Online/In-Store Integration and Customer Retention

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Reducing the risks believed to be associated with product availability can be critical to increasing consumer retention rates. This study considers the role that perceptions of channel integration have on such beliefs and their impact on purchasing decisions. Surveys distributed to purchasers of specific goods both online and in-store provide data used in the analysis of these effects. The findings suggest that firms simultaneously managing both online and in-store channels should not only reassess the repercussions of availability failures but also consider efforts that encourage the transparency of channel integration.

Keywords: multichannel; availability; perceptions; online sales

Of particular interest in multichannel settings are the rates at which consumers faced with a lack of product availability in one channel (e.g., a physical store) seek out an alternate through an affiliated channel (e.g., the store’s Web site) rather than a competing firm. However, consumers can only be expected to use one of the firm’s alternate channels if such an option is perceived to be an easily accessible substitute or “backup” for the failed channel. This implies that firms may be motivated to emphasize both channel diversity and channel interchangeability as a means of retaining customers in light of the risk of unavoidable availability failures.

Interestingly enough, in today’s business environment, a growing number of firms are openly promoting the use of multiple integrated channels. Barnes & Noble took one of the earliest steps at integrating online and in-store channels in October 2000, when it announced that it would begin allowing customers of barnesandnoble.com to return products to Barnes & Noble stores. It later spent $20 million to install Internet service counters in 551 Barnes & Noble superstores and offer a membership loyalty program to reward customers who shop in both channels. Customers buying online would also have the option of picking up the item in-store if available. A similar model is now used by Circuit City and other retailers. Even more recently the introduction of Internet kiosks has been initiated. The distribution of profits between Barnes & Noble and barnesandnoble.com would evolve, relying on approaches based on fulfillment source rather than purchase origination (Quick 2000).

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Journal of Service Research, Volume 7, No. 4, May 2005 313-327
DOI: 10.1177/1094670504273964
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Regardless of potential gains in market share and cost efficiencies that channel integration can provide, some of the most interesting benefits come in the form of psychological effects on consumers. In particular, perceptions of integration may affect many of the perceived risks associated with patronization decisions. With an awareness of pursuable backup options provided by a multichannel firm, customers may place less importance on the risk that any one channel may fail to fulfill their needs. Subsequently, such firms may appear increasingly appealing to customers. This study considers whether or not such benefits have theoretical underpinnings and if, in fact, they are observable in reality.

The discussion begins with a review of related literature and draws from concepts such as risk aversion and mental accounting theory to establish a foundation for hypothesis building. This discussion includes the use of a consumer decision framework as a foundation for the hypotheses of interest to this research. The data collection methodology is then discussed, followed by a section in which the results of factor analysis performed on the channel-integration items considered and the evaluation of hypotheses are provided. The research concludes with a discussion of empirical evidence supporting the proposed impact of perceptions of channel integration on consumer decisions.

BACKGROUND AND RESEARCH FRAMEWORK

Traditional brick-and-mortar operations face the challenge of adapting to a new set of competitive rules made necessary by the advent of online sales. Machliss and Vijayam (1999) claimed that this adaptation cannot be fully successful without an understanding of online customer response, an ability to overcome organizational barriers, and an integrated approach to channel management. Although the assumption that opportunity costs are associated with fulfillment failures in these channels has had a long history in management research, the role of multichannel integration in reducing these costs has been relatively unvisited (Balachander and Farquhar 1994; Motes and Castleberry 1985; Schary and Christopher 1979; Walter and Grabner 1975). For the purpose of focus, channel integration is viewed here to specifically represent the use of multiple modes of fulfillment for mutual support of, or as semi-interchangeable alternatives for, end-customers transactions. The present work considers the effects of such integration with regard to consumer responses to perceived risks of service failures online as well as in traditional store settings.

Research into the role of perceived risk has its beginnings with Bauer’s (1960) formal introduction of the concept. “Perception of risk” continues to be used as an explanatory variable in empirical research into consumer behavior, particularly as it relates to consumer choice (Dowling and Staelin 1994; Rao and Farley 1980; Srinivasan and Ratchford 1991). Contemporary research has also shown that consumer experience provides a fundamental basis for many of these perceptions, thus emphasizing the importance of corporate efforts to promote the realization of positive experiences that can in turn dispel perceptions of high risk (Goering 1985; Ingene and Hughes 1985; Oglethorpe and Monroe 1987; Wu and Wu 1998).

From the standpoint of risk-averse behavior, when consumers believe that specific goods will take longer to acquire simply because the items are not immediately available either for pickup at a store or for delivery online, alternative channels or competing firms that operate along similar channels may appear more appealing both in the present and in the long run. This view is in line with the behavioral propositions put forth by Westerbrook, Newman, and Taylor (1978) and Farquhar and Pratkanis (1987). However, this mechanism is complicated by the fact that goods’ availability along a particular retail channel can vary greatly through time.

The consideration of operational attributes from a risk-aversion perspective and with specific regard to implications on consumer purchasing decisions is not unprecedented. For example, following established risk/uncertainty frameworks of past research (e.g., Einhorn and Hogarth 1987; Zeithaml 1988), Tellis and Gaeth (1990) showed that perceived risk related to quality can be linked to specific choices made by consumers. By their definition, quality is seen as the performance of a purchase option (a product in their case) relative to outlined specifications. The focus of their analysis is on consumer perceptions of quality, rather than objective measures of quality, contending that perceptions have a more realistic cognitive impact than objective measures that consumers often are not conscious of. According to their empirical findings, the degree of uncertainty perceived to be associated with an option’s capability to live up to these specifications (i.e., the option’s quality) serves as an important driver of selection. Similarly, in the present context, risk of unavailability along a specific channel can be viewed as uncertainty in channel quality (i.e., its ability to ensure fulfillment in the form of product availability). Because perceptions of risk in availability are more likely to provide cognitive impacts than the actual rates of stock-outs observed by firms, the focus of the present study is on perceptions as well.
Using a decision tree framework similar to that originally posed by Oral et al. (1972) and to allow for conceptual and empirical tractability in this study, Figure 1 provides an overview of the decision and failure processes assumed to follow initial firm selection by consumers.

Notation is introduced in this figure to simplify the representation of both in-store and online product availability probabilities ($A_s$ and $A_e$, respectively) and post-stock-out alternative selection probabilities ($r_{s2}$ through $r_{s4}$, and $r_{e1}$ through $r_{e4}$). The subscripts $s$ and $e$ are meant to represent in-store and online settings, respectively. For the post-stock-out alternative selection rates, the secondary subscripts 1 and 2 are affiliated with actions that might be regarded as firm loyalty, whereas the subscripts 3 and 4 are affiliated with actions that might be regarded as channel-type loyalty. The term $p_i$ is used here to represent the probability that a consumer's initial choice would be to purchase a particular item online rather than in-store. This same notation will be used later in describing empirical data and results.

Moving from left to right in this tree, one can consider the initial choice of a specific channel managed by a given firm and the potential occurrence of product availability failures along that channel. Complete opportunity losses for the firm occur only when consumers faced with availability failures decide to pursue their purchase at a nonaffiliated competing store or Web site. Therefore, the ability to encourage either order placement through the failed channel (e.g., back ordering) or the use of the alternative channel affiliated with the firm can be critical to retaining demand. By estimating the rates at which consumers choose to pursue alternatives during availability failures, a firm can gauge the importance of both maintaining specific availability criteria (e.g., stock-out rates) and tactics that encourage the use of other channels managed by the firm.

Given the implications of perceived risk, any dampening of negative perceptions through channel management tactics should be expected to prove advantageous. Providing a range of options and making consumers aware of the integrated nature of these options can both increase the appeal of a firm and reduce firmwide customer defection rates. For example, if we operationally depict the perceived rate of in-store availability as $A_s$ (and thus the risk...
of in-store unavailability = 1 - A_r) and the perceived rate of online availability as A_o, the combined risk of unavailability provided through contact with a firm controlling both channels may be viewed as the probability of both failures occurring ((1 - A_o) × (1 - A_r)). Unless either channel is risk-free, this combined risk will obviously be less than that of either channel considered separately, and therefore a visibly channel-integrated "firm" option may appear more appealing than either separate "channel" options. Of course, this all depends on whether or not consumers actually view these channels as integrated as opposed to isolated options.

This interpretation regarding perceptions of integration and consumer choice is given additional support at a cognitive level through the established foundation of mental accounting theory (Thaler 1980, 1985). One of the major tenets of mental accounting predicts that individuals should generally prefer to integrate negative outcomes rather than confront them as independent occurrences (Thaler and Johnson 1990). The application of this "integration" or "bundling" effect predicted by mental accounting theory has been successfully applied in a number of contexts.

In a study of lottery selection, Langer and Weber (2001) applied mental accounting theory in describing how a sequence of isolated gambles is less attractive compared to an integrated portfolio of gambles with a collectively defined joint distribution. Their analysis of two alternate lottery presentation modes (visibly integrated vs. separate) emphasizes what they describe as a "surprisingly distinct" delineation by lottery selection schemas. Similarly, Smith, Bolton, and Wagner (1999) in a study of service failures use mental accounting theory to suggest that customers associate losses due to distinct service failures into distinct categories for comparison (i.e., mental accounts). Their research shows that by this mechanism, perceptions regarding the risk of specific service failures can lead to distinguished opinions concerning the sources of such risk, assuming that these sources themselves remain distinguished.

In a waiting time context, Lecerc, Schmitt, and Dube (1995) illustrated that consumers prefer options in which time losses are integrated rather than separate. Because the occurrence of availability failures implies a loss of time on behalf of the consumer, a logical extension is to suggest that consumers who are aware of the integrated nature of two channel options may use this knowledge in creating a mental account of combined risk for using either integrated-channel rather than separate risks of using channels viewed otherwise as separate. In doing so, the anticipated costs of relaying on a firm with highly integrated channels should be viewed as less than that of a firm without such integration, even if individual channel risks for each firm are equivalent. In other words, when consumers believe that higher levels of channel integration exist, the total impact of individual channel risks should be less prominent. This forms the basis of the first hypothesis.

**Hypothesis 1:** The greater the perceived integration of online and in-store operations, the smaller the impact of availability on channel selection with regard to those options.

For the current study, availability refers specifically to product availability rates both within stores and online. However, overall channel preference represents only part of the decision-making process when risk of availability is present. Also worth considering is whether or not the same issues that may serve to moderate basic channel preference also affect decisions made by consumers faced with a product availability failure along a specific channel. As suggested earlier, perceptions of channel integration can be critical in preventing customers from looking to alternative firms for fulfillment. When integration is apparent, consumers that have made an initial choice to purchase from a given firm may be more encouraged to use the alternate channel of that same firm in the event of an availability failure. This contention provides the basis of the second hypothesis considered in this study.

**Hypothesis 2:** Given an availability failure, the greater the perceived integration of a firm's channels, the less likely customers will seek out channel options provided by competing firms.

The evaluation of this hypothesis in particular should be of interest to firms grappling with issues of managing and integrating multiple channels for customer retention purposes. Whereas support for Hypothesis 1 would suggest that firms associated with strong images of seamless integration among their fulfillment channel alternatives have the opportunity to focus less on individual channel accuracy and more on other strategic issues, support for Hypothesis 2 would suggest that those same firms may be positioning themselves for much greater loyalty-based customer relationship capabilities than other firms struggling with such issues.

**METHOD AND DATA**

Empirically testing for the effects proposed by Hypotheses 1 and 2 requires both the development of a measurement scheme by which channel integration can be represented and the selective collection of data to provide clear and unbiased effect assessment. Each of these tasks is discussed here in turn, followed by a description of the data prior to formal analysis.
Operationalizing Channel Integration

Building on the definition of channel integration provided earlier, mutual support and interchangeability can be perceived of in many forms. For example, the focus of a firm’s channel-integration strategy may depend largely on the business units involved in its development and maintenance. Integration efforts dominated by advertising managers might focus more on promotional aspects of channel integration. Measurement of such integration might therefore involve the extent to which each channel formally acknowledges each other through advertisements, coupon offerings, and other marketing strategies. In contrast, when channel integration efforts are dominated by sales or even accounting departments, the focus may be on the extent to which each channel provides opportunities for transactions associated with the other channel to be conducted and manipulated (e.g., the presence of Internet kiosks within stores). It may further focus on rules that allow for revenue-sharing opportunities for purchasing or fulfillment activities that involve multiple channels simultaneously.

The involvement of production and inventory control departments in channel-integration activities can affect the ability to share physical resources and information on these resources between store and online channels. Examples include the use of stores as local distribution sites for online deliveries, allowing consumers to reserve or purchase goods online for personal pickup in-store and allowing the return of online purchases in-store. One might argue that the setup costs that go into the more complex forms integration would warrant that efforts by various business units complement each other and therefore the capabilities of one might imply those of another. However, making this assumption a priori would be inappropriate. Furthermore, the complexity of integration may not necessarily mandate the order in which these efforts are pursued, and therefore the assumption that one form of integration cannot exist without another being in place may also be faulty. Finally, regardless of whether special synergies exist between alternate forms of integration, the actual extent to which these efforts are obvious to consumers may vary greatly between these efforts.

Given the notable variety of these mechanisms, in developing measures of channel integration, it is therefore relevant to consider whether integration itself is viewed as a single concept or as multiple factors from a consumer perception point of view. Prior to such an assessment, an appropriate set of questions relating to various possible views of channel integration need to be developed. To do this, representatives of three single-business, national retail chains were each asked to list the various ways that their online and in-store operations were integrated. Although the names of these firms cannot be shared, each had considerable experience in both store and online fulfillment for the clothing, consumer electronics, or music retail industries. For the purpose of discussion, these firms are referred to as Cloth-Firm, Elect-Firm and Music-Firm, respectively. These three firms would ultimately serve as the sources of the sample population mailing lists used in the study. Although various issues were described in informal discussions with these firms, for uniformity purposes, only those that the three firms had in common were further considered in this study. Parallels between online and store efforts at integration were apparent. Table 1 outlines these issues in a sequence that emphasizes these parallels.

Data Collection

To gather the information necessary for testing the outlined hypotheses, a two-phase survey was conducted. The first phase involved the distribution of a questionnaire to 7,428 individual consumers with common purchasing experiences. Specifically, this population consisted of three distinct groups, each of which contained consumers that purchased the same item either through a Web site or a store affiliated with one of three firms. Contact information for these individuals was provided by these three firms each respectively representing either clothing, consumer electronics, or music retail purchases exclusively. That is, although each firm sold a range of items, all the information provided by any one firm dealt with the purchases of only one of the three categories (clothing, consumer electronics, or music retail). Because each firm sells both online and within their own stores and are hence presently struggling with novel issues in integrated inventory management, summary data from this study provided
the underlying incentive for their participation. The availability of purchasing information a priori provided two benefits. First, it directly represented a key dependent variable for analysis, therefore eliminating the need to frame the first portion of the questionnaire around a future hypothetical experience. Second, the convenience of these preestablished databases also provided control data on the consumers, therefore reducing the number of items to be filled out by the consumers in the questionnaire distributed.

Surveys were designed to focus on this specific purchase. For proprietary reasons, however, the firms in question have required that the specific items and stores are not fully described for publication beyond the fact that the goods were common and representative of their industries and that the costs of the goods were equivalent online and in-store (before shipping and handling costs are taken into consideration). To increase the likelihood that the behavior asked about was representative of reality and to increase comparability across responses, only consumers for which at least five in-store and five online purchases were on record with a firm were used. Again, this tactic was based on the belief of past researchers that greater levels of involvement and experience with specific channels would lend greater validity to responses (Ingene and Hughes 1985; Ogletree and Monroe 1987). An additional screening mechanism involved making sure that the particular purchase inquired about was conducted along the preferred channel of choice and not simply as a result of the good not being available at another store or along the alternate channel. A prequestionnaire submitted to all customers in the three groups was used for this purpose. This prescreening eliminated only 17.5% of the total sample.

The full survey was then distributed to the remaining consumers. Each survey required respondents to provide information regarding their perceptions of product availability rates both in-store and online and their perceptions regarding aspects of channel integration. With regard to questions relating to availability perceptions, all three firms had established policies for explicitly notifying online consumers of delays to be expected in delivery due to a lack of typical availability in the item for shipment. Consumers were reminded of these policies within the questionnaire and asked to base their assessments on online availability of the rate at which they encountered these notifications. Although each survey included various other items that that are not used in the present study, the specifics of all survey questions relevant here are detailed in Appendix A. Consumers in these lists were encouraged to respond in this first phase through discounts offered by the three firms.

The second phase of the survey involved giving those who had completed the initial questionnaire the opportunity to earn additional discounts. Additional coupons were available if at some later point they were unable to find similar items (narrowly defined) through the firm, either online or within one of their stores, and subsequently either placed the item on order through that channel, bought the item through the alternate channel of the firm, or bought the item through the Web site or a store owned by a competing firm. To earn this additional discount, respondents were required to submit receipts of purchase and the date and description (e.g., which store) of the experienced availability failure. Only those claims backed by the firm's record of stock-outs within the channel in question were used in analysis. The benefit of this second phase was that nonbiased information (checked by both receipt information and firm stock-out information) could be provided regarding postfailure choice, thus avoiding issues of common source bias in both the independent-variable data (e.g., perceptions of availability and integration) and dependent-variable data (e.g., choice of channel). Specifically, these choices provided binary values of \( r_{1} \) to \( r_{4} \) and \( s_{1} \) to \( s_{4} \) (as in Figure 1) used in the customer retention analysis to follow. That is, although the same respondents provided both types of data, the first set involved prefailure perceptions, and the second set involved real postfailure actions.

During the 6-month investigation period following the initial questionnaire, a total of 1,598 usable responses (to both phases) were received for an overall response rate of 21.5%. Response rates were comparable across all three subpopulation groups. Although the response rate for this type of consumer survey may have been considered relatively high, the issues relating to nonresponse bias were still viewed seriously. To provide a valid assessment of such bias, this study takes one of the more traditional routes suggested by researchers through testing for significant differences between early and late responses collected (Lambert and Harrington 1990). The assumption behind the appeal of such an approach is that late respondents can to some degree characterize the opinions of nonrespondents (Armstrong and Overton 1977). The tests used in comparing responses provided by the first 20% versus the last 20% of those who responded indicated no significant differences at the 1% level. This was the case for all three population samples surveyed.

Data Characteristics

A summary of response means and standard deviations to various items compared across the three product-firm groups is provided in Table 2. To simplify subsequent analysis, the four possible availability failure reactions described by consumers were reduced to two. The first, \( R_{1} \), was a binary describing whether or not the consumers claimed they would pursue the purchase through the same
firms listed in this table in place, the perceptions of the presence of the policies varied greatly in certain cases. This suggested that the presence of some of these services was not consistently transparent to all of the consumers associated with these firms. Once again, significant distinctions among firm-specific data sets were recognized. In the case of "providing product availability information" (item 6), all three firm categories seem to be represented by distinct levels of perceived effectiveness. These distinctions further suggested that an opportunity for assessing the robustness of later analysis would be available.

**ANALYSIS AND RESULTS**

Because the ultimate desire was to be able to apply either one or multiple measures of perceived channel integration in the analysis, the next critical step was to determine how many distinct factors the responses to the related integration items in the questionnaire actually represented. To accomplish this task, established factor analytic procedures were followed (Mukherjee, Lapre, and Van Wassenhove 1998). Extractions were performed through a maximum likelihood procedure in SPSS. Varimax rotation was used as a clarification mechanism in the analysis. A similar analysis was performed for the entire pooled sample set, that is, the combined data associated with all three firms. The three largest eigenvalues determined through initial evaluation for each of the three population samples are given in Table 4.

Due to the relatively low level of the third eigenvalue with respect to the top two, as well as being below the typi-
TABLE 3
Descriptive Statistics on Channel-Integration Items

<table>
<thead>
<tr>
<th>Survey Item</th>
<th>Cloth-Firm</th>
<th>Electr-Firm</th>
<th>Music-Firm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extent to which the firm advertises its Web site at its local stores</td>
<td>5.34</td>
<td>5.08</td>
<td>4.49</td>
</tr>
<tr>
<td>Extent to which the firm advertises its local stores through its Web site</td>
<td>4.71</td>
<td>4.09</td>
<td>4.72</td>
</tr>
<tr>
<td>Extent to which employees at the firm's stores are knowledgeable and</td>
<td>2.68</td>
<td>5.36</td>
<td>3.51</td>
</tr>
<tr>
<td>helpful regarding the use of its Web site</td>
<td>1.6</td>
<td>1.5</td>
<td>1.2</td>
</tr>
<tr>
<td>Extent to which consumers can receive nonproduct information on the</td>
<td>4.12</td>
<td>1.45</td>
<td>1.16</td>
</tr>
<tr>
<td>firm's stores (e.g., driving directions) via e-mail contact or other</td>
<td>1.42</td>
<td>2.84</td>
<td>4.11</td>
</tr>
<tr>
<td>electronic communication made available through its Web site</td>
<td>1.5</td>
<td>1.1</td>
<td>1.4</td>
</tr>
<tr>
<td>Extent to which the firm provides information regarding the availability</td>
<td>3.89</td>
<td>2.07</td>
<td>1.48</td>
</tr>
<tr>
<td>of specific goods at specific stores through its Web site</td>
<td>1.3</td>
<td>0.8</td>
<td>0.6</td>
</tr>
<tr>
<td>Extent to which the firm accepts returns at its stores for purchases made</td>
<td>3.49</td>
<td>4.13</td>
<td>4.15</td>
</tr>
<tr>
<td>through its Web site</td>
<td>1.2</td>
<td>1.6</td>
<td>1.5</td>
</tr>
<tr>
<td>Extent to which the firm allows consumers to purchase items through</td>
<td>4.91</td>
<td>4.13</td>
<td>4.70</td>
</tr>
<tr>
<td>its Web site and pick them up in one of its stores</td>
<td>1.5</td>
<td>1.6</td>
<td>1.7</td>
</tr>
<tr>
<td>n</td>
<td>432</td>
<td>545</td>
<td>621</td>
</tr>
</tbody>
</table>

NOTE: All items are measured along a 7-point Likert-type scale (1 = apparently not done, 7 = extensive and obvious). Numbers in italics indicate those that are significant at 5% or better.

Between-firm ANOVAs: *Significant at the 5% level. **Significant at the 1% level.

TABLE 4
Top Three Eigenvalues in Factor Analysis of Channel-Integration Items

<table>
<thead>
<tr>
<th></th>
<th>Cloth-Firm</th>
<th>Electr-Firm</th>
<th>Music-Firm</th>
<th>Pooled Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eigenvalue 1</td>
<td>2.56</td>
<td>2.75</td>
<td>2.48</td>
<td>2.89</td>
</tr>
<tr>
<td>Eigenvalue 2</td>
<td>1.87</td>
<td>1.99</td>
<td>1.90</td>
<td>1.96</td>
</tr>
<tr>
<td>Eigenvalue 3</td>
<td>0.69</td>
<td>0.55</td>
<td>0.63</td>
<td>0.57</td>
</tr>
</tbody>
</table>

The community figures associated with these loadings also illustrated a relatively high level of variation being accounted for in the analysis (between 47% and 98%). Factor analysis for these factors provided Goodness-of-Fit Indices above 0.9 and Normed Fit Indices above 0.92, thus suggesting the convergent validity of the factors. Because of the dominant loading pattern of each item on a single factor, representative variables based on the factor analysis were constructed as linear combinations and normalized. The distributions of these composite variables were contrasted with comparable normal distributions via Kolmogorov-Smirnov tests and showed no significant deviations from normality. Construct reliability for the two factors, judged by Fornell and Larcker's (1981) method appeared to be adequate at a level of .73.

To simplify interpretation and comparability in the subsequent regressions, an additional step was taken to divide these values by three (i.e., 3σ) and add 0.5, thus providing values that ranged predominantly between zero and one. By doing so, the factors $I_I$ (Informational Integration) and $I_P$ (Physical Integration) could be viewed roughly as fractional levels of integration relative to standards set by the 99.7th percentile (approximately) at the upper bound and the 0.3rd percentile (approximately) at the lower bound. Therefore, numerical expectations for the hypothesized interaction effects of integration and availability, in the opposing direction of any existing direct availability effects, could be extended to suggest that the magnitude of the interaction should be less than or equal to the direct effect to provide interpretable meaning. That is, with integration terms ranging predominantly from zero to one, high levels of integration (near 1) should only be expected to reduce the total effect of availability and not change the
TABLE 5
Factor Loadings and Variance Accountability for Each Sample Group

<table>
<thead>
<tr>
<th>Survey Item</th>
<th>Pooled Sample</th>
<th>Informational Integration: $\lambda_i$</th>
<th>Physical Integration: $\lambda_p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extent to which the firm advertises its Web site at its local stores</td>
<td>.641</td>
<td>.101</td>
<td></td>
</tr>
<tr>
<td>Extent to which the firm advertises its local stores through its Web site</td>
<td>.616</td>
<td>.028</td>
<td></td>
</tr>
<tr>
<td>Extent to which employees at the firm's stores are knowledgeable and helpful regarding the use of its Web site</td>
<td>.582</td>
<td>.024</td>
<td></td>
</tr>
<tr>
<td>Extent to which consumers can receive nonproduct information on the firm's stores (e.g., driving directions) via e-mail contact or other electronic communication made available through its Web site</td>
<td>.810</td>
<td>-.015</td>
<td></td>
</tr>
<tr>
<td>Extent to which the firm provides access to its Web site within its stores</td>
<td>.613</td>
<td>.038</td>
<td></td>
</tr>
<tr>
<td>Extent to which the firm provides information regarding the availability of specific goods at specific stores through its Web site</td>
<td>.795</td>
<td>.053</td>
<td></td>
</tr>
<tr>
<td>Extent to which the firm accepts returns at its stores for purchases made through its Web site</td>
<td>.014</td>
<td>.834</td>
<td></td>
</tr>
<tr>
<td>Extent to which the firm allows consumers to purchase items through its Web site and pick them up in one of its stores</td>
<td>-.004</td>
<td>.849</td>
<td></td>
</tr>
<tr>
<td>% variance explained</td>
<td>42.8</td>
<td>20.6</td>
<td></td>
</tr>
</tbody>
</table>

NOTE: Numbers in italics indicate those that are significant at 5% or better.

sign of this effect. Similarly, low values of integration (near 0) should not have much impact on the total effect of availability at all. As a final check to ensure that the two derived and transformed factors provided representations of distinct consumer perceptions on channel integration, correlation tests as a form of post hoc discriminant validity were performed on these derived variables. The $r = .12$ correlation between the two factors was shown to be insignificant at the 5% level.

Logistic regression was used in formally testing each of the hypotheses posed earlier. The use of such methods has been well established and documented in a number of marketing studies. Some of these studies have been purely analytic, considering such issues as market share and constrained profit maximization (Allenby and Rossi 1991; Bucklin, Russel, and Srinivasan 1998). Others, however, have been used to make better sense of large quantities of real-world data, such as those collected through the use of shopping scanners (Bucklin and Gupta 1992; Bucklin, Gupta, and Sangman 1995; Chintagunta 1992; Gupta 1988). Still others have applied logit models in providing insights into the effect of some of the factors described earlier, such as perceptions of service and channel integration. Notably, Heide and Weiss (1995) applied such a model to survey-collected data in the consideration of the impact of these factors on brand-switching behavior.

The present analysis included all controls described earlier and used a three-stage blocked strategy for testing the contributions of availability perceptions and the interaction of these perceptions with the two derived channel-integration variables. Given the number of variables intended for the regression and in the interest of ensuring adequate power in the test results, data from all three firms were pooled. The appropriateness of pooling in this case was validated through Bass and Wittink's (1975) method and double-checked through the observation that the same variable coefficients in nonpooled regressions were generally significant and of the same sign as those in the pooled analysis (see Appendix B for subsample regressions by firm). The first of the three regression blocks included the controls, dummy variables representing the electronics and the music retail firms, respectively, as well as a regression constant. The second block was used to introduce the perceived availability rates for the store and online channels, whereas the third introduced four interaction terms arising from the combined consideration of availability rates and the two derived channel-integration variables. Table 6 presents the coefficient estimates when all three blocks in the regressions were included and provides a comparison of the fitness measures for each of the three blocks in turn. The dependent variable in each of these regressions was whether or not each consumer made use of the online channel ($1_{o}$) in the actual purchase of the good around which the sample populations and questionnaires were designed.

As apparent from the fit estimates, the impact of perceived availability rates on channel preference was highly significant and in the anticipated direction. Furthermore, corresponding fit estimates including log likelihood, as well as Cox and Snell and Nagelkerke $R^2$, show significant increases upon the introduction of the block of independent variables including the perceived availability rates. Specifically, the Cox and Snell statistic increased from .139 to .178, and the Nagelkerke $R^2$ showed a shift from .158 to .212 upon the addition of the second block. The addition of the interaction terms in the third block raised
the Cox and Snell statistic to .226 and the Nagelkerke $R^2$ value to .279. Tests on the equality of the magnitude of the coefficients on availability showed that the two direct effects were distinct. This suggested that the effect could not be attributed solely to a difference between the availability rates perceived along each channel.

The addition of the third block provided a significant increase in variance accounted for. This increase is also illustrated in the statistical significance of the interaction effects. Given the design of the factors involved and the direction of these effects, the interpretation of these interactions as countereffects to the respective availability direct effects provides statistical support for Hypothesis 1 in three out of four cases. That is, higher levels of perceived integration reduce the overall impacts of availability. It is also worth noting that these significant coefficients in the third block are in contrast to the lack of significant direct effects of perceived integration, suggesting that although integration does affect consumer evaluations of availability, it does not by itself provide a criterion for selection.

An identical approach was taken in assessing the impact that perceived availability and channel integration have on decisions made as the result of availability failures. In this case, the dependent variable was whether or not the channel options of an alternate firm would be preferred in the event of an availability failure ($1 - R_{ij}$). Here the sample was split based on for which channel the customer in the second phase of data collection reported a service failure. Such a distinction was deemed necessary to ensure the interpretation of availability effects that might be observed. Table 7 outlines these results.

Although several terms provided relevant contributions to the fit for each case, most important to the assessment of this last hypothesis were the direct and interaction effects associated with the perceived channel-integration variables. As with the former analysis, all significant coefficients appeared to correspond to anticipated directions (dampening the impact of individual risks of availability), and the introduction of these terms provided significant increases to the blockwise fitness measures of each regression. Specifically, the addition of the direct effects provided improvements in the Cox and Snell statistics from .116 to .229 for in-store failure responses and to a lesser extent from .078 to .107 for responses to online failures. Similar changes were observed in the Nagelkerke $R^2$ values (from .144 to .245 for responses to in-store failures and from .110 to .149 for online failures). The addition of the interaction terms in the third block raised the Cox and Snell statistic to .370 (for in-store failures) and .157 (on-
TABLE 7
Logistic Regression Results for the Selection of an Alternate Firm

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>Failure at Store</th>
<th>Failure Online</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
</tr>
<tr>
<td>Constant</td>
<td>8.567</td>
<td>2.575**</td>
</tr>
<tr>
<td>Elect-firm dummy</td>
<td>2.418</td>
<td>0.670*</td>
</tr>
<tr>
<td>Music-firm dummy</td>
<td>2.547</td>
<td>0.817*</td>
</tr>
<tr>
<td>Age of consumer (years)</td>
<td>0.021</td>
<td>0.010*</td>
</tr>
<tr>
<td>Gender (male = 1, female = 0)</td>
<td>0.460</td>
<td>2.681</td>
</tr>
<tr>
<td>Distance to store (miles)</td>
<td>0.005</td>
<td>0.057</td>
</tr>
<tr>
<td>Average time between online purchase and delivery (days)</td>
<td>0.0852</td>
<td>0.915</td>
</tr>
<tr>
<td>$A_G$: Perceived store availability rate</td>
<td>-1.433</td>
<td>1.259</td>
</tr>
<tr>
<td>$A_E$: Perceived online availability rate</td>
<td>-5.671</td>
<td>1.057**</td>
</tr>
<tr>
<td>$I_F$: Informational integration</td>
<td>-2.738</td>
<td>0.671**</td>
</tr>
<tr>
<td>$I_P$: Physical integration</td>
<td>-1.481</td>
<td>0.445*</td>
</tr>
<tr>
<td>$A_S - I_P$</td>
<td>0.319</td>
<td>0.181</td>
</tr>
<tr>
<td>$A_E - I_P$</td>
<td>0.853</td>
<td>0.192*</td>
</tr>
<tr>
<td>$A_S - I_F$</td>
<td>0.696</td>
<td>0.441</td>
</tr>
<tr>
<td>$A_E - I_F$</td>
<td>1.781</td>
<td>0.269**</td>
</tr>
</tbody>
</table>

-2 log likelihood

Block 1: 1,683.2
Block 2: 1,495.1
Block 3: 1,261.5

n: 1,276 322

NOTE: Numbers in italics indicate those that are significant at 5% or better.
Coefficient significance levels: *Significant at the 5% level. **Significant at the 1% level.

Similarly, increases were observed for Nagelkerke $R^2$ values in these regressions, raising them to .460 (for in-store failures) and .218 (online).

Significant negative coefficients on channel-integration factors suggested that perceived integration is associated with a reduced likelihood of firm switching upon initial channel failure. The results show that in both original purchase scenarios, support was provided for Hypothesis 2 given the high levels of significance associated with several of the interaction terms. Interestingly, the integration effect was consistently significant with regard to the availability effect on the firm’s alternate channel, serving to reduce the impact of potentially low availability rates in such channels and suggesting that both loyalty and within-firm channel switching was being promoted.

DISCUSSION

Product availability failures can have both immediate and long-term repercussions for a firm. However, the findings presented in this study suggest that although the levels of perceived availability associated with specific channels managed by a single firm can have significant impacts on initial and subsequent purchasing decisions, the magnitude of these effects is tempered by the extent to which consumers perceive these channels to be integrated. Of course, if firms are to maintain reasonably cost-effective inventory management policies, they must inevitably accept a certain level of risk regarding such availability. Given this reality, multichannel firms should not neglect potential policies that simultaneously encourage the retention of customers who might be disappointed by unavailability at their first channel choice. Formal activities that promote the integration of online and in-store channel operations such as those considered here may provide powerful tools in this regard.

By the present study, the perception of higher levels of integration between store and online channels is shown to be associated with greater loyalty, or perhaps more appropriately, a greater “stickiness” to firms that make the seamlessness of such integration sufficiently transparent to consumers. Although it is obvious that idiosyncrasies exist in how consumers perceive of availability and channel-integration conditions in different product markets, the hypothesized roles of perceived availability and channel integration appear to be robustly evident across these diverse markets. The ability of the two factor analyti-
cally derived measures to pick up channel-integration effects is furthermore encouraging because it suggests a robust conceptual framework for future research.

Regardless, certain notable limitations to this study should be considered. For example, one of the specific tactics taken to ensure subject familiarity with both online and in-store channels considered (i.e., the requirement of at least five past purchases along each channel) may simultaneously bias these results in such a way that they are not characteristic of low-frequency shoppers. It is possible that these results do not entirely apply to such consumers; however, a similar study of such consumers would have to take alternate measures to help their ability to provide meaningful responses to the items of interest here. It would also require an ability to obtain information regarding low-frequency consumers (for which certain firms may be less likely to maintain records on).

As another limitation, from a design perspective, although mental accounting theory helps provide general theoretical justification for the hypotheses posed, formal measurement of typical cognitive metrics such as increases in satisfaction or utility due to greater perceived integration or greater availability levels were not collected. The findings suggest that the end results of such perceptions do contribute to hypothesized purchasing tendencies, but intermediate and end levels of satisfaction or utility with such decisions are not addressed. Future work should pursue the possibility of observing such intermediate cognitive phenomena.

From a system-modeling perspective, it should be noted that the current findings only represent the tip of the iceberg for considerations involving multichannel operations. As mentioned at the outset, existing operations research literature on inventory management has traditionally ignored behavioral repercussions of availability failures. In particular, it has generally not viewed demand to be dependent on availability. At the same time, ironically, the impact of demand on availability is a well-established dynamic in math models of inventory systems (Clark 1972; Goyal and Giri 2001; Schwarz 1981; Sobel and Zhang 2001). The incorporation of perceptual impacts on consumer demand, based on a firm’s selection of availability targets, should provide more realistic foundations for future inventory management models in retail settings.

The behavioral role of integration should likewise be incorporated in future models, particularly because the present results imply that this issue moderates the effect of changes in availability perceptions. But increased integration does not come free. In both research modeling and practice, the integration of online and in-store inventory management policies implies certain additional fixed and variable costs that may not be present when inventory management for online customer-direct deliveries are kept entirely separate from shelf-stock management practices. When inventory for both online and store fulfillment is shared within regional stores, such costs may include maintenance of additional backroom packaging equipment and personnel, as well as fundamental coordination costs and accounting complications. Integration policies may also include necessary concessions in order to maintain strong relationships with retail partners given the real or perceived threat of business losses for those partners to online channels.

On the other hand, the sharing of information and inventory tagged for online fulfillment with that used to fill store demand also implies the potential for quicker and more consistent customer service. This is based in part on proximity and an ability to rely on neighboring facilities for customer-direct delivery service when inventories are low. Joint promotional efforts that provide mutual support among the channels managed by a firm can also help ensure consistent demand, which in turn can assist in effective tactical planning efforts and ultimately improved service. The study of such informational strategies to help balance demand in such multichannel settings warrants further investigation.

As a final thought for future inventory management studies, it should be noted that the storage of additional inventory, although tagged for online fulfillment, may also provide a source of pseudosafety stock for local stores. Ultimately, this last issue draws on the concept of inventory pooling, a research topic already subject to considerable study in operations research. Research that couples inventory-pooling models (focusing on risk reduction for the firm) and the effects of perceived integration (focusing on perceived risk reduction for the consumer) would provide substantial contributions both to academics and practitioners simultaneously struggling with such modern issues as customer relationship management and efficient supply chain control.
### APPENDIX A

**General Form of Questionnaire Items**

1. How often have you shopped for an item through [firm’s Web site] and been notified that it would not be available for delivery within the amount of time you would consider typical for the item? (% scale)
2. How often has [firm name] not had items that you have wanted in its store? (% scale)
3. To what extent does [firm name] accept returns at its stores for purchases made through [firm’s Web site]? (7-point Likert-type scale)
4. To what extent does [firm name] advertise [firm’s Web site] at its local stores? (7-point Likert-type scale)
5. To what extent does [firm name] provide access to [firm’s Web site] within its stores? (7-point Likert-type scale)
6. To what extent does [firm name] provide information regarding the availability of specific goods at specific stores through [firm’s Web site]? (7-point Likert-type scale)
7. To what extent does [firm name] advertise its local stores through [firm’s Web site]? (7-point Likert-type scale)
8. To what extent are employees at [firm name’s] stores knowledgeable and helpful regarding the use of [firm’s Web site]? (7-point Likert-type scale)
9. To what extent does [firm name] allow you to purchase items through [firm’s Web site] and pick them up in one of its stores? (7-point Likert-type scale)
10. To what extent can you receive nonproduct information on [firm name’s] stores (e.g., driving directions) via e-mail contact or other electronic communication made available through [firm’s Web site]? (7-point Likert-type scale)

### APPENDIX B

**Main and Interaction Effects in Logistic Regressions by Firm-Specific Subsamples**

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>Cloth-Firm</th>
<th>Electr-Firm</th>
<th>Music-Firm</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>M</td>
</tr>
<tr>
<td>$A_5$: Perceived store availability rate</td>
<td>-6.993</td>
<td>.689**</td>
<td>-4.760</td>
</tr>
<tr>
<td>$A_5'$: Perceived online availability rate</td>
<td>3.255</td>
<td>1.683*</td>
<td>5.396</td>
</tr>
<tr>
<td>$I_5$: Informational integration</td>
<td>-0.545</td>
<td>1.221</td>
<td>0.050</td>
</tr>
<tr>
<td>$I_5'$: Physical integration</td>
<td>0.241</td>
<td>1.358</td>
<td>0.104</td>
</tr>
<tr>
<td>$A_5 - I_5$</td>
<td>-0.334</td>
<td>0.249</td>
<td>-0.974</td>
</tr>
<tr>
<td>$A_5 - I_5'$</td>
<td>1.458</td>
<td>0.360**</td>
<td>1.432</td>
</tr>
<tr>
<td>$A_5' - I_5'$</td>
<td>-0.216</td>
<td>0.948</td>
<td>-0.430</td>
</tr>
</tbody>
</table>

$-2$ log likelihood

- Block 1: 329.9
- Block 2: 297.8
- Block 3: 292.9

$n = 432$

**Dependent Variable:** Online Channel Used = 1, Store Channel Used = 0

**NOTE:** Standard controls included in these regressions were nonsignificant and do not appear above. Numbers in italics indicate those that are significant at 5% or better. Coefficient significance levels: *Significant at the 5% level. **Significant at the 1% level.

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### REFERENCES


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