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Amitava Dutta

George Mason University, adutta@gmu.edu

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Amitava Dutta
George Mason University
adutta@gmu.edu

Nirup M. Menon
George Mason University
nmenon@gmu.edu

ABSTRACT

Firms have leveraged the Internet in innumerable ways to derive business value from this technology. However, one class of firm that is distinctively dependent on this platform is the online retailer or eTailer. One aspect of this distinctiveness is that eTailers depend on their Web portals to attract customers, engage them in purchase activities, and execute transactions connected with a purchase ultimately leading to revenue generation. In this study, we wish to examine the informational determinants of this customer interaction and their relationship to eTailer revenue. We propose a two-phase path model of customer acquisition leading to revenue generation. Informational determinants are included in the path structure. The model is empirically tested using a dataset of 500 eTailers. The results indicate that the model is able to explain a large proportion of the variability in financial performance of these eTailers. We find that the type of information made available on the eTailer's website, along with transactional capabilities and customizability, significantly correlate with customer acquisition. Analytical capability correlated significantly with the transition to phase two – which we refer to as conversion. These findings have implications for information technology governance within firms as they manage their IT investments to deliver maximum value.

Keywords

Online retailer, customer acquisition, portal functionality, financial performance.

INTRODUCTION

Organizations continue to make ever more widespread use of the Internet to carry out common business activities with customers, suppliers, and other business partners. While the nature and extent of Internet use varies across organizations, one class of organization is especially dependent on this technology. These are the so called Internet retailers or eTailers. A distinctive characteristic of these companies is that their Web portals and the Internet is the primary platform for them to ply their wares, solicit customers, execute purchases and otherwise maintain relationships with their customers. These are the activities that, ultimately, lead to revenue generation. It therefore stands to reason that the information-based functionalities of their Web portals will play an important role in these customer interactions and revenue generation. There is an extensive body of research that examines a variety of consumer behaviors at eTailer websites. It is not possible to enumerate all the different types of studies, but some examples will illustrate the variety. Some studies, for instance, use the technology acceptance model to explain consumer's use of a portal (e.g. Chen et al., 2002). Others have examined the effect of portal layout on customer behavior (e.g., Vrechopoulos and Atherinos, 2009; Kim et al., 2007; Jiang and Benbasat, 2007). Sia et al (2009) establish the importance of incorporating cultural factors into website design, and the effectiveness of recommender systems has been investigated in Xiao and Benbasat (2007). A few relationships between website features – informational and transactional – have been studied (Mithas et al., 2006), but other important features and relationships are yet to be studied. To include a broader set of features and relationships, we take a process view of revenue generation by an eTailer, which consists of customer acquisition, conversion to a purchase, followed by retention of the customer for multiple future purchases. With this process in mind, we wish to examine the relative impact of different information-based functionalities of the eTailer's portal on this revenue generation process. We test the model empirically and, based on the results, discuss implications for the design and implementation of such Internet based systems by eTailers.

A small example would be helpful in setting the stage for our investigation. 1-800-flowers is a quintessential eTailer – its Internet portal is the focal site for customer interactions and revenue generation. The portal for 1-800-Flowers, pictured in Figure 1, shows that a lot of the content is information in that it tells the consumer about products and services provided by this company. Some of this information is static, such as pictures of flower arrangements. Other content is dynamic, such as an audio or video clip from a famous personality promoting 1-800-flowers, or the status of a customer order. Other content

clearly involves a two-way interaction between the customer and 1-800-Flowers, such as various payment functions and the functions 'Catalog quick order', and 'Flower Blog' in Figure 2. The website offers search capability, as in determining the availability of a certain type of flower arrangement for a specific day and occasion and at a specific location. Affiliates programs are particularly popular with eTailers given the ease with which electronic links can be established between the two entities. On the other hand, there are no sophisticated recommender systems on this portal as there are on, say, Amazon.com. For example, on the latter portal, when you buy a book, the system offers recommendations about other books bought by customers who also bought the book you just bought. Moreover, a visitor to 1-800-Flowers cannot customize their experience at the portal. By comparison, at Amazon.com, when a registered customer logs in with their username and password, the system comes back with recommendations based on the user's profile and preferences and provides your recent browsing history at the portal.
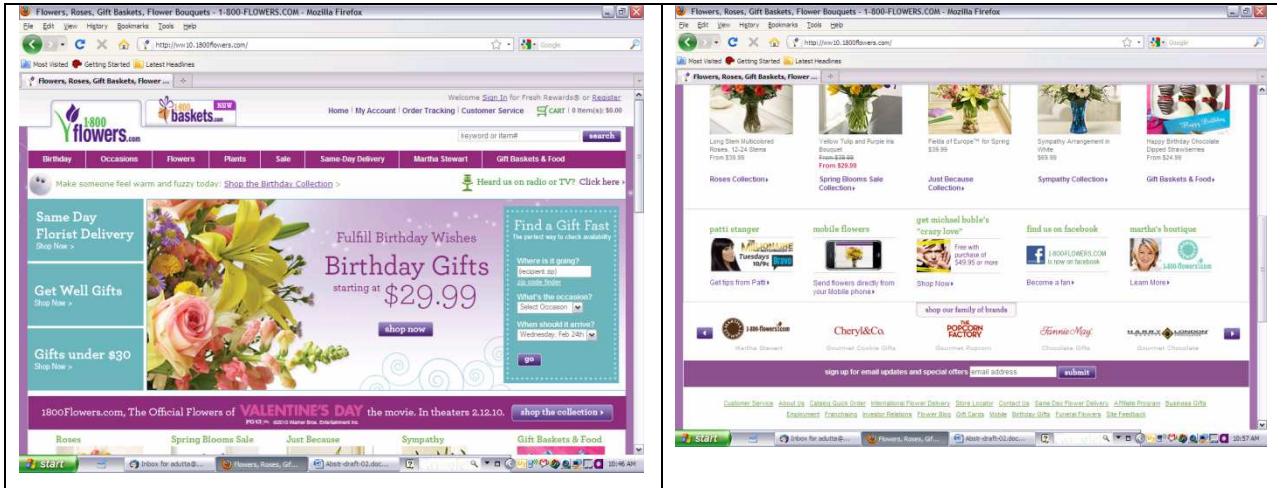

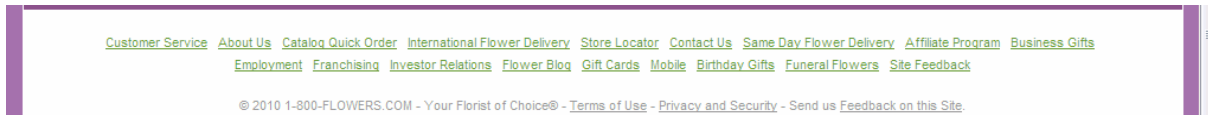**Figure 1. Web Portal of 1-800-Flowers.**

Figure 2. Specific Functions Available at 1-800-Flowers Website

In short, there are different types of information based functionalities manifested in the web portals of eTailers. With the help of these functionalities, the firm goes about acquiring customers and getting them to convert to revenue generating entities. We wish to examine this linkage between the functionalities, the customer acquisition process and revenue generation. By doing so, we hope to get a better understanding of which aspects of the content architecture of these portals have a significant impact on customer acquisition and revenue generation.

MODEL

Our conceptual model of eTailer customer acquisition and revenue generation is shown in Figure 3. We first present the constructs of the model, linkages among these constructs, and how they are measured in the dataset. The theoretical basis for the model follows thereafter. Our model hypothesizes that, for an eTailer, revenue generation is realized through a multiphase interaction with customers. The first phase, which we name Acquisition Capability, occurs when new customers visit the eTailer's site. The ability of an eTailer to attract traffic to its website is known as the Acquisition Capability. While there would be many drivers of this capability, we are specifically interested in the information based functionalities in the portal that would drive this construct. We hypothesize that there are four such constructs, which we name Information Capability, Transaction Capability, Customization Capability and Analytical Capability respectively. Our conceptual model looks to extend prior literature in two ways. First, we extend the model of information technology infrastructure, e-commerce capability and financial performance (Zhu 2004) to include additional capabilities. The model proposed by Zhu (2004) directly related e-commerce capability (comprised of information, transaction, customization, and backend integration capabilities) to financial performance. It does not delve into the details of how financial performance is realized from the business processes. We add such details in this paper. The second way in which we extend prior literature is that we extend the process-oriented view of business value generated by information technology investments such as (Barua et al., 2004)

with customer-based capabilities of a firm. The model proposed by Barua et al. (2004) associates customer-based information capabilities to financial performance. We extend their model by proposing a phased approach to the association between customer-based capabilities and financial performance.

Information refers to a variety of static and dynamic content that is available to a customer when they visit the website. The distinguishing feature of this capability is that this is primarily one-way communication from the eTailer to the online customer. eTailers provide product comparisons, product reviews, customer self-help portal, etc., that enable customers to inform themselves. Such ancillary services on a website play an important role in affecting customer purchasing behavior (Cenfetelli et al., 2008; Wang and Benbasat, 2007). It was also found that website presentation flaws affect user perceptions of website quality and, ultimately, their intention to purchase (Everard and Galletta, 2005). Transaction refers to a two-way electronic interaction between the eTailer and the customer. The purpose of website features such as express checkout and mapping is to enable a purchase transaction, either electronically or physically. Payments must be made and goods/services ordered and delivered. Customization is measured in our model by the ability of the eTailer's portal to allow the customer to both personalize what they see on the website and to articulate customized needs. On 1-800-Flowers, for example, one can ask for flower arrangements for a particular occasion, such as birthdays. Analytical Capability refers to the eTailer's ability to analyze enterprise data to facilitate various business objectives, including the acquisition of new customers. This capability increases by the use of customer relationship management and web traffic analysis. After all, one must have the customer-centric data to analyze as well as the technical capacity to actually carry out the analysis.
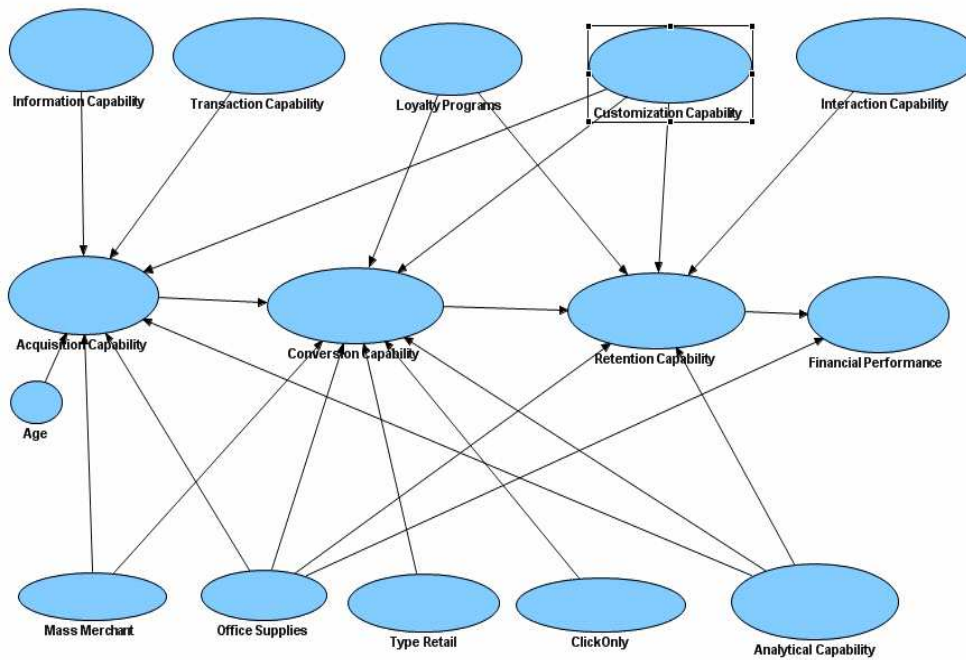

Figure 3. A Path Model of Customer Acquisition and Revenue Generation

The phase following Acquisition is named Conversion Capability. Usually, only a small fraction of the visitors to a portal actually engage in revenue generating activity. Conversion captures the transition for a customer from being a mere visitor to becoming a first time revenue generator. Of course, one of the major determinants of Conversion Capability, per our process view of revenue generation, is Acquisition Capability. We hypothesize that, in addition to Acquisition Capability, loyalty programs available on the portal, Customization Capability, and Analytical Capability drive Conversion Capability. Users have been found to be receptive to personalized content on the websites of online retailers and find it useful as a decision aid (Tam and Ho, 2006). This can contribute to getting a visitor to actually buy after visiting the portal. In our conceptual model, Conversion Capability is followed by a phase, which we name Retention Capability, which captures repeat customers and their revenue generating activities. It is measured by the number of customers who return to the portal. In addition to Conversion Capability, we hypothesize that the other major drivers of Retention Capability are the Customization Capability, the Analytical Capability, and a third construct which we have named Interactivity Capability. This latter construct is

measured by the presence/absence of social media functionalities on the eTailer's portal, and the presence/absence of recommender and rating software agents. The rationale for this construct is to capture IT based mechanisms by which the eTailer stays engaged with the revenue generating customer on an ongoing basis in order to encourage and sustain continued revenue generation. Interactivity of product presentations has been shown to affect customers intentions to return to an online site and purchase (Jiang and Benbasat, 2007). Customer generated feedback can be very useful in building trust and ultimately generating revenue producing transactions. This kind of information or interactive capability should therefore have a positive influence with conversion and loyalty (Pavlou and Dimoka, 2006). Our final dependent variable is the revenue generated (Financial Performance) and is measured by eTailer's sales. There are a number of control variables in the model, as shown in Figure 3. These control variables are age of the company (year launched), the type of products sold (mass merchant or office supplies), and eTailer selling model (retailer and pure click).

DATA

The data for this research was obtained from the publication called the Internet Retailer Top 500 2008 edition, published by Vertical Web Media. This company surveys the top 500 retailers by revenues on the features of information systems and characteristics of the company. The broad categories of data are customer service features, payment features, vendor used, website features, website summary, and operational, marketing and financial performance. There is a total of 109 data items in these eight categories. Most items in the customer service features, payment features, and website features are binary items; the item was coded 1 if the feature is present, otherwise it was coded 0. All binary items were used as-is. A few variables that were multinomial were converted into binary variables. Two items, conversion rate and return shoppers, were present in data in percentage terms. An item, the Number of Converted Shoppers, was created by multiplying the conversion rate by the number of unique monthly visitors. Another item, the Number of Return Shoppers, was created by multiplying return shoppers by the Number of Converted Shoppers. These transformations were done because the Acquisition Capability and the Financial Performance constructs were weighted by items that were measured in number of customers and sales dollars, rather than as percentages.

We mapped the 109 items into the constructs of our model. Since there is no apriori reason to believe if the items mapped to a construct would covary, each latent construct was defined as a formative (rather than reflective) construct following the norm in this type of research. Next, we dropped items that had a skewed distribution in the data, i.e., over 80% was 1 or 0. The reason for dropping items with a skewed distribution is that these items would not help much in explaining the variance of the outcome variables – for e.g., almost all companies had a toll free 800 number. Other examples of dropped items are presence of frequently asked questions, keyword search, wiki, order management, etc. In all, we dropped 27 items. The only item retained from items with more than 80% distribution on one value was Web Analytics because there is currently a great deal of interest in practice on analytics based capabilities of firms. Thereafter, we ran the partial least squares (PLS) analysis for our model using the SmartPLS software (Ringle et al., 2005). One of the problems that can affect the performance of a PLS result is a high correlation between an item and the construct to which it is mapped as well as between the item and other constructs to which it is not mapped. Similarly, a low correlation of an item on the construct that it is mapped to, as well as to other constructs, indicates that the item is not contributing to the model's explanatory powers as we surmised it would. We used a cutoff of 0.4 to decide whether or not a correlation was high. Items that suffered from high cross-loading on other constructs or low correlation with all constructs were dropped from the further analysis. We were left finally with 29 items for the ten constructs of the model.

Finally, we also dropped observations with missing data. For example, over 150 observations were missing data on the percentage of return shoppers. After dropping missing variables, the data contained 341 observations. The mean and standard deviation of the items are presented in Table 1, Descriptive Statistics.

RESULTS

After the PLS model was finalized, we ran it once more for the results that are presented on Table 2 and Table 3. To obtain the significance of the estimates, a bootstrapping method was used. We set the number of observations to 500 (thereby allowing sampling with replacement of the original 342 observations) and the number of samples to 200. Table 2 shows that the regression weights of Account Status Feature, Comparison Feature, Coupon Feature, and Syndicated Content Feature are significant and positive, highlighting that the Information Capability is primarily about customers being aware of the amount that they currently owe, which products are better, whether discounts are possible, and does a third party provide valuable information.

Table 1. Descriptive Statistics of Items

Item	Mean	Standard Deviation
Account Status Feature	0.542	0.027
Comparison Feature	0.240	0.023
Coupon Feature	0.686	0.025
Customer Relationship Management Feature	0.583	0.026
Product Customization Feature	0.340	0.025
Customer Review Feature	0.436	0.026
Express Checkout Feature	0.741	0.023
Frequent Buyer Feature	0.328	0.025
Mapping Feature	0.407	0.026
Monthly Email Campaigns	7.296	0.424
Monthly Email Incentives	4.882	0.332
Monthly Unique Visitors	2299296	259250
Monthly Visits	5185230	870448
Outlet Store Feature	0.624	0.026
Payment Processor Feature	0.706	0.024
Personalization Feature	0.598	0.026
Customer Ratings Feature	0.448	0.026
Recommendation Feature	0.700	0.024
Sales Volume in 2007	285995	54589
Number of Converted Shoppers	68139	8032
Number of Return Shoppers	28783	5878
Social Media Feature	0.252	0.023
Buy at Store Feature	0.554	0.026
Syndicated Content Feature	0.243	0.023
Value Card Feature	0.340	0.025
Video Feature	0.217	0.022
Web Analysis Feature	0.906	0.015
Web Hosted Feature	0.697	0.024
Web Performance Feature	0.686	0.025

The regression weight of Monthly Unique Visitors with Acquisition Capability is positive and significant, but that of Monthly Visits is negative. This means that Acquisition Capability is primarily a representation of new visitors. Transaction Capability is represented by express checkout, mapping, and value card features. The presence of a store or use of it does not contribute to this capability positively. Analytical capability is made up of customer relationship management and web performance. Finally, Interaction Capability is made up of social media features of the eTailer.

The results of the path model in Figure 2 show that the R^2 for the four dependent variables, Acquisition Capability, Conversion Capability, Retention Capability, and Financial Performance are respectively 0.29, 0.63, 0.80, and 0.81. The high R^2 indicate a good overall performance of the model. The results in Table 3 reveal that Acquisition Capability increases with Information, Transaction, and Customization capabilities. The impacts of Information and Transaction capabilities are not very different from each other, and the impact of Customization is small compared to the impact of these two capabilities. Conversion Capability increases with Acquisition, Loyalty and Analytical capabilities. Loyalty and Analytical capabilities show similar impacts on Conversion. Retention Capability increases with Conversion Capability and Interaction Capability. However, it decreases with Customization Capability. Finally, Financial Performance increases with Retention Capability.

Among control variables, we see that mass merchants and office supplies retailers possess higher Acquisition and Conversion capabilities. Office supplies retailers do not have an average positive Retention Capability, but have enjoyed an average positive financial performance. Results also show that younger firms have a better Acquisition Capability than older firms. Both retail only and pure click retailers have an average negative Conversion Capability.

Table 2. Regression Weight of Indicator Variables on Main Constructs based on Partial Least Squares[†]

Constructs	Indicator Variables	Coefficient Estimate	Standard Error
Information Capability	Account Status Feature	0.563	0.08[***]
	Comparison Feature	0.258	0.11[**]
	Coupon Feature	0.236	0.07[***]
	Customer Review Feature	0.123	0.10
	Syndicated Content Feature	0.286	0.12[**]
	Video Feature	0.124	0.13
Acquisition Capability	Monthly Unique Visitors	1.922	0.31[***]
	Monthly Visits	-1.063	0.36[***]
Transaction Capability	Express Checkout Feature	0.281	0.16[*]
	Mapping Feature	0.605	0.18[***]
	Monthly Email Campaigns	-0.149	0.13
	Monthly Email Incentives	0.312	0.18
	Outlet Store Feature	-0.287	0.16[*]
	Buy at Store Feature	-0.415	0.21[*]
	Value Card Feature	0.627	0.17[***]
Conversion Capability	Number of Shoppers	1.000	0.00
Loyalty Capability	Frequent Buyer Feature	1.000	0.00
Customization Capability	Product Customization Feature	-0.042	0.20
	Personalization Feature	0.977	0.03[***]
Analytical Capability	Customer Relationship Management Feature	0.558	0.16[***]
	Payment Processor Feature	-0.010	0.25
	Web Analysis Feature	0.255	0.24
	Web Hosted Feature	-0.176	0.32
	Web Performance Feature	0.502	0.16[***]
Interaction Capability	Recommendation Feature	0.332	0.23
	Social Media Feature	0.697	0.16[***]
	Customer Ratings Feature	0.300	0.22
Retention Capability	Number of Return Shoppers	1.000	0.00
Financial Performance	Sales Volume in 2007	1.000	0.00

[*]: $p<0.05$; [**]: $p<0.01$; [***]: $p<0.001$; single-tailed.

[†]: All constructs that are control variables in our model have single-indicators. They are not reported in this table, because their regression weights on their respective constructs will be 1.

DISCUSSION

Our results show that information systems features and website features together create value for an eTailer. Results also validate the phases of value creation from acquisition of the customer to financial performance, via conversion and retention. The results highlight the importance of different capabilities at each phase. Based on the results, we suggest some possible implications for the design and implementation of the Internet platforms on which the eTailers depend for revenue generation. Since analytical capability was significantly associated with only the conversion phase of the path model, it suggests that the business intelligence capabilities of an eTailer is relatively more influential in generating the first purchase compared to repeat purchases. This finding is somewhat surprising in that one could expect analytical capability to play a major role in customer retention. After all, once a customer is acquired, the retailer probably has some information on the customer's identity and can therefore proceed to collect relevant information on them, which can then be subjected to analysis for the purpose of generating potential repeat purchases. Among the other informational drivers, we find that Customization ability was significantly associated with acquisition and retention, but not with conversion. Customization includes both the ability of the customer to express specific custom requirements for a good or service, as well as the ability to customize the portals appearance and content to ones one's tastes and preferences. We conjecture that the first ability is relevant for acquisition, while the second is more relevant for customer retention.

Table 3. Partial Least Squares Estimates of Regression Coefficients for the Path Model

Dependent Variable	Explanatory Variable	Coefficient Estimate	Standard Error
Acquisition Capability	Information Ability	0.265	0.04***
	Transaction Ability	0.203	0.06***
	Analytical Ability	-0.061	0.06
	Customization Ability	0.082	0.03**
Conversion Capability	Acquisition Capability	0.707	0.05***
	Customization Ability	0.003	0.02
	Loyalty Ability	0.088	0.02***
	Analytical Ability	0.067	0.03**
Retention Capability	Conversion Capability	0.952	0.03***
	Customization Ability	-0.031	0.01**
	Analytical Ability	-0.022	0.02
	Interaction Ability	0.032	0.01*
	Loyalty Ability	-0.012	0.01
Financial Performance	Retention Capability	0.776	0.15***
Control Variables			
Acquisition Capability	Age	0.063	0.02***
	Mass Merchant	0.313	0.07***
	Office Supplies	0.032	0.01*
Conversion Capability	Mass Merchant	0.080	0.03**
	Office Supplies	0.230	0.08**
	Retail Only	-0.110	0.02***
	Pure Click	-0.081	0.04*
Retention Capability	Office Supplies	-0.257	0.11**
Financial Performance	Office Supplies	0.368	0.14**

*: $p<0.05$; **: $p<0.01$; ***: $p<0.001$; single-tailed.

Information technology governance has become an important and established function in many organizations. Effective information technology governance helps ensure that information systems supports business goals, optimizes business investment in information systems and appropriately manages information systems-related risks and opportunities (Luftman and Brier, 1999). In recent surveys of CxOs, alignment of information systems investments with business objectives ranked among the top three information systems priorities of organizations (the other two were control and compliance). Like other businesses, eTailers need to know where they are likely to get the most return for their information technology dollars. Our investigation can shed some light on that connection, and guide the information systems-business objective alignment process, by identifying the relationship between information functionalities of the web Portals used by eTailers and the revenue generation process.

LIMITATIONS AND CONCLUSIONS

In this paper, we presented and validated a model of value creation in the context of eTailers. The data for validating the model was obtained from the field. The results validated the phases of value creation and highlighted the importance of different information systems capabilities, analytical, information, customization and interaction. For each of these capabilities, we were able to identify the information system feature or website feature that enables the building of the capability.

As with any empirical study one must be cautious in interpreting the results in light of limitations of the data which were discussed earlier. One major limitation is that there is no data on the eTailer's back end operations. Thus we do not know what information infrastructure is used to communicate and coordinate activities with suppliers. Moreover, we do not have cost data. Our performance metric is revenue and would be useful to determine if the associations uncovered in our analysis hold when the performance metric includes costs in some realistic manner. Also, many variables had to be coded as 0/1 which is not completely realistic. For instance, two eTailers could both have CRM systems and yet one could be using it much more effectively than the other. Our data set does not reflect intensity of usage of different software components, or the effectiveness of internal procedures and organizational structures. Nevertheless, the results can be used to provide guidance to managers with design prescriptions for building information systems capabilities, as we have done in the discussion section. The empirical model contributes to theory by elucidating the phases of value creation for eTailers.

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