# TECHNOLOGY-ENABLED RETAIL SERVICES AND ONLINE SALES PERFORMANCE

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**ABSTRACT**

Drawing on the past literature on four retail service areas: *content management, customer management, multi-channel management,* and *visitor traffic management*, this research offers an empirical analysis of the relationships between these four service areas and the online sales performance of Web retailers. Using data from an independent source on the profiles as well as operational and sales performances of the top-ranked Web retailers, we map the retailers' online features into a unified conceptual framework that incorporates the above four broad areas, and empirically study their direct implications on online sales performance. The results show that the retailers' efforts in *content, customer*, and *multi-channel management* features have a significant positive impact on their online sales. However, while retailers expend considerable efforts on attracting visitors to their retail Web sites, our result is inconclusive regarding whether or not the *visitor traffic management* features have an impact on retailers' sales performance.

**Keywords:** Web retailing; e-services; IT-enabled services; e-commerce services; Web functionalities; e-tailing best practices

## 1. INTRODUCTION

The increasing popularity and quality of broadband Internet access as well as advanced Web technologies have allowed online retailers to provide flexible and competitive services to their existing and potential customers. These technologies allow retailers to build their online stores and services, and effectively deploy strategies in all aspects of their operations [37], [38]. Contemporary Web retailing is built around business opportunities that come with Web sites, communication networks, data resources, and application servers to ensure security, reliability, and quality of service that goes beyond simply Web site interactivity [18], [58]. Accordingly, Web retailers are increasingly employing new information technologies and innovative features for delivering service to their customers [20], [40], [53], [54], [55], [56]. These advanced technologies such as personalization, advanced search tools, product cataloging, and product visualization are just a few examples of the many retail Web site functionalities that have gained significant popularity among online retailers [16].

While the growing capabilities of such innovative IT-enabled services are revolutionizing the way online stores and services can be configured and marketed to customers, it is unclear whether or not the use of these advanced technologies on retail Web sites actually increases the sales performance. Prior studies on the impact of IT-enabled services have focused on one technology-supported service area separate from other areas, and thus, they are limited in terms of providing a broad perspective. Moreover, in the past, the actual sales performance data of online retailers were not readily available and thus were not analyzed in previous research.

With the plethora of new technologies, retailers continue to invest in technology-enabled Web functionalities and services with an expectation that their efforts will result in an increase in business performance. The relationship between the web site functionality and its effects on performance is an important topic with important implications for practitioners as well as academics [6]. In the current study, the inclusion of the actual online sales performance as the dependent variable differentiates this research from previous studies that do not address the key question: To what extent can web site functionalities be translated into revenues? As a result, this study advances our understanding of the business value of various e-commerce practices.

In this paper, drawing on the literature from four broad retail service management areas, namely, *content management* [10], [11], *customer management* [45], [47], [57], *multi-channel management* [26], [28], [44], [49], *and visitor traffic management* [36], [38], we offer an empirical analysis of the relationships between these four service management areas and the actual sales performance of online retailers. Using data obtained from an independent source on the profiles as well as operational and Web related performances of the 500 top-ranked Web retailers in the U.S. [29], we map the retailers' various IT-enabled online service features and functionalities into a unified conceptual framework that incorporates these four broad areas. Our goal is to measure those service management areas through the retailers' related IT-enabled online service features and functionalities, and empirically study their direct implications on sales performance.

The remainder of this paper is organized as follows: In the next section, we review the relevant literature and present our conceptual framework. In the following section, we provide a detailed description of the data we used in our empirical study. We then describe our model, analysis, and the results obtained. Subsequently, we present our discussions on the key results. Finally, we provide concluding remarks, limitations, and future research directions.

## 2. LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

Prior research into the success of online retailers has highlighted the importance of Web site design and implementation (e.g., [53], [54]). Chu et al. [16], for example, have provided an evolutionary perspective of e-commerce Web sites and developed

Received: May 25, 2009 Revised: July 25, 2009 Accepted: September 9, 2009

a conceptual framework to characterize such sites. Griffith and Krampf [25] studied the Web-based strategic objectives of the top 100 US retailers and identified three objectives: online sales, communication, and customer service. Liu et al. [36] explored factors associated with e-commerce Web site success and identified four factors that are critical: information and service quality, system use, playfulness, and system design quality. Similarly, Ranganathan and Grandon [46] examined the key characteristics of a business-to-consumer (B2C) Web site as perceived by online consumers. While all the above studies emphasize the importance of e-commerce Web site design, none of them comprehensively examine the various Web site features and functionalities in terms of their roles in key retail service management areas and their direct impact on the retailers' sales performance.

Furthermore, prior studies on IT-enabled retail services have focused on one particular technology aspect (e.g., content management) separate from others and primarily have examined user attitudes, trust and loyalty, acceptance, or satisfaction with those retail service features. Ahn et al. [2], for example, studied the relationship between Web quality factors and user acceptance behavior and found that Web quality, categorized into system, information, and service quality, has a significant impact on the perceived ease of use, playfulness, and usefulness in the context of online retailing. Babakus et al. [6] analyzed the impact of service and merchandise quality, mediated by customer satisfaction, on store traffic and revenue growth. The studies by Wallace et al. [57], and Kumar and Shah [35] also focus on customer satisfaction and/or loyalty in online and offline environments.

In this research, we contribute to the existing literature by providing empirical evidence that explains the relationship between retailers' sales performance and IT-enabled online services implemented by top online retailers. In order to do this, we identified four major retail service management categories: content, customer, channel, and traffic management. Then we represented these four service management categories using specific Web site features employed by the top online retailers. In order to categorize the Web site features into the four service management areas, we referred to relevant prior research (see, for example, [10], [11], [26], [28], [36], [38], [44], [45], [47], [57]) as well as practitioner-oriented guides to retail Web site design and usability [30]. Additionally, we examined how major vendors of e-commerce software for online retailers (e.g., Omniture/Mercado, Endeca, MICROS-Retail, Commission Junction, EasyAsk, Vignette, GSI Commerce, LinkShare, and Autonomy) defined and classified specific features in their products. Table 1 provides descriptions of these four retail service management areas and a comprehensive listing of the Web site features/functionalities within each area [29].

In the following sections, we provide a review of the literature related to the four retail service management areas that we used to develop our conceptual framework and perform the subsequent empirical analysis.

### 2.1 Content Management

In its broadest sense, content management is a combination of technology and business processes that allow businesses to effectively manage and deliver large amounts of diverse information to different media [23]. In today's competitive marketplace, online retailers consider content management as one of the top priorities in order to effectively meet the challenges of creating, using, and sharing relevant and up-to-date information with their business partners [39]. Content management determines the structure of a site, the appearance of the published pages, and the navigation tools provided to the users. It is the process behind matching what businesses possess to what their business partners and customers want by providing the creation, management, distribution, and publishing of information on their site [11]. For example, at the *Land's End* Web site, customers have access to extensive product information at their fingertips as well as the ability to zoom in on photo images that detail the product's craftsmanship (e.g., the grain of the leather, the sewing details on a dress shirt).

Online retailers must maintain up-to-date information on their products in order to preserve their credibility and their consumers' trust [56]. As the volume of information being published on Web sites continues to grow at a rapid pace, Web site content management becomes a mission-critical business solution [10], [27]. In the content management area, therefore, we focus on online strategies that enable retailers to present their products (or services) to customers. Our first hypothesis focuses on the relationship between the implementation of content management features and the actual sales performance of online retailers, formally stated as the following:

> **Hypothesis 1:** The extent of a retailer's content management-related Web functionalities is positively associated with its online sales performance.

### 2.2 Customer Management

Customer service management refers to the range of activities around creating and retaining the customer base. Results from past research indicate that customer management has a positive effect on customer satisfaction, purchase intentions, word-of-mouth recommendations, and market values [8], [21], [47]. With a vast number of online stores for consumers to choose from, successful retailers need to create a productive relationship with their customers. Internet technologies enable retailers to make service information available to customers at all times. These services go beyond online personal accounts where customers can track their order shipments, receive discount coupons, and/or obtain product/usage information. For example, retailers such as *Dell* allow customers to communicate with customer representatives using an online chat. Other retailers set up electronic bulletin boards, online circulars, and Web logs to allow customers to communicate with company experts and service representatives. Some retailers also employ customer loyalty programs such as store membership, point accumulation, and sweepstakes, to increase customer retention and enhance long-term customer relationships [12], [31], [32], [33], [52]. These services also enable retailers to obtain and analyze a large amount of information about their customers in order to further customize their product offerings and incentive programs.

Employing these strategies, however, can be both technologically and managerially challenging. The acquisition and maintenance of customers' preferences and private information requires expertise that involves dealing with privacy or security risks. These online services must also be tuned to provide fast and reliable performance, and, at the same time, to adequately safeguard customers' private information. Shopping risks that may compromise private information causes customers to lose trust in the retailer, which is one of the most critical criteria for consumers when they decide to shop online [46], [56].

As explained above, retailers employ various strategies and IT-supported service features and functionalities to provide customers with their shopping needs. The main purpose of these features is to ensure that customers have a satisfying shopping and purchasing experience with an online retailer, and that the derived customer satisfaction will bring them back to the retailer's Web site, thereby translating into more sales. Accordingly, we propose the following hypothesis:

**Hypothesis 2:** The extent of a retailer's customer management-related Web functionalities is positively associated with its online sales performance.

**TABLE 1 — Retail Service Management Categories and Related Web site Features**

| **Content Management** | |
|---|---|
| **Descriptions** | **Website Features** |
| ➢ Facilitates product presentation and product visualization<br>➢ Supports rich applications such as rich media, videocasts, syndicated content<br>➢ Provides product-related content in greater detail and convenient ways, such as top selling items, new items, daily deals or seasonal specials, online outlet centers.<br>➢ Helps customers create and share merchandise or merchandise related content, such as through wish lists, gift registries.<br>➢ Helps customers search and compare products and services, such as through key word and advanced search features, product comparison tools.<br>➢ Helps customers choose different options to personalize merchandise.<br>➢ Allows a retailer to target customers or personalize sites for customers based on their shopping and purchasing data. | • **Advanced Search**<br>• **Daily/Seasonal Specials**<br>• **Enlarged Product View**<br>• **Gift Registry**<br>• **Keyword Search**<br>• **Mapping**<br>• **Outlet Centers**<br>• **Product Comparison**<br>• **Product Customization**<br>• **Rich Media**<br>• **Syndicated Content**<br>• **Site Personalization**<br>• **Top Sellers**<br>• **Videocasts**<br>• **What's New**<br>• **Wish List** |
| **Customer Service Management** | |
| **Descriptions** | **Website Features** |
| ➢ Facilitates marketing and selling programs to customers, such as through coupons and rebate tools, online circulars.<br>➢ Facilitates customer service application that allows a retailer to communicate interactively, such as through live chat, emails.<br>➢ Provides customers with alternate payment services.<br>➢ Allows customers to post comments, suggestions, and complaints about products and services. | • **Alternative Payment**<br>• **Coupons/Rebates**<br>• **Customer Reviews**<br>• **Online Circular**<br>• **Online Gift Certificate**<br>• **Live Chat**<br>• **Social Networking** |
| **Channel Management** | |
| **Descriptions** | **Website Features** |
| ➢ Provides customers with alternate mechanisms for shopping and purchasing, such as with online quick catalog orders with item numbers.<br>➢ Provides auctions for marked down and discontinued merchandise.<br>➢ Provides customers with alternate mechanisms for merchandise fulfillment and returns.<br>➢ Provides customers with alternate convenient purchases, such as mobile commerce through PDAs, cell phones, etc. | • **Auction**<br>• **Buy Online/Pickup-In-Store**<br>• **Catalog Quick Order**<br>• **Mobile Commerce** |
| **Traffic Management** | |
| **Descriptions** | **Website Features** |
| ➢ Allows retailers to increase visits to their sites or conversion rates<br>➢ Facilitates programs to attract traffic to a retailer's site, such as through affiliate programs with commissions, email a friend, frequent shoppers reward programs.<br>➢ Manages traffic through online pre-order forms. | • **Affiliate Program**<br>• **Email a Friend**<br>• **Frequent Buyer**<br>• **Pre-Orders**<br>• **Store Locator** |

### 2.3 Multi-Channel Management

Multi-channel management, sometimes referred to as the "click-and-mortar" or "brick-and-click" strategy, involves the combined use of channels supported by the Internet and related technologies as well as the traditional, physical channels to serve the same market and customer groups [51], [57], [59]. Executing click-and-mortar strategies that bridge the physical and the virtual worlds has become essential to the online retailer's success [7], [26], [50] and can create new business opportunities for retailers [44], [48]. In addition, allowing customers to use multiple service channels (both online and offline) may translate into more service outputs, convenience, time saving, and reliability [19]. The multi-channel strategy provides customers with the advantage of real-time information with the flexibility to shop, pick-up, or return products at physical stores. As a result, a large number of retailers have made multi-channel service options available to their customers [24], [49]. This channel integration offers obvious benefits, such as cross-promotion, service innovations, shared information, customization, purchasing leverage, distribution economies, and longer relationships with customers [9], [26], [28]. These benefits, however, come with challenges regarding the right degree of integration as well as in the management of the multiple fronts without confusion and cannibalization effects [41], [42]. As a result, our third hypothesis addresses the impact that the multi-channel features have on the sales performance of online retailers.

> **Hypothesis 3:** The extent of a retailer's multi-channel management-related Web functionalities is positively associated with its online sales performance.

### 2.4 Visitor Traffic Management

Another key retail service component that has received much attention among the academic community and practitioners is how to attract potential customers to retail sites. Retailers exert significant effort to attract new customers as well as retain existing customers [6], [13], [45]. These efforts, often referred to as visitor traffic management strategies, include online features and advertisements that help bring customers to the retail Web site, as well as IT capabilities that are implemented to ensure the Web site's availability and fast response time. Much effort has been made to bring potential customers to visit a retail Web site with an expectation that an increase in the Web site traffic will generate an increase in sales [15]. Past studies have investigated the impact of Web site traffic management using various online mechanisms. For example, Ansari and Mela [4] examined the use of customized advertising through emails, online banners, and affiliate Web sites, collectively called external customization, to attract potential customers to a Web site. Their study included both retail and non-retail Web sites such as *Amazon.com*, *Morning Star*, and the *New York Times*, all of which regularly send out emails to potential consumers that contain links back to their Web sites. Dréze and Zufryden [22] proposed a scheme to measure the "online visibility" of a retail site and thus allow Web sites to assess their Web presence relative to their competitors.

With the increasing competition among online retailers, capturing the attention of potential consumers has become a critical task. According to recent studies, more than 80% of Internet traffic goes to less than 0.5% of Web sites [1]. Apparently, online retailers face fierce competition not only in offering products and services, but also in gaining consumers' recognition. This concentrated traffic flow suggests that the retailer's first and foremost task may be to inform potential customers about their Web presence and the products they offer. Many retailers attempt to increase the traffic flow into their stores through online advertisements on well-known portals such as online news or other retailing sites.

Given the extent of retailers' efforts in attracting more visitors to their sites, the underlying expectation is that increasing the number of visitors should contribute to sales. Consequently, we suggest the following hypothesis:

> **Hypothesis 4:** The extent of a retailer's visitor traffic management-related Web functionalities is positively associated with its online sales performance.

### 2.5 Conceptual Framework

Figure 1 shows our conceptual framework based on the above four hypotheses. In order to avoid model misspecification and to ensure that possible alternative explanations for variations in sales performance are incorporated, we also include four control variables.

First, we control for the *product variety* offered by a retailer using the number of stock keeping units (SKUs; log transformed variable). Second, we control for the *age of retailer* by using the number of years the online retailer has been in business. As mentioned in the existing literature (e.g., [14]), a retailer's reputation and the trust developed between consumers and retailers can play an important role in purchasing decisions. Reputation and trust is usually accumulated over time; therefore, we use the online retailer's age to control for possible confounding effect. Third, we control for the *type of retailer* based on information about whether a particular retailer is Web-Only or not. Fourth, to account for a possible variation across merchandizing categories, we control for the *product category* in which the retailer operates.

## 3. EMPIRICAL ANALYSIS

In order to test our hypotheses, data was obtained from *Internet Retailer* [29], which ranks America's 500 largest online retailers based on their 2006 annual online sales. The data set also provides the retailers' background information, sales performance, and other Web-related profiles (see Table 2 for a portion of the data for the top 10 Web retailers). While there were more than ten thousand Web retailers operating in the U.S. in 2006, the top 500 retail Web sites together accounted for $83.6 billion of the nation's $136.2 billion online sales (or about 61.38%). These top 500 retailers include both public as well as privately-owned companies. In addition, many online retailers are part of a larger business conglomerate. For example, *Peapod.com*, ranked at number 45 in our 2006 data set, is a subsidiary of *Royal Ahold*, a multi-brand corporation whose annual financial report usually includes only very limited information, if any, specific to *Peapod.com*. As a result, their business performance is not publicly available. To the best of our knowledge, the *Internet Retailer* report is the only source of cross-sectional, comparative data for these online retailers.

Store-based retail chains contributed close to 41% of all online sales reported by these 500 Web merchants in 2006, while Web-Only retailers, catalogers, and consumer brand manufacturers

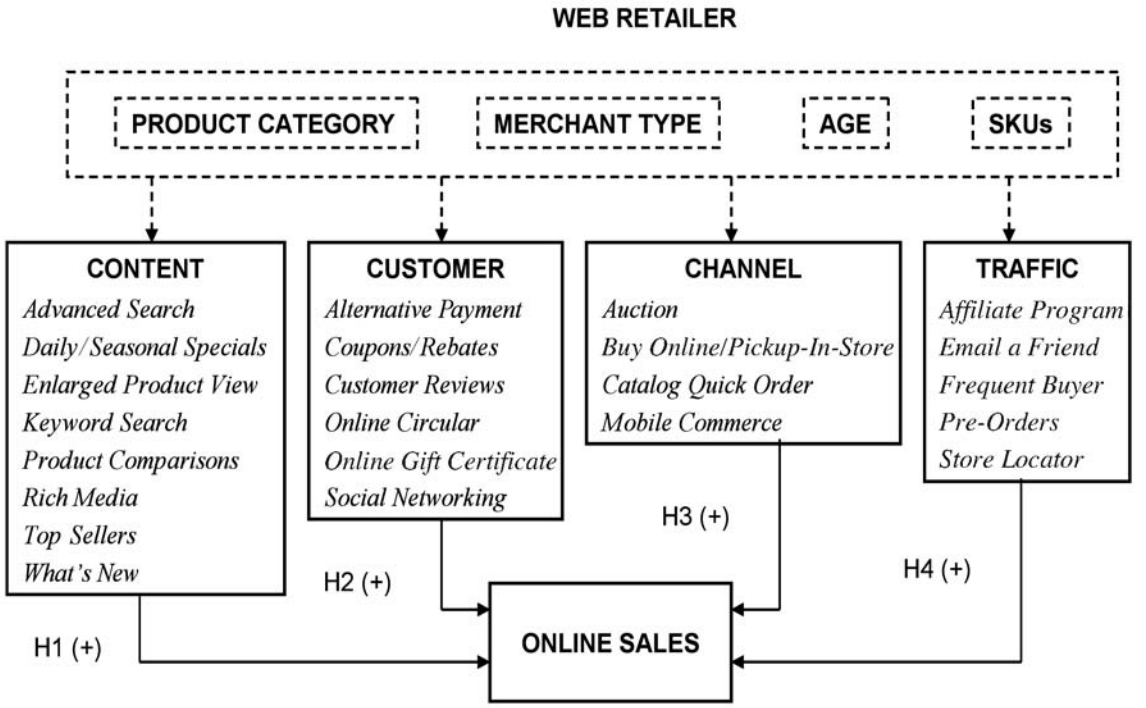


**FIGURE 1 — Conceptual Framework**

**TABLE 2 — Profiles of the top 10 Web retailers [29]**

| Retailer | 2006 Sales (US$ million) | Web SKUs | Year Launched | Product Category | Merchant Type |
|---|---|---|---|---|---|
| *Amazon.com Inc.* | 10,710 | 10,000,000 | 1995 | Mass Merchant | Web-Only |
| *Staples Inc.* | 4,900 | 42,000 | 1998 | Office Supplies | Non-Web-Only |
| *Office Depot Inc.* | 4,300 | 200,000 | 1998 | Office Supplies | Non-Web-Only |
| *Dell Inc.* | 3,965 | 60,000 | 1996 | Computer/Electronics | Non-Web-Only |
| *HP Home and Home Office* | 3,055 | 100 | 1998 | Computer/Electronics | Non-Web-Only |
| *OfficeMax Inc.* | 2,849 | 40,000 | 1995 | Office Supplies | Non-Web-Only |
| *Sears Holdings Corp.* | 2,376 | 150,000 | 1998 | Mass Merchant | Non-Web-Only |
| *CDW Corp.* | 2,001 | 131,000 | 1995 | Computer/Electronics | Non-Web-Only |
| *SonyStyle.com* | 1,690 | 200,000 | 2000 | Computer/Electronics | Non-Web-Only |
| *Newegg.com* | 1,500 | 95,852 | 2001 | Computer/Electronics | Web-Only |

accounted for 31%, 14%, and 14%, respectively. After excluding the missing data cases, data from 331 retailers were retained for further analyses. Among the remaining retailers, a total of 180 (54.38%) are owned by Web-Only retailers, 75 (22.66%) by store-based retail chains, 59 (17.82%) by cataloguers, and 17 (5.14%) by consumer brand manufacturers. The average size of these remaining retailers was approximately $204 million in sales. Merchandizing categories represented in this remaining data set include: apparel and accessories (12.69%); specialty/non-apparel (15.41%); housewares/home furnishings (12.39%); computer/electronics (12.99%); hardware/home improvement and office supplies (10.57%); mass merchants (6.65%); books/CDs/DVDs, sporting goods, and toys/hobbies (13.60%); food/drug and health/beauty (9.36%); and flowers/gifts and jewelry (6.34%).

To summarize, the following variables were extracted from the data for our study: 2006 *Annual Sales* (Ln *2006Sales*); *Age* (i.e., the number of years that the online retailer has been launched); *SKUs* (i.e., the number of stock keeping units); *Web-Only* (i.e., whether or not the retailer is a Web-only business); *Product Category*; and a list of 32 retail Web site features and functionalities. In the *Internet Retailer's* survey, each retailer was asked in a questionnaire to list specific online features they have implemented on their Web sites. These Web site features and functionalities are the most commonly found among online retailers. Even though the actual number of features and functionalities varies among online retailers, all retailers who took part in the survey employed at least some of them. Subsequently, we categorized these Web site features and functionalities into

**TABLE 3 — Descriptive Statistics and Correlations (n = 331)**

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|
| 1. Sales Performance (Ln *2006 Sales*) | 1.00 | | | | | | | | |
| 2. E-Retailer Age | 0.24* | 1.00 | | | | | | | |
| 3. E-Retailer Product Variety (Ln *SKUs*) | 0.23* | 0.03 | 1.00 | | | | | | |
| 4. E-Retailer Type (*Web-Only*) | -0.29* | -0.23* | 0.07 | 1.00 | | | | | |
| 5. E-Retailer Product Category | 0.00 | 0.07 | -0.02 | -0.06 | 1.00 | | | | |
| 6. Content Management | 0.38* | 0.15* | 0.17* | -0.19* | 0.02 | 1.00 | | | |
| 7. Customer Management | 0.46* | 0.12† | 0.14† | -0.20* | 0.05 | 0.51* | 1.00 | | |
| 8. Multi-Channel Management | 0.36* | 0.19* | 0.09 | -0.42* | 0.06 | 0.23* | 0.39* | 1.00 | |
| 9. Traffic Management | 0.31* | 0.13† | 0.12† | -0.48* | 0.10 | 0.44* | 0.47* | 0.37* | 1.00 |
| Mean | 17.50 | 7.33 | 9.88 | 0.53 | 5.39 | 0.70 | 0.44 | 0.15 | 0.46 |
| Standard deviation | 1.47 | 2.27 | 2.44 | 0.50 | 3.00 | 0.19 | 0.26 | 0.17 | 0.25 |

*$p < .01$; † $p < .05$; ‡ $p < .10$

content management, customer management, multi-channel management, and visitor traffic management components (see Table 1). As mentioned earlier, in order to categorize the features into the four service domains, we referred to existing literature (see, for example, [10], [11], [26], [28], [36], [38], [44], [45], [47], [57]), practitioner-oriented guides to retail Web site design [30], as well as documentations of major vendors of e-commerce software.

In order to further validate this classification, we followed the two-step procedure recommended by Anderson and Gerbing [3]. First, we used exploratory factor analysis (EFA) in SPSS 16.0 to assess the features individually for each component. Given the dichotomous nature of these variables, we conducted EFA using tetrachoric (rather than Pearson) correlations as inputs as suggested by Knol and Berger [34]. After the removal of 9 features, the remaining 23 features yielded proper and significant loadings with their respective components (i.e., higher than 0.40), with no cross-loadings. To verify that the remaining features did not provide the four-factor model fit randomly, we also ran confirmatory factor analysis (CFA) using the AMOS 6.0 program [5]. CFA revealed that all 23 features yielded factor loadings higher than 0.40 with their respective components, normalized residuals of less than 2.58, and modification indices of less than 3.84 [3]. Consequently, no additional features needed to be removed in order to improve the four-factor model fit. Figure 1 illustrates the final set of 23 features used in subsequent calculations and analyses.

We measured the four components based on the feature composition of the Web site features/functions. For each retailer, we calculated a score based on the number of service features the retail Web site offered in each of the four service components. To obtain the score of each component, we divided the number of features offered by a Web retailer in a category by the total number of features in the corresponding category. For example, *Toys 'R' Us*, which offers seven out of eight content management features, scored 0.88 out of maximum 1.0 on the content management dimension. On the other dimensions, *Toys 'R' Us* received 0.83 out of 1.0 (five of six features) for customer service management, 0.25 out of 1.0 (one out of four features) for multi-channel management, and 0.60 out of 1.0 (three out of five features) for traffic management.

## 4. ANALYSIS AND RESULTS

We used hierarchical multiple regression analysis to test our hypotheses [17]. Table 3 reports the descriptive statistics and correlation matrix of all variables used in this study. It is worth noting that without the log transformation, the average for 2006 is 167.4 million dollars in annual sales and 3.8 million for the stock keeping units.

Diagnostics of multiple linear regression models were performed to check for violation of assumptions. A residual plot against the fitted values was examined in order to evaluate the suitability of the multiple regression equation and constancy of error variance. The residual values are scattered around zero, which suggests that the linearity assumption is met. The residuals were also plotted against each predictor variable to determine the constant variance assumption and the sufficiency of the regression model with respect to the predictor variable. Randomly scattered residual values along the range of predictor variables suggest a good fit and a constant variance of error terms. As such, the normality assumption was met according to the normality plot. The presence of potential multicollinearity problems among predictor variables was evaluated using the variance inflation factor (VIF). The VIF for each regression coefficient is well below the recommended threshold of 10 [45] (i.e., lowest = 1.06; highest = 2.08), and thus multicollinearity is not an issue in our model.

In addition, several methods recommended by Neter et al. [43] were employed to detect outliers and influential observations. We tested for Y-outlier cases by comparing studentized deleted residuals against the Bonferroni critical value ($t[1-\alpha/2n; n-p-1]$), where $p$ is the number of estimated parameters and $n$ the number of observations. The highest studentized deleted residual value of 2.5 is smaller than the critical value of 3.65 ($t[.9998; 322]$). Therefore, evidence of Y-outlier is not present.

The X-outlier cases were also tested by comparing the leverage of each case against the critical value (2p/n). Influential cases were identified by comparing DFFITS against critical value ($2\sqrt{(p/n)}$) where DFFITS should be smaller than the critical value. The Cook's Distance of each case was used to calculate the percentile value in F(p,n-p) distribution. The percentile value of each case should be less than 10 percent to conclude that the case is not influential [45]. Eleven cases had leverage values greater than the criterion value (0.05), with 0.075 being the highest. We determined the influence of these 11 cases by considering their DFFITS and Cook's Distance values. All of them have DFFITS values well below the critical value of 0.31, and Cook's Distance values lower than the 1st percentile of F(8, 323) distribution. Therefore, the outlying cases are not influential and do not require any remedial action.

In Table 4, we show the regression results for two nested models that include different groups of variables. Model 1 contains only the control variables; Model 2 adds the impact of content management, customer management, multi-channel management, and traffic management. Model 2 explains significantly more variance in the dependent variable (i.e., sales performance) than Model 1 ($\Delta R^2 = 0.156$; $\Delta F = 17.7$; $p < 0.01$).

The findings in Model 1 show that the retailers' age of launch is positively related to their level of sales performance ($t = 3.297$; $p < 0.01$); that is, all else being equal, younger retailers are outperformed by their older counterparts. Furthermore, the findings indicate that in general, retailers who run Web-Only operations enjoy a lower level of sales performance than other online merchant types ($t = -4.952$; $p < 0.01$). Conversely, we found that the number of SKUs is positively associated with the level of sales ($t = 4.653$; $p < 0.01$). Retailers with high SKUs tend to perform better in terms of sales when compared with those with low SKUs. We hypothesized that the four management components all have positive effects on online retailers' level of sales. Based on the results listed in Model 2, three of the four hypotheses are supported with different levels of significance: content management is positively related to sales performance ($t = 2.468$; $p < 0.01$; H1 is supported); customer management is positively related to sales performance ($t = 4.893$; $p < 0.01$; H2 is supported); and multi-channel management is positively related to sales performance ($t = 2.222$; $p < 0.01$; H3 is supported). However, we found no significant relationship between traffic management and sales performance (H4 is not supported).

**TABLE 4 — Regression Results**
**Dependent Variable: Sales Performance (Ln *2006 Sales*)**

| | Model 1 | Model 2 |
|---|---|---|
| E-Retailer Age | 0.115* | 0.084* |
| | (3.297) | (2.654) |
| E-Retailer Product Variety (Ln *SKUs*) | 0.146* | 0.100* |
| | (4.653) | (3.413) |
| E-Retailer Type (*Web-Only*) | -0.782* | -0.470* |
| | (-4.952) | (-2.747) |
| E-Retailer Product Category | -0.011 | -0.017 |
| | (-0.439) | (-0.748) |
| H1: Content Management | | 1.116* |
| | | (2.468) |
| H2: Customer Management | | 1.647* |
| | | (4.893) |
| H3: Multi-Channel Management | | 1.058* |
| | | (2.222) |
| H4: Traffic Management | | -0.305 |
| | | (-0.832) |
| $R^2$ | 0.175 | 0.331 |
| $\Delta R^2$ | | 0.156 ($p < 0.01$) |

Unstandardized coefficients (t-values)
*$p < 0.01$; † $p < 0.05$; ‡ $p < 0.10$

## 5. DISCUSSION

Our study evaluates how IT-enabled services commonly used by top online retailers translate into an increase in online sales. Implementation of these online features such as product visualization, social networking, and sophisticated search engines requires a substantial investment by the retailers. Specifically, we examine whether or not these features and functionalities have helped increase the sales performance of the retailers. Our results indicate that online services related to content, customer service, and multi-channel management can, in fact, increase online retail sales. The first three service areas (i.e., content, customer service, and multi-channel management) are related to the services offered to online customers already visiting the retail Web sites. The fourth service area (i.e., traffic management) focuses on strategies designed to help generate additional Web site visits.

Regarding the traffic management component, our results indicate that the specific traffic management features included in our model do not lead to an increase in sales. This could be due to the fact that affiliated "educational" web sites and email advertisements have an apparent commercial objective and may be perceived unfavorably by potential customers [14]. However, unlike content, customer service, and channel management components, some traffic management strategies used by online retailers are not implemented solely by the individual retailers, but through partnership with other companies. For example, many retail web sites work with search engines such as Google or Yahoo to help direct Web traffic to their portals. Based on our results, retailers may want to re-consider their traffic management strategies and focus their efforts more on these partnerships with search engines.

Consumer trust and brand awareness also appear to play an important role in our other finding that newer, and thus less well-established, retailers were outperformed by older, possibly more established retailers. Our finding also emphasizes the importance of multi-channel strategies as Web-Only retailers were outperformed by retailers offering both online and traditional channels. Additionally, our empirical results substantiate theoretical findings from past studies (see, for example, [44] and [48] show that channel integration strategies such as in-store order pick-up can create additional business opportunities for retailers). We also observe variety-seeking behavior in online consumers as our results indicate that retailers with a higher number of SKUs tend to perform better than retailers with a smaller number of SKUs.

Although we cannot offer a formulaic prescription that guarantees a retailer's success, our study shows strong evidence that the business values of these online service features are positively linked to sales performance. In other words, our results should alleviate a retailer's concern over whether or not these IT-enabled

service implementations are financially worthwhile. Specifically, our results indicate that retailers should consider implementing online features that help customers locate the products they want (content management) as well as those that allow retailers to enhance their service while possibly reducing customer-related service costs (customer service management). Results from our study should also encourage retailers to take advantage of both off-line and online channels for product delivery and return (channel management), a practice that evidently contributes to the retailer's financial return. Moreover, as described in our study, a majority of top online retailers employ at least several of these service features on their web sites. As a result, consumers will likely come to expect these services from other web sites they visit, thus making it mandatory for all retailers to implement these technologies.

Our study results are not without limitations. Our data set is based on a secondary source that includes publicly- as well as privately-owned companies. Moreover, many online retailers are part of larger business enterprises that do not report financial performances of their subsidiaries. Therefore, it is not possible for us to complement this data set with other sources to obtain a more comprehensive analysis. In addition, further examination that includes a longitudinal analysis, when additional data become available, is needed in order to provide greater insight into our current results which are based solely on cross-sectional data.

## 6. CONCLUDING REMARKS, LIMITATIONS, AND FUTURE RESEARCH

In this research, we identify and categorize IT-enabled services that are commonly used by the top 500 online retailers. We contribute to the literature on online retailing by providing empirical evidence that explains the relationship between retailers' sales performance and the IT-enabled online services implemented on their Web sites. We also provide a unified framework that encapsulates online services on retail Web sites in four broad service management areas. We recognize that the specific online services analyzed in our study are only a few among the many online features currently implemented by Web retailers. There certainly are other online features that are designed to improve services in the four management areas. We believe that our conceptual framework can be extended to evaluate these other online features in future research. Future research will also benefit from a longitudinal study that combines multiple years of data to study trends in IT-enabled Web features and their long-term impact on retailers' business performance.

In addition, our study focuses on large online retailers with a relatively high number of product offerings. The sophistication and depth of online services used by these retailers may be too costly and complex to be viable for smaller retailers. Some small, yet very successful, online retailers maintain their Web sites less elaborately with only essential service features. We do not dispute their success or doubt the appropriateness of their simplified service strategies for small businesses; however, we do believe that these simplified strategies are also consistent with our conceptual framework because it emphasizes the importance of the content, customer service, and multi-channel management of retail Web sites.

As outlined in our literature review, past studies have tended to focus narrowly on one or a few online features (e.g., on customer management features), and thus provide an in-depth analysis of only the few specific features that they studied. This research, on the other hand, provides a broad framework that consolidates these specific features/functions into four areas. Future studies on the quality of the specific features/functions and the retailer's financial performance would certainly be valuable additions to our current research.

Finally, as emphasized in our results, we expect future research to address more extensively the implementation and benefit of multi-channel strategies. As sophisticated mobile devices and wide-area broadband Internet connection become more popular among customers, managing multiple retail and marketing channels will be among the service components most essential to online retailing.

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