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An examination of retail website design and conversion rate

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ABSTRACT

Retailers and manufacturers widely use Internet retailing as part of a multichannel promotion and distribution strategy. The rate at which site visitors convert to customers is low for online retail, resulting in high customer acquisition costs. Almost 96% of website visits end with no consumer purchase. This study examines empirical associations between website features and online conversion rates through regression analysis. Results indicate that certain website design features do explain a sizeable portion of the variance converting e-commerce visitors to purchasers. Features that promote flow, a psychological state of immersion into an activity, positively associate with conversion.

1. Introduction

Retailers commit substantial resources to developing online brands and e-commerce sales channels. In 2014, global online retail sales reached $1.3 trillion annually, representing over 5% of total global retail sales (EMarketer, 2014). Although record levels of activity underscore sales opportunities, 96% of all visits to a website do not end with product purchases (Neilsen NetRatings, 2005; Statista, Inc., 2015). This low conversion rate worsens when consumers switch to mobile devices (1.2%) (Statista, Inc., 2015). Thus, firms wishing to decrease their cost-per-conversion rate require knowledge of consumer behavior that occurs between the time points a user enters and exits a website.

Consumers linger in a company's website longer if they feel immersed, without mental interruption, in the content of that space. Prior research identifies this psychological state of deep immersion into an activity, called flow, as a potential influence on consumer behavior and e-commerce consumption (Richard & Chandra, 2005; Rosen & Purinton, 2004; Sicilia, Ruiz, & Munuera, 2005; Smith & Sivakumar, 2004). It proposes that website design has a considerable effect on the immersion a consumer feels, and thus increases the likelihood that the user stays through conversion (Visinescu, Sidorova, Jones, & Prybutok, 2015). This research examines whether website design features are associated with conversion rates. It examines websites of leading online retailers for specific design features and tests for association between these features and the site's conversion rate.

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2. Analytical framework

2.1. Web design

Internet retailing is part of a multichannel promotion and distribution strategy among retailers and manufacturers (Grewal, Gopalkrishnan, & Levy, 2004). The applicability of the Internet to a firm's business model imposes some constants. For example, high-risk, high-priced products do not easily sell over the Internet (Grewal et al., 2004). Some consumers are hesitant to purchase due to the risk of a security breach of their personal information (Koufaris & Hampton-Sosa, 2004; Tarafdar & Zhang, 2007/8). Because of these and other reasons, the rate at which shopping visitors convert to customers is low for online retail, resulting in high customer acquisition costs (Grewal et al., 2004; Hoffman & Novak, 2000; Sohrabi, Mahmoudian, & Raessi, 2012).

Research indicates that website design is an important factor that converts visitors to customers. Experts conceptualize the site's content and design to influence consumers' willingness to buy (Smith & Sivakumar, 2004; Sohrabi et al., 2012; Shobeiri, Mazaheri, & Laroche, 2015), and these features apparently alter the attitude of the viewer (Hausman & Siekpe, 2008; Sicilia et al., 2005). Pleasurable Visitor Greeting stages of consumer website experiences are associated with positive attitudes (Richard & Chandra, 2005). Entertaining content such as film, music, and games also boost positive attitudes and intention to purchase (Lu & Su, 2009; Hausman & Siekpe, 2008). Positive attitudes toward a well-designed website are positively associated with further site exploration (Menon & Kahn, 2002) and purchase behavior (Bruner, Stevenson, & Kumar, 2000; Jayawardhena, 2004; Lynch, Kent, & Srinivasan, 2001).

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Designs that incorporate interactivity increase the appeal of Internet sites (Ghose & Dou, 1998). Many design characteristics, such as comment sections, downloads, and frequently asked question sections, can promote site interactivity while others can promote customer frustration. Information overload can cause users to become lost, grow weary, and exit before a purchase is made (Sohrabi et al., 2012). Knowledge of user behavior is key to ensuring that design does not interfere with purchase (Sismeiro & Bucklin, 2004).

2.2. Conversion rate

The conversion rate reflects the interaction between a website and its consumers' purchase choices and is defined as the percentage of users purchasing a product out of the total unique visitors entering a website. The conversion rate (Loftus, 2001) is exceedingly low for retailers, as low as 2% to 4% (Holzwarth, Janiszewski, & Neumann, 2006; Sohrabi et al., 2012; Retailer, 2013). Given the dramatic growth in online usage coupled with the historically low conversion rates, any increase in the conversion rate could greatly affect a firm's profitability (Li, 2004; Silverstein, Stanger, & Abdelmessih, 2001).

Several previous studies explore the links between conversion rate and website effectiveness. Direct website effectiveness measures linked to higher conversion rates include improvements in the Checkout process and the removal of unnecessary graphics (Tsai, 2004), using a decision maker to assist the user (Sismeiro & Bucklin, 2004), elimination of a back door element (Zhou, Lau, & Yang, 2004), and various customer interactions (Awad, 2004). Repeat visit behavior has a positive significant relationship with conversion rate (Moe & Fader, 2004). Users' trust in the company's abilities, which a well-designed, high-investment website reflects, is a great determinant of purchase intention (Schlosser, Barnett, & Lloyd, 2006).

2.3. Site design and user behavior

One perspective explaining consumer online behavior is flow. Flow is a pleasurable cognitive "holistic sensation that people feel when they act with total involvement" (Csikszentmihalyi, 1977). Flow typically occurs when an individual actively participates in some task that is interesting, and challenging, such as a sport, hobby, or work (Novak, Hoffman, & Yung, 2000; Richard & Chandra, 2005). When flow involves an online environment, the user's concentration blocks consideration of other occurrences outside the website environment (Hoffman & Novak, 2000; Novak et al., 2000). Studies examine this mental state in the context of computer interaction and the Internet as a means by which online marketers may engage customers and increase repeat purchases (Richard & Chebat, 2016; Smith & Sivakumar, 2004). Website interactivity increases the intensity of the consumer's flow experience and produces positive attitudes among consumers toward the website (Mahnke, Benlian, & Hess, 2015; Richard & Chandra, 2005; Sicilia et al., 2005). Inhibitors to flow include long download delays, link failure, long forms to complete (Richard & Chandra, 2005), extraneous product descriptions, and ambiguity about the next step in site navigation (Rosen & Purinton, 2004). Frustrated users develop a poor attitude toward the site, and their purchase intentions diminish (Hausman & Siekpe, 2008; Sohrabi et al., 2012; Trevinal & Stenger, 2014).

The objective of web design is to direct the consumer to the goals that the website designer sets (Geirland, 1996). Whether flow induces purchase behavior is not clear, although it apparently increases purchase intention (Jayawardhena, 2004). The more their exposure to irrelevant or dynamic content, the less likely the users are to convert (Sismeiro & Bucklin, 2004). It is possible that user preoccupation with extraneous information could enhance the browsing experience to the extent that completing the purchase becomes unimportant (Smith & Sivakumar, 2004).

3. Hypotheses, variables, and measures

3.1. Hypothesis development and maintained assumptions

This study hypothesizes a relationship between website features that enhance or impede user flow and the website's conversion rate. The hypothesis test involves examining the association between the online conversion rate and 21 potentially consequential website features. Research is not decisive with regard to the direction of the influence upon actual sales that these features may provide (Jayawardhena, 2004; Smith & Sivakumar, 2004).

3.2. E-commerce website progressions and hypotheses

E-commerce transactions require consumers to advance through websites in a sequential manner. Four specific stages of website experience are common to e-commerce progression (Scheffelmaier & Vinsonhaler, 2002/3; Sismeiro & Bucklin, 2004). The first stage is the website's homepage, which identifies the site, gives content information, and provides links to other pages (Singh, Dalal, & Spears, 2005). The second feature group is the Catalog stage, which provides product information and offers browsing among options (Sismeiro & Bucklin, 2004). The third stage is the Shopping Cart, which summarizes the customer order and allows the user to either go back to browsing or move on to complete a purchase. The final stage is Checkout. This stage includes the pages of the site involved with payment and collection of information to complete an online transaction.

Although website pages representing different destinations are interconnected, purchase transactions generally lead a consumer to navigate through these destinations sequentially. For example, in the websites examined, consumers first connect with the Visitor Greeting page prior to connecting with the Catalog pages. Catalog pages generally lead to the Shopping Cart page(s), through which the Checkout pages are accessed. Although websites may allow consumers latitude to navigate backward or bypass destinations once they proceed through the initial sequence, websites generally require consumers to finalize each destination in sequence in order to complete a purchase. In keeping with this standard navigational path, the study tests independent hypotheses for each of the four website destination stages.

Hypothesis 1. : E-commerce website features that enhance purchase intention within the Visitor Greeting stage of the website are associated with conversion.

Hypothesis 2. : E-commerce website features that enhance purchase intention within the Catalog pages of the website are associated with conversion.

Hypothesis 3. : E-commerce website features that enhance purchase intention within the Shopping Cart page(s) of the website are associated with conversion.

Hypothesis 4. : E-commerce website features that enhance purchase intention within the Checkout page(s) of the website are associated with conversion.

3.3. Variable definitions and measures

3.3.1. Dependent variable

Data on the dependent variable, conversion rate, are available from the Neilsen data service as a measure of website usage. Nielsen data provide both session and visitor conversion rates. Session conversion rates track the percentage of web sessions that result in an online purchase by product. Session rates do not eliminate redundant counts of individuals making multiple session visits. This analysis employs visitor conversion rates, which track the percentage of unique visitors making an online

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purchase on a vendor's site in the month under observation. Visitor conversion rates eliminate redundancy of multiple visits, allowing each unique customer's behavior to be tracked as the unit of analysis.

3.3.2. Independent variables

The independent variables for this research comprise Offers Recommended Products, Offers Featured Products, Displays Shopping Cart Icon, Provides Links To Site Pages, Has Navigation Bar, Instantaneous Pricing Total, Has Return Links, Displays Shipping Charges, Provides Order Tracking, Offers Related Products, Requires Email Address, Provides Human Contact, Instantaneous Pricing Total, Webpage Design Changes, and One-Time Credit Card Registration. This study derives these variables from Scheffelmaier and Vinsonhaler (2002/3), who content analyze 59 studies of website features that reportedly enhance conversion. The variables, grouped by website stage, represent objective, physical properties that are measureable through direct observation of the site. The final list of variables represents, following Scheffelmaier and Vinsonhaler, themes such as website features that enhance or detract from interactivity, features that improve interpersonal communication via the web, and features that result in delays or exertion of excessive resources to utilize (Ghose & Dou, 1998; Hausman & Siekpe, 2008; Lu & Su, 2009; Richard & Chandra, 2005; Rosen & Purinton, 2004; Sismeiro & Bucklin, 2004; Sicilia et al., 2005; Smith & Sivakumar, 2004).

3.3.3. Control variables

The regression involves five variables that control for firm differences and reduce the risk of omission of correlated variables from the model (Greene, 2003). Average Order Size controls for variation in conversion rate due to pricing differences. Theoretically, consumers may be more likely to purchase less rather than more costly items (Rao, 1984). Lower priced purchases place less pressure on budget constraints and place the consumer at less risk. Consequently, order size should negatively relate to conversion rate. Online Store Only controls for any influence from having physical storefronts. Having physical storefronts may increase the online conversion rate by directing loyal customers to purchase from the store's website (Harvin, 2000). However, physical storefronts may lower the conversion rate if customers mainly use the site to browse online prior to purchasing in person from the store. Flowers, Toys & Games and Music, Movies & Books control for differences in industry mean conversion rate for firms selling these items.

4. Methodology and descriptive analysis

4.1. Methodology and data

The sample of firms for this study is from the Nielsen Company, a global provider of market and consumer behavior information (NetRatings, 2005). Nielsen NetRatings monitors 350,000 individuals visiting commercial websites and records their Internet behavior and purchasing habits. Nielsen NetRatings tracks gross visits, unique visits, average sales per visit, and conversion rates for a wide variety of companies, among other information. The firm then projects the Nielsen sample statistics to the larger population of all Internet users.

To eliminate sector effects, this study includes within the sample only firms classified as retail establishments. Our analysis targets retail establishments due to their high volume of unique visitors. Consequently, conversion rates relate to a much larger sample of customers, increasing the reliability of the analysis. Isolating retail establishments yields a sample of 114 firms. The sample comprise ten industry groups: electronics, health care, apparel, toys and games, books, movies, flowers, music, computing, and general merchandise. The sample firms represent leading online retailers. They report average monthly Internet sales of $64 million, ranging from less than $1 million to $1.9 billion. The number of unique visitors to each site during the month of study ranged from 407,000 to 60 million with a mean of 4.9 million unique visitors.

The study uses three trained coders for the corporate sites in the sample to examine pages in each section of the site and to code the presence or absence of independent variable features. The researchers examine intercoder reliability after each site and resolve inconsistencies by visiting the site and coming to a group consensus in accordance with the variable definition.

4.2. Descriptive analysis of data

Table 1 reports descriptive statistics for regression analysis. The dependent variable, Visitor Conversion Rate, has a mean of 4.36%, suggesting that roughly one out of every twenty-five unique visitors make a purchase. The standard deviation is 4.17%, indicating a significant amount of variance in the conversion rate to explain. Given that the sample comprises leading online retail firms, these descriptive statistics highlight the potential for gains that online retailers face from gaining an understanding of the customer–website interface. Despite truncation of conversion rates at 0%, a Kolmogorov–Smirnov test for normality fails to reject the fact that the data originate from a normal distribution (Cameron & Trivedi, 2005).

The independent variables are dichotomous. Their means represent percentages of sample firms that employ a given feature on their website. With rare exceptions, means are not extreme, indicating that each variable has sufficient differentiation to provide explanatory power. The exceptions are Instantaneous Pricing Total (8% of sample firms) and Offers Related Products (6% of sample firms).

Table 1
Descriptive statistics.

Variable	Mean	Correlation with D.V.	
		Correlation	*p*-Value
Dependent variable			
Visitor Conversion Rate	4.36%	1.00	.000
Independent variables — Visitor Greeting page			
Offers Recommended Products	.39	.26	.002
Offers Featured Products	.64	.29	.001
Displays Shopping Cart Icon	.48	.14	.074
Provides Links To Site Pages	.89	−.18	.026
Has Navigation Bar	.54	−.01	.471
Independent variables — Catalog pages			
Displays Shopping Cart Icon	.59	−.06	.281
Offers Recommended Products	.62	−.03	.380
Provides Special Offers	.58	−.22	.010
Requires Customers To Register	.41	−.19	.022
Provides Subject Tabs	.80	−.28	.001
My Account	.67	.08	.210
Independent variables — Shopping Cart page(s)			
Instantaneous Pricing Total	.08	.18	.027
Has Return Links	.84	−.19	.023
Displays Shipping Charges	.53	.19	.025
Provides Order Tracking	.51	−.20	.017
Offers Related Products	.06	.22	.011
Independent variables — Checkout page(s)			
Requires Email Address	.66	−.29	.001
Provides Human Contact	.58	.20	.019
Instantaneous Pricing Total	.24	.17	.039
Webpage Design Changes	.71	−.21	.012
One-Time Credit Card Registration	.38	.20	.016
Control variables			
Average Order Size	$115	−.05	.306
Online Store Only	.55	.16	.042
Sells Flowers	.03	.37	.000
Sells Toys & Games	.03	−.11	.118
Sells Music, Movies or Books	.10	.05	.298

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Table 1 also presents univariate Pearson correlations with Visitor Conversion Rate and the corresponding *p*-values. Most of our flow website features are independently associated with conversion rates at statistically significant levels. However, consistent with the literature and our hypotheses, the direction of the association is mixed. Most striking are the Catalog page variables, which, with one exception, have negative correlations with the dependent variable. In summary, the initial analysis suggests a link between these website features and conversion rates, but that selected features can have offsetting effects upon purchase decisions.

5. Results and discussion

The four hypothesis tests use regression models designed for each stage of the retail website experience: Visitor Greeting, Catalog, Shopping Cart, and Checkout. The model structure allows for the association between the independent variables, common web design features, and the dependent variable, conversion rate. The models account for the control variables Average Order Size, Online Store Only, Flowers, Toys and Games, and Music, Movies, and Books. Flowers, Toys and Games, and Music, Movies, and Books are dummy variables representing industry groups. The researchers determine industry groups by observing the mean conversion rate for each industry and grouping those firms whose mean values clustered closely. General merchandise is the omitted group. Table 2 presents the regression analysis results for each retail website stage.

5.1. Visitor Greeting stage regression findings

The findings support Hypothesis 1, which states that website features that enhance purchase intention are associated with levels of conversion rate in the Visitor Greeting stage. Results indicate that design features account for a sizeable portion of the variance in conversion rate ($R^2 = .278$). Variables that are significant predictors of the conversion rate include Recommended Products, Featured Products, Shopping Cart Icon, and Provision Of Links to Site Pages. Provision of Links to Site Pages has a strong negative association with the conversion rate ($\beta = -2.900, p = .011$) and is the only design feature that shows a significant negative association with the conversion rate in the Visitor Greeting stage. Flowers is the only control variable to exhibit statistical significance across all regression models.

Results for the Visitor Greeting stage model indicate that early engagement is important for conversion to purchase. Recommended and featured products help to develop immediate interactivity with the customer. In addition, provision of a Shopping Cart Icon in the Visitor Greeting stage of the website experience is also positively associated with increases in the conversion rate. Also an interactivity booster, the link to the customer's Shopping Cart can be a step toward simplifying the customer's path to the purchase. Finally, the strong negative association between the conversion rate and the provision of links to other pages within the website, such as investor relations, customer service, and outlet shopping, can be explained by the negative impact of excessive browsing through the site.

5.2. Catalog stage regression findings

Hypothesis 2 states that website features that enhance purchase intention are associated with levels of conversion rate in the Catalog stage. The findings support this hypothesis. The results indicate that web design features in the product information pages partially account for the variance in conversion rate among customers. Specifically, Special Offers and Uses Subject Tabs show strong negative associations with conversion rate. Shopping Cart Icon and Recommended Products are not significantly associated with conversion rate, and the association between Mandatory Registration and conversion rate is weakly significant at the .10 level.

Table 2
Regression analysis findings by retail website stage — website features on conversion rate.

Stage	Variable	β	*t*	*p*-Value	Adj. R^2
Visitor Greeting	Offers Recommended Products	2.155	2.776	.007***	.278
	Offers Featured Products (Specials)	1.780	2.281	.025**	
	Displays Shopping Cart Icon	1.553	2.094	.039**	
	Provides Links To Site Pages	−2.900	−2.606	.011**	
	Has Navigation Bar	−1.114	−1.440	.153	
	Average Order Size (000s)	0.000	−0.016	.987	
	Online Only (No Storefront)	0.992	1.366	.175	
	Sells Flowers	7.832	4.200	.000***	
	Sells Toys & Games	−0.359	−0.191	.849	
	Sells Music, Movies & Books	−0.052	−0.043	.966	
Catalog	Displays Shopping Cart Icon	−0.182	−0.245	.807	.220
	Suggests Recommended Products	0.985	1.197	.234	
	Provides Special Offers	−1.948	−2.249	.017**	
	Mandatory Registration Required	−1.242	−1.705	.091**	
	Uses Subject Tabs To Access Site	−2.805	−2.805	.006***	
	Average Order Size (000s)	0.000	−0.126	.900	
	Online Only (No Storefront)	0.557	0.727	.469	
	Sells Flowers	7.549	3.905	.000***	
	Sells Toys and Games	−1.253	−0.647	.519	
	Sells Music, Movies, and Books	−1.519	−1.143	.256	
Shopping Cart	Instantaneous Pricing Total	3.150	2.498	.014**	.270
	Has Return Link to main catalog	−2.099	−1.896	.061*	
	Provides Shipping And Handling Charges	1.992	2.2725	.008***	
	Order Tracking Mechanism	−1.320	−1.779	.078*	
	Related Products	3.723	2.492	.014**	
	Average Order Size (000s)	−0.001	0.737	.463	
	Online Only (No Storefront)	0.773	1.057	.293	
	Sells Flowers	7.674	4.006	.000***	
	Sells Toys and Games	0.295	0.155	.877	
	Sells Music, Movies, and Books	−0.645	−0.522	.603	
Checkout	Order Tracking Mechanism	−0.684	0.899	.371	.237
	Email Address Required for Checkout	−1.708	−2.167	.033**	
	Human Contact Information Displayed	1.538	2.048	.043**	
	Instantaneous Pricing Total	2.058	2.323	.022*	
	Design Changes on Checkout Page	−1.360	−1.717	.089*	
	Express Checkout	0.264	0.329	.743	
	Average Order Size (000s)	−0.001	−0.606	.546	
	Online Only (No Storefront)	0.606	0.816	.417	
	Sells Flowers	7.368	3.697	.000***	
	Sells Toys and Games	−1.185	−0.619	.537	
	Sells Music, Movies, and Books	0.164	0.135	.893	

*** $p < 0.001$.
** $p < 0.05$.
* $p < 0.01$.

The Catalog stage model is the only regression model to show only negative associations between features and conversion rate. This finding is consistent with the argument that visitors who browse extensively may never decide to purchase (Sismeiro & Bucklin, 2004; Sohrabi et al., 2012; Smith & Sivakumar, 2004). Consistent with industry reports from Bulkeley and Carlton (2000), discounts and free shipping actually relate negatively with purchase behavior. This probably means that firms with less effective business models resort to price competition as an ineffective strategy to convert visitors to customers. However, equally likely is the explanation that flow is broken when a special offer appears that is unrelated to the products examined or when one needs to go through a mandatory registration before proceeding (Richard & Chandra, 2005; Rosen & Purinton, 2004). The presence of subject tabs in web design shows a negative relationship with conversion rate. The ease with which the visitor is repeatedly able to self-reward by selecting new navigational options can make the path toward purchase less likely.

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5.3. Shopping Cart regression findings

Hypothesis 3 states that website features that enhance purchase intention are associated with levels of conversion rate in the Shopping Cart stage. The findings in the study support this hypothesis. Results indicate that the main predictor variables associated with conversion rate are Instantaneous Pricing, Provides Shipping and Handling Charges, and Offers Related Products. Each of these variables is positively associated with conversion rate. Return to Main Catalog and Order Tracking options are negatively associated with conversion rate; however, the *p*-values of these associations are weaker, meeting only the $p < .10$ standard for significance.

Most features in the Shopping Cart phase are positively associated with the conversion rate. This shift from negative associations in the Catalog phase occurs probably because the customer's pre-purchase intentions have been expressed through the action of entering the Shopping Cart (Rajamma, 2006). Once the customer arrives at the cart destination, flow once again influences the customer to continue to interact. Instantaneous pricing, including product costs, shipping, and taxes, reduces the level of uncertainty that the customer experiences, and allows the customer to stay in the flow state (Bulkeley & Carlton, 2000; Rajamma, 2006).

Once at the Shopping Cart destination, continued interactivity drives the customer through the sequences of the cart and on to purchase (Richard & Chandra, 2005). One explanation of the positive association between the suggestions for related products and conversion rate is the concept of bundling. The rationale of bundling is that the perceived consumer surplus will drive the customer to buy more than the original item considered (Liao & Tauman, 2002). By offering the customer a related product, possibly at a reduced price as Amazon.com does, the creation of consumer surplus could result in an increased conversion rate.

5.4. Checkout regression findings

The results support Hypothesis 4 which states that website features that enhance purchase intention would be associated with levels of conversion rate in the Checkout stage. The final model, representing the association between website features in the Checkout stage and conversion rate, resulted in two strong positive associations between the independent variables Human Contact Information and Instantaneous Pricing and Conversion Rate. A strong negative relationship appears between Email Address Required for Checkout and Conversion Rate. Finally, a negative association emerges between Design Changes and Conversion Rate; however, this association appears only at the $p < .10$ level.

6. Implications and directions for future research

This study provides evidence on the relationship between effective web design and consumer responses as measured by the conversion rate. The findings are subject to the numerous limitations inherent in conducting cross-sectional analysis at a single point in time with empirical data and preclude our making implications beyond the associations observed. For example, an association does not necessarily imply that web design features that incorporate flow cause increases in the conversion rate. However, the findings do indicate that websites with higher conversion rates are more likely to contain flow-enhancing features.

Prior studies identify flow as an important element of e-commerce. We provide empirical evidence suggesting that firms may consider the impact of flow when designing websites. Potential for future research falls into four themes. Future studies may examine website characteristics that enhance or impede flow. Other studies may explore ways in which users experience a state of flow in an e-commerce setting. An additional need for investigation from the user perspective concerns any potential differences in the manner in which interested consumers versus browsers experience flow. Finally, future studies may extend our analysis of the relationship between web design and standard e-commerce performance metrics such as conversion rate.

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