consumer familiarity with technology in general) have a direct bearing on consumer attitudes and behavior toward a specific technology-based self-service. As in the previous case, we hope to discover this relationship through our content analysis and propose the following:

H3a. Consumers who like self-scanning (and use or plan to use it) will have favorable attitudes toward using technology in general.

H3b. Consumers who dislike self-scanning (and have not used it or plan not to use it) will have unfavorable attitudes toward using technology in general.

We also expect a carryover effect of consumer familiarity and preference for other technology-based self-service options to use of self-scanning. Similarly, we expect a carryover effect of consumer avoidance for interacting with employees in other shopping options to use of self-scanning. Considering the two effects together, we propose the following hypothesis:

H4. Consumer who use self-scanning in grocery stores will prefer:

- (a) shopping from home to shopping at the store;
- (b) Internet shopping to telephone shopping;

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- (c) using touch-tone dialing to speaking to a person when telephone shopping;
 - (d) using a computer touch screen in the store to ordering verbally to an employee in the store;
 - (e) using an ATM to using a bank teller.

In addition, from the behavioral and motivational patterns that emerge for these different forms of technology-based self-service options, we propose four hypotheses parallel to hypotheses *H2a-b* and *H3a-b*. Based on the theory discussed earlier for hypotheses *H2* and *H3*, we expect similar relationships for using and avoiding these other technology-based self-service options as we do for using and avoiding self-scanning. Thus:

- H5a.* Consumers who prefer a particular technology-based self-service to its alternative traditional service option will wish to avoid interaction with service employees.
- H5b.* Consumers who prefer the alternative traditional service option to a particular technology-based self-service, will value interaction with service employees.
- H6a.* Consumers who prefer a particular technology-based self-service to its alternative traditional service option will have favorable attitudes toward using technology in general.
- H6b.* Consumers who prefer the alternative traditional service option to a particular technology-based self-service, will have unfavorable attitudes toward using technology in general.

Past research (e.g. Dickerson and Gentry, 1983; Prendergast and Marr, 1994) found that younger, better educated, and affluent males were more likely to use technology-based self-service. Some retailers have observed that older consumers do seem somewhat reluctant to use self-scanning (*Discount Store News*, 1998a; Grant, 2001), possibly due to being accustomed to service by employees in this context. Yet, Anselmsson (2001) found the opposite to be the case. It is unlikely today that demographic factors play a major role in the evaluation and use of in-store technology-based self-service. Therefore, we measure demographics to investigate these issues only in an exploratory sense. The one hypothesis we propose on demographics that is supported by theory is related to Internet access, which may be viewed as a more relevant surrogate for education and income in this context. We have noted that as consumers become comfortable with technology in one service industry, they are more willing to try technologies in other service industries (Dickerson and Gentry, 1983; Korgaonkar and Moschis, 1987). This suggests that consumers more likely to use technology-based self-service options are the ones more familiar with technology in general, such as indicated by greater Internet access. Thus:

- H7.* Consumers who use self-scanning will have greater access to the Internet than consumers who avoid self-scanning.

As before, we propose a parallel hypothesis for the other forms of technology-based self-service options explored in this study. Thus:

H8. Consumers who prefer a particular technology-based self-service will have greater access to the Internet than consumers who prefer the alternative traditional service option.

Researchers suggest that situational factors can influence the use of technology-based self-service, including Internet shopping (Bobbitt and Dabholkar, 2001; McMellon *et al.*, 1997). Empirical studies (Dabholkar, 1996; Dabholkar and Bagozzi, 2002) have substantiated the influence of situational factors, such as waiting time and crowding, on the use of technology-based self-service. Based on the literature as well as on observation, it is likely that a variety of situational factors, such as the length of lines for alternative checkout options, time of day, day of the week, whether the store is crowded, and whether the consumer is in a hurry, will influence evaluations of the self-scanning checkout. We do not propose hypotheses for situational factors because a rigorous test of these would necessitate an experimental research design. Instead, we study them in an exploratory sense, both by observing conditions at the time of the interview and also by specifically asking consumers to name situations under which they would use self-scanning checkouts.

To sum, the principal research objective for this study is to determine the reasons consumers use (or avoid) self-scanning checkouts. Based on classic adoption literature (e.g. Rogers, 1983; Gatignon and Robertson, 1985) as well as the literature on technology-based self-service (e.g. Dabholkar 1992; 1994b; 1996; Meuter *et al.*, 2000; Prendergast and Marr, 1994), we expect these reasons to include “innovation characteristics” (i.e. attributes of self-scanners) as well as “personal characteristics” (i.e. consumer attitudes toward interacting with employees and toward using technology). Another research objective is to compare use of self-scanning checkouts with consumer shopping preferences for other technology-based self-service options to uncover possible behavioral and motivational patterns. We also plan to explore the influence of demographic factors on the use and avoidance of self-scanning checkouts and other technology-based self-service options. Yet another research objective is to investigate the effect of situational factors on usage of self-scanning checkouts. Finally, we plan to compare results from different research approaches to offer insights on the approaches themselves. All of our findings should have implications for managerial strategy as well as for future research on services.

Methodology

Data collection and sample selection

A large regional supermarket chain in the southeastern USA was selected for the study. A representative store that offered both self-scanning and traditional checkout was chosen for data collection. Using tightly structured interviews, data were collected from two groups of shoppers in the selected store. One

group consisted of consumers shopping at various locations throughout the store. The other group consisted of shoppers at the self-scanners. Undergraduate honor students, rigorously trained with practice interviews, collected the data. They were monitored on-site, and coached as needed, by doctoral students.

Data collectors took up strategic spots in the store (including some at the checkouts) at various times of the day and on various days of the week. Every fifth person encountered in the store by each data collector was approached and asked if they would be willing to answer a few questions. In the second group, respondents were actually in the process of checking out using the self-scanners. The students identified themselves to potential respondents in both groups and explained that this was a university research project. This resulted in an unusually high response rate of 83.33 percent. The students were equipped with clipboards and made quick but comprehensive notes as they conducted the interviews.

Interview questions

For respondents located throughout the store (i.e. the “in-store” group), a set of closed-ended questions measured awareness of the self-scanning checkout in the store, as well as past usage, attitude, and intentions for future use of the “self-scan option.” For respondents at the self-scanners, awareness was evident. Hence, similar closed-ended questions were limited to past usage of self-scanning and intentions to use the self-scan option in the future.

For the in-store group, open-ended questions were included to capture why respondents liked or disliked the self-scanning checkout. For respondents at the self-scanners, preference for this option over the traditional checkout was measured quantitatively, as described later in this section. For both groups, open-ended questions were included to capture why the respondents planned to use or not use the self-scan option in the future.

Both groups were also questioned about their shopping preferences for technology-based self-service versus the alternative, traditional service provided by an employee. Specifically, respondent preferences were measured for shopping from home vs shopping at the store, Internet shopping vs telephone shopping, using touch-tone dialing vs talking to a service employee by telephone, using a computer touch screen in the store vs ordering verbally to an employee in the store, and using an ATM vs using a bank teller.

Demographic questions on age, gender, education, and measures of Internet access were included for both groups. Situational factors, including time of day, day of the week, crowded conditions, relative length of lines at alternative checkouts, and whether the consumer was in a hurry, were noted by the interviewer. In addition, respondents were asked under what situations they would use the self-scan option.

For the group at the self-scanners, additional questions measured perceptions of speed, control, reliability, ease of use, and enjoyment related to

the self-scanning checkout, as well as their overall preference for the self-scan option over the traditional checkout. Each construct was measured using two seven-point Likert items; the phrasing was adapted from Dabholkar's (1996) study for the self-scanning context (see Appendix).

Quantitative analysis

Confirmatory factor analysis and reliability tests were performed on the items used to measure perceptions and preference related to the self-scanning checkout. *T*-tests (and ANOVAs) were conducted to determine differences in these perceptions and preferences, for situational and demographic differences as well as for different groups of respondents. Frequencies were computed and nonparametric statistical tests conducted to determine differences between the two major respondent groups (i.e. in-store and at the self-scanners) in terms of demographic factors. Similar tests were conducted to determine differences in shopping preferences between these two groups. The tests were repeated for certain relevant sub-groups of respondents to look for possible differences.

Content analysis

The qualitative data collected from both groups were recorded in detail. Two researchers independently identified categories for all the responses recorded, then discussed these categories to determine agreement on labeling. Inter-judge reliability can be ascertained by a number of possible measures. Initial agreement between the two researchers was 92.6 percent. Differences in opinion regarding the categories were discussed so that agreement on labels rose to 97 percent. A third researcher examined the agreed-upon categories and after further discussion, 7.4 percent of these were relabeled. The third researcher also reconciled the differences for the categories (3 percent) where agreement had not been reached. Final agreement on labeling was 100 percent.

Results

Sample breakdown by research design

The sample of consumers shopping throughout the store included 101 respondents, and the sample of consumers at the self-scanners included 49 respondents. A breakdown for the 101 in-store respondents, in relation to awareness, past use, and attitudes related to the self-scan option, as well as their intentions to use this option in the future, is shown in Figure 1. A breakdown for the 49 respondents at the self-scanners, in relation to past use and future intentions, is shown in Figure 2.

Results of quantitative analysis

Respondents at the self-scanners had answered a survey to measure their perceptions and preference for the self-scan option (see Appendix). Confirmatory factor analysis (Jöreskog and Sörbom, 1993) was run on all the items capturing perceptions (speed, control, reliability, ease of use, and

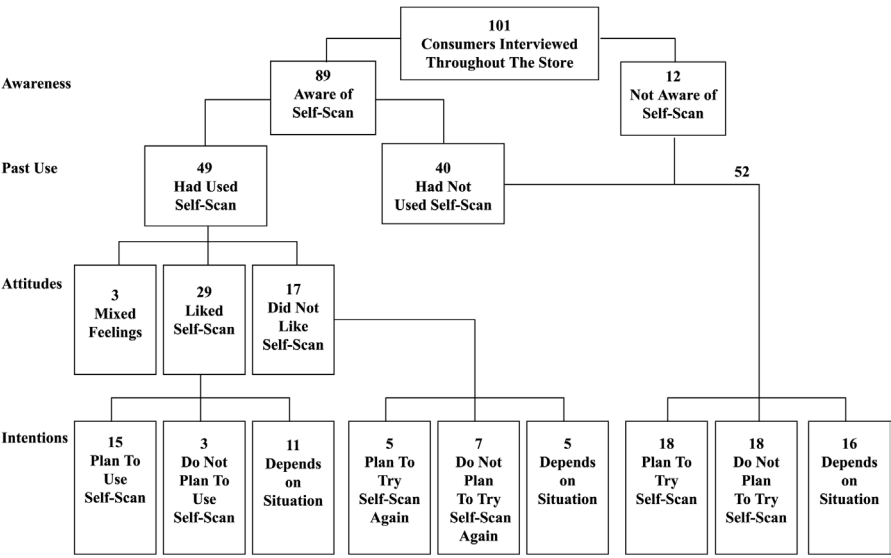


Figure 1. Distribution of in-store survey respondents

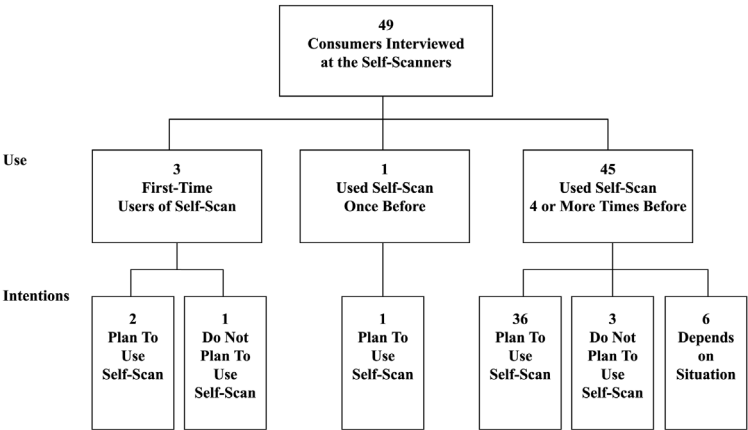


Figure 2. Distribution of survey respondents at self-scanners

enjoyment) of the self-scan option and preference for the same over the traditional checkout. The results strongly supported the six factor structure with a chi-squared value of 71.58, with $df = 39$, $RMSR = 0.03$, $NNFI = 0.92$, and $CFI = 0.95$. Cronbach's alpha values for these constructs were 0.97 for speed, 0.92 for control, 0.87 for reliability, 0.84 for ease of use, 0.86 for enjoyment, and 0.86 for preference for the self-scan option.

The sample ($n = 49$) was too small to run structural equations, and regression analysis did not discriminate sufficiently among the constructs. Separate simple regressions showed all factors (perceptions) to be significant determinants of preference, but multiple regression showed only ease of use to be significant ($b = 0.85, p < 0.001$), masking the effect of other factors.

In any case, the research question of interest was whether consumers who planned to use self-scanning regularly had different perceptions of it from those who did not plan to use it regularly, and whether these consumers indeed preferred the option to the traditional checkout (*H1*). It was expected that the sample would be somewhat equally divided between these two groups. Instead, 39 respondents planned to use self-scanning regularly, four did not plan to use it, and six respondents indicated they might use it depending on the situation (see Figure 2). *T*-tests were conducted to compare perceptions of the 39 who planned to use self-scanning regularly versus the ten who did not plan to use it or would only use it under certain situations.

Despite the one small group ($n = 10$), the *t*-tests worked well. Consumers who planned to use self-scanning regularly viewed it as offering greater control ($t = 2.12, p < 0.05$), more reliable ($t = 2.05, p < 0.05$), easier to use ($t = 2.45, p < 0.05$), and offering greater enjoyment ($t = 3.41, p < 0.01$) than those who did not plan to use this option regularly. Thus, hypotheses *H1b*, *H1c*, *H1d*, and *H1e* were supported. Only speed was not significantly different for the two groups, thus failing to support hypothesis *H1a*. This result does not however indicate that speed was not important to these groups. The mean value for speed was 5.67 (on a scale of 1-7), higher than the means for all the other perceptions. This suggests that irrespective of whether consumers planned to use self-scanning regularly, they saw it as a fast option. Finally, a *t*-test confirmed that consumers who planned to use self-scanning regularly showed greater overall preference for the option over the traditional checkout ($t = 3.12, p < 0.05$) than the group that did not plan to use this option regularly, thus supporting hypothesis *H1f*.

Although hypothesis *H2* was to be tested with content analysis, a nonparametric test statistic (Mann-Whitney) also showed some support for *H2* as follows. Shopping preferences of consumers within the in-store group were compared between those who had used the self-scan and those who had not used the self-scan or were not aware of it. The only significant difference was that the first group preferred using touch screen ordering in a store to ordering verbally to an employee in a store ($z = 1.93, p < 0.054$). It appears that consumers who had used the self-scan do want to avoid contact with employees, thus offering support for hypothesis *H2a*. The finding also suggests simultaneously that consumers who had not used the self-scan prefer interacting with an employee, thus offering support for hypothesis *H2b*.

Table I shows the shopping preferences for in-store respondents ($n = 101$) and for respondents at the self-scanners ($n = 49$). A series of Mann-Whitney tests showed no differences between the two groups for preferences related to: shopping from home vs shopping at the store; using touch-tone dialing vs speaking to a person when telephone shopping; and using a computer touch

Comparison of shopping methods	In-store <i>n</i> = 101		At self-scanners <i>n</i> = 49	
	<i>n</i>	Percent	<i>n</i>	Percent
1. Shopping from home	15	21	7	19
Shopping at the store	56	79	30	81
Total	71	100	37	100
2. Internet shopping from home	18	25	19	51
Telephone shopping from home	52	73	16	43
Total	70	98	35	94
3. Using touchtone dialing when telephone shopping	7	10	6	16
Speaking to a person when telephone shopping	61	86	29	78
Total	68	96	35	94
4. Using a computer touch screen in a retail store	17	17	14	29
Ordering verbally to an employee in a retail store	81	80	34	69
Total	98	97	48	98
5. Using an ATM for banking transactions	49	49	35	71
Using a bank teller for banking transactions	51	50	12	24
Total	100	99	47	95

Notes: 1. A screening question was used to determine the people who had shopped from home before. Only these people (71 and 37 in the two groups respectively) answered the first three questions. (The entire samples answered questions 4 and 5.) 2. Percentages may not add up to 100 per cent due to some non-response on questions

Table I.
Shopping preferences
of respondents

screen vs ordering verbally to an employee in a store (see categories 1, 3, and 4 in Table I).

However, compared to in-store respondents, respondents at the self-scanners preferred Internet shopping to telephone shopping ($z = 2.88$, $p < 0.01$) and (2) using ATMs to using bank tellers ($z = 2.75$, $p < 0.01$) (see categories 2 and 5 in Table I). Thus, hypotheses *H4a*, *H4c*, and *H4d* were not supported, but hypotheses *H4b* and *H4e* were supported. Given that the in-store respondents included those who had used and liked the self-scan, this difference across the two groups for hypotheses *H4b* and *H4e* is even more striking.

Table II shows the demographic profiles of the two major groups of respondents (i.e. in-store and at the self-scanners). Within the second group, i.e. respondents at the self-scanners, *t*-tests were conducted for gender and overall Internet access (yes/no), and ANOVAs were run for age, education, and specific Internet access (home/work/both). No differences were found in perceptions of attributes or in overall preference for the self-scanning checkout across any of the basic demographic categories or for Internet access.

To compare differences across the two groups of respondents without reference to attributes or preference, a nonparametric test statistic was used

Demographics	In-store		At self-scanners	
	<i>n</i>	Percent	<i>n</i>	Percent
<i>Age</i>				
18-24	29	28.7	16	32.7
25-34	18	17.8	17	34.7
35-44	22	21.8	4	8.2
45-54	15	14.9	5	10.2
55-64	10	9.9	5	10.2
65 and over	7	6.9	2	4.1
Total	101	100.0	49	100.0
<i>Gender</i>				
Male	37	36.6	21	42.9
Female	64	63.4	28	57.1
Total	101	100.0	49	100.0
<i>Education</i>				
Grade school	1	1.0	2	4.1
High school	13	12.9	2	4.1
Some college	28	27.7	11	22.4
Undergraduate degree	31	30.7	13	26.5
Graduate degree	20	19.8	15	30.6
More than one graduate degree	8	7.9	5	10.2
Total	101	100.0	48 ^a	97.9
<i>Overall Internet access</i>				
Yes	77	76.2	44	89.8
No	24	23.8	5	10.2
Total	101	100.0	49	100.0
<i>Specific Internet access^b</i>				
Home	23	29.9	20	45.5
Work	18	23.4	20	45.5
Both	29	37.6	4	9.1
Total	70 ^c	90.9	44	100.0

Notes: ^aOne person did not provide this information; ^bthis question was asked only to those who had Internet access (i.e. 77 in the in-store group and 44 in the self-scan group); ^cseven people did not provide this information

Table II.
Demographic profiles

given the independence of the samples. The Mann-Whitney test showed no significant differences for age, education, and gender across these two groups. This is a good finding in that it verifies that the demographic profiles of the randomly selected respondents in the two major groups are similar.

Other sub-groups within the in-store group were also compared for possible demographic differences using the same procedure, i.e. the Mann-Whitney test. No difference in demographic profiles was found between respondents who had used the self-scan and those who had not used it or who were not aware of it. Nor were any demographic differences found between respondents who had liked the self-scan and those who had disliked it. These findings show

that demographic factors do not influence use, preference, or avoidance of self-scanning.

Similarly, when demographic profiles were compared for shopping preferences, no differences were found for shopping from home vs shopping at the store, for using touch-tone dialing vs speaking to a person when telephone shopping, or for using a touch screen vs ordering verbally to an employee in the store. However, those who preferred using ATMs to using bank tellers tended to be younger ($z = 3.41, p < 0.001$) and those who preferred Internet shopping to telephone shopping also tended to be younger ($z = 1.87, p < 0.05$) and were more likely to be male ($z = 2.64, p < 0.01$), supporting earlier research on these specific contexts.

As predicted, Internet access across the two major groups of respondents was significantly different. Respondents at the self-scanners were more likely to have Internet access than those who were interviewed in other areas of the store. The Mann-Whitney statistic was significant for overall Internet access ($z = 1.97, p < 0.05$) and for specific Internet access ($z = 2.97, p < 0.01$). Thus, hypothesis *H7* is supported at two levels.

There was no difference in Internet access across the same three earlier sets of shopping preferences that had shown no demographic differences in consumer profiles. However, Internet access was higher for those who preferred using ATMs to using tellers ($z = 3.29, p < 0.001$) and understandably for those who preferred Internet shopping to telephone shopping ($z = 3.40, p < 0.001$), thus partially supporting hypothesis *H8*.

Finally, *t*-tests were conducted for a variety of situational factors: weekday vs weekend, morning vs evening, longer vs shorter wait lines at the self-scanning checkout, whether the consumer was in a hurry or not, and whether the store was crowded or not. None of the first four situational factors changed perceptions of attributes or preference for the self-scan. The only situational factor that showed a difference was whether the store was crowded. A test for crowding showed that respondents using the self-scanning checkout under crowded conditions thought it was faster than those who were using it under normal conditions ($t = 2.13, p < 0.05$).

Results of content analysis

Preference, avoidance and situational use of self-scanning option. Table III compares reasons consumers like or plan to use the self-scan option among three groups: respondents at the self-scanners ($n = 39$), in-store respondents who had used and liked this option ($n = 29$), and in-store respondents who had not used this option but were thinking of trying it ($n = 18$). It is seen that the most important reason that all these consumers would want to use the self-scan option is that they perceive it as “fast.” This result offers additional support to explain why the relevance of speed could not be differentiated across groups in the earlier quantitative analysis (see *H1a*). The content analysis results suggest

Table III.
Reasons for using
self-scan option

Why self-scan option will be used regularly (Respondents at self-scanners)	<i>n</i> = 39	What was liked about self-scan option (In-store respondents who had used self-scan option)	<i>n</i> = 29	Why self-scan option may be used in the future (In-store respondents who had <i>not</i> used self-scan option)	<i>n</i> = 18
Fast	30	Fast	22	Fast	8
No waiting	11	Easy to use	8	Enjoyable	3
Easy to use	11	Convenient	7	Easy to use	3
Convenient	7	No waiting	6	Convenient	2
Avoid interaction with employee	4	Can use for few products	5	No waiting	2
Can use for few products	3	Enjoyable	4	Control	1
Control	2	Novelty	4	Accurate	1
Enjoyable	2	Accurate	2		
Can use for certain products	1	Assistance	2		
Employees are rude, unhelpful, etc.	1	Avoid interaction with employee	1		
Advanced technology	1	Control	1		
Loves the option	1	Familiarity with technology	1		
Ability to see prices	1	Likes self-service	1		
Novelty	1	Time pressure	1		
Using self-service to fill time	1	Self-scan is challenging	1		

(as expected, based on the comparison of attribute means) that, irrespective of where they were interviewed, consumers who had used or planned to use self-scanning viewed this option as fast.

Other frequently cited reasons for using self-scanning were that there was no waiting (related to speed), and it was easy to use, convenient, and enjoyable. Control and accuracy were also mentioned but less frequently. In addition to reasons related to attributes of self-scanning, respondents mentioned “avoid interaction with employee,” and “employees are rude, unhelpful, etc.,” thus offering some support for hypothesis *H2a*. Favorable attitudes toward using technology were mentioned in a variety of ways – “advanced technology,” “familiarity with technology,” “self-scan is challenging,” “loves the option,” and “novelty” – thus offering support for hypothesis *H3a*.

Table IV compares reasons consumers do not like or do not plan to use the self-scan option among three groups: respondents at the self-scanners ($n = 4$), in-store respondents who had used but disliked this option ($n = 17$), and in-store respondents who had not used this option and were not planning to try it ($n = 18$). The most important reason these consumers would want to avoid the self-scan option is that they like to interact with employees, thus supporting hypothesis *H2b*. As additional support for *H2b*, some respondents said that self-scanning was impersonal or they liked the social experience and the relationship with employees.

Other important reasons for avoiding self-scanning include perceptions that it is difficult to use or the customer is not familiar with it. There is also a sense that the customer has a right to expect service, the self-scan involves too much effort, and the price should be lower for self-service. These along with other reasons such as “dislikes automation,” “lack of familiarity,” and “uncomfortable with using self-scan” suggest unfavorable attitudes toward using technology, thus supporting hypothesis *H3b*. Perceptions of the self-scan as slow, inaccurate, difficult to use, having process problems, and inconvenient add indirect but further support for hypothesis *H3b*.

Table V compares situations where consumers would want to use the self-scan option among three groups: respondents at the self-scanners ($n = 6$); in-store respondents who had used this option (and either liked or disliked it) ($n = 16$); and in-store respondents who had not used this option ($n = 16$). The most frequently mentioned situation relates to number of items. In other words, if the store did not have a policy restricting the number of items a customer could have in order to use the self-scan, more consumers would be willing to use this option.

Other situations cited frequently were “if (there is a) line at regular checkout” and “if (customer is) in a hurry.” These situations along with “if line at self-scan is short” reveal the importance of speed and/or the perception of the self-scan as fast. Those relatively unfamiliar with the self-scan however said they would use the option if they had the time to learn how, if someone helped them, and if they gained

Table IV.
Reasons for not using
self-scan option

Why self-scan option will not be used regularly (Respondents at self-scanners)	<i>n</i> = 4	What was not liked about self-scan option (In-store respondents who had used self-scan option)	<i>n</i> = 17	Why self-scan option may not be used in the future (In-store respondents who had <i>not</i> used self-scan option)	<i>n</i> = 18
Likes interaction with employee	2	Difficult to use	6	Lack of familiarity	7
Habit (using regular checkout)	1	Likes interaction with employee	4	Likes interaction with employee	4
Need incentive for self-service	1	Customer has a right to service	3	Customer has a right to service	6
Time pressure	1	Too much effort	3	Price should be lower for self-service	3
Dislikes automation	1	Process problems	3	Habit (using regular checkout)	2
Lack of accessibility	1	Computer voice annoying	2	Difficult to use	2
Self-scan is impersonal	1	Price should be lower for self-service	2	Not accurate	1
		Slow	2	Lack of accessibility	1
		Dislikes automation	1	Relationship with employees	1
		Not accurate	1	Social experience	1
		Inconvenient	1		
		Lack of familiarity	1		
		Long lines at self-scan	1		
		Not enough time saved	1		
		Limit on number of products to be scanned	1		
		Prefers traditional check-out method	1		
		Type of products	1		
		Uncomfortable with using	1		

Under what situations would self-scan option be used (Respondents at self-scanners)	<i>n</i> = 6	Under what situations would self-scan option be used (In-store respondents who had used self-scan option)	<i>n</i> = 16	Under what situations would self-scan option be used (In-store respondents who had <i>not</i> used self-scan option)	<i>n</i> = 16
If few products	4	If few products	16	If few products	8
If line at regular checkout	2	If line at regular checkout	7	If line at regular checkout	4
If child wants to use	1	If more experience	2	If in a hurry	3
		If time available to use	2	If more experience	3
		If in a hurry	2	If time available to use	2
		If motivated	2	If purchasing certain types of products	2
		If purchasing certain types of products	1	If option is easy to use	1
		If line at self-scan is short	1	If faster	1
		To avoid interaction with employee	1	If assistance provided in learning to use	1
		If assistance provided in learning to use	1		
		If bank did not charge for cash withdrawals	1		
		If correct change	1		
		If food stamps can be used	1		

Table V.
Situations influencing
the use of the self-scan
option

more experience in using this option. Other concerns related to the type of products they were buying or the payment options related to the self-scan.

Shopping preferences for other technology-based self-service options. For both groups of respondents (in-store and at the self-scanners), shopping preferences were determined for other technology-based self-service options versus traditional alternatives. As mentioned, these included:

- shopping from home vs shopping at the store;
- Internet shopping vs telephone shopping;
- using touch-tone dialing vs talking to a person when telephone shopping;
- using a computer touch screen in the store vs ordering verbally in the store; and
- using an ATM vs using a teller.

Content analysis determined the reasons for these preferences.

Irrespective of the group, the majority of consumers preferred shopping at the store to shopping from home (see Tables I and VI). Table VI compares reasons consumers gave for shopping from home vs shopping at the store. The reasons supporting an option are marked as positive (+) and those against the alternative option are marked as negative (-). A reason related to a particular situation is marked as “depends” with a (D). The most important reason for shopping from home is convenience, followed by ease of use and ease of shopping. In contrast, the most important reason for shopping at the store is the ability to see products, followed by verification of items, ability to touch products, and social experience. Other reasons mentioned frequently for shopping at the store are avoiding returns, ease of return, and convenience, which are parallel to the reasons for shopping from home. Thus, consumers who prefer a particular option think it is faster, offers more control, is more reliable (accurate), easier to use, and more enjoyable than the alternative option. Some reasons against shopping from home are similar to reasons for avoiding self-scanning (e.g. too much effort or discomfort).

In-store respondents clearly preferred telephone shopping, whereas respondents at the self-scanners preferred Internet shopping (see Tables I and VII). Table VII compares reasons consumers gave for Internet shopping vs telephone shopping. Ironically, the most important reason for preferring Internet shopping is “the ability to see products,” also the most important reason for shopping at the store. This is followed by ease of use, control, and security. The most important reason against telephone shopping is to avoid interaction with employees, thus supporting hypothesis *H5a*. In contrast, the most important reasons for preferring telephone shopping are “likes to interact with employees,” and “employees are friendly, helpful, etc.” thus supporting hypothesis *H5b*. This is followed by security, familiarity, ease of use,

Category	At self-scanners (n = 15)		At self-scanners (n = 7)		Category	At self-scanners (n = 56)		At self-scanners (n = 30)
	Prefer home shopping	In-store	In-store	Category		Prefer store shopping	In-store	
+	Convenient	12	4	+	Ability to see products	32	19	
+	Easy to use	3		+	Verification of items	15	9	
+	Ease of shopping		3	+	Ability to touch products	9		
+	Ability to see products (catalogue/pictures)	1	1	+	Social experience	5	2	
+	Accurate	1		+	Avoid returning purchases	3		
+	Control	1		+	Ease of return	3	2	
+	Fast	1	1	+	Convenient	2	1	
+	Novelty		1	+	Accurate	2		
+	Enjoyable		1	+	Familiarity	2	1	
				+	Ability to see prices	1		
				+	Ability to try product		1	
				+	Easy to use	1		
				+	Enjoy shopping	1		
				+	Freshness of products	1		
				+	Habit	1	1	
				+	Likes to interact with employee	1		
				+	Employees are friendly, helpful, etc.		1	
				+	Method of payment- cash	1		
				+	More product variety	1		
				+	Control	1		
				+	No waiting on delivery	1		
				+	Wider selection	1	1	
				+	Security	1		
				+	Cheaper	1	1	

(continued)

Table VI.
Shopping preference:
home vs store

Category	At self-scanners (n = 15)		Category	At self-scanners (n = 56)	
	In-store (n = 15)	At self-scanners (n = 7)		In-store (n = 56)	At self-scanners (n = 30)
-	3	2	-	1	1
-	2	-	-	1	1
-	1	-	-	1	1
-	1	1	-	1	1
			-		1
			-		1
			-		1
			-		1
D	2	1	D	1	1
D	1	-	D	1	1
Total	28	15	Total	90	45

Category	At self-scanners (n = 19)			At self-scanners (n = 16)		
	In-store (n = 18)	Category	Prefer telephone shopping	In-store (n = 52)	Category	Prefer telephone shopping
+	4	Ability to see products	+	14	Likes to interact with employee	1
+	3	Easy to use	+		Employees are friendly, helpful, etc.	2
+	2	Control	+	6	Security	1
+	2	Security	+	5	Familiarity	2
+	1	Fast	+	4	Assistance – questions	
+	1	Accurate	+	3	Easy to use	3
+	1	Confirmation	+	3	Fast	3
+	1	Convenient	+	3	Ability to see products (catalogue)	
+	1	No waiting	+	3	Habit	
+		Familiarity with Internet	+	2	Convenient	2
+		Wider selection	+	1	Assistance – information	1
+		Enjoyable	+	1	No waiting	1
+		Like it	+		Accurate	1
+		Easier to compare prices				
-	6	Avoid interaction with employee	-	11	Lack of accessibility (Internet/computer)	5
-		Employees are rude, unhelpful, etc.	-	11	Lack of familiarity (Internet)	4
-	1	Dislikes using phone	-		Lack of trust (Internet)	2
-	1	Dislikes recordings	-	1	Difficult to use (computer)	1
D	1	If everything were available on-line	-	1	Physical limitation (eyesight)	1
Total	25		Total	71		25

Table VII.
Shopping preference:
Internet shopping vs
telephone shopping

convenience, etc. showing that preference for an option makes consumers think it does better *on the same attributes*. Finally, lack of familiarity and lack of accessibility are major reasons against shopping on the Internet.

Irrespective of the group, the majority of consumers preferred speaking to a person when telephone shopping to using touch-tone dialing (see Tables I and VIII). Table VIII compares reasons consumers gave for using touch-tone dialing vs speaking to a person when telephone shopping. The most important reasons for using touch-tone dialing are that it is easy to use and fast, offering indirect support for hypothesis *H6a*. The only reason given against speaking to a person when telephone shopping is to avoid interaction with employees, thus supporting hypothesis *H5a*. In contrast, the most important reason for talking to a person when telephone shopping is “likes to interact with employee.” This together with “employees are friendly, helpful, etc.” and several reasons related to assistance by employees on the telephone strongly support hypothesis *H5b*. Again, interestingly, consumers who prefer this option see it as fast, easy to use, and offering control, and also see the touch-tone option as difficult to use, inconvenient, slow, annoying, impersonal, and not enjoyable. Their other reasons against using touch-tone dialing point to unfavorable attitudes toward technology (e.g. dislikes automation, dislikes using machines, do not trust technology, not comfortable with technology, etc.), thus supporting hypothesis *H6b*.

Irrespective of the group, the majority of consumers preferred ordering verbally to an employee to using a touch screen in a store, although a higher percentage of respondents using the self-scan preferred the touch screen option (see Tables I and IX). Table IX compares reasons consumers gave for using a touch screen in the store vs ordering verbally to an employee in the store. The most important reasons for using a touch screen in the store are that it is easy to use, fast, convenient, and accurate. These reasons along with reasons such as superiority, novelty, familiarity, and enjoyable are indicative of a favorable attitude toward using technology, thus supporting hypothesis *H6a*. The main reason given against ordering verbally is to avoid interaction with employees, thus supporting hypothesis *H5a*. In contrast, the most important reasons for ordering verbally in a store are to interact with employees, to get assistance, and employees are friendly, helpful, etc., thus supporting hypothesis *H5b*. Again, consumers who prefer this option see it as fast, easy to use, and offering control, and also see the touch screen option as difficult to use, inflexible, slow, inconvenient, and involving too much effort. These reasons along with other reasons against using a touch screen (e.g. dislikes automation, dislikes using machines, do not trust technology, not comfortable with technology, etc.) point to unfavorable attitudes toward technology, thus supporting hypothesis *H6b*.

Category	Prefer touch-tone dialing	In-store (n = 7)	At self- scanners (n = 6)	Category	Prefer speaking to a person	In-store (n = 61)	At self- scanners (n = 29)
+	Easy to use	5	2	+	Likes to interact with employee	21	1
+	Fast	3	2	+	Assistance – answer questions	21	3
+	Convenient	1		+	Assistance - information	9	1
+	Likes touch-tone	1		+	Employees are friendly, helpful, etc.	6	8
+	Accurate		1	+	Accurate	6	6
+	Assistance – product knowledge		1	+	Assistance – handle problems	6	3
				+	Fast	2	2
				+	Easy to use	5	3
				+	Control	3	
				+	No waiting	1	2
				+	Familiarity	1	
				+	People perform better		1
				+	Trust		1
				+	Dislikes automation	3	1
				–	Dislikes using machines		2
				–	Lack of familiarity with technology	2	2
				–	Too much effort	2	
				–	Difficult to use (touch-tone)		2
				–	Lack of control (touch-tone)	2	
				–	Annoying (touch-tone)	1	
				–	Inconvenient to use (touch-tone)	1	1
							(continued)

Table VIII.
Shopping preference:
using touch-tone
dialing vs speaking to
a person when
telephone shopping

Table VIII.

Category	Prefer touch-tone dialing	In-store (<i>n</i> = 7)	At self- scanners (<i>n</i> = 6)	Category	Prefer speaking to a person	In-store (<i>n</i> = 61)	At self- scanners (<i>n</i> = 29)
				–	Slow (touch-tone)	1	1
				–	Impersonal (touch-tone)	1	1
				–	Process problems (touch-tone)	1	
				–	Don't trust technology	1	
				–	Not enjoyable (touch-tone)	1	1
				–	Not comfortable with technology		1
				–	Physical limitation		1
D	If order is simple	1					
D	Type of product		1				
Total		13	8	Total		93	44

Category	Prefer using touch screen	In-store (n = 17)	At self-scanners (n = 14)	Category	Prefer ordering verbally	In-store (n = 81)	At self-scanners (n = 34)
+	Easy to use	7	6	+	Likes to interact with employee	29	4
+	Fast	5	7	+	Assistance – questions	25	9
+	Convenient	4	2	+	Employees are friendly, helpful, etc.	2	10
+	Accurate	3	2	+	Accurate	7	3
+	No waiting	2	1	+	Easy to use	6	1
+	Familiarity	1	2	+	Assistance – information	4	3
+	Less effort	1		+	Assistance – product knowledge	3	
+	Novelty	1		+	Familiarity	3	4
+	Superiority	1		+	Fast	2	1
+	Enjoyable	1	1	+	Assistance – handle problems	2	2
				+	Social experience	2	1
				+	Control	1	
				+	Personalized service	1	
				+	Prefers personal assistance	1	
				+	Relationship with personnel	1	
				+	Trust	1	
				+	Verification of order	1	
				+	Flexibility with employees		1
				+	Likes to be served		1
				+	Customer has right to service		1
-	Avoid interaction with employees	3	4	-	Dislikes automation	5	2
				-	Possible service failure	4	
-	Avoid bothering employees	1		-	Dislikes using machines		3
				-	Too much effort	2	
				-	Concern about accuracy	1	
				-	Difficult to use (touch screen)	1	1

(continued)

Table IX. Shopping preference: using touch screen in store vs ordering verbally in store

Table IX.

Category	Prefer using touch screen	In-store (n = 17)	At self-scanners (n = 14)	Category	Prefer ordering verbally	In-store (n = 81)	At self-scanners (n = 34)
				-	Inflexibility of computers	1	
				-	Lack of experience (touch screen)	1	
				-	Lack of familiarity (touch screen)	1	
				-	Lack of familiarity with technology		1
				-	Technophobic	1	
				-	Slow (touch screen)		1
				-	Inconvenient to use (touch screen)		1
D	Type of product	1		D	Type of product	1	
D	Type of store (grocery)		1	D	Easy to use – if large number of products	1	
				D	Easy to use – if no lines		1
				D	Type of store (non-grocery)		1
Total		30	26	Total		110	52

In-store respondents were equally divided as to preference for using ATMs and bank tellers, whereas respondents at the self-scanners clearly preferred using ATMs (see Tables I and X). Table X compares reasons consumers gave for using an ATM vs using a teller. The most important reasons for using an ATM are that it is fast, convenient, accessible, and easy to use, again offering indirect support for hypothesis *H6a*. The main reason given against using tellers is to avoid interaction with employees, which together with the reason that employees were rude, unhelpful, etc., offers support for hypothesis *H5a*. In contrast, the most important reasons for using a teller are liking to interact with employees (in-store respondents) and employees are friendly, helpful, etc. (respondents at self-scanners), thus supporting hypothesis *H5b*. Other reasons such as assistance and social experience also offer support for *H5b*. The main reasons against using ATMs (e.g. dislikes automation, dislikes using machines, unfavorable experiences, etc.) indicate an unfavorable attitude toward using technology, thus supporting hypothesis *H6b*.

Discussion

A main research issue in the study was to determine consumer reasons for using or avoiding self-scanning checkouts in retail stores. Our quantitative analysis showed that control, reliability, ease of use, and enjoyment were indeed important to consumers in using the self-scanning option. Although speed was not differentiated among consumers who planned to use this option regularly and those who did not, mean values of attribute perceptions showed clearly that self-scanning was very much viewed as a fast option by consumers who had tried it.

Our content analysis supported these findings but in addition showed the predominance of speed as a reason for liking the self-scan option. The other reasons tested in the quantitative analysis (i.e. control, reliability, ease of use, and enjoyment) were also mentioned, but less frequently. One factor, not included in the theoretical framework, but frequently mentioned by respondents, was convenience. Future studies will need to determine whether convenience is a separate construct, or whether it overlaps with speed and/or ease of use.

In addition to reasons related to attributes, consumers planned to use this option to avoid interaction with employees and/or because they had favorable attitudes toward using technology in general. So far, this is good news for supermarket chains, as well as for other retailers considering this option; consumers who prefer self-scanning see it as offering many benefits and they seem inclined to use it whenever possible.

With regard to reasons for avoidance of self-scanning, we found that many consumers truly like to interact with employees and the self-scanning checkout cannot fulfill this need. These consumers did have unfavorable attitudes toward using technology in general and the stores would have little control

Table X.
Banking preference:
using ATM vs using
teller

Category	Prefer using ATM	In-store (n = 49)	At self- scanners (n = 35)	Category	Prefer using teller	In-store (n = 51)	At self- scanners (n = 12)
+	Fast	24	26	+	Likes to interact with employees	20	1
+	Convenient	17	13	+	Accurate	9	
+	Accessibility – after hours	11	4	+	Assistance – questions	6	2
+	Easy to use	6	8	+	Security	5	
+	Familiarity	3	1	+	Easy to use	4	1
+	Accessibility – multiple locations	3	1	+	Familiarity	3	
+	No waiting	2	3	+	Habit	3	
+	Confirmation		2	+	Social experience		2
+	Less effort	1	1	+	Assistance-handle problems	2	
+	Does not need assistance	1		+	Confirmation of deposit	2	
+	Accurate	1		+	Fast	2	
+	Enjoyable	1		+	Cost	1	
+	Habit	1		+	Greater satisfaction	1	
+	Security	1		+	Prefers traditional method	1	
			1	+	Trust	1	
				+	Employees are friendly, helpful, etc.		3
-	Avoid interaction with employee	2	4	+	Flexibility with employees		1
-	Employees are rude, unhelpful, etc.	1	2	+	Versatility – other services		1
-	Time pressure		1	-	Unfavorable experience (ATM)	3	1
-	Lack of experience with teller	1		-	Dislikes automation	3	1
				-	Dislikes using machines		2
				-	Dislikes ATMs	1	
				-	Cost associated with ATM	1	
				-	Lack of accessibility (ATM down)	1	1
				-	Lack of familiarity (ATM)	1	1
				-	Lack of trust (ATM)	1	
				-	Inconvenient to use (ATM)		1
D	For withdrawals	1	1	D	Purpose of transaction	2	
Total		76	68	Total		75	18

over changing such attitudes, especially in the short term. Also, earlier we had raised the issue of effort and wondered whether this might be why self-scanning checkouts seem to face some resistance, in contrast to ATMs which are so widely accepted. Our study did show that consumers who disliked self-scanning expressed a sense of having a right to be served and that self-scanning involved too much effort. Given these findings, it would not be prudent to switch completely to self-scanning as some grocery stores in Sweden have done. Retailers that do this would stand to lose a large part of their clientele, especially in regions with healthy competition in the particular service industry. The best scenario is to offer both options and gradually win over more and more consumers to the self-scanning checkout. The good news is that there is a sizeable segment that does prefer this option so as to make the investment in it economically viable for grocery chains as well as for other retailers.

Another research issue was to explore the possible influence of demographic factors. Our quantitative analysis showed that demographic factors such as age, gender, and education, had no influence on the use of self-scanning. The only demographic factor that was different was that those who used self-scanning had greater access to the Internet. The implication for grocery stores or other retailers planning to offer self-scanning is that as Internet access is widened – as it will undoubtedly – consumer acceptance and use of the technology-based self-service options within stores should increase as well.

With regard to the effect of demographic influences on other technology-based self-service options, our study did find that younger people were more likely to prefer using ATMs to using tellers and younger males more likely to prefer Internet shopping to telephone shopping. Greater Internet access was also related to both these preferences. Practitioners, especially those who hope to increase Internet sales significantly, should ensure that younger males know and approve of their Websites. A related implication for Internet marketers is to increase access to and familiarity with the Internet for a wider audience, especially as inaccessibility and unfamiliarity were two major reasons cited by consumers against Internet shopping.

Yet another research objective was to investigate the influence of situational factors on the evaluation and use of self-scanning checkouts. Our quantitative analysis found only one situational factor to be relevant. Under crowded conditions, consumers viewed the self-scan as faster than under normal conditions. This is an important finding for practitioners; at crowded times, the presence of a self-scanning checkout will assure its good utilization and help pay toward the investment in this technology.

Our content analysis revealed many possible situations where consumers would use self-scanning, all of which have managerial implications. The most important situation cited was the number of products purchased. Currently, many stores set a maximum number of products that can be bought through the self-scanning checkout. Although NCR reports that 60 percent of US shoppers have fewer than 12 items at checkout (Solomon, 1997), the restriction

keeps consumers from using the self-scanning checkout when they have many items to purchase. Respondents indicated that they would be likely to use self-scanning when they have fewer products than the maximum allowed. By removing this constraint, or raising the number of items allowed, grocery stores should be able to increase the use of self-scanning. This is an implication that retailers considering offering self-scanning checkouts should bear in mind when considering alternative systems with or without such constraints.

Other reasons cited showed a willingness to try self-scanning if there is assistance in showing the customer how self-scanners work and if payment options preferred by the customer apply. Clearly, managers have an opportunity here to increase utilization of the self-scanning checkout by having an employee stand by and offer to actively help consumers learn how to use it (as banks did years ago when the ATM was first introduced). Utilization may also be increased by adopting systems that are flexible in allowing consumers to pay for their purchases using a variety of methods, as is possible through the traditional checkout. These implications apply to grocery chains as well as to retailers in general.

A fourth research objective was to compare the use of self-scanning checkouts with shopping preferences for other types of technology-based self-service. We found that consumers who use self-scanning prefer Internet shopping to telephone shopping and also prefer using ATMs to using tellers. This is understandable because the reasons driving preference for these different technology-based self-service options are similar: fast, convenient, accessible, reliable, avoiding interaction with an employee, and so on. The broad implication for practitioners is that for technologies that work well, consumers with favorable attitudes toward using technology in general will transfer those attitudes to a variety of technology-based self-service options. Other implications relate to the set of attributes that consumers found important in each case. Practitioners should ensure that their particular technology-based self-service option offers the specific attributes consumers seek from that service.

In contrast, most consumers irrespective of their use of self-scanning prefer shopping at the store vs shopping at home, speaking to a person when telephone shopping vs using touch-tone dialing, and ordering verbally with an employee vs using a touch screen in a store. It is interesting that whereas some consumers prefer the Internet to telephone shopping, they still prefer to shop at the store to shopping from home. The ability to see and touch products and to verify items is extremely important to a majority of consumers, and ease of return is also a consideration. Until Websites make it easy for consumers to view products and Internet marketers simplify returns, this preference is unlikely to change.

It is not surprising that preference for talking to a person when telephone shopping to using touch-tone dialing is almost universal. Given the frustration brought about by interminable directions on automated telephone systems, most consumers are rightly reluctant to use these systems. To change attitudes

toward this particular technology-based self-service, automated touch-tone systems need enormous improvement in terms of speed, information as to waiting time, and easy options to connect with a person or to leave a voice message.

It is not clear why most consumers prefer ordering verbally in a store to using a touch screen. We had expected that those who use self-scanning would prefer using a touch screen as well. Although the percentage was higher in this group as expected, the difference across groups was not statistically significant. Perhaps, this option is so new that respondents were not assured that it would be faster than the verbal option. Unlike the ATM, touch screens in retail stores vary widely in terms of user-friendliness, and respondents chose to be conservative in answering a question where they could not be sure of attributes as they could with the widely familiar ATM. The implication for practitioners is to design better touch screens in terms of flexibility and user-friendliness so that consumers will eventually be as comfortable with using them as they are with using ATMs.

Having discussed managerial implications along with the detailed discussion of our findings, it remains to acknowledge limitations of the study, compare efficacies of different research methodologies, and suggest directions for future research. In terms of limitations, our sample was relatively small and we collected information from only one store; to that extent, the results may not be widely generalizable. The small sample also precluded the use of structural equations, but this was relevant for only a small part of our overall research plan. The sample size was more than sufficient for thorough content analysis as well as for conducting *t*-tests, ANOVAs, and nonparametric statistical tests. A second limitation is that consumer time constraints (especially while grocery shopping) prevented us from including many more questions of interest in our surveys. Still, we were able to capture much useful information in relatively short, but carefully structured interviews.

Having used a variety of research and analytical methods in this study, our overall conclusion not surprisingly is that where possible, a combination of methods yields the most information. For example, our quantitative analysis supported past theory with respect to attributes important for using self-scanning. Our content analysis corroborated these results but the frequencies for the reasons cited gave a clearer indication of the most important reasons motivating consumers to use or avoid the self-scanning checkout. In addition, where theory was lacking, we were able to determine through content analysis that consumers who avoided self-scanning perceived the traditional checkout as performing better on the same attributes that were important for using self-scanning checkouts. We had conjectured that this might be one of two alternatives. The other possibility was that consumers may think the self-scan does better on some of these attributes, but they choose the traditional checkout in spite of this in order to interact with employees. The findings showed that consumers who preferred the traditional checkout viewed it as performing better on all the same attributes and also liked to interact with employees. The

two sets of reasons together form a strong basis for their choice of the traditional checkout, suggesting to managers that they need to offer both options for the foreseeable future.

Our content analysis also revealed that consumers who used self-scanning had favorable attitudes toward using technology in general and wanted to avoid interaction with employees. This was also true for consumers who preferred Internet shopping, using touch-tone dialing, touch screens, or ATMs. In contrast, our content analysis revealed that consumers who avoided self-scanning had unfavorable attitudes toward using technology in general, and as mentioned earlier, wanted to interact with employees. This was also true for consumers who preferred telephone shopping, speaking to a person, ordering verbally in a store, or using a teller. Certainly, these findings could have been verified through quantitative analysis as in Dabholkar's (1996) study on touch screens; however, it would have considerably lengthened the questionnaire to capture items measuring all of these constructs for the various contexts. In addition, support from a different research approach for these hypotheses, on reasons for using and avoiding self-scanning checkouts as well as several other technology-based self-service options, advances services marketing theory even further.

In addition, our content analysis revealed that attributes similar to those cited for using or avoiding self-scanning (e.g. speed, control, enjoyment) motivated the use or avoidance of various technology-based self-service options. Again, to verify this through quantitative analysis would have been cumbersome and close to impossible in a field setting. Our research approach in this case allowed us to garner huge amounts of relevant information in an efficient way. The content analysis also revealed attributes not included in previous models, and it is up to future research to determine rigorously if these attributes are unique constructs or if there is overlap.

But content analysis could not tell us much about the influence of demographic factors. In contrast, our quantitative findings showed that demographic factors (other than Internet access) were not relevant for using or avoiding self-scanning. In most cases, however, findings from content analysis and quantitative methods supported each other as discussed earlier. Another case in point is that eye-balling frequencies for shopping preferences (Table I) revealed which ones were different for the two main respondent groups, but quantitative analysis offered statistical support for this assumption. As for situational factors influencing the use of self-scanning, quantitative analysis supported only one factor (crowding) to be significant whereas content analysis extracted a number of new ideas that managers could work on to possibly improve utilization of self-scanning. Again, the two methods together allowed us to confirm hypotheses based on theory as well as to uncover motivational and behavioral patterns and raise new issues for managers to consider and for future researchers to investigate further.

Based on our results, we recommend a combination of research methods, including content analysis and different types of quantitative testing, for future

research on technology-based self-service. In addition, we offer the following suggestions for future studies. Studies similar to ours but conducted for other contexts where new technology-based self-service options are being proposed or tested would be very useful to practitioners in that industry. The attributes extracted from our content analysis could be measured through surveys in future research to allow statistical testing of their relative significance for a variety of contexts offering technology-based self-service. Situational factors uncovered in our content analysis could be controlled and tested in future studies with lab or field settings. Finally, future research could test a combination of technology-based “self-service” with varying degrees of interaction with service employees in a variety of contexts. The idea would be to gauge the viability of such combinations in an attempt to win over those consumers who like to interact with service employees as well as those who have somewhat unfavorable attitudes toward using technology entirely on their own.

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Appendix. Measures for attributes and preference (for self-scan)

Speed

- The self-scan saves me time.
The self-scan lets me check out quickly.

Control

- The self-scan gives me control.
The self-scan lets the customer be in charge.

Reliability

- The self-scan is accurate.
The self-scan is reliable.

Ease of use

- The self-scan is easy to use.
The self-scan does not take much effort.

Enjoyment

- I enjoy using the self-scan.
It is fun to scan the items yourself.

Preference

- The self-scan is better than the regular checkout.
I prefer using the self-scan to using the regular checkout.

Source: Adapted from Dabholkar (1996); all items used seven-point Likert scales.