Examining why Customers Choose Online Grocery as a Channel

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ABSTRACT

Many retailers are increasingly turning to home delivery as a new arena of operational competition. This study controlled for industry by investigating the online home delivery grocery business, and an analysis of 1,919 customers of home delivery grocers identified four groups of online customers based on reasons for selecting this service. These four groups were next linked to operational execution in terms of service, product, and Internet quality and found to vary in predicable ways. Subsequent to the initial data collection, five month's of *post hoc* longitudinal purchasing history was collected on the four groups of online customers to determine the relative profitability. The "convenience sensitive" customers were among the largest and most valuable of all online customers while the "price sensitive" ones had the lowest overall order sizes and represented the smallest pool of potential customers. Finally, as a follow-on analysis, the study used regression to predict future consumer purchases based upon operational execution. Time savings and service quality emerged as the two most important independent variables in terms of future buying from such online home delivery services.

(Keywords: e-Services, Supply Chain Management, Empirical Research)

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1.0 INTRODUCTION

The OM literature often focuses on processes, but inadvertently excludes customers that actually receive an operation's output (Hayes 2002). This need to understand customers *before* processes are developed and finalized is especially relevant when studying new electronic services commonly called "e-services" (Froehle, Roth, Chase, and Voss 2000). Although customers have always been an important part of service delivery they now regularly play a pivotal role thanks to online e-service technologies (Voss 2000). Customers in effect act as if the firm employs them in completing online transactions and thus e-services represent a sharing of work between consumers and companies. For this reason it is important to investigate customer expectations of the overall online shopping experience as well as related e-service delivery processes (Tsikriktsis 2002).

Understanding e-service customers is especially relevant because in total they purchase billions of dollars *every day* from online home delivery retailers. While the Internet provides rich search capabilities and product information, beyond that we know little about who these various groups of e-service consumers are and what they want from online operations (Zeithaml, Parasuraman, and Malhotra 2000). What are different types of customers most interested in from a company's web-based operations? This question remains largely unexplored for e-services and there are relatively few such examinations (Tsikriktsis, Lanzolla, and Frohlich 2004). Notably, while many of the most famous dot.com successes (and failures) involved online grocery companies like Tesco and Webvan, research has mainly emphasized their underlying order picking and distribution methods (Pyke, Johnson and Desmond 2001). Missing in such studies was an analysis of the types of customers that Internet-enabled operations sought to serve and, by extension, how operational execution affected their continued willingness to purchase.

This study contributes to the literature by starting the analysis with customers and then working backwards to what they are seeking in terms of operational processes. In particular it investigates what types of customers purchase an e-service - in this case online groceries. From there, the paper links these customer groups to what they want in terms of operations. We follow up these preliminary investigations of e-services with some *post hoc* analyses of customers' purchases five months after the original survey was done to longitudinally measure performance.

The rest of this paper is organized into four sections. In the next section we look at the literature on e-services and online home delivery. We also formulate a series of hypotheses. In the subsequent two sections we describe methods and discuss our findings. In the final section we draw conclusions. Insights from this paper are relevant to both managers and academics. For academics, it introduces new scales and isolates the types of customers that use e-services. For managers, it gives them insight into to how best to structure e-services such as the online home delivery of groceries in order to maximize customer retention and profitability.

2.0 LITERATURE REVIEW AND HYPOTHESES

Burke (1997) was perhaps the first to note that there are heterogeneous groups of online consumers, yet he stopped short of actually identifying them. Furrer, Liu, and Sudharshan (2000) and others later added support to the argument that online consumers are heterogeneous, but like Burke (1997) none to date has tested for and isolated the various groups of online home delivery customers. As we summarize below, the literature suggests that there are four major groups of online home delivery customers that to varying degrees value convenience, the technology, immediate delivery, and costs differently.

Interactive online shopping commonly provides extensive product information that customers can exploit (Alba et al. 1997; Varadarajan and Yadav 2002). As a result, online buying potentially increases the ease of shopping as well as improves a customer's ability to make purchase decisions (Pitt, Berthon, Watson, and Zinkhan 2002). Moreover, some consumers value products delivered to their homes since they no longer have to endure "the rigors" of traditional shopping (Maruca et al., 1999). Szymanski and Hise (2000) found that among the most satisfied consumers were ones that perceived e-retailing as highly convenient. We therefore *a priori* expect to find in any representative sample of online shoppers a subset that most values the overall *convenience* of the shopping experience.

The literature suggesting that some home delivery customers most value *convenience* is supported by our field observations. There is a pool of home delivery grocery customers that only want to shop once for their groceries. These people tend to be the most "time starved" and, as with take-out food or dry cleaning, they will gladly pay a premium for a highly reliable home delivery service if it removes the weekly grocery shopping trip from their busy schedules. On the other hand, if their order is only 98 percent correct, and they still have to go to the store to buy a few items, then for them the whole online shopping experience remains a relative failure.

Paradoxically, new technologies like the Internet commonly take time to learn, which potentially discourages some groups of customers from fully exploiting its potential (Mick and Fournier 1998, Venkatesh 2000). Reinforcing this point, prior research suggests that there are distinct differences between early versus late adopters of the Internet (Morganosky and Cude 2002). Parasuraman and Colby's (2001) work in particular identified five generic groups of customers: the optimistic and innovative *explorers*, the innovative yet cautious *pioneers*, the uncertain *skeptics*, the insecure *paranoids*, and the resistant *laggards*. As consumers become

experienced online shoppers, they commonly improve their efficiency and substantially reduce the time spent shopping. Experienced online grocery shoppers spend significantly less time shopping and were more likely to buy many or all of their groceries online in comparison to less-experienced consumers (Morganosky and Cude, 2002). These perceptions of time-saving efficiencies in turn can influence shopping behaviors including the willingness to buy even more items online. We therefore expect to find in any sample a subset of *Internet-accepting* shoppers that wholeheartedly embraces the web and is little troubled by conducting online transactions.

In the course of conducting the field portion of our research we likewise encountered these people. In general, they tend to be the ones that pioneering online retailers such as Amazon and Dell trained and "conditioned" to buy online in the 1990s and early 2000s. These people understand how to quickly navigate around retail websites, search for items, and when it comes to checkout they know that paying online is safe. Moreover, many have also experienced the benefits of letting a trusted online retailer build a customer profile on them in order to better tailor the shopping experience and suggested purchases to their preferences.

Ring and Tigert (2001) discovered that failing Internet grocery retailers such as Webvan companies were in the process of floundering mainly because they did not understand that different types of customers valued immediate home delivery to varying degrees. Indeed, Blackwell (2001) noted that a reason Webvan went bankrupt was that they assumed all online customers wanted next-day delivery inside a 30-minute delivery window. As a result, Webvan scaled their entire operations around "hitting" an infeasible short-notice delivery window that was doomed to be unprofitable. By extension, it follows that in any sample of online customers there will always be a subset of people that are *delivery insensitive* to immediately receiving their

goods, but instead are content to accept a longer delivery window and to wait a reasonable number of days before items are delivered.

Once again, we had the chance to see firsthand these types of people in our preliminary fieldwork. In some instances they tend to be very organized shoppers that plan and make their online purchases during the weekend for delivery later in the week. In other instances, these customers may be retired, have disabilities, or work-at-home and for them they are relatively flexible in terms of when items can be delivered. If anything, the thought of paying a premium for next-day delivery for these people is extravagant because they know that with a little planning you can wait another day or two and receive the same items at a lower rate.

Finally, as Porter (1982) noted almost a generation ago, there is always room in every business for low-cost providers. Thus, Zeithaml, Parasuraman, and Malhotra (2002) found that there is a subset of online customers that most highly-values a low price. Zeithaml et al. (2002) similarly held that for some online customers low prices were just as important to repeat business as traditional in-store factors including reliability, access, assurance, responsiveness, and customization. It follows then that in any representative sample of online customers there will always be a subset that most highly prizes *low prices* over other factors.

Fieldwork again supports the literature. There is a group of online shoppers that want their purchases to be perceived as bargains. These are the closest online customers to Wal-Mart's demographics – people motivated by relatively low prices and the feeling that they are getting a "good deal". It is risky stereotyping these people, since they can come from all income brackets, but in general they tend to have more modest incomes in proportion to the number of family members in their households or to be on fixed incomes. In other instances, these people

may actually have a traditional "big box" low-cost retailer within minutes of their home and therefore online prices need to be relatively low in order to motive them to shop on the Internet.

Insert Figure 1 About Here

Figure 1 illustrates our research model. We start with the a priori expectation that customers will differ in their reasons for choosing to order groceries online (proposition 1 below). Thus we identify customer groups as a foundation for further analysis. We then examine the effects of operational execution on each of these groups separately. The following two sections develop the hypotheses that will be tested for the groups.

P1: Customers of online grocers will choose the service for substantially different reasons. Our a priori expectation is that groups will differ based on value placed on convenience, low price and acceptance of the Internet as an ordering mechanism.

2.1 Online Customer Groups and Operational Execution

The literature also gives insight into consumer behavior and what they are looking for in terms of operational execution. Meuter, Ostrom, Roundtree, and Bitner (2000) investigated customer's reactions to self-service shopping technologies including the Internet and found that such processes were most highly rated when the e-service operations saved time (30%), worked reliably (21%), was easy to use (16%), addressed a salient need (11%), offered greater control, and had 24/7 access (8%). In other words, many online customers expect for their money a relatively high degree of *service quality* including reliability in providing the service, empathy to needs, responsiveness, and tangibles such as the appearance of trucks, staff, and products (Zeithaml et al., 2002).

Mathwick (2002) held that consumers shop online because they expect to receive positive value. Corbett (2001) similarly concluded that while many customers expected convenience and time-savings, they also wanted to receive good quality products. Indeed, Corbett (2001) held that a key risk factor for Internet shopping was negative perceptions when the quality of delivered products was worse than for traditional shopping. Burke (2002) likewise found that while experienced online shoppers were generally satisfied with service levels, product information, and the speed of shopping, they still wanted high quality products as part of the experience. In short, *product quality* can be as important for online shopping as it is for in-store.

On a slightly different theme, Meuter et al., (2000) found that in contrast to in-store shopping, online buying was also judged due to Internet-related issues such as technology failures (43%), process-related problems (17%), and poor overall system design (17%). Punakivi and Saranen (2001) likewise compared several different models of home delivery based upon product range, delivery hours, length of the delivery time window, delivery lead time, and minimum order or delivery surcharge and found that all of these factors related to a consumers' continued use of the service. Consumer awareness influences their expectations about delivery and ultimately, a customer's willingness to keep purchasing online (Esper, Jensen, Turnipseed, and Burton, 2003). In short, customers are also interested in *Internet quality* as reflected in issues unique to online shopping such as a sufficient range of product choices, products that are the same quality as in stores, and a reasonable number of substitutions or out of stock items.

Finally, many studies have noted that practically all online customers are interested in saving time including the time to place orders (e.g., Meuter, Ostrom, Roundtree, and Bitner 2000; Berry, Seiders, and Grewal 2002; Zeithaml, Parasuraman, and Malhotra 2002) as well as the total time (including travel time to and from the store) to place an order and pickup groceries

at the store (e.g., Kau, Tang, and Ghose 2003; Sarel and Marmorstein 2004; Matthew, Christy, and Cheung 2004). Indeed, to varying degrees saving time is behind the massive shift to online operations for a host of traditional processes ranging from booking airline tickets to placing bets to even paying taxes. We expect the same case to hold true for online home delivery – that all customers will be interested to more or less the same degree in potential *time-savings*.

These observations on Internet-related operational execution, in conjunction with the four groups of online customers described earlier, lead to a set of testable predictions. Online customers most concerned with price should be highly interested in the levels of product and service quality received for their money from online operations. Conversely, online customers most interested in convenience will likely value service and Internet quality over product quality since these are the keys to a relatively effortless online shopping experience. Paradoxically, online customers not preoccupied with receiving their items immediately after ordering (i.e., the delivery insensitive group) will likely have more modest demands concerning service, product, and Internet quality than either the convenience or price sensitive customers. Similarly, the Internet acceptor group, being the most conformable overall with shopping online, should on average place the lowest demands in terms of service, product, and Internet quality on operational execution. On the contrary, given that the literature strongly suggests that *all* online customers are interested in time-savings, this should not be a big differentiator between groups of home delivery customers. These four hypotheses are formalized below:

H1a: Price Sensitive online customers will place the highest levels of demand on service and product quality in terms of operational execution.

H1b: Convenience Sensitive online customers will place the highest levels of demand on service and Internet quality in terms of operational execution.

H1c: Delivery Insensitive online customers will place intermediate levels of demand on service, product, and Internet quality in terms of operational execution.

H1d: Internet Acceptor online customers will place the lowest levels of demand on service, product, and Internet quality in terms of operational execution.

2.2 Online Customers, Operational Execution, and Future Purchases

Although no study to date has examined the characteristics and patterns of online customers longitudinally, the literature suggests that groups of experienced consumers maintain their uniqueness over time. In particular, e-service customers do not seem to converge into one large group of amorphous consumers but instead remain separate pools of customers that need to be individually addressed by the underlying operations. A customer's knowledge about an online retailer and its associated service, products, and Internet quality creates trust and repeat purchasing (Alba et al., 1997). Urban, Sultan, and Quails (2000) built on this principle and found that groups of online consumers make repeat buying decisions on the basis of trust. In order for an online business to build a customer base of repeat buyers, consumers must have trust in the retailer's web site, the information displayed, and the firm's delivery service. Of these, among the most important element of consumer trust and repeat buying is near-perfect order delivery, which includes getting the right product to the right consumer at the right time (Urban et al. 2000).

Online groceries echo these findings and Tanskanen, Yrjola, and Holmstrom (2002) argued that one of the most important ways to create a profitable Internet grocery retailing service was though customer loyalty. As they pointed out "the cost of acquiring a new e-grocery customer is high, especially in relation to the low margins of the grocery business" and that achieving customer loyalty requires the systematic building and maintaining of trust. In practice, this means putting an emphasis on high-quality service and fast customer response in order to minimize any gap between what the customer sees online and what he or she gets when the order

is delivered to their front door. Having said that, the factors that initially draw a buyer to a Web site might not necessarily be the ones that motivate that same buyer to return. Hence, customer service, product, and Internet quality can be key variables in terms of whether or not a buyer remains loyal to an online shopping business (Reibstein, 2002).

In terms of service, a consumer often makes judgments based not only on how long it takes the firm to complete its portion of the process but also on how efficient the consumer views the use of their resources, especially their time, to complete the process (Xue and Harker, 2002). In other words – Internet quality is a driver of repeat purchases. An efficient customer base in turn makes it possible for a firm to simultaneously lower its costs while maintaining a high quality of service. The ability to have customers serve themselves efficiently is therefore a key to success for many businesses - enhancing both the relationship with the firm and increasing their loyalty (Xue and Harker, 2002).

Relating these observations concerning customer profitability to the four groups of online customers, we expect that the convenience sensitive customers are the most profitable since they are relatively unconcerned about prices. Conversely, the price sensitive ones should be the least lucrative group given their preoccupation with costs. The delivery insensitive and Internet acceptors should likely fall somewhere between these two extremes. These findings lead to a second set of hypotheses regarding how home delivery customers may act after they have been surveyed for the first time and then tracked longitudinally in terms of their future purchases.

H2a: Convenience Sensitive online shoppers are the most valuable group of home delivery customers to align operational execution with.

H2b: Price Sensitive online shoppers are the least valuable group of home delivery customers to align operational execution with.

H2c: Delivery Insensitive and Internet Acceptors are intermediately profitable to align operational execution with.

In summary, the above observations lead to the conceptual model shown in Figure 1. Based on existing research, we *a priori* expect to find four major sub-groups of online customers that to varying degrees value differently convenience, the technology, immediate delivery, and costs. These four groups in turn will demand different combinations of service, product, and Internet quality. Finally, over a longitudinal period (5 months) after the original survey data was collected these different groups of online customers will demonstrate different purchasing patterns suggesting that they each have distinct relative values to online companies.

3.0 METHODS

3.1 Sample and Data Collection

The sample consists of customers of four online/home delivery grocers – two in the U.S., one in the U.K and one in Canada. All four firms were generous with their managerial time and allowed us access to their customers. In total, the firms had annual online/home delivery sales of well over $250 million. The customer-base of the firms, in aggregate, was in excess of 200,000 customers, with at least 30,000 loyal or repeat customers that purchase over $500 in groceries year each. The people in our contact sample accounted for a total of over 38,000 purchases, and $5 million in home delivery sales. Table 1 provides a summary of the data collection techniques for the individual grocers in our sample, the number of customers contacted from each company, the number of responses and their response rates. All of the customers contacted had purchased groceries online for home delivery at least once.

Insert Table 1 About Here

We collected a stratified sample from each company based on the experience level of the customers. In designing the sample of customers to be contacted for each firm, we split each sample into 1/3 brand new customers (those that had placed 1 or 2 orders online from that grocer), 1/3 repeat customers (3 to 6 online orders and 1/3 experienced customers (7 or more online orders). By setting up such a stratified sample of customers we controlled for learning curve and loyalty issues in our study. From an earlier study done at Office Depot and our preliminary field work, we noticed that per learning curve theory the typical user's ordering times dropped from about 70-60 minutes for the first order down to around 25-30 minutes after approximately 4-5 online shops. We also observed that around 4-5 online orders customers tended to crossover from being somewhat tenuous shoppers into relatively loyal consumers. In total, this stratified sampling plan helped ensure that the sample was a representative mix of new through experienced as well as relatively loyal versus unfaithful online customers.

In general, the principles advocated by Dillman's (1978) total design method for survey data collection were followed: initial contact with follow-up reminders, a small incentive for completing the survey and the promise of anonymity in survey responses. As can be seen in Table 1, we were able to employ substantially similar data collection methods albeit with some minor exceptions. All four grocers provided a small incentive to customers to participate in the study. These incentives ranged from a company hat for all customers filling out a survey, to one free delivery for participating customers, to a raffle for 20 pairs of movie theater tickets. In all, the incentives were all worth less than $10 per customer, but these companies felt that it was important to compensate their busy customers for their time and valuable feedback.

As shown in Table 1, the overall response rate for the entire sample was 1,919 responses out of 6,159 customers contacted, or 31.2%. All of the data was collected in the period August,

2002 – May, 2003. This compares very favorably to the response rate in similar studies (Duray, Ward, Milligan and Berry, 2000; Papke-Shields, Malhotra and Grover, 2002). All of the individual company response rates were well above 20%. Several tests were made across the different sub-samples to test for potential biases due to the different data collection methods (physical mail, email or Internet) and none of the tests suggested the presence of a bias. This result parallels the findings of Couper (2000) and Klassen and Jacobs (2001) that surveys can be administered via physical mail, electronic mail or the Internet with no cause for concern as long as the research design is solid and the questionnaire is consistent.

Finally, we went back to the grocers in our study 5 months after each of their customers completed the survey in order to collect *post hoc* data on their purchases. Three of the four grocers were able to provide data on the number of purchases made and the average purchase price for each of the customers that completed the survey. This type of longitudinal performance information is extremely valuable as it provides insight into the dynamic nature of the business and a means to address common methods/source variance due to a single informant. As noted by, Rungtusanatham, Choi, Hollingworth, Wu and Forza (2003), very few operations management studies explicitly recognize the possibility of bias due to common methods, much less control for it. Collecting longitudinal data based on objective measures of customer purchases provides a strong method for eliminating common methods bias.

3.2 Scales

This section describes the scales used to measure the various components of Figure 1. We used existing scales where possible, but also tried to develop customized scales where appropriate to capture the dynamic and customized nature of the online grocery shopping. Each of the factors

shown in Figure 1 is described below. The individual items included in each scale are shown in the Appendix. Computing the mean of the items comprising that scale forms all final scales.

The construct of service quality has been studied and debated for the last decade (e.g., Cronin and Taylor 1992; Van Dyke, Prybutok, and Kappelman 1999). In general, recent evidence supports the use of performance perceptions in measures of service quality (Zeithaml, Berry, and Parasuraman 1996). Because of the need to ensure construct and measurement equivalence across multiple grocers in multiple countries, it is especially important to use a broad range of scale items that can be generalizable across several countries and different grocers while at the same time keeping the items to a manageable number. As such, we devised a scale composed of ten items based upon Parasuraman, Zeithaml, and Berry's (1985) ten original dimensions of service quality. Kettinger, Lee and Lee (1995) have used similar scales.

The product quality scale is a new scale that we developed to assess customer perceptions of online product quality relative to what they can get in the store. This scale measures customers' view of the general brand quality of the physical products. In contrast, Internet quality measures aspects of operational execution – i.e. how well the grocer delivers the product. Thus, this scale includes items relating to range of product choices and the number of substitutions for out of stock items. The third item included in the scale relates to the quality of online products in comparison to that obtained in the store. These three issues repeatedly came up during our interviews with managers at all of the grocers in our study as key concerns of customers as well as key challenges for the company to execute well.

Time savings is composed of two items: a) asking whether the time to place an order shortens with repeat experience and b) asking customers to rate the total time to place and receive an order online relative to traveling to the store and back. It is interesting to note that the

average response across all four grocers for this item (b) was 5.94, suggesting that customers find online ordering to be substantially faster than traditional shopping. It is also worth nothing that this perceptual measure of timesavings strongly parallels the actual minutes to place an order that we were able to measure for a subset of customers with a correlation of –0.32 ($p < 0.01$).

As shown in the appendix, all of the scales exhibit good reliability based on measurement of Cronbach's alpha, with all the scales exceeding the generally recommended threshold of 0.70 (Flynn et al., 1990). The scales were also factor analyzed via confirmatory factor analysis to evaluate construct validity and confirm that items loaded as predicted and that each of the factors was uni-dimensional. The data showed good validity on all counts and these scales have been used in other papers with no apparent problems. Thus, the score for each scale was computed by taking an average of all items in that scale.

4.0 RESULTS

Our data analysis followed a four-step procedure. The first step was to perform a market analysis to identify groups of customers with different reasons for selecting online ordering and home delivery of grocery. To accomplish this, we employed a cluster analysis of six questions concerning why customers select a given home delivery service. The results of this step, four different customer groups, were then used in step 2 to examine differences in operational execution and resulting performance in step 3. Finally, in step 4 as a follow-on analysis, we employed linear regression within each group and the measures for operational execution and subsequent customer orders to examine the ability to predict customer purchase patterns and loyalty. It is worth noting that for steps two through four, examining these differences in variables that were not part of step 1's clustering algorithm allows us to show that the groups provide predictive validity and a managerial interpretability (Miller and Roth, 1994).

4.1 Step 1: Market Analysis

The first analytic step was to test for and isolate heterogeneous groups of home delivery grocer customers. To do this we employed cluster analysis of the six questions shown in Table 2. The goal was to classify the complete sample into several groups or subsets of customers that exhibit similar patterns in their reasons for home delivery. The primary challenge with cluster analysis is to determine the appropriate number of clusters, with the objective of balancing parsimony (few clusters) and accuracy (keeping the data as individual observations provides the greatest accuracy). To provide a reasonable amount of parsimony, we explored cluster solutions of 3 to 5 clusters using Ward's minimum variance cluster method, which is generally considered to provide distinctive, well-separated clusters (Milligan and Cooper, 1985). An important criteria for choosing an appropriate number of clusters is whether the groups formed differ from each other on both the input variable (the selection questions in Table 1) and on *post hoc* criteria (as will be examined in Tables 3 and 4). Based on these criteria, as well as the managerial interpretability of the solution, a four-cluster solution best fit the data as shown in Table 2.

Insert Table 2 About Here

Table 2 shows both the overall mean for each question for the complete sample and the mean for each group separately. The means for the complete sample are listed from highest to lowest in order to illustrate the relative importance to customers. The most important reason for selecting home delivery of grocers was, not surprisingly, convenience. What is interesting is that the least important reason is the price of products (mean = 5.24), which presents a distinct contrast with traditional grocery stores where price is often the over-riding variable (Taylor, 2003). Another interesting finding is that customers place a great deal of importance on the

accuracy of their order (second highest with a mean of 6.39). This is probably due to the fact that orders for home delivery are selected and assembled by store employees rather than the customers themselves, so any missing products, mis-picks or substitutions are distressing to customers who value their convenience. We will explore the ability to deliver accurate orders in the next section when discussing the Internet Quality scale.

As shown in Table 2, the data supported our *a priori* expectation concerning four main groups of online customers. The first group is labeled as Price Sensitive. This group has high means for all of the questions, so they are quite demanding, yet two means stand out as being particularly high. The questions for order accuracy (mean = 6.89) and price of products (mean = 6.93) were extremely high. In particular, the mean for price of products is practically the highest possible (i.e. maximum = 7.0) and is substantially different from the other four groups. The second group is labeled as Delivery Insensitive since they have the lowest mean for the question on available delivery slots. Thus, while convenience is clearly important to customers in this group, they are less concerned about the availability of delivery slots, i.e. when they are able to receive delivery. The third group is labeled as Internet Acceptors since they have by far the lowest mean for the question around the security of Grocer X's website. This group also has a fairly low mean for the question about ordering speed (time to place an order), thus this group appears to be fairly comfortable and trusting with the Internet as an ordering method. Finally, the fourth group is labeled as Convenience Sensitive since all of their means were over 6.50, EXCEPT for the question about price of products (4.88). This group appears to be more willing than the others to pay a price premium for home delivery so long as they receive excellent convenience, order accuracy and delivery as part of their home delivery shopping experience.

4.2 Step 2: Hypotheses 1a, 1b, 1c, and 1d Regarding Operational Execution

The next step in our analysis involves comparing the groups formed in step 1 for differences based on the ability to execute operational aspects of grocery home delivery. Our first set of hypotheses deals with the ability of grocers to execute the ordering, picking and delivering of groceries. In particular, we tested for differences in service, product and Internet quality across the four groups. Table 3 shows the ANOVA results for the four groups formed in Table 2.

Insert Table 3 About Here

Table 3 highlights that there are significant differences in customer perceptions of all three aspects of quality: service, product and Internet. The two highest means for service quality are for the Price Sensitive and Convenience Sensitive groups. In contrast, neither the Delivery Insensitive or Internet Acceptor groups rated service quality highly. Similar patterns were observed for both Product Quality and Internet Quality – both the Price Sensitive and Convenience Sensitive groups perceive these to be more critical than the remaining two groups.

In short, the data provide support for hypotheses 1a, 1b, 1c, and 1d that differences in operational execution can be identified based upon customer selection group. As anticipated, the Price Sensitive group was focused on service and product quality per H1a. Conversely, the Convenience Sensitive customers zeroed in on service and Internet quality as the most important dimensions of operational execution (H1b). The Delivery Insensitive and Internet Acceptor groups were both less demanding customer groups as anticipated respectively in H1c and H1d. As seen in Table 3 for the Internet Acceptors, they in particular seemed to be the most nonchalant about shopping online. This is logical since they apparently harbor few of the fears that Parasuraman and Colby's (2001) research identified in what they called the uncertain *skeptics*, the insecure *paranoids*, and resistant *laggards* of online shopping and home delivery.

4.3 Step 3: Hypotheses 2a, 2b, and 2c Regarding *Post Hoc* Performance

The next step in our analysis involved comparing the groups formed in step 1 for differences based on outcomes in terms of continued customer purchases. Table 4 presents the results of an ANOVA comparing various performance measures by customer selection group. We employ 3 *post hoc* measures of actual customer purchases in the five months following the survey. The three *post hoc* measures are 1) Post Orders (number of purchases by each customer), 2) Percentage of follow-up orders (i.e. customers were classified as either continuing – they made at least one purchase following the survey or discontinued – no purchases since the survey), and 3) Average Order (average dollars spent on an order). The use of such *post hoc* measures provides several important benefits including 1) a more objective measure of performance (Vickery, Droge and Markland, 1993); 2) limits the possibility of common-method bias (Rungtusanatham et al., 2003); and 3) provides longitudinal rather than cross-sectional insight into causal relationships affecting performance (Boyer, 1999).

Insert Table 4 About Here

As shown in Table 4, there were some significant and non-significant differences between groups on our three *post hoc* objective measures drawn from actual purchase data. The one difficulty with the *post hoc* measures is the relatively high variance – customers vary greatly in their purchasing patterns and the data does not conform to a symmetrical distribution such as the normal distribution that ANOVA assumes. Therefore, we examined differences across groups while realizing that there are some limitations to the assumptions underlying these tests. This is why we tested multiple measures. For example, there is no significant difference in Post Orders, although a cursory glance at the means reveals that the Internet Acceptor and Price

Sensitive groups appear to make more purchases. Part of the limitation is due to skewed data – numerous customers in each group made zero purchases following the survey, while there are customers in each group who made as many as 22 purchases. To further address this skewed data issue, we also examined the percentage of repeat purchases (i.e. the percentage of customers in each group that made at least one purchase subsequent to the survey). While there were no significant differences, the Convenience Sensitive group has the highest proportion of "repeat" customers with 67%.

The one *post hoc* measure with a significant difference between the groups was Average Order size. This also happens to be among the most important of all grocery home delivery performance metrics. Breakeven for most grocery home delivery operations is typically in the $95-100 range (McAfee and Ashiya, 2001) with of course the largest possible average orders being the best. In this case, the Convenience Sensitive group had the highest average order ($110.65) while the Price Sensitive group had the lowest average order ($90.59). Interestingly enough, this places the Convenience Sensitive group on the positive-side of breakeven and the Price Sensitive customers on the losing end of the spectrum. Similarly, the Delivery Insensitive and Internet Acceptor's average order sizes of $101.12 and $97.27 respectively place them at just about breakeven.

4.4 Step 4: An Extension Predicting Performance

Our final analysis used regression models to predict customer purchases based upon their selection group and their views of Service Quality, Product Quality, Internet Quality and Time Savings. For the dependent variable, we utilized the post-hoc objective measure Post Orders that was collected from the database of each grocer across the 5 months following the close of survey data collection. It is important to note that the study's research design included a number of

controls for these regressions. For example, all four grocers in the study had approximately the same 3-4 years experience with online home delivery, used many of the same technologies for process like websites and picking routers, employed similar kinds of staff and operations people, and sold virtually identical products (e.g., milk, Coca-Cola, tomato soup, etc.).

Table 5 shows regression equations to predict each of these dependent variables for both the complete sample of customers and the four selection groups. It is generally hard to predict objective measures of performance (like purchasing intention) since there are many factors that cannot be accounted for in any such study. For example, customers that get frustrated with slow modem speeds, were swayed by a competitor's advertising, changed jobs or lifestyles, or maybe even moved out of the area will suddenly stop shopping, which no study can account for. Thus while the model was significant for the complete sample, it has a low (but expected) R^2 of 0.07 with a statistical power well above the .80 suggested threshold (Cohen, 1988) at greater than 99 percent. In other words, while we are only measuring a small part of a truly complex issue – why do customers stay loyal – we are measuring that phenomenon with *extreme accuracy*. At the same time, the use of objective post-hoc eliminates common methods bias. Thus, the significance of the R^2 value of 0.07 is important in that it indicates that there are strong relationships between the independent variables and customer purchasing patterns.

Insert Table 5 About Here

We are also interested in the ability to predict Post-survey Orders for each selection group, so Table 5 shows individual regression models for each of the four groups. The results show that each model has a R^2 value that is equal to or higher than that for the complete sample. Likewise the statistical power for each model was well above Cohen's (1988) 80 percent

threshold. Together, this supports the argument that purchase patterns can be predicted more accurately for particular customer groups than for the entire population. We were also interested in how the significance of each scale varies across home delivery groups. The only independent variable that is significant in all four models is Time Savings, which implies that ensuring that online ordering and home delivery is time efficient (quick) is one of the primary requirements for success in these business. In other words, no matter why a customer selects grocery home delivery, a major driver of their tendency to continue using the service is their perception of the ability to save time. In contrast, Service Quality is only significant for the Convenience Sensitive group. Our interpretation of this finding is that the customers in this group do not care as much about issues such as price – AS LONG AS they perceive that they are receiving a higher standard of service quality. Another way to view this is in terms of Hill's (1994) definition of operations strategy – grocery home delivery for this group makes price an order qualifier, but service quality is the order winner.

It is interesting that Product Quality is significant for three of the four groups but not for the Convenience Sensitive group. In particular, the beta coefficients for both the Internet Acceptor and the Price Sensitive groups are above 1, which indicates that improvements in product quality have a large impact on follow-on purchases. This is an important insight since one of the major barriers to home delivered groceries is customer perceptions that they will get lesser quality foods (in particular perishable products that other customers have picked over or that have been damaged in transit). Finally, Internet Quality is not significantly related to Post Orders for any of the four groups.

5.0 DISCUSSION

The foundation analysis for this study starts with the premise that there are multiple groups of e-service home delivery customers. Although the literature has suggested since the late 1990s that not all online customers are the same, this study helps firmly establish that they are indeed different. Not only were these groups replicated across companies but also across countries. Going back to our introduction and the traditional OM focus on processes – what does this mean for our field as well as practitioners? It means that home delivery processes must be carefully tailored for a variety of heterogeneous customers instead of one big homogenous group of online shoppers. Notably, companies interested in providing successful online capabilities *to a broad variety* of customers must first understand whom the customers are that they need to serve. From there, they then need to design a home delivery service to try and satisfy as many of these groups of home deliver customers as possible. Or conversely, if practitioners are only interested in one group such as the Convenience Sensitive, then they need to closely match their operations to exactly what this group wants in terms of products and service.

The first series of hypotheses (H1a, H1b, H1c, and H1d,) give us new insight in improving home delivery services. As a set these hypotheses support one of the core principles of operations strategy theory, namely that companies can configure their operations differently, and this in turn leads to varying outcomes. As seen in Table 3, customer perceptions of service, product, and Internet quality do in fact vary between home delivery customers. As expected, the Price Sensitive group was the most concerned about two of three dimensions of online quality including service and product. Conversely, the Convenience Sensitive group was least concerned about product quality and most interested in operations that delivered high service and Internet quality. Interestingly, both groups were also very sensitive to service quality. In other words, it is up to the company to decide whether or not they will emphasize relatively high or

low prices and/or Internet quality and correspondingly attract a greater or lower percentage of Price versus Convenience Sensitive customers.

At the other end of the spectrum, the Internet Acceptors and Delivery Insensitive groups appear to be the easiest kinds of customers to please as was earlier predicted. Although a preliminary finding, companies targeting these types of customers most likely need to be good but not necessary great in order to attract these consumers to their home delivery service. Or, looking at online home delivery from a slightly different perspective, these are the customers that will likely show up and shop at any decent online home delivery services versus the harder to win over Price Sensitive versus Convenience customers.

Hypotheses 2a, 2b, and 2c, regarding purchasing patterns, leads to several more important findings. First, all groups of online home delivery customers can be converted into repeat purchasers. This is good news – if each group likes the service that they are getting from online companies then they will come back and order again. Furthermore, each groups appears to have a return or 'yield' rate of on average 63 percent (Table 4). At the individual group level, *post hoc* analyses show that they vary, and the Convenience Sensitive group seems to be the single most desirable type of customer. They have the highest intention to purchase again from the home delivery service that they are using, plus they have a significantly larger average order size ($110.65) than the other groups. Conversely, the Price Sensitive group appears to be the least attractive subset of customers for online home delivery. Not only do they have the lowest overall average order size ($90.59), but also their group was on a percentage basis the smallest number of total shoppers. Meriting future research, it appears that if an online home delivery company does not attract a sizable percentage of Convenience Sensitive customers then they may never reach operational breakeven with an average order size over $95-100. Although

speculative, this may be why Wal-Mart's online business has floundered three times since the late 1990s. If you try to build your online business around Price Sensitive customers then a firm will never likely make a profit on the venture.

Finally, in terms of the follow-on analysis predicting future purchasing patterns related to home delivery customer groups, there is another interesting set of findings. Referring back to Table 5, it is curious to see that in fact only product quality and time-savings were critical when examining objective, longitudinal measures of repeat purchases. Of these, time-savings (Beta = 1.15) was by far the most important factor. This goes back to the literature and Table 2 where convenience was the most important dimension for all four customer types (rated 6.53 out of 7). In other words, if a company does not make things as convenient as possible for its customers and save them time in the process then that is going to minimize the probability of consumers shopping with them again. Table 5 especially highlights that time savings was critical to all four groups of customers – including the most profitable Convenience Sensitive group. It is also worth noting that Service Quality was important to the Convenience Sensitive customers suggesting that home delivery companies interested in wooing these consumers also need to focus on this. Alternatively, if a company is interested in winning a greater percentage of Internet Acceptors or Price Sensitive customers then they need to emphasis Product Quality. On the other hand, as mention in the above discussion of results, Internet Quality was the least important dimension in Table 5 across all four groups.

6.0 CONCLUSIONS

This paper investigated the customers that now commonly shop at online home delivery services. It established that there are multiple types of customers, and that they vary on distinct underlying dimensions of service, product, and Internet quality. This research also suggests that for

academics we need to be more precise when we talk about online customers in future studies. The technology management field went though a similar phase where they first included all forms of product and process technologies together in single analyses before they later learned to control for technology. Internet-related research is at similar crossroads. It not longer seems appropriate to consider all online customers as one group, and by extension we need to think about how the processes that we seek to analyze and optimize are best configured for each class of online customer. In addition, this study includes a number of scales for measuring e-service related outcomes and performance to help guide such future research.

This study also makes important contributions to managers. It not only shows them who are the most valuable online home delivery customers, but also how to go about winning them. Over 30 years ago, Skinner (1974) taught managers that "focus" wins. So it would also appear to be true with today's e-businesses. Only this time around the focus is not only on the underlying processes (as it was in Skinner's day) but also on the end-customers involved in the e-service delivery process. Understanding customer types and then working backwards is the key to online success. If only the failed dot.coms of a few years ago had known that - maybe the Internet bubble would never have burst so swiftly and completely.

On the other hand, results suggest that some companies are starting to figure out the keys to successful online home delivery – just in time to serve the ever-growing population of online home delivery customers. These customers, after all, never went away in the wake of failure at companies such as Webvan. They simply got more sophisticated and demanding as they continued to show with Internet survivors such as Amazon and Dell. Unfortunately, while more customers than ever are out there to be pursued, this time the winning home delivery strategy has to be perfect. It's doubtful that firms will ever get a third attempt to try and earn their business.

Figure 1. Research Model

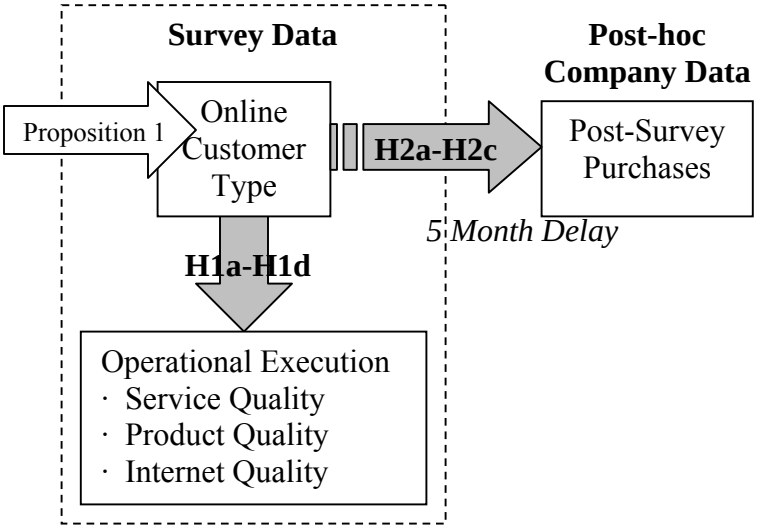

Table 1. Description of Participating Companies and Data Collection Methods

		US Grocer-Northern	US Grocer-Southern	Canadian Grocer	UK Grocer
Data Collection Methods					
Sample Selection		Stratified	Stratified	Stratified	Stratified
Invitation to Customer		Email	Email	Email	Written letter
Incentive		Yes	Yes	Yes	Yes
Survey Method		Web Survey	Web Survey	Web Survey	Written Survey
Follow-up invitation		No	Yes	Yes	Yes
Samples	Complete Sample				
Customers Contacted	6,159	2,000	1,159	2,500	500
Responses	1,919	460	396	690	373
Response Rate	31.2%	23.0%	34.2%	27.6%	74.6%

Table 2. Cluster Analysis – Reasons for Selecting Direct Delivery Service

		Group[1]				
Question[2]	Sample Mean	Price Sensitive	Delivery Insensitive	Internet Acceptors	Convenience Sensitive	F-value[3]
Convenience	6.53	6.69	6.36	6.31	**6.85**	51.92**
Order accuracy	6.39	6.89	6.21	**5.69**	6.82	190.69**
Security of Grocer X's website	6.00	6.77	6.42	**3.53**	6.57	285.96**
Availability of Delivery Slots	5.81	6.43	**5.19**	5.37	6.59	236.75**
Ordering Speed (Time to place an order)	5.80	6.45	**5.19**	5.29	6.61	279.31**
Price of products	5.24	**6.93**	4.83	4.76	4.88	271.33**
n	1828	353	678	333	464	

Notes:

1. Customers were asked to rate "How important were the following factors in selecting Grocer X" for each question on a seven point Likert scale ranging from 1 = Not Important, to 4 = Somewhat Important to 7 = Very Important.
2. Items in **bold** are factors that distinguish each of the groups in terms of emphasizing that factor to the lowest or highest degrees in comparison to the other three clusters.
3. Based on a Scheffe *post hoc* test.
   * $p < 0.05$
   ** $p < 0.01$

Table 3. ANOVA Comparison of Groups on Operational Aspects of Quality (H1a-H1d)

		Group				
		Price Sensitive	Delivery Insensitive	Internet Acceptors	Convenience Sensitive	F-value
SERVICE QUALITY	Mean	**6.22**	6.02	5.88	6.19	12.39**
	St. Dev.	0.95	0.86	0.84	0.86	
PRODUCT QUALITY	Mean	**5.58**	5.31	5.28	5.50	8.13**
	St. Dev.	1.16	0.99	0.98	1.07	
INTERNET QUALITY	Mean	5.22	5.04	5.04	**5.30**	6.39**
	St. Dev.	1.18	1.09	1.11	1.13	
TIME SAVINGS	Mean	5.69	5.57	5.60	5.70	2.32
	St. Dev.	1.000	0.94	1.01	0.96	
	n	353	678	333	464	
	Hypothesis	H1a	H1c	H1d	H1b	

Notes:

Items with double underline are the lowest mean for that group, while items in **bold** are the highest. Based on a Scheffe *post hoc* test.

* $p < 0.05$

** $p < 0.01$

Table 4. ANOVA Comparison of Outcome Measures by Group (H2a-H2c)

		Group				
		Price Sensitive	Delivery Insensitive	Internet Acceptors	Convenience Sensitive	F-value
POST ORDERS	Mean	4.34	3.86	4.35	3.73	1.16
(Over 5 Months	St. Dev.	5.54	5.26	5.86	4.78	
after Survey)	n	246	546	273	317	
PERCENTAGE	Mean	0.64	0.58	0.61	0.67	2.32
OF FOLLOWUP	St. Dev.	0.48	0.49	0.49	0.47	
ORDERS	n	246	546	273	317	
AVERAGE	Mean	$90.59	$101.12	$97.27	**$110.65**	4.82**
ORDER SIZE	St. Dev.	$48.84	$55.21	$51.59	$60.95	
	n	246	546	273	317	
	Hypothesis	H2a	H2c	H2c	H2b	

Notes:

Items with double underline are the lowest mean for that group, while items in **bold** are the highest. Based on a Scheffe *post hoc* test.

* $p < 0.05$

** $p < 0.01$

Table 5. Linear Regression to Predict Post-Survey Orders

	Complete Sample	Price Sensitive	Delivery Insensitive	Internet Acceptors	Convenience Sensitive
	Beta	Beta	Beta	Beta	Beta
Constant	-4.82**	-4.53	-5.68**	-3.54	-6.26**
SERVICE QUALITY	-0.10	-0.47	0.03	-0.61	0.82*
PRODUCT QUALITY	0.77**	1.25**	0.61*	1.01*	0.37
INTERNET QUALITY	-0.27	-0.37	0.07	-0.23	-0.47
TIME SAVINGS	1.15**	1.17**	1.16**	1.29**	0.91**
R^2	0.07**	0.11**	0.07**	0.09**	0.07**
Statistical Power[1]	99+ %	99 %	99 %	98 %	98 %
n	1453	246	546	271	316

Notes:

* $p < 0.05$

** $p < 0.01$

APPENDIX: SCALES

All Scales rated from 1 = strongly disagree to 7 = strongly agree except where noted.

SERVICE QUALITY ($\alpha = 0.96$)

a. Grocer X[1] employees are reliable in providing the service I expect
b. Grocer X employees are understanding of my service needs
c. Grocer X employees are responsive to my service requests
d. Grocer X employees are competent in providing the expected service
e. I feel secure in service encounters with Grocer X employees
f. Grocer X employees are courteous in providing me service
g. Grocer X employees are available to answer my service-related questions
h. The tangible (appearance of trucks, staff, products) aspects of Grocer X's service
i. Grocer X service is excellent
j. Grocer X has good credibility in providing the service I need
k. I have access to communicate with Grocer X regarding my service needs

PRODUCT QUALITY ($\alpha = 0.86$)

a. Grocer X has prestigious products
b. Grocer X has an excellent assortment of products
c. Grocer X products are among the best

INTERNET QUALITY ($\alpha = 0.72$)

a. GrocerX has a sufficient range of product choices (I can get what I want)
b. The products are the same quality as I can get in the store
c. The number of substitutions or out of stock items is reasonable

TIME SAVINGS (inter-item correlation = 0.20, $p < 0.01$)

a. The time to place an order becomes much shorter as I use the system more
b. The total time (including travel time to and from the store) to place an order and pickup groceries at the store[2]

NOTES:

[1] Insert name of specific company wherever Grocer X appears.

[2] TIME SAVINGS item b asked customers to rate their experience with Online ordering vs. their experience with a "traditional" store. The specific question asked was: Please rate the degree of change when using the Internet for ordering groceries through Grocer X in comparison to shopping in a neighborhood store (i.e. an Albertsons, Kroger, Safeway, Sainsbury's etc.). The question was rated on a scale from 1 = Much worse than in-store shopping, to 4 = about the same to 7 = Much better than in-store shopping.

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