EXTENDING THE SUPPLY CHAIN: INTEGRATING OPERATIONS AND MARKETING IN THE ONLINE GROCERY INDUSTRY

Kenneth K. Boyer
Associate Professor of Operations Management
Eli Broad Graduate School of Management
Michigan State University
East Lansing, MI 48824-1122
Phone: (517) 353-6381
Fax: (517) 432-1112
Email: boyerk@msu.edu

G. Tomas M. Hult
Director, International Business Center (MSU-CIBER)
Associate Professor of Marketing and Supply Chain Management
Eli Broad Graduate School of Management
Michigan State University
East Lansing, MI 48824-1122
Phone: (517) 353-4336
Fax: (517) 432-1009
Email: hult@msu.edu

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ABSTRACT

This study reports results from case studies of four Internet ordering and home delivery grocers and 2440 of their customers. Each grocer follows a different operations strategy as determined by choice of where to fulfill customer orders (from existing stores or from a dedicated DC) and by choice of delivery method (direct to the customer's home/office or indirect via customer pickup or third-party logistics provider). The survey data from customers is used to assess the degree of integration between marketing and operations and the relationship with customer behavioral intentions. The results indicate that eBusiness Quality, Product Quality and Service Quality all have a significant direct effect on customer behavioral intentions to purchase again. There is limited support for technology as a moderating factor. Finally, the relationships between the predictor variables and customer behavioral intentions differ across grocers. This supports the idea that grocers utilizing different operational strategies should focus attention on different facets of their business and provides insight as to where efforts should be directed.

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INTRODUCTION

Groceries are perhaps the most universal commodity, thus competition often spurs supermarkets to go to great lengths to develop new technologies and methods of streamlining both their supply chain and their marketing efforts. In theory, the Internet can be used to link customers with grocery stores from their homes and will help integrate the supply chain by closely linking marketing, sales, operations and logistics. The current study examines online grocery ordering and home delivery as a market where marketing and operations strategies need to be carefully integrated. We examine four different grocers that have selected distinctly different operations strategies for delivering groceries to the customer's home. We then examine results from a consumer-oriented survey filled out by customers of each grocer to investigate relationships between marketing, operations and customer satisfaction in this challenging market.

As Webvan and other early online grocers discovered the hard way, there are numerous challenges and drawbacks to online ordering and home delivery of groceries. First and foremost, the delivery of groceries to the customer presents severe logistical difficulties. Companies such as Tesco, Ocado or Peapod seek to deliver groceries within a specified delivery window (typically ranging from 1 –3 hours). The tighter the window, the more consumers like the service, but tight windows make deliveries difficult. It is this last mile that proved to be a crucial barrier to making online groceries a viable business model. Webvan could not make their processes cost competitive with traditional grocers such as Kroger, Meijer or Safeway. The challenge lies in offering a greater reach of services – i.e. delivering directly to the customer rather than having the customer complete the selection and delivery of goods by coming to the store themselves, which although valued by the customer, increases the operational complexity faced by the grocer (Lee and Whang, 2001). In short, Webvan's marketing and operations strategies were not well matched. Webvan tried to build market share by offering groceries delivered to a customer's door in a specified 30-minute window

at prices comparable to what consumers get by doing the shopping themselves. Webvan's process was simply unable to meet this challenge. Hindsight being 20-20, it is possible that Webvan could have been more successful by utilizing a process that focused less on providing groceries at low cost and more on providing timely delivery. The market would not have been as large, but there are consumers that would pay more for convenience – however this market is certainly much smaller than a majority of the market as Webvan appeared to believe. In short, Webvan went bankrupt – falling from a high market value of $7.9 billion to the $2.7 million that Louis Borders sold his 45 million shares for (at 6 cents per share) in July, 2001 (Rizzo, 2001).

In contrast to Webvan, Tesco, Britain's leading grocer, has implemented a very different process for providing online ordering of groceries. First, Tesco is marketing online groceries as a convenience, not as a low price option – charging customers an $8 delivery charge in addition to the retail cost of groceries. Second, Tesco has kept the operations of grocery delivery simple by using existing assets rather than building high-tech warehouses. Online orders are filled by Tesco employees at the nearest Tesco store, then picked up and delivered via van. This approach works much better for lower volumes of business, albeit at a high cost per order, than Webvan's high fixed investment, low variable cost approach – which was only viable with a very high volume of orders. The net result is that Tesco had sales of $336 million in 2000, making it the world's largest online grocery (Tomlinson, 2000; Hall, 2001). Revenues increased to $450 million in 2001, with operating profits of ~$22 million (Reinhardt, 2001). The most recent figures show that Tesco is on pace to surpass $1 billion per year, with $900 million in sales in 2003 (Richardson, 2004). Recognizing that the potential market reach for Internet grocery sales was fairly small (Internet sales are still only 1.5% of total revenue) and the associated operational challenges, allowed Tesco to develop an appropriate Internet strategy rather than shooting for the stars and flaming out as with Webvan.

With a few notable exceptions, what failed Internet grocers (Webvan, Streamline, Homegrocer) overlooked or miscalculated was that a marketing strategy of offering low prices needs to be matched with an operations strategy that actually achieves low costs. The companies that have achieved some success (notably Tesco, Sainsburys and Albertsons) take an alternative approach of marketing their services to customers as a convenience added option which will cost customers more, but which can then be supported by using the extra funds to support operations aimed at providing convenient timely delivery.

LITERATURE REVIEW AND HYPOTHESES

The operations strategy process is most often modeled as a hierarchical one in which functional strategies such as operations, logistics, marketing and finance are driven by the higher level business strategy (Skinner, 1969; Fine and Hax, 1985). A key element of the strategic framework involves coordinating functional level strategies to work in concert to achieve the overall business strategy rather than to locally optimize outcomes for individual functions, business units, plants or stores. One of the primary challenges in implementing effective strategy involves achieving fit or consensus within an organization – both between business and functional strategies, and between various functional strategies. Unfortunately, while this concept is clearly sound on a conceptual level, actual implementation is typically very difficult (Bozarth and Berry, 1997).

The majority of discussion regarding the Internet and E-commerce implicitly assumes that electronic business methods provide a new means of seamlessly integrating functional level strategies. While there is a developing stream of research that examines the interaction of the functional level strategies in this model, most of the extant studies are either conceptual in nature or based on anecdotal evidence or fairly high-level case studies. For example, Kaplan and Sawnhey (2000) examine B2B hubs in terms of what and how businesses manage their purchasing processes

and identify four types of B2B exchange strategies. De Figueiredo (2000) provides a conceptual mapping of marketing characteristics onto operating characteristics to identify four promising E-commerce strategies. Feeny (2001) utilizes elements of De Figueiredo's (2000) model to delve deeper into the nuances of matching operations and marketing strategies for E-commerce. A similar approach is taken by Werbach (2001) in examining the benefits of syndication to identify strategies for using the Internet to revise supply chains. While all of these papers make intuitive sense and begin to provide useful frameworks for effective utilization of E-commerce, at this point they remain firmly in the theory building stage based on a loose collection of qualitative data. Our study seeks to capitalize on this existing foundation and move into more rigorous theory testing. Although all of the functional level strategies are critical to the ultimate success of business organization, our primary area of interest is on the relationship between operations, marketing and business strategy, with particular emphasis on operations strategy.

The need for firms to be market-oriented is well established in marketing (Kohli and Jaworski, 1990; Narver and Slater, 1990), management (Hult and Ketchen, 2001), and operations management (Hult, Hurley, Giunipero and Nichols, 2000). Drawing on work by Narver and Slater (1990) and a similar conceptualization by Day and Wensley (1988), responsive market orientation is a function of three subcomponents: customer orientation (understanding the customers' needs and wants), competitor orientation (understanding the strengths and weaknesses of the competitors and how they are satisfying customers' needs and wants), and interfunctional coordination (the coordinated utilization of the organization's resources in creating superior value for customers). Building on Day (1994), these elements of market orientation collectively target a customer's expressed needs via responsive market orientation activities. As such, this form of market orientation is frequently interpreted as the adaptation of product offerings to the customers' preferences and/or market structures (Jaworski, Kohli, and Sahay, 2000). Moreover, for grocery

firms, reactive market orientation implies that firms typically accept the market structure and/or behavior of customers as a constraint and work within these constraints to provide customer value.

Solely focusing on responsive market orientation, however, may not encourage opportunity-seeking behaviors such as aggressively taking risks and being innovative. New business areas such as Internet ordering of groceries often require a "disruptive technological change" (Christensen and Bower, 1996). To explain, using the rationale by Christensen and Bower (1996) the power of the dominant grocery customers (i.e., those who go to the store to shop) contributes to the failure of leading firms in the Internet grocery industry. Specifically, many grocery stores devote so much attention to traditional customers (who are already considered as established in high margin segments) that they miss out on technologies (and opportunities) that emerge in low margin, niche markets but ultimately supplant earlier technology. Intuitively, Internet ordering of groceries provides a value-added service to customers, similar to home pizza delivery and next-day at home service of computers. However, to date most grocery stores have failed in their attempts to be profitable in the Internet ordering segment, mainly due to a lack of focus on behaviors that target a customer's latent needs (needs that the customer cannot directly express without being exposed to the product/service in question).

Our primary research question combines elements of the operations and marketing literature, as filtered through emerging knowledge regarding e-commerce. In essence, a new market such as Internet ordering for home delivery of groceries puts great pressure on the integration of marketing and operations. The need to drive markets from a marketing perspective while simultaneously keeping a tight rein on operational costs and challenges puts a great deal of pressure on this market. These pressures are due to the increased service offered (i.e. home delivery), in combination with the relentless competition from existing brick-and-mortar stores in this dynamic and challenging

industry. The increased value added by delivery must be carefully balanced against increased operational challenges and costs.

Figure 1 provides an overview of our research. We examine three primary constructs that are linked to IT, operations and marketing respectively, yet the overarching theme is that grocery home delivery is such a challenging environment that companies must integrate all three aspects (IT, marketing and operations) to be successful.

Insert Figure 1 about here

Integrated Marketing/Operations Focus

Integrating marketing and operations is a challenge in any business since there is a natural tension between these two functional areas (Bozarth and Berry, 1997). At best, the tension between these two functions results in a dampening of marketing's tendency to over-promise to lure customers and a push on operations to move beyond an internal focus on reducing costs without a clear vision of end-consumer needs. At worst, the tension leads to a rift between the two functions that prohibits any integration of goals and leaves consumers poorly served. Companies that manage this integration well tend to outperform companies in which a rift exists (Collier, 1991). We thus examine the integration of marketing and operations and its relationship with customers' behavioral intentions. Our hypotheses examine three specific areas of focus or quality: eBusiness, Product and Service Quality. The premise is that online grocers must perform well in all three of these areas to successfully attract and retain customers. They must make it easy and comfortable to place orders online (eBusiness Quality), while also providing excellent products that meet customer expectations (Product Quality), while simultaneously providing customers with attractive service (Service Quality). Taken together, these three concepts address the synthesis of IT, operations and marketing.

eBusiness Quality. One of the biggest concerns with online ordering and home delivery of groceries is that it represents a fundamental shift from consumers selecting their own groceries to the companies providing the service selecting for consumers, based on consumer orders. From a corporate point of view, this represents an increased challenge for operations since the company is essentially taking back work that had previously been self-sourced by the customer (Yrjola, 2001). This switch can be justified from two points of view. First, increasingly busy consumers are willing to pay to have someone else do this work, thus saving them time. Second, a "professional" shopper should be able to shop more efficiently than consumers due to better knowledge of the store, ability to combine multiple orders and the use of software to develop efficient routes through the store. There is building evidence that home delivery grocers are able to achieve efficiencies in picking customer orders (Reinhardt, 2001; Spindler, 2002).

From a customer point of view, ordering groceries online is fundamentally different than physically walking through a store. Thus, one of the major hurdles is getting the customer's order in the first place. Studies have shown that the first order a customer places on the Internet for groceries averages between 75 and 80 minutes, while the average order time decreases to 25 – 30 minutes by the time the customer places their fifth order (Ellis, 2003). If it takes 80 minutes to order groceries online, that is little, if any timesavings over physically going to the store – clearly this negates some of the convenience of ordering online. Thus, we examine the premise that companies must facilitate the movement of customers down the learning curve by (A) providing a simple and understandable website and (B) making transactions as easy and transparent as possible, while delivering what the customer ordered.

Our examination of eBusiness Quality uses two separate literature streams as a foundation. First, extant research has employed a construct labeled Perceived Ease of Use that has proved to be an important indicator of both adoption and satisfaction with numerous types of software (Davis,

Bagozzi and Warshaw, 1989; Agarwal and Prasad, 1999). Perceived Ease of Use includes elements of marketing (customer perceptions) and operations (company ability to meet those expectations). Numerous researchers have noted that the information technology component of the e-service encounter presents both opportunities and challenges for shaping customer experiences. Zeithaml, Parusuraman and Malhotra (2000) present a conceptual framework that identifies elements of e-service quality, including: website related items such as ease of use and navigation. Several studies have demonstrated a linkage between user satisfaction and website factors (Deveraj, Fan and Kohli, 2002; Torkzadeh and Dhillon, 2002).

A second measure of the ability to place and manage orders online is provided by Boyer and Olson (2002) with a construct labeled Site Ease. This construct assesses specific aspects of ordering online, including navigation, sequence of steps and ease of search. Research has shown that both of these measures are correlated with customers' behavioral intentions in industries other than groceries (Agarwal and Prasad, 1999; Boyer and Olson, 2002). Furthermore, these measures assess factors that have been shown to be important to customer behavior in traditional grocery shopping – namely ease of navigation in the store, ability to find items etc. (Park, C. Whan, I., Easwar S., Smith, 1989; Vrechopoulos, O'Keefe, Doukidis and Siomkos, 2004). Another significant aspect of the e-service encounter is that transactional information can be seamlessly integrated back into the organization (Lynch and Ariely, 2000). While we do not explicitly test the method of integrating order information into the organization, it is logical to assume that customers that are more comfortable and accepting of the company's ordering system will make fewer mistakes, and will thus be easier to seamlessly integrate into backroom operations. Thus, we test the following hypothesis:

H1: The quality of XYZ company's Website (eBusiness Quality) is positively related to a customer's behavioral intentions to use the online grocery service in the future.

Product Quality. In many ways, one of the biggest challenges in grocery home delivery is convincing customers that the products they get are of comparable quality to what they select in the store. Although these are the same products as in store, they have been handled an additional time by the professional shopper and the customer has forfeited the ability to self select their items (Boyer, Frohlich and Hult, 2004). In the case of packaged goods, which are primarily commodities and differ very little within a specific item (i.e. any two of the same item are, for all intents and purposes identical) this is not as great a concern. However, there is a large degree of concern for customers when buying produce, meats and other fresh items. Interestingly, the argument can be made here that this is not primarily an operational issue since groceries ought to be fresher in the case of online grocers that pick in a centralized distribution center (i.e. Ocado, FreshDirect, GroceryGateway etc.) because the groceries actually get to customers more quickly because they do not have the additional step of being shipped from the DC to the store – thus the supply chain is more direct. In the case of grocers that pick customer items directly from existing stores, the groceries should be equally fresh (relative to traditional stores) since the grocer is simply substituting their employees for the customer when selecting items. However, most consumers have never really given any thought to how their groceries get from the field to their fork and the idea of having someone else making selections is unnerving, to say the least. However, there is evidence that customers can be educated and do accept that groceries delivered to their home are as fresh, and in some cases fresher, than those in the store (Ellis, 2003).

Product Quality combines elements of marketing (sufficient range) and operations (the number of substitutions or out of stocks) that represent direct trade-offs. One of the fundamental challenges is any business is managing the trade-off between degree of choice versus the organization's ability to accurately predict and stock that product (Skinner, 1969; Schmenner and Swink, 1998). This challenge is particularly intense in the grocery business where a typical store

stocks 40,000 items, but averages stockout rates between 5- 8% (Frankel, Goldsby and Whipple, 2002). When offering consumers home delivery of groceries, this problem is compounded because customers are giving up the ability to make their own substitutions. In other words, when you are in the store and there are no Kellogg's corn flakes on the shelves, most often you will not be particularly upset and will unconsciously either choose an alternate size of the same brand or an alternative brand. However, consumers shopping over the internet give up control of this decision and often are very uncomfortable with the substitution choices made by the store.

Thus, the integration of marketing and operations in the grocery industry, and in particular the balancing of assortment and substitutions is posited to have a positive correlation with customer behavior. In summary, we address three specific elements of product quality: (1) the physical quality of the goods in the eyes of the customer, (2) the degree of choice or assortment and (3) the ability of the grocer to keep these in stock and/or make appropriate substitutions. Thus, we test the following hypothesis:

H2: The Product Quality offered by XYZ is positively related to a customer's behavioral intentions to use the online grocery service in the future.

Service Quality. Understanding the impact of service-encounter constructs such as physical good quality, service quality, and the servicescape on behavioral intentions has been the focus of numerous marketing researchers for more than two decades (Lovelock 1983; Shostack 1977). In addition to the significant support found in service quality literature for this link (e.g., Boulding, Kalra and Staelin, 1999; Cronin and Taylor 1992; Zeithaml, Berry, and Parasuraman 1996), the concept that customers seek greater service quality is intuitive, particularly if price is held constant. Furthermore, equity theory suggests that customers who perceive an organization's delivery of service quality in conjunction with, for example, groceries to be superior are likely to attribute greater equity to the relationship with that organization (Kelley and Davis 1994).

Service Quality can be expected to be substantially different when purchasing groceries online versus in the store. Several researchers have examined the idea that the Service Quality relationship is moderated in an e-commerce setting in which the buying process is dis-intermediated or de-personalized, the importance of the service quality can be expected to change (Kaynama and Black, 2000; Meuter, Ostrom, Roundtree and Bitner, 2000). Thus, we test the following hypothesis:

H3: The Service Quality offered by XYZ is positively related to a customer's behavioral intentions to use the online grocery service in the future.

Technology as a Moderator

Our final hypotheses examine the moderating role of technology. In particular, we examine the importance of attitude toward ordering via the Internet and the ability to access the website. Attitude toward a particular software tool has been repeatedly shown to be a central factor in technology adoption as well as end satisfaction. Since Davis et al. (1989) first developed the technology adoption model, this relationship has been supported in hundreds of studies (Jackson, Chow and Leitch, 1997; Venkatesh and Davis, 1996; Boyer and Olson, 2002). Online accessibility is defined as speed of access – whether the website loads quickly and is available at the user's discretion. Online accessibility differs from eBusiness Quality in that it assesses speed and reliability of access, whereas eBusiness Quality assesses the ease of utilizing the ordering tool. Therefore, we examine the role of attitude toward internet ordering and online access ability as moderating variables:

H4: Customer attitude toward internet ordering serves as a *moderator* of the relationships in H1-H3 and a customer's behavioral intentions to use the online grocery service in the future.

H5: Ability to access the website serves as a *moderator* of the relationships in H1-H3 and a customer's behavioral intentions to use the online grocery service in the future.

As such, given the predicted moderators in H4 and H5, the direct relationships in H1-H3 are hypothesized to hold while also being moderated by attitude towards ordering on the Internet as well as ability to access.

METHODS

Data Collection and Samples

The overall sample consisted of customers of four different online/home delivery grocers. The research project was supported by a grant from the National Science Foundation (NSF). All four firms were generous with their time and allowing us access to their customers, but prefer not to be identified by name given the dynamic nature of the home delivery grocery business. Collectively the firms had annual online/home delivery sales of more than $300 million in 2003, an aggregate customer base of more than 100,000 customers who purchase at least once per month. The customers in our final sample account for over 34,000 purchases and $4 million in home delivery sales. Each of the four online grocery firms represents one of the four strategy types illustrated in the quadrants in Figure 2, as determined by choice of where to fulfill customer orders (from existing stores or from a dedicated DC) and by choice of delivery method (direct to the customer's home/office or indirect via customer pickup or third-party logistics provider). Table 1 shows data on the number of customers contacted, number of responses and other descriptive data for each sub-sample. All data was collected during the period between September, 2002 and July, 2002, with collection of data at each grocer taking 2 – 3 weeks per instance.

Insert Figure 2 about here

Semi Extended. Customers of this grocer were contacted by email and asked to fill out an online survey. One free delivery (a $4.95 value) was offered to customers as an incentive to

complete the survey and customers were sent a reminder email one week after the first if they had not yet filled out the survey. A total of 1,159 customers were contacted and 396 responses were received for a response rate of 34.2%.

Fully Extended. This grocer was not comfortable providing us with any contact or past ordering information on any customers, despite our standard and repeated assurances that all information would be held in complete confidentiality. Thus, this grocer posted a link on the checkout page for orders inviting customers to opt-in and fill out the survey. No incentive for participation was offered. A total of 10,418 unique customers placed 14,959 orders over the two-week period in which we received 898 survey responses.

De-Coupled. Customers of this grocer were contacted by email and asked to fill out an online survey. The grocer provided baseball hats with the grocer's logo as an incentive to complete the survey – the choice of incentives was partly driven by the desire to build the company's brand given a lack of brick and mortar stores. A total of 2,000 customers were contacted and 461 responses were received for a response rate of 23.0%.

Centralized Extended. Customers of this grocer were contacted by email and asked to fill out an online survey. The grocer provided 20 pairs of movie tickets to be raffled of to customers participating in the survey and a reminder email was sent one week after the first if customers had not yet filled out the survey. A total of 2,500 customers were contacted and 691 responses were received for a response rate of 27.6%.

Each of the samples includes roughly 1/3 new customers (defined as having placed 1 or 2 orders), 1/3 repeat customers (3 to 6 orders) and 1/3 experienced customers (7 or more orders). The samples of customers to be contacted was designed in this manner to give roughly equal weight to new and older customers since perceptions are likely to change as customers gain experience with online ordering. In addition, the incentives given to each sub-sample of customers differ because

the companies offered different incentives and we had to adjust to their wishes. While this is potentially limiting, we do not believe it is a serious problem as all the incentives were fairly small ($5 or less per respondent).

Non-response bias. The extrapolation procedure suggested by Armstrong and Overton (1977) was used to assess potential non-response bias. In assessing the first quartile versus the last quartile of the respondents in each sample group (semi extended, fully extended, de-coupled, and centralized extended strategies), we found no significant difference between the early and late respondents on either of the six summated measures in the survey (i.e., eBusiness quality, product quality, service quality, online access ability, attitude toward Internet ordering, and behavioral intentions). Thus, our inference is that the data are free from systematic difference bias across the early and late respondents; thus, non-response bias is not an inhibiting factor in analyzing the hypotheses.

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. These include comparison of response rates (based on groups of low, medium and high frequency customers) and size of order across each of the four grocers. This result is consistent with 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.

Measures

The measures used in this study are included in the Appendix. Three categories of measures were used to assess the hypotheses: (1) quality measures associated with the operations of online grocers such as service-, product-, and eBusiness-quality, (2) performance (i.e., customers'

behavioral intentions), and (3) moderator variables (i.e., online accessibility and attitude toward Internet ordering).

Quality Measures. Three quality measures were used to center specific attention on an integrated operations/marketing focus (eBusiness quality), an operations focus (product quality), and a marketing focus (service quality). While each construct can and has been examined in both operations management and strategic marketing, we attribute each phenomenon to its most logical foundation. eBusiness quality was measured via seven items adapted from Agarwal and Prasad (1999) and Boyer and Olson (2002). Service quality was measured via ten items based on Parasuraman, Zeithaml, and Berry's (1985) ten original dimensions of service quality (reliability, understanding, responsiveness, competence, security, courtesy, access, tangibles, credibility, and communication) (cf. Gotlieb, Grewal and Brown 1994; Hartline and Ferrell 1996). Product quality was measured via six items adapted from works by Carsky, Dickson, and Canedy (1998) and Garvin (1987).

Performance. Given the customer focus of our study, we opted to use customers' behavioral intentions as the performance variable. Zeithaml, Berry, and Parasuraman (1996) develop an argument that positive behavioral intentions are reflected in a firm's ability to get its customers to: (1) say positive things about them, (2) recommend them to other consumers, (3) remain loyal to them, (4) spend more with the company, and (5) pay price premiums. Similar to Cronin, Brady, and Hult (2000), we used four items to operationalize customers' behavioral intentions that are similar to the domains assessed in the first four of these five outcomes (cf. Samiee and Anckar 1998).

Moderator Variables. In addition to the quality and performance measures, we included survey items to assess two constructs that have been shown to affect customers' behavioral intentions, in some cases directly and in many cases in a moderated fashion, within the online shopping industry. These include measures that assess a customer's ability to "get online" (i.e.,

online accessibility) (Boyer and Olson 2002) and a customer's attitude toward Internet ordering (Agarwal and Prasad 1999).

ANALYSIS AND RESULTS

Measurement Analysis

The correlations among the study variables are reported in Tables 2 and 3. Table 2 reports the correlations in the overall sample while Table 3 presents the correlations in the four segmented samples (i.e., semi extended, fully extended, decoupled, and centralized extended). Table 4 summarizes the item analysis across the four samples (i.e., the robustness of each item across each sample). The means, standard deviations, average variances extracted, composite reliabilities (and coefficient alphas), factor loadings, and fit indices are reported in Tables 5 (overall sample) and Table 6 (the four segmented samples). Table 7 summarizes the "pairwise" discriminant validity test using the overall sample (additional discriminant validity testing is reported in the text).

Insert Tables 2 through 7 about here

To ensure that the hypothesis testing can be conducted using robust measures, a five-step approach was used to assess the measures across the four strategy types. These steps include: (1) testing the robustness of each item across the four samples, (2) conducting a confirmatory factor analysis using the full sample (n=2,440), (3) conducting confirmatory factor analyses using each sample separately, (4) assessing the reliability and validity of the scales (both in the overall and in each segmented sample), and (5) testing to ensure that common method variance does not inhibit the hypothesis testing.

Equivalence of the item loadings across the four samples. To test the robustness of the survey items across the strategy types in Figure 2, we conducted a multi-sample CFA using the

input matrices from each of the four groups (i.e., semi extended, fully extended, de-coupled, and centralized extended samples) using LISREL 8.54 (Jöreskog et al. 2000). Specifically, we examined the robustness of each item loading across the groups by constraining appropriate β estimates to be equal and then different across the four groups. We then evaluated if the $\Delta\chi^2_{(\Delta df=3)}$ was significant (Jöreskog et al. 2000). The results indicated that of the 33 items, four items were significantly different ($p<.05$) across the four samples (i.e., PQ4, PQ5, EQ1, and BI5 – each of those questions are marked in the Appendix with a "[2]"). See Table 4 for complete results. The four items were deleted, leaving 33 items for subsequent analysis.

Confirmatory factor analysis (CFA). The next step in the analysis of the measurement properties was to conduct a CFA on the remaining 29 items using the full sample (n=2440) and each of the segmented samples. The model fits were evaluated using a series of indices. The DELTA2 index (Bollen 1989), the relative noncentrality index (RNI) (McDonald and Marsh 1990), and the comparative fit index (CFI) (Bentler 1990) have been shown to be most stable fit indices by Gerbing and Anderson (1992). Hu, Bentler and Kano (1992) suggested that the Tucker-Lewis index (TLI) (Tucker and Lewis 1973) and the root mean square error of approximation index (RMSEA) (Steiger and Lind 1980) be added in evaluating CFA and SEM analyses. After deleting one problem item (BI4), the CFA for the overall sample resulted in DELTA2, RNI, CFI, and TLI all being .95, and RMSEA = .08 (χ^2 = 6,452.17, df = 413) (see Table 5). Similar results were found for each of the semi extended, fully extended, de-coupled, and centralized extended samples (see Table 6 for complete results). Thus, the measurement structure of six factors and 28 items produced excellent fit statistics.

Reliability and validity assessments. Within the CFA setting, composite reliability was calculated using the procedures outlined by Fornell and Larcker (1981) based on the work of Werts, Linn, and Jöreskog (1974). The formula specifies that:

$$CR_{\eta} = \frac{(\sum \lambda \gamma_{i})^{2}}{(\sum \lambda \gamma_{i})^{2} + (\sum \varepsilon_{i})},$$

where CR_{η} = composite reliability for scale η; λ_{yi} = standardized loading for scale item γ_i, and ε_i = measurement error for scale item γ_I. Additionally, the parameter estimates and their associated t-values were examined along with the average variance extracted for each construct (Anderson and Gerbing 1988). Average variance extracted was calculated using the following formula:

$$V_{\eta} = \frac{\sum \lambda \gamma_{i}^{2}}{\sum \lambda \gamma_{i}^{2} + \sum \varepsilon_{i}},$$

where V_{η} = average variance extracted for η; λ_{yi} = standardized loading for scale item γ_i, and ε_i = measurement error for scale item γ_i. The composite reliabilities for the six scales ranged from .69 to .94, the factor loadings ranged from .41 to .93 ($p < .01$), with average variances extracted ranging from 43.67 to 70.67 percent in the overall sample (see Table 5). Corresponding results were found in the segmented samples (see Table 6 for complete reliability and validity results for the segmented samples). The 28 purified items were found to be reliable and valid when evaluated based on each item's error variance, modification index, and residual covariation, and the skewness and kurtosis results of each item indicated that the data were normally distributed.

Discriminant validity was tested using two different methods. First, discriminant validity was assessed by calculating the shared variance between pairs of constructs and verifying that it was lower than the average variances extracted for the individual constructs (Fornell and Larcker 1981). Shared variance was calculated as:

$$\gamma^{2} = 1 - \psi,$$

where γ^2 = shared variance between constructs, and with the diagonal element of ψ indicating the amount of unexplained variance. Since η and ε were standardized, γ^2 was equal to the squared correlation between the two constructs. In all but one case in the overall sample (i.e., the behavioral

intentions scale), the average variances extracted were higher than 50 percent (cf. Fornell and Larcker 1981) (ranging from 43.67 to 70.67 percent; see Table 5). The shared variances between pairs of all possible scale combinations indicated that the variances extracted were higher than the associated shared variance in all cases (see Table 2 for shared variances and Table 5 for average variances extracted for the overall sample and Table 3 for shared variances and Table 4 for average variances extracted for the segmented samples).

The second method of assessing discriminant validity entailed analyzing all possible pairs of constructs in a series of two-factor CFA models using LISREL 8.54 (e.g., Anderson 1987; Bagozzi and Phillips 1982). Each model was run twice – once constraining the ϕ coefficient to unity and once freeing this parameter. A χ^2-difference test was performed on the nested models to assess if the $\Delta\chi^2$ was significantly lower for the unconstrained models (Anderson and Gerbing 1988). The critical value ($\Delta\chi^2_{(\Delta df=1)} > 3.84$) was exceeded in all cases. See Table 7 for complete results for the overall sample (corresponding results were found for each segmented sample). Thus, the six constructs and their purified 28 indicators were found to be reliable, valid, and robust across samples.

Testing for potential common method bias. We employed a confirmatory factor-analytic approach to Harman's one-factor test (McFarlin and Sweeney 1992; Sanchez and Brock 1996). The rationale for this test is that if common method bias poses a serious threat to the analysis and interpretation of the data, a single latent factor would account for all manifest variables (Podsakoff and Organ 1986). A worse fit for the one-factor model would suggest that common method variance does not pose a serious threat (Sanchez et al. 1995). The one-factor model yielded a χ^2=25460.71 with 350 degrees of freedom compared with the χ^2= 5783.14 and df=335 for the measurement model. Thus, the fit is considerably worse ($p<.01$) for the unidimensional model than for the measurement model. Corresponding results were found for the semi extended ($\chi^2_{\text{one-factor}}$ =

3673.05, $\chi^2_{\text{measurement-model}} = 1191.99$) fully extended ($\chi^2_{\text{one-factor}} = 8706.63$, $\chi^2_{\text{measurement-model}} = 1954.01$), de-coupled ($\chi^2_{\text{one-factor}} = 5105.26$, $\chi^2_{\text{measurement-model}} = 1385.71$), and centralized extended ($\chi^2_{\text{one-factor}} = 7468.80$, $\chi^2_{\text{measurement-model}} = 1705.13$) samples. Collectively, these results indicate that common method bias is not a serious threat in the study.

RESULTS

The hypothesis testing was accomplished via the estimation of five hierarchical regression equations, one for the overall sample and one each for the firm-level samples (i.e., semi extended, fully extended, de-coupled, and centralized extended). The construct-level scores were standardized (mean-centered) before they were entered into the regression analysis. The technique of least squares and pairwise deletion of cases with missing values was used to estimate the predictor variables on the criterion variables.

In the full-sample analysis, we included three dummy variables to account for the four different strategies (i.e., we used the centralized extended strategy as the baseline model and coded each of the other dummy variables as 1 or 0, as applicable, for each of the strategies). As such, for the overall model (full-sample analysis), we included the three dummy variables for the strategy types as well as the two control variables of OA and ATT in Step 1, followed by the hypothesized direct relationship-variables in Step 2 (i.e., EQ, PQ, and SQ), and the moderators in step 3 (i.e., OA*EQ, OA*PQ, OA*SQ, ATT*EQ, ATT*PQ, and ATT*SQ). In the separate strategy-level analyses, the control variables of OA and ATT were entered in Step 1, the hypothesized direct relationship-variables were entered in Step 2, and the moderators were entered in Step 3. Additionally, as a part of the regression analysis, we tested for multicollinearity by calculating variance inflation factors (VIF) for each predictor variable. All VIFs are less than 3.56, which is below the threshold of 10.0 where VIF becomes evidence of harmful collinearity (Mason and

Perreault 1991). We now turn to the hypotheses (see Table 8 for complete results; only significant relationships are reported in the text). To test the hypothesized relationships, the following regression model was analyzed:

$$BI = \alpha + \beta_1(D_{SE}) + \beta_2(D_{FE}) + \beta_3(D_{DE}) + \beta_4 OA + \beta_5 ATT + \beta_6 EQ + \beta_7 PQ + \beta_8 SQ + \beta_9 OA*EQ + \beta_9 OA*PQ + \beta_{10} OA*SQ + \beta_{11} ATT*EQ + \beta_{13} ATT*PQ + \beta_{14} ATT*SQ + \varepsilon,$$

where:

BI = Behavioral Intentions,
D_{SE} = Dummy Variable for the Semi Extended Strategy (overall sample analysis),
D_{SE} = Dummy Variable for the Fully Extended Strategy (overall sample analysis),
D_{SE} = Dummy Variable for the Decoupled Extended Strategy (overall sample analysis),
OA = Online Accessibility,
ATT = Attitude Toward Internet Ordering,
EQ = eBusiness Quality,
PQ = Product Quality,
SQ = Service Quality, and
ε = Random Disturbance Term.

Insert Table 8 about here

Overall Results. Seven of the predictors were significant predictors of behavioral intentions in the overall sample. The highest Variance Inflation Factor (VIF) for the overall model was 2.32. First, the three dummy variables that were used to account for the four strategy types were all significant, including the semi extended dummy variable (β_1 = .08, p<.01, standard error = .07), the fully extended dummy variable (β_2 = .17, p<.01, SE = .05), and the decoupled extended dummy variable (β_3 = .12, p<.01, SE = .06). Of the two control variables, only ATT was significant (β_5 = .09, p<.01, SE = .02).

Regarding the hypothesized direct effects, all three variables were significant: EQ (β_6 = .15, p<.01, SE = .03), PQ (β_7 = .33, p<.01, SE = .02), and SQ (β_8 = .22, p<.01, SE = .03). None of the moderators involving OA and ATT were significant (i.e., OA*EQ, OA*PQ, OA*SQ, ATT*EQ,

ATT*PQ, and ATT*SQ). The full model explained 39 percent of the variance (Adjusted R^2 = .38; F-statistic = 96.20, p<.01). Thus, H1, H2, and H3 were supported but not H4 or H5.

Given that the three strategy dummy-variables were significant in the overall analysis, our contention that different strategies (see Figure 2) are associated with different implementation mechanisms is supported. As such, we continue by examining the relationships within each of the strategy samples (i.e., semi extended, fully extended, de-coupled, and centralized extended) to allow for a comprehensive understanding of which predictors are relevant for which strategy type.

Semi Extended Strategy. Three of the predictors were significant in the analysis of the semi-extended strategy sample. The control variable of ATT (β_5 = .12, p<.05, SE = .05) was significant in the model. In addition, PQ (β_7 = .28, p<.01, SE = .07) and SQ (β_8 = .28, p<.01, SE = .09) were directly affecting BI. None of the moderators involving OA and ATT were significant. The highest VIF = 3.08. The full model explained 32 percent of the variance (Adjusted R^2 = .30; F-statistic = 13.94, p<.01). These results differ from the overall analysis in that EQ was insignificant in the semi-extended strategy model but significant in the overall analysis.

Fully Extended Strategy. Three of the predictors were significant in the analysis of the fully-extended strategy sample. Neither of the two control variables of OA and ATT was significant. However, all three hypothesized direct effects were significant, including EQ (β_6 = .21, p<.01, SE = .04), PQ (β_7 = .32, p<.01, SE = .04), and SQ (β_8 = .22, p<.01, SE = .05). None of the moderators involving OA and ATT were significant. The highest VIF = 3.56. The full model explained 40 percent of the variance (Adjusted R^2 = .39; F-statistic = 48.31, p<.01). These results differ from the overall analysis in that the control variable of ATT was insignificant in the fully-extended strategy model but significant in the overall analysis.

De-Coupled Strategy. Two of the predictor variables and two of the moderators were significant in the analysis of the decoupled-extended strategy sample. Neither of the two control

variables of OA and ATT was significant. However, PQ (β_7 = .38, p<.01, SE = .05) and SQ (β_8 = .28, p<.01, SE = .05) were directly affecting BI. Additionally, the two moderators of OA*SQ (β_{10} = -.12, p<.05, SE = .06) and ATT*PQ (β_{13} = .38, p<.01, SE = .05) were significant in the analysis. The highest VIF = 3.35. The full model explained 42 percent of the variance (Adjusted R^2 = .40; F-statistic = 24.63, p<.01). These results differ from the overall analysis fairly significantly in that that EQ and ATT were insignificant in the decoupled-extended strategy model but significant in the overall analysis, while the moderators of OA*SQ and ATT*PQ were significant in the decoupled-extended strategy model but insignificant in the overall model.

Centralized Extended Strategy. Four of the predictor variables and two of the moderators were significant in the analysis of the centralized-extended strategy sample. The control variable of ATT (β_5 = .12, p<.05, SE = .05) was significant in the model. Also, all three hypothesized direct effects were significant, including EQ (β_6 = .11, p<.01, SE = .05), PQ (β_7 = .34, p<.01, SE = .05), and SQ (β_8 = .22, p<.01, SE = .06). Additionally, the two moderators of OA*EQ (β_9 = -.08, p<.05, SE = .03) and ATT*PQ (β_{13} = .12, p<.01, SE = .04) were significant in the analysis. The highest VIF = 1.99. The full model explained 35 percent of the variance (Adjusted R^2 = .34; F-statistic = 30.51, p<.01). The direct effects involving ATT, EQ, PQ, and SQ are similar to the overall analysis. However, the centralized-extended mode also results in the two moderators of OA*EQ and ATT*PQ being significant.

DISCUSSION

The results shown in Tables 5 through 7 provide two broad insights into the online grocery industry. First, they provide an aggregate view of how customers perceive the various components of online ordering and home delivery. The mean values for each of the constructs are shown for the overall sample in Table 5 and for each sub-sample in Table 6. Comparisons across the sub-samples

allow insights into the effect of different operations strategies (since each grocer picks and delivers groceries using different methods). Second, the regression results reported in Table 8 provide insight regarding the relationships between the various constructs and customer behavioral intentions. These results, too, can be compared across the three sub-samples to assess the effects of operational differences.

The results from Table 8 indicate that Behavioral Intentions can be predicted fairly well in both the sub-samples and the overall sample. The R^2 values range from a high of 0.42 for Decoupled Extended to a low of 0.32 for Centralized. The overall sample has a R^2 of 0.39. The significance of the dummy variables for company indicates that there are substantial differences at the strategy level. Thus, while the integrated marketing/operations focus correlates well with behavioral intentions, at the strategy level (i.e. within each grocer) intentions appear to be driven greatly by different elements of this focus. We will highlight this below.

In the overall sample all three of the quality constructs (eBusiness, Product and Service) are significantly related to Behavioral Intentions. Thus, there is strong support for hypotheses 1 – 3. At the strategy level, it is interesting that the construct with the largest coefficient in each sub-sample is Product Quality, suggesting that operations must carefully manage all aspects of assortment, availability and appearance. In contrast, the coefficient for eBusiness Quality, while significant for the overall model, is not significant for either the Semi Extended or Decoupled Extended strategies. This suggests that improvements in eBusiness Quality are important for Fully or Centralized Extended, there is not a strong relationship for Semi or Decoupled Extended. Finally, it is interesting to note that the two grocers with the highest coefficients for Service Quality (Semi-Extended and De-coupled Extended) are the two that provide indirect delivery (customer pickup orders and very limited delivery options, respectively). Perhaps the limited nature of customer interaction for these two grocers places a premium on getting it right when it does occur – i.e.

customer perceptions of the service quality correlate highly with their behavioral intentions, or there is a big bonus (penalty) for getting it right (wrong). Regardless, this is clearly an area where both grocers should focus time and resources.

In contrast, there is little support for the idea that Online Accessibility and Attitude act as moderators. Attitude has a direct effect as a control variable for the complete model and for Semi and Centralized Extended. But there is no moderating effect in step 3 for the overall sample. While there is a slight moderating effect for Decoupled and Centralized Extended, it is not substantial. The only significant relationships were for ATT * PQ and OA * PQ in the Decoupled Extended sample and for OA * EQ and ATT * PQ in the Centralized Extended sample. Thus, there is not support for hypotheses 4 and 5. This may be due, in part, to the growing use of broadband connections and the growing acceptance of Internet ordering as an everyday shopping experience. Alternatively, the two moderator variables, Online Accessibility and Attitude, may simply not offer much additional explanatory power because of their similarity to eBusiness Quality.

MANAGERIAL IMPLICATIONS AND FUTURE RESEARCH

The findings from this study offer many useful insights for managers and have been utilized in some instances to make operational and marketing changes. First, the aggregate data presented in Table 5 indicates that customers generally like Internet ordering of groceries, with mean Behavioral Intentions = 5.06. Second, as companies improve their eBusiness Quality, Product Quality and Service Quality, customers are substantially more likely to stay with both that company and Internet ordering as a primary method of shopping.

The findings from this study, while focused on the home delivery grocery industry, offer broad insights into Internet or multi-channel retailing. As channels converge and customers become more demanding, the pressure to carefully integrate IT, marketing and operations will only increase.

Companies can not afford to be good at 1 or 2 things – they must deliver on all three aspects of quality – eBusinesses, Product and Service. These correspond, in a broad sense to order entry, production and delivery and failure in one results in failure for all. Secondly, the data suggest that there are four broadly applicable strategies for fulfilling and delivering orders. While all can be successfully, there are important nuances regarding the treatment of IT, marketing and operations that greatly effect outcomes.

The most interesting findings come through a comparison across sub-samples. For example, the data suggest that the grocers with indirect delivery systems (Semi and Decoupled Extended) must work extra hard to deliver excellent Service Quality (as evidenced by the high coefficients in Table 8. Interestingly, the Semi Extended grocer had the highest overall rating for Service Quality, but as often discussed in manufacturing circles, variance is the enemy – many customers perceive lower Service Quality and this correlates with lower ratings for Behavioral Intentions. In contrast, Decoupled Extended has the lowest aggregate rating for Service Quality, but a high coefficient between Service Quality and Behavioral Intentions. This grocer has spent the last year pursuing numerous initiatives to improve Service Quality and early findings from our follow-up study suggest that this effort is reaping dividends.

Another interesting finding involves the role of eBusiness Quality. The lowest aggregate rating is for Fully Extended, yet this grocer has the highest coefficient between EQ and Behavioral Intentions. This indicates that this company needs to focus efforts on improving their website and customers' interaction with it. This grocer has undergone a major site re-design in the past year since our initial data collection. In contrast, Centralized Extended has a higher score for eBusiness Quality, which is consistent with a stand alone Internet-only company, but has one of the lowest scores for Product Quality. Yet, this grocer has a high coefficient for the relationship between

Product Quality and Behavioral Intentions. Again, this is consistent with an Internet only grocer and the need to build a degree of trust and brand recognition with customers.

In short, the findings support the hypothesis (H1 – H3) that IT, manufacturing and marketing must be carefully integrated to achieve success with online ordering for home delivery of groceries. However, examination of the individual sub-samples reveals different approaches for maximizing behavioral intentions, depending on the operational strategy employed. Obviously, there is substantial need for further research on this topic. We have neglected numerous other strategic factors that quite likely come into play. For example, the rate of expansion and investment in a new business sector must be carefully matched with the growth in customer acceptance of the offerings – otherwise something like the Webvan debacle where $1.2 billion was invested to build a string of high-tech warehouses that had no proven capabilities, nor a proven market. Another area of research should include methods for changing customer habits and encouraging adoption of new products or services. A broader and more thorough discussion of the numerous challenges for grocery home delivery is offered by Boyer, Frohlich and Hult (2004).

There are numerous areas for further examination that we have not addressed. First, there is likely to be a substantial learning curve for customers to understand this new method of ordering groceries and to develop a degree of comfort. Future research should examine the nature of the learning curve, including its shape and length, and search for ways to accelerate it. Second, the data in our study is all cross-sectional, it would be interesting for future researchers to examine longitudinal data, including tie-ins to specific operational or marketing changes that the companies make. It is very likely that customer perceptions and actions will change substantially as this dynamic portion of the grocery industry evolves. Third, there is ample opportunity for researchers to examine specific operational decisions such as methods for determining delivery routes, algorithms and systems for controlling order picking, choice of item range and stocking levels, etc.

Fourth, the choice of competitive priority – i.e. choosing to compete on low price, high quality or excellent service – should be examined in combination with both operational decisions to support that priority as well as customer perceptions of the online grocer. Finally, the biggest question for future research involves the profitability of this channel. Can grocers make money off this venture? Obviously many of them think so or they would not be investing large sums to develop this industry.

TABLE 1
Data Collection Methodologies and Response Rates

	Overall	Semi Extended	Fully Extended	Decoupled Extended	Centralized Extended
Customers contacted	16,077	1,159	10,418	2,000	2,500
Responses received	2,442	396	896	461	689
Response rate	24.7%	34.2%	8.6%	23.0%	27.6%
Data Collection Method	15.2%	Internet	Opt-in	Internet	Internet
Average $/Order	N/A	$101.87	$133.51	$107.47	$84.24
Average Items/Order	N/A	64.56	N/A	38.3	27.9
Average No. Orders Placed	N/A	8.25	20.6	8.5	6.8
Maximum Orders Placed	N/A	103	200	123	45

TABLE 2
Correlations Among the Study Variables in the Overall Sample (n=2440)[1]

Construct	EQ	PQ	SQ	AOO	ATT	BI
EQ	1.00	.16	.16	.35	.07	.14
PQ	.40	1.00	.24	.16	.04	.28
SQ	.32	.49	1.00	.08	.02	.18
OA	.59	.32	.28	1.00	.05	.08
ATT	.26	.21	.14	.23	1.00	.07
BI	.37	.53	.43	.29	.26	1.00

[1] All correlations are significant at the $p<.01$ level. All items used a seven-point Likert-type scale ranging from strongly disagree (1) to strongly agree (7). Shared variances are included above the diagonal.

Labels:

EQ = eBusiness Quality
PQ = Product Quality
SQ = Service Quality
OA = Online Accessibility
ATT = Attitude Toward Internet Ordering
BI = Customer's behavioral intention

TABLE 3a
Correlations Among the Study Variables in the Semi Extended Sample (n=396)[1]

Construct	EQ	PQ	SQ	AOO	ATT	BI
EQ	1.00	.21	.19	.32	.09	.12
PQ	.46	1.00	.30	.12	.06	.23
SQ	.44	.55	1.00	.13	.05	.20
OA	.57	.35	.36	1.00	.04	.06
ATT	.30	.25	.22	.19	1.00	.05
BI	.34	.48	.45	.25	.22	1.00

TABLE 3b
Correlations Among the Study Variables in the Fully Extended Sample (n=898)[1]

Construct	EQ	PQ	SQ	AOO	ATT	BI
EQ	1.00	.18	.15	.36	.06	.19
PQ	.43	1.00	.32	.14	.04	.29
SQ	.39	.57	1.00	.10	.05	.24
OA	.60	.38	.32	1.00	.05	.12
ATT	.24	.19	.23	.23	1.00	.05
BI	.44	.54	.49	.35	.22	1.00

TABLE 3c
Correlations Among the Study Variables in the Decoupled Sample (n=461)[1]

Construct	EQ	PQ	SQ	AOO	ATT	BI
EQ	1.00	.12	.08	.41	.12	.12
PQ	.35	1.00	.19	.09	.02	.29
SQ	.28	.44	1.00	.07	.01	.21
OA	.64	.30	.26	1.00	.07	.08
ATT	.34	.14	.09	.27	1.00	.03
BI	.34	.54	.46	.28	.16	1.00

TABLE 3d
Correlations Among the Study Variables in the Decoupled Sample (n=689)[1]

Construct	EQ	PQ	SQ	AOO	ATT	BI
EQ	1.00	.15	.08	.29	.11	.12
PQ	.39	1.00	.18	.06	.06	.25
SQ	.29	.42	1.00	.05	.03	.17
OA	.54	.25	.22	1.00	.10	.06
ATT	.33	.25	.18	.31	1.00	.08
BI	.35	.50	.41	.25	.28	1.00

[1] All correlations in each of the four samples are significant at the $p<.01$ level. Shared variances are included above the diagonal.

TABLE 4
Item Analysis Across the Four Samples

	χ^2_{fixed}	df_{fixed}	χ^2_{free}	df_{free}	χ^2_{change}	df_{change}	Significance
SQ1	9418.27	2163	9417.49	2160	0.78	3	ns
SQ2	9418.27	2163	9418.10	2160	0.17	3	ns
SQ3	9418.27	2163	9417.56	2160	0.71	3	ns
SQ4	9418.27	2163	9417.48	2160	0.79	3	ns
SQ5	9418.27	2163	9418.05	2160	0.22	3	ns
SQ6	9418.27	2163	9412.79	2160	5.48	3	ns
SQ7	9418.27	2163	9417.58	2160	0.69	3	ns
SQ8	9418.27	2163	9411.87	2160	6.40	3	ns
SQ9	9418.27	2163	9418.10	2160	0.17	3	ns
SQ10	9418.27	2163	9416.44	2160	1.83	3	ns
PQ1	9418.27	2163	9418.13	2160	0.14	3	ns
PQ2	9418.27	2163	9417.83	2160	0.44	3	ns
PQ3	9418.27	2163	9415.14	2160	3.13	3	ns
PQ4	9418.27	2163	9396.89	2160	21.38	3	p<.05
PQ5	9418.27	2163	9404.51	2160	13.76	3	p<.05
PQ6	9418.27	2163	9412.56	2160	5.71	3	ns
EQ1	9418.27	2163	9386.92	2160	31.35	3	p<.05
EQ2	9418.27	2163	9416.84	2160	1.43	3	ns
EQ3	9418.27	2163	9418.02	2160	0.25	3	ns
EQ4	9418.27	2163	9418.07	2160	0.20	3	ns
EQ5	9418.27	2163	9415.39	2160	2.88	3	ns
EQ6	9418.27	2163	9415.65	2160	2.62	3	ns
EQ7	9418.27	2163	9414.80	2160	3.47	3	ns
ATT1	9418.27	2163	9417.06	2160	1.21	3	ns
ATT2	9418.27	2163	9414.11	2160	4.16	3	ns
ATT3	9418.27	2163	9417.31	2160	0.96	3	ns
OA1	9418.27	2163	9417.63	2160	0.64	3	ns
OA2	9418.27	2163	9417.22	2160	1.05	3	ns
BI1	9418.27	2163	9415.91	2160	2.36	3	ns
BI2	9418.27	2163	9415.69	2160	2.58	3	ns
BI3	9418.27	2163	9414.77	2160	3.50	3	ns
BI4	9418.27	2163	9411.45	2160	6.82	3	ns
BI5	9418.27	2163	9408.83	2160	9.44	3	p<.05

TABLE 5
Means, Standard Deviations, and Measurement Statistics for the Overall Sample (n=2440)

Variable	Mean	Standard Deviation	Variance Extracted	Composite Reliability	Factor Loadings
EQ	5.97	1.03	67.83%	.93	.68 to .93
PQ	5.27	1.05	50.50%	.79	.41 to .88
SQ	6.04	.91	60.10%	.94	.57 to .85
OA	6.12	.99	59.50%	.75	.75 to .79
ATT	6.01	1.11	70.67%	.88	.77 to .90
BI	5.05	1.21	43.67%	.69	.50 to .77

Fit Statistics

χ^2	5783.14 ($p<.01$)
d.f	335
DELTA2	.95
RNI	.95
CFI	.95
TLI	.95
RMSEA	.09

TABLE 6a
Means, Standard Deviations, and Measurement Statistics for Semi Extended (n=396)

Variable	Mean	Standard Deviation	Variance Extracted	Composite Reliability	Factor Loadings	Fit Statistics	
						χ^2	1191.99 (p<.01)
EQ	5.92	1.07	66.50%	.92	.69 to .90	d.f	335
PQ	5.73	1.01	56.25%	.83	.51 to .87	DELTA2	.96
SQ	6.25	.82	59.70%	.94	.66 to .88	RNI	.96
OA	6.16	1.05	56.50%	.72	.72 to .79	CFI	.96
ATT	5.94	1.18	71.00%	.88	.77 to .88	TLI	.96
BI	5.31	1.18	46.00%	.72	.56 to .74	RMSEA	.09

TABLE 6b
Means, Standard Deviations, and Measurement Statistics for Fully Extended (n=898)

Variable	Mean	Standard Deviation	Variance Extracted	Composite Reliability	Factor Loadings	Fit Statistics	
						χ^2	1954.01 (p<.01)
EQ	5.82	1.14	67.67%	.93	.70 to .91	d.f	335
PQ	5.23	1.14	60.50%	.85	.51 to .91	DELTA2	.97
SQ	6.01	.95	65.60%	.95	.67 to .89	RNI	.97
OA	6.01	1.01	50.50%	.67	.70 to .71	CFI	.97
ATT	6.34	.91	70.33%	.88	.73 to .91	TLI	.97
BI	5.15	1.26	51.67%	.76	.54 to .80	RMSEA	.08

TABLE 6c
Means, Standard Deviations, and Measurement Statistics for Decoupled (n=461)

Variable	Mean	Standard Deviation	Variance Extracted	Composite Reliability	Factor Loadings	Fit Statistics	
						χ^2	1385.71 (p<.01)
EQ	6.34	.76	69.00%	.93	.65 to .93	d.f	335
PQ	5.30	.94	47.00%	.77	.36 to .85	DELTA2	.95
SQ	5.77	1.04	61.10%	.94	.58 to .87	RNI	.95
OA	6.31	.88	64.50%	.78	.79 to .82	CFI	.95
ATT	6.16	.98	62.33%	.83	.72 to .87	TLI	.95
BI	5.17	1.12	47.67%	.72	.44 to .84	RMSEA	.09

TABLE 6d
Means, Standard Deviations, and Measurement Statistics for Centralized Extended (n=689)

Variable	Mean	Standard Deviation	Variance Extracted	Composite Reliability	Factor Loadings	Fit Statistics	
						χ^2	1705.13 (p<.01)
EQ	5.95	.94	67.83%	.93	.66 to .93	d.f	335
PQ	5.05	.94	54.25%	.82	.40 to .90	DELTA2	.96
SQ	6.15	.76	58.70%	.93	.64 to .85	RNI	.96
OA	6.12	.98	58.50%	.74	.71 to .82	CFI	.96
ATT	5.54	1.19	76.33%	.91	.84 to .92	TLI	.96
BI	4.68	1.15	42.67%	.69	.56 to .73	RMSEA	.08

TABLE 7
Discriminant Validity Assessment:
Pairwise CFAs in Overall Sample (n=2440)

Pair of Constructs		χ^2_{free}	χ^2_{fixed}	$\Delta\chi^2_{(df=1)}$	Sign
EQ	PQ	3792.76	1323.55	2469.21	p<.01
EQ	SQ	14031.34	3740.98	10290.36	p<.01
EQ	OA	2090.76	1520.84	569.92	p<.01
EQ	ATT	4799.91	1268.15	3531.76	p<.01
EQ	BI	2149.83	1177.89	971.94	p<.01
PQ	SQ	5308.87	2858.32	2450.55	p<.01
PQ	OA	1030.71	94.17	936.54	p<.01
PQ	ATT	3667.71	94.49	3573.22	p<.01
PQ	BI	683.87	175.05	508.82	p<.01
SQ	OA	3395.48	2405.43	990.05	p<.01
SQ	ATT	6309.40	2437.96	3871.44	p<.01
SQ	BI	3401.69	2555.06	846.63	p<.01
OA	ATT	1005.46	22.73	982.73	p<.01
OA	BI	877.18	16.68	860.50	p<.01
ATT	BI	1178.61	55.43	1123.18	p<.01

TABLE 8
Standardized Regression Results with Behavioral Intentions as the Criterion Variable

Hypothesis / Predictor Variable	Overall Model (n=2440)	Semi Extended (n=396)	Fully Extended (n=898)	Decoupled Extended (n=461)	Centralized Extended (n=689)
Semi Ext (Dummy Variable)	.08**	n/a	n/a	n/a	n/a
Fully Ext (Dummy Variable)	.17**	n/a	n/a	n/a	n/a
Decoupled Ext (Dummy Variable)	.12**	n/a	n/a	n/a	n/a
OA (Control Variable)	.03	.02	.06	.02	-.03
ATT (Control Variable)	.09**	.12*	.05	.05	.14**
Integrated Marketing/ Operations Focus					
H1: eBusiness Quality (EQ)	.15**	.08	.21**	.09	.11**
H2: Product Quality (PQ)	.33**	.27**	.32**	.38**	.34**
H3: Service Quality (SQ)	.22**	.27**	.22**	.28**	.22**
Online Accessibility (Moderators)					
H4a: OA * EQ	.00	.04	.08	-.02	-.08*
H4b: OA * PQ	.00	-.06	-.05	.02	.05
H4c: OA * SQ	-.03	.01	-.02	-.12*	-.00
Attitude Toward Internet Ordering (Moderators)					
H5a: ATT * EQ	.02	.10	.05	-.06	-.05
H5b: ATT * PQ	.05	.06	-.06	.14**	.12**
H5c: ATT * SQ	-.00	-.04	.05	-.03	-.06
Range of Std Error for Betas	.02 to .07	.05 to .09	.03 to .05	.05 to .08	.03 to .07
F-statistic	96.20**	13.94**	48.31**	24.63**	30.51**
R^2	.39	.32	.40	.42	.35
Adjusted R^2	.38	.30	.39	.40	.34
R^2 Increase (Step 1 to Step 2)	.23**	.20**	.24**	.29**	.23**
R^2 Increase (Step 2 to Step 3)	.00	.01	.01	.03**	.02**

Notes:

- *p < 0.05, **p < 0.01.
- In the overall hierarchical regression analysis, the dummy variables (corresponding to the semi-extended, fully extended, and de-coupled extended strategies with the centralized extended strategy as the baseline dummy variable) along with OA and ATT as control variables were entered in Step 1, the hypothesized direct effect-variables (EQ, PQ, and SQ) were entered in Step 2, and the moderators involving OA and ATT were entered in Step 3.
- In the separate regression analyses (i.e., semi extended, fully extended, decoupled, and centralized extended), the control variables of OA and ATT were entered in Step 1, the direct effect-variables (EQ, PQ, and SQ) were entered in Step 2, and the moderators involving OA and ATT were entered in Step 3.
- Consistent with the directional hypotheses, one-tailed tests were used for the direct effects and two-tailed tests were used for the moderator effects.
- Coefficients are from the final model (after step 3) in all cases. R2 increase is reported based on difference between steps 1 and 2; and steps 2 and 3.

FIGURE 1
A Model of the Integration of an Operations and Marketing Focus
In the Online Grocery Industry

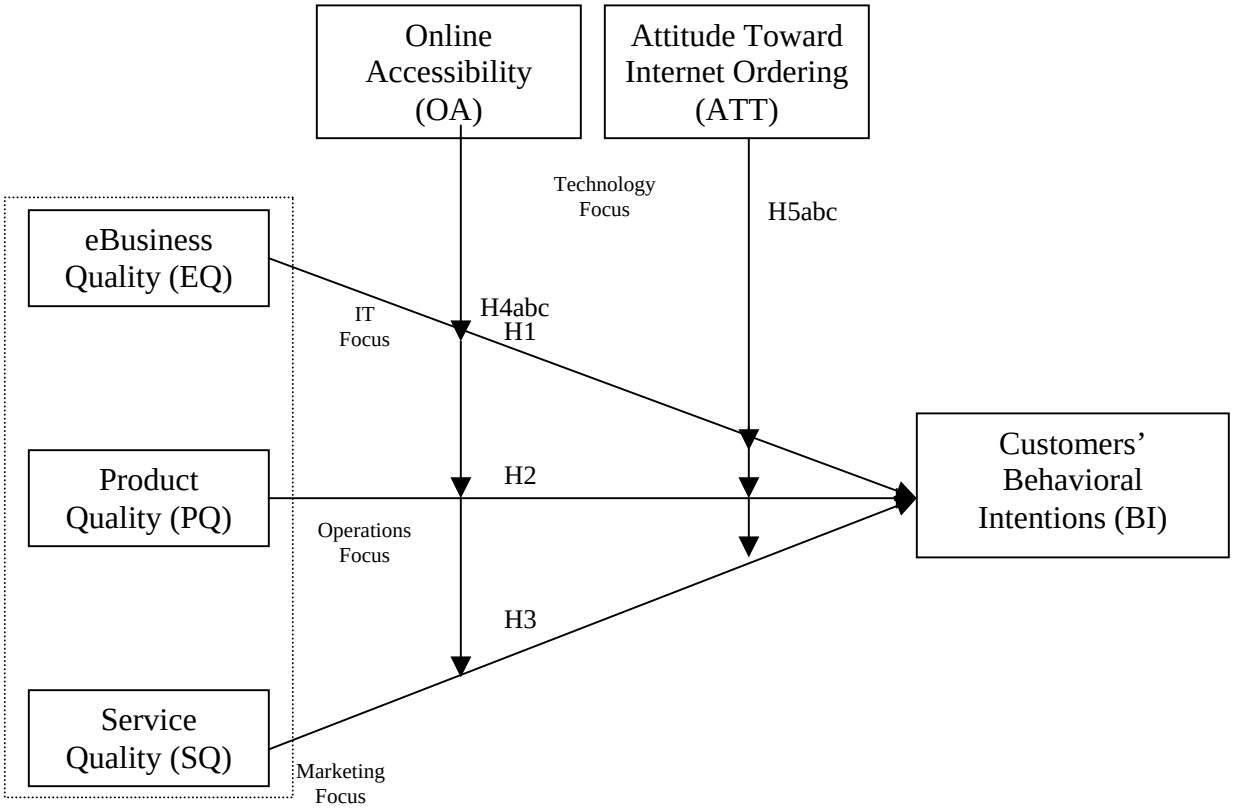
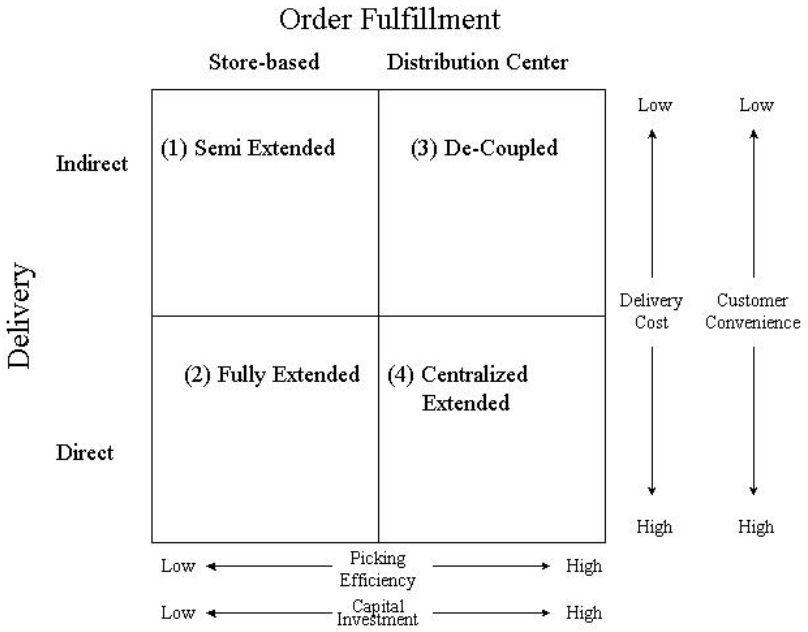


FIGURE 2
Research Design for Operational Differences in Grocery Delivery



APPENDIX
Measures and Sources[1]

eBusiness Quality (EQ) (Adapted from Agarwal and Prasad 1999; Boyer and Olson 2002)

EQ1	It is easy for me to remember how to perform tasks using XYZ Company's website.[2]
EQ2	It is easy to get XYZ Company's website to do what I want it to do.
EQ3	My interaction with XYZ Company's website is clear and understandable.
EQ4	Overall, I believe that XYZ Company's website is easy to use.
EQ5	The site is easy to navigate.
EQ6	The site has a logical sequence of steps for completing an order.
EQ7	The XYZ Company's web site is easy to search.

Product Quality (PQ) (Adapted from Brucks, Zeithaml, and Naylor 2000; Carsky et al. 1998; Garvin 1987)

PQ1	XYZ Company has prestigious (high quality) products.
PQ2	XYZ Company has an excellent assortment of products.
PQ3	XYZ Company's products are among the best.
PQ4	XYZ Company has a sufficient range of product choices (I can get what I want).[2]
PQ5	The products are the same quality as I can get in the store.[2]
PQ6	The number of substitutions or out of stock items is reasonable.

Service Quality (SQ) (Adapted from Gotlieb et al. 1994; Parasuraman et al. 1985)

SQ1	XYZ Company's employees are reliable in providing the service I expect.
SQ2	XYZ Company's employees are understanding of my service needs.
SQ3	XYZ Company's employees are responsive to my service requests.
SQ4	XYZ Company's employees are competent in providing expected service.
SQ5	I feel secure in my service encounters with XYZ Company's employees.
SQ6	XYZ Company's employees are courteous in providing me service.
SQ7	XYZ Company's employees are accessible to answer my questions.
SQ8	The tangible aspects of XYZ Company's service (appearance of delivery vans, staff, products, etc.) are excellent.
SQ9	XYZ Company has good credibility in providing the service I need.
SQ10	I can easily communicate with XYZ Company regarding my service needs.

Online Access Ability (OA) (Adapted from Boyer and Olson 2002)

OA1	I can get on the site when I want to.
OA2	The site loads quickly (I don't have to wait long for new material).

Attitude Toward Internet Ordering (ATT) (Adapted from Agarwal and Prasad 1999)

ATT1	I like using Internet ordering.
ATT2	Internet ordering is fun to use.
ATT3	Internet ordering provides an attractive ordering method.

Customers' Behavioral Intentions (BI) (Adapted from Cronin et al. 2000; Zeithaml et al. 1996)

BI1	I would classify myself as a loyal customer of XYZ Company.
BI2	I do not expect to switch to another online grocer to get better service in the future.
BI3	I would continue to shop with XYZ Company even if I had to pay more.
BI4	I would complain to other customers if I experienced a problem with XYZ Company's service.[3]
BI5	I would complain to XYZ Company's employees if I experienced a problem with their service.[2]

Notes: [1]All items used a 7-point Likert-type scale ranging from "strongly disagree" to "strongly agree."
[2]Item deleted after the item-level analysis across the four strategy groups (i.e., company samples).
[3]Item deleted after the confirmatory factor analysis.

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