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Service-Process Configurations in Electronic Retailing: A Taxonomic Analysis of Electronic Food Retailers

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Comments are welcome

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Abstract

Service-processes of electronic retailers are founded on electronic technologies that provide flexibility to sense and respond online to the dynamic and complex needs of customers. In this paper, we develop a taxonomy of service-processes in electronic retailing and demonstrate their linkage to customer satisfaction and customer loyalty. The taxonomy is grounded in a conceptual classification scheme that differentiates service-process stages on a continuum of flexibility. Using data on electronic service-processes collected from 255 electronic food retailers, we identified eight configurations for the taxonomy. We also collected and analyzed publicly reported customer satisfaction survey data that were available for 52 electronic food retailers in the study sample. The results of this analysis indicate positive and significant correlation of the ordering of the taxonomy configurations with (i) customer satisfaction with product information, product selection, web site aesthetics, web site navigation, customer support, and ease of return, and (ii) customer loyalty. Taken together, the results of our empirical analyses demonstrate that the taxonomy captures information and variety within and across the electronic service-process configurations in ways that can be related to customer satisfaction and customer loyalty.

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Service-Process Configurations in Electronic Retailing: Taxonomic Analysis of Electronic Food Retailers

1. Introduction

Electronic retailers now can deliver service-products – conceptualized as bundles of physical goods, offline services, and digital content – to individual customers almost anywhere and at any time. Service-processes of electronic retailers are founded on electronic technologies that provide flexibility to sense and respond online to the dynamic and complex needs of customers. Practitioners and researchers who attempt to comprehend the developments in electronic retailing are confronted by a broad and complex mix of electronic technologies combined into service delivery systems. Some of these technologies are used by many retailers, while others are used less often. Studies have found that configurations of process technologies often are significantly associated with service quality and other measures of performance (Roth and Jackson 1995; Sulek et al. 1995; Verma and Young 2000). Such associations are likely to be evident among electronic retailers as well. According to Sherman (1999), inappropriate technologies already cause disappointment and defection among electronic retailers' customers.

In spite of the explosive growth of electronic retailing, our review of the academic and practitioner literatures yielded neither studies that shed light on the typical configurations of electronic retailers' service-processes, nor evidence of their relationship to performance. The premise of this paper is that an understanding of the alternative configurations of electronic service-processes and their association with relevant measures of performance is fundamental to designing, re-designing, and managing electronic retailing operations effectively. To this end, we develop a taxonomy of service-processes for electronic retailers. The empirical analysis we

conducted to develop the taxonomy is based on data collected from a sample of electronic food retailers. The primary contribution of this paper is the taxonomy itself. The taxonomy identifies and orders eight configurations of electronic service-processes on a continuum of low to high flexibility with which electronic retailers sense and respond online to the dynamic and complex needs of customers.

Another contribution of this paper is that it demonstrates linkages between electronic service-processes and customer ratings of service performance. For a sub-set of the study sample for which data from customer satisfaction surveys were available, we examined the association of the taxonomy configurations with customer satisfaction and with customer loyalty. The ordering of the configurations of electronic service-processes – based on a continuum of increasing flexibility – is positively associated with (i) customer satisfaction with product information, product selection, web site aesthetics, web site navigation, customer support, and ease of return, and (ii) customer loyalty.

The remainder of the paper is organized as follows. Section 2 discusses the conceptual foundation for this study. Section 3 describes the electronic food retailing sector, the empirical context of this research. Section 4 contains a discussion of the taxonomic analysis of our data collected from a sample of electronic food retailers. Section 5 describes the constituent configurations of the proposed taxonomy and examines the relationship between the configurations, customer satisfaction, and customer loyalty. Section 6 contains our concluding remarks. The Appendix presents a glossary of technology terms used in the paper.

2. Conceptual Foundation

2.1 Service-Process Flexibility in Electronic Retailing

Flexibility is arguably the most important strategic capability that managers should consider when designing operations for turbulent environments such as that of electronic retailing (Hayes and Pisano 1994). Flexibility allows firms to quickly sense and respond to evolving customer needs, adapt to shifts in technology, and recover from competitor actions and capital market downturns. However, a comprehensive review of the service management literature indicates that issues of service-process flexibility have largely been overlooked (see Cook et al. 1998).[1] The emergence of electronic retailing underscores the significance of bridging this gap in the literature (Rosen and Howard 2000). Following Heim and Sinha (2001), we first conceptualize the dimensions of service-process flexibility in this section. Next, we propose a conceptual classification scheme that differentiates electronic service-processes based on flexibility.

Table 1 presents a framework for examining the electronic service-process flexibility dimensions relevant to electronic retailers. The table differentiates between flexibility dimensions related to product and customer interactions, processes of an individual electronic retailer (i.e., intra service-process flexibility), and processes connecting multi-company alliances (i.e., inter service-process flexibility). Some of these dimensions – e.g., mix, volume, and changeover – are adapted from the literature on manufacturing flexibility (Gerwin 1993; Sethi and Sethi 1990; Upton 1994). The remaining dimensions are relevant for responding to the market uncertainties faced by electronic retailers. We propose that, in each case, uncertainties

[1] A recently published paper by Verma and Young (2000) on low-contact services is a notable exception.

stemming from customers and from inter-linked electronic process technologies can be effectively responded to by developing process flexibility.

Insert Table 1 about here

2.2 A Conceptual Classification Scheme of Electronic Service-Processes

The conceptual classification scheme, presented in Figure 1, differentiates electronic service-processes on a continuum of flexibility. The Appendix contains a glossary of technology terms used in Figure 1. Choosing flexibility as the continuum for differentiating service-process stages is consistent with the growing recognition that electronic retailers, posed with the challenge of surviving in dynamic and turbulent market environments (Glazer 1999), should develop capabilities to quickly "sense and respond" to customers' needs (Bradley and Nolan 1998; Garud and Kotha 1994). As shown in the figure, each of the electronic service-process stages is embedded within the previous stage. On a continuum of low to high flexibility, the service-process of an electronic retailer can be classified as belonging to one of the following four stages: Service Kiosk, Service Mart, Mass Service Customization, and Joint Alliance Service Customization. As is evident from Table 1, flexibility is a multi-dimensional construct. The flexibility vector of an earlier process stage in Figure 1 is dominated by the flexibility vector of a later process stage. For example, the flexibility vector of Mass Service Customization is dominated by the flexibility vector of Joint Alliance Service Customization. Compared to Mass Service Customization, Joint Alliance Service Customization is constructed from internetworking of individual companies' service-processes, leading to a higher level of flexibility.

The names of the four electronic service-process stages were chosen to evoke relationships to traditional operations already found in the marketplace. *Service Kiosk* evokes the notion of small stands set up in shopping malls and airports through which individuals deliver services. *Service Mart* evokes the notion of a store that chooses to deliver a larger number of options to customers, but is limited in what it can deliver by capacity and capabilities. *Mass Service Customization* evokes the notion of a provider who employs a single modular system to deliver a large number of service designs that can satisfy a variety of customers. *Joint Alliance Service Customization* evokes the notion of several electronic retailers integrating their flexible process technologies. We now describe each of the four stages.

Insert Figure 1 about here

Service Kiosk exemplifies a make-to-stock delivery strategy and is designed to provide identical experiences in a similar manner to all customers. Service Kiosk uses inflexible but widely available static technologies such as HTML, static image files, and static sound files. This leads to low flexibility of service-processes, and thus little or no ability to sell online. Electronic retailers with Service Kiosks may choose not to operate the technology infrastructure used to deliver digital content, such as servers, security systems, and telecommunication lines. Instead, they may outsource these needs to vendors who design, maintain, and host such systems. Outsourcing servers and infrastructure can constrain the technological capabilities of electronic retailers and, in turn, limit the overall service-product variety and the number of customers served simultaneously.

The Service Kiosk can serve as the primary delivery process for service providers, or as an inexpensive extension of their existing physical operations. Service Kiosks have been used by

manufacturers, distributors, and traditional retailers as a means to enter the electronic delivery channels. These Service Kiosks are basic storefronts that allow customers to specify and order offline services. For example, font designer Chank Diesel uses ChankStore (http://www.chank.com/) to sell his fonts online and to advertise and sell his offline font design services. ChankStore technologies include static HTML and graphic files. Raisin Rack Specialty Food Emporium (http://www.raisinrack.com/) also uses a Service Kiosk process. Raisin Rack is a natural foods store that sells produce, grains, herbs, and vitamins for a chain of Ohio stores. The Raisin Rack HTML order form e-mails a customer's information and order to Raisin Rack and requests that customers call or fax their credit card payment information.

Service Mart is characterized by an assemble-to-order delivery strategy that builds on technologies used in the Service Kiosk process stage. The Service Mart stage involves processes that use very simple to very complicated executable scripts and programs (Greenspun 1999). In Service Mart processes, the static technologies used in the Service Kiosk may be created dynamically by programs residing on a server computer. This approach can lead to more service-product variety, but possibly at a loss of some of the discretion and scope available in the Service Kiosk. Service Marts typically use CGI scripts to increase the flexibility of electronic service-processes. The scripts assemble customer identification numbers, names of graphics files, hypertext links, and text templates into hypertext pages sent to the customer. Small database files also increase the ease of performing offline tasks in the Service Mart. Database records can be modified manually when product prices or inventories change. The database contents are later assembled with standard HTML templates when customers request them. The databases are connected to the front end of the service-process through interfaces built from CGI scripts or server side scripting systems such as Cold Fusion and Active Server Pages. However,

performing back-office service updates manually also limits the flexibility of the Service Mart. Finally, server and telecommunication capacity must become more robust as volume increases. The limitations of technology, particularly from executable scripts and programs, impose upper bounds on the volume flexibility of the Service Mart stage.

The Service Mart process can be found in Baltimore Coffee and Tea (http://www.baltcoffee.com/), which uses a CGI shopping cart system to sell more than 1,000 varieties of coffee and tea. Customers can choose whether to shop in a text or graphically rich shopping environment. During the checkout process, the CGI system collects shipping and payment information and calculates a total order cost, all encrypted by SSL. Virtual Vineyards, a retailer of wine and gourmet food, initially employed a Service Mart process consisting of secure HTML forms delivered through Perl CGI scripts (Gibson 1997). Other examples of the Service Mart include the processes used by Salami.com and 3E Market. Salami.com (http://www.salami.com), a purveyor of Italian specialty foods, uses the SoftCart CGI program to insert shopping cart identification numbers into checkbox HTML order forms. 3E Market (http://www.3emarket.com/) uses a CGI program that assigns a shopping cart identification number to each customer and inserts that number into HTML template files.

Mass Service Customization involves a make-to-order delivery strategy and uses the most flexible single-company implementation of electronic service-process technologies. The Mass Service Customization stage involves personalized services delivered from databases (Greenspun 1999). Massive databases are built to collect customer data. The databases are analyzed to better understand customers or inter-linked to collaborative filtering and data mining systems to enhance customer relationships and customer experiences. Electronic service-processes with high demand imposition – e.g., millions of service requests per hour – require

scalable systems of servers that can handle wildly varying aggregate customer demands without decreasing the effectiveness of service delivery. Server system capacity is load balanced and distributed geographically to improve responsiveness. Backup systems of redundant hard disks, servers, power generators, and telecommunication infrastructure connections are put in place to improve system reliability. A scheme involving redundant security systems is implemented to protect the process technology itself and sensitive customer information during electronic transactions.

Travelocity (http://www.travelocity.com/), an online travel agency, employs Mass Service Customization. Travelocity was built around the Sabre travel reservation system and uses HTML, JavaScript, CGI scripting, massive database systems, and secure channels for searching and booking. Travelocity uses its databases to proactively e-mail travel information to customers and to maintain personal travel pages for customers. The extensive customer data collected through Travelocity has motivated the Sabre group to build a data warehouse to explore and develop new services (Deck 1998).

Friend Finder is another example of the Mass Service Customization process stage. Friend Finder (htttp://www.friendfinder.com/), an online dating service, customizes its service-products according to customer interests and previous transactions. As a customer uses Friend Finder's services, the system attempts to update the customer's interests by examining the appeal of previous matches. Friend Finder offers several levels of service options at different prices and employs a modular system to extend the same service-processes to diverse customer lifestyle segments. The service levels allow customers to decide how much they value flexible self-service and to pay for access to a service-process having the capabilities they desire.

Joint Alliance Service Customization also involves a make-to-order delivery strategy, but one in which service-products are designed and delivered via inter-linking or recursive systems developed between several companies. This process stage represents operations oriented toward multiple-company delivery of service-products. More specifically, the process stage is characterized by its ability to deliver service-products using technology separated by organizational boundaries. Joint Alliance Service Customization is similar to the "shop-within-a-shop" model often used in physical retailing (e.g., Microsoft selling Internet services through point-of-sale terminals in Radio Shack stores). Companies pursuing Joint Alliance Service Customization integrate Mass Service Customization technology across several companies.

Joint Alliance Service Customization can be found in the Autoweb Automotive Superstore (http://www.autoweb.com/), an alliance of automotive service providers, that provides one-stop shopping for automobiles, automotive insurance, and other related needs. Another example is the wine retailing site WineAccess (http://www.wineaccess.com). WineAccess integrates the services and inventories of approximately 30 specialty wine sellers into a joint alliance service operation that accesses, collects, and shares information about wine connoisseurs. The AOL.COM (http://www.aol.com/shopping/) store and Amazon.com's ShopTheWeb and zShops (http://www.amazon.com/) integrate product information from hundreds of electronic retailers. In the case of AOL.COM, customers can use a personalized gift search system that lets them search across all of the products of participating retailers based on self-reported personality profiles.

3. The Empirical Setting: Electronic Food Retailing

Several factors have motivated the growth in the number and types of electronic food retailers. These factors make food retailing an interesting and appropriate setting for analyzing

the service-processes employed in electronic retailing. Most importantly, industry-wide revenues from food retailing are large enough to motivate food companies to attempt to switch customers from one delivery channel to another. Total consumer expenditures within established market segments are not expected to change drastically as a result of introducing electronic services (Peterson et al. 1997). Yet, the difference between food expenditures at traditional grocery stores, at $436 billion in 1997 (Donegan 1998), and electronic food retailers, projected to be $270 million in 1998 (Krantz 1998), provides a strong incentive for electronic food retailers to attempt to switch customers to their delivery channel.

Food retailing is a highly fractionated industry on both the supply and demand sides. Electronic food retailers come in many sizes, and individual customer tastes can vary widely. While unique tastes have often been satisfied by fringe brands, recent changes in the food supply chain have removed many smaller brands from large grocery stores, forcing them to shift selling efforts to alternative delivery channels such as specialty stores and electronic retailing (Mathews 1998). The margins of large grocery stores also have been hurt by sales losses to specialized category retailers such as merchandise discounters, category killers, and super center stores (Kinsey and Senauer 1996). Electronic retailing allows retailers once again to strategically target the niches where high margins traditionally have been found (Tordjman 1988).

For empirical researchers, food industry fragmentation means that food retailers of all sizes have employed numerous variations of the product and process attributes used in electronic retailing. With a mix of small and large food retailers, and industry practices that have favored the introduction of emerging information technologies (Lewis 1991), electronic food retailers exhibit a large range of product and process dimensions along which services might be differentiated. On the product side, food retailers can provide a great variety of complementary

food and non-food goods, offline services, and electronic service experiences. They also can provide information related to the food items regarding history and culture. On the process side, food retailers employ a variety of electronic and non-electronic inputs in their online front-office processes and back-office fulfillment processes, respectively.

In reviewing the literature, we found that research in food retailing has often taken an interest in how retailing technologies and service-process attributes affect customer decisions and their service experience perceptions. For example, Messenger and Narasimhan (1997) showed that historical patterns of personal income were positively associated with the size of retail food stores and inferred that higher valuations for customer time led to growth in one-stop shopping behavior. They also found that the emergence of the supermarket store format led to customer net savings relative to other store formats. Bell et al. (1998) studied customer food store visiting behaviors related to store distance, customer loyalty, food basket costs, and inventories. Finally, Lewis and Thomas (1990) used taxonomic methods to analyze the link between food retailers' scope, and resource commitment strategies and performance. Thus, we believe that the development of a taxonomy of service-processes using electronic food retailing as our empirical setting will advance the body of literature on food retailing as well.

4. Taxonomic Analysis

Taxonomies are developed to classify and explain complex organizational phenomena in many disciplines. Classification is a fundamental human process motivated by a desire for cognitive economy, predictive ability, and theory development (Milligan and Cooper 1987). Taxonomies "provide parsimonious descriptions which are useful in discussion, research, and pedagogy" (Miller and Roth, 1994, p. 286).

Several considerations are useful for understanding the taxonomic analysis that follows. In reviewing the literature on taxonomic analysis, we found that most studies employed an inductive approach. While an inductive approach is useful when little is known about the context of empirical research, a deductive approach – which we employ in this study – is preferable (Ketchen and Shook 1996). Also, prior taxonomic analyses mainly have relied on techniques for multivariate normal data. Most Monte Carlo studies of taxonomic analysis methods have involved tests of known configurations in continuous spaces (Milligan and Cooper 1985, 1987; Zimmerman, Jacobs and Farr 1982; Blashfield and Morey 1980; Hamer and Cunningham 1980). However, data on process technologies available from operational settings are seldom continuous. These data are more commonly dichotomous or categorical in nature, indicating presence or absence of technologies. Thus, our empirical analysis was conducted following general guidelines from the literature on taxonomy development (Ein-Dor and Segev 1993; Ketchen and Shook 1996; Bozarth and McDermott 1998). Specifically, several research design issues need to be addressed prior to developing taxonomies. These issues include the choice of the study sample, selection of variables for analysis, standardization of the variables, and transformation of data when variables exhibit multicollinearity. We address each below.

4.1 The Study Sample

The data for this study were collected from a sample of electronic food retailers on the World Wide Web during the months of May 1998 to June 1999. The large number of electronic food retailers makes food retailing valuable for empirical studies. Specifically, the number of food retailers leads to a sufficient sample frame and sample sizes large enough to obtain statistically meaningful findings within a single industrial setting.

No directory of electronic food retailers existed prior to the study. Hence, we first pooled addresses of electronic food retailers from several sources, including Internet search engines and sites that maintained address lists. This process led to a preliminary list of food-related sites on the World Wide Web. Each site was visited and classified as a retailing site, a non-retailing site, or non-operational. The non-retailing and non-operational sites were removed, leaving approximately 650 electronic food retailing sites. As additional food retailers appeared, they were added to the address database, leading to a slightly larger candidate set of electronic food retailers. The sample was randomly chosen from this list of retailers. The sample for this study consists of 255 electronic food retailers. Salient characteristics of the study sample are summarized in Table 2.

Insert Table 2 about here

4.2 Selection of Variables and Data Collection

The choice of taxonomic variables is perhaps the most important decision that confronts researchers conducting taxonomic analyses (Ketchen and Shook 1996; Bozarth and McDermott 1998). Taxonomies can be developed inductively, deductively, and cognitively (Ketchen and Shook 1996) – three strategies that imply theoretically ungrounded, theoretically grounded, and expert opinion approaches to variable choice. Both existing theory and the task at hand should guide the choice of variables (Bozarth and McDermott 1998).

The selection of variables for this study was guided by the dimensions of electronic service-process flexibility presented in Table 1 and the conceptual classification scheme for electronic service-processes depicted in Figure 1. Given the exploratory nature of this study, data were collected for a broad set of variables. The data for the variables were collected via direct

observation of each electronic food retailing site. During the visit to a site, the architecture of the site was mapped and relevant features were noted or printed out for future reference. For each site, all observable content was downloaded and counted. This procedure transformed each retailer's site into a set of variables representing the electronic service-processes implemented at the sites. We also collected supplemental information from external information sources, such as the Internic (http://www.internic.net/) WHOIS resource, which provided physical addresses and technical information for Web addresses. Several data types were used to characterize the electronic service-processes, with dichotomous data being the most frequently applicable data type. Column 1 of Table 3 presents the dichotomous (0/1**)** proxy variables related to the electronic service-process flexibility dimensions in Table 1: mix flexibility, security flexibility, order process flexibility, changeover flexibility, and integration flexibility.

Insert Table 3 about here

4.3 Standardization and Transformation of Variables

Variables measured by different scales often adversely affect cluster analysis results. In particular, metric and ordinal variables with larger ranges may contribute more heavily to the distances used to construct configurations. Such data typically are transformed so they do not adversely affect cluster results (Ketchen and Shook 1996; Miller and Roth 1995; Verma and Young 2000). Redundancy from inter-correlation among variables related to one dimension also may affect cluster analysis results. However, the literature does not suggest an appropriate methodology to include all potential data when a data set consists of a mixture of data types. Instead, researchers must limit a study to a single type of data, or reduce mixed data sets to a single data type (Anderberg 1973). For example, Ein-Dor and Segev (1993) limited their

analysis to dichotomous variables. We also limited our analysis to dichotomous variables that represent the presence or absence of a technology, and utilized clustering methods that employ similarity measures for dichotomous variables. Thus, no further standardization or transformations were required. While weighting schemes can be used to modify similarity measures (Johnson and Wichern 1992), we used a uniform weighting scheme to avoid introducing potential bias.

4.4 Exploratory Data Analysis

We present summary statistics for the variables used in the taxonomy development in Table 3. Columns 2 and 3 of the table list counts and percentages for the number of retailers that implemented specific technologies. The counts and percentages presented in Table 3 and in the subsequent analysis are based on 254 of the 255 observations in the study sample. The remaining one observation was identified as conceptually related to Joint Alliance Service Customization, and, as such, the variables representing that operation would have been empirically quite different from the remaining 254 observations. Table 3 indicates that a number of technologies are either implemented by most of the retailers, or by very few of the retailers. We sort Table 3 by the percentage of retailers in the study sample implementing the technologies within each of the dimensions of flexibility to which the technologies are conceptually related. Table 3 shows that the technologies in the sample are frequently related to an inflexible electronic order process. Variables that could enable higher changeover, mix, volume, security, and integration flexibility seem to be less frequently implemented.

4.5 Cluster Analysis

The cluster analysis method used in this study consisted of the following procedures. First, we used hierarchical cluster analysis to construct the taxonomy. Ward's method was used

on squared Euclidean distances between the dichotomous data for individual food retailers due to its versatility and tendency to provide very good solutions (Anderberg 1973). Squared Euclidean distances were employed because of the simplicity of their interpretation, since they would represent a count of the number of different process technology decisions between two electronic food retailers. We employed the full set of 33 dichotomous variables to perform the analysis.

We constructed the clusters following Lehmann's rule, a standard guide followed by prior studies (see Miller and Roth 1994; Boyer et al. 1996; Verma and Young 2000). According to this rule, the number of feasible clusters should be between n/30 and n/60, where n is the number of cases, indicating our study sample with 254 observations[2] can support four to eight clusters. We chose the seven-cluster solution since the cluster sizes that were being combined by Ward's method (Anderberg 1973) in going from seven down to three clusters were quite large. By studying a higher number of clusters, it is likely that the clusters will have better internal consistency or accuracy, as each cluster would consist of a reasonably large group of similar observations yet would exhibit large distances between itself and other clusters. At the same time, we acknowledge that the tradeoff in choosing higher accuracy is a loss of potential parsimony of alternative cluster solutions having few clusters (Boyer et al. 1996).

To analyze the service-process configurations generated by the seven-cluster solution, we first examined frequencies of various technologies within each configuration. Specifically, we examined the variables used in constructing the configurations obtained from the cluster analysis. In Table 4, we order the seven clusters – along the flexibility continuum, from low to high – based on their relationship to the conceptual classification scheme shown in Figure 1. We also present the proportion of retailers within the cluster that employ a specific technology.

[2] As noted earlier, a single outlier observation that corresponded to the Joint Alliance Service Customization stage

Clusters 1 and 2 appear to concentrate on offline ordering processes. Clusters 3 through 7 concentrate on online ordering processes, commonly using shopping carts and dynamic processes to manage a customer order. Clusters 4 through 7 are the only clusters that have security features such as SSL encryption and passwords.

We examined the technology patterns across the electronic service-process taxonomy using χ^2 statistics for contingency tables. These statistics indicate the existence of an association between many of the technology variables and the clusters. The numbers in parentheses next to each of these statistics in Table 4 are the *p* values for the test statistics. Since the clusters were constructed to minimize differences between technologies within the clusters, one might expect that many of the χ^2 statistics would exhibit significance. We also examined the directional relationships between the clusters and each technology variable using Spearman correlation statistics. Table 4 indicates that movement toward higher indexed clusters is associated with more flexible process technologies such as CGI, Cold Fusion, Active Server Pages, online database queries, and security systems. Table 4 also indicates that the development of electronic service-processes to manage affiliate or associate programs, and inter-service alliances, tends to be associated with the higher indexed clusters.

Insert Table 4 about here

We analyzed the reliability of our cluster solution using the discriminant analysis hold-one-out jackknife procedure (Miller and Roth 1996; Verma and Young 2000). This procedure examines whether and to what extent the results might be sensitive to individual observations in the study sample. We performed this analysis with data on the full set of variables used in the

in the conceptual classification scheme, shown in Figure 1, was removed from the original sample of 255

cluster analysis. We used both direct and stepwise approaches for estimating the discriminant analysis functions. In doing so, this analysis examined the robustness of our cluster solution both to our set of observations and to our choice of variables. The results of this analysis ranged from 90.6% to 93.7% for the classification accuracy of our discriminant analysis functions, and between 87.4% and 87.8% for the cross-validated cases using the hold-one-out jackknife procedure. As such, these high percentages indicate that our seven-cluster solution is reliable.

5. The Taxonomy of Electronic Service-Processes

5.1 Electronic Service-Process Configurations

The eight configurations in the taxonomy of electronic service-processes are presented in the last column of Table 5. The first seven configurations correspond to the seven clusters identified in Table 4. The eighth configuration corresponds to the outlier observation in the study sample. The names of the configurations, discussed below, are assigned to reflect any distinguishing service-process characteristic of a configuration, as well as to indicate its relationship with the four electronic service-process stages of the conceptual classification scheme depicted in Figure 1, namely, Service Kiosk, Service Mart, Mass Service Customization, and Joint Alliance Service Customization.

Insert Table 5 about here

Mail, Phone, or Fax Us–Service Kiosk (Cluster 1). This configuration is a variant of the Service Kiosk process stage in the conceptual classification scheme. The configuration is characterized by its use of very few HTML and graphic files to list methods through which one can order food offline via mail, phone, or fax. The retailers in this configuration provide

observations. We assigned the outlier its own configuration.

printable order forms and information about toll-free numbers, with the expectation that customers will remember to call them at a later time. While the retailers in this configuration infrequently employ CGI scripts, very few of these retailers allow customers to order online. Instead, customers are required to order by mail, phone, or fax, at their own cost.

Please Call Us–Service Kiosk (Cluster 2). This variant of the Service Kiosk is quite similar to the retailers found in Cluster 1. However, retailers in this configuration rely largely on phone or fax, and provide no forms that one can use to fax such an order. A small proportion of the retailers use a single page electronic order form to provide an additional means of ordering.

Unsecure Order Form–Service Mart (Cluster 3). The Unsecure Order Form-Service Mart is characterized by the shift to frequent use of processes involving CGI. The retailers in this configuration have introduced electronic ordering into the service mix. About half of these retailers provide a simple order form that e-mails customer information to the retailer, while the remaining order forms are commonly implemented through CGI scripts that parse the order form fields and examine whether they are correct. A small proportion of the retailers implement unsecured shopping cart systems. Overall, these Service Mart systems do not indicate a concern for the security of their customers' payment information, as they seldom employ security technologies in their system.

Secure Order Form–Service Mart (Cluster 4). This variant of the Service Mart is similar to Cluster 3, except that all of the retailers in this configuration use SSL encryption to protect customer payment information.

Secure Shopping Cart–Service Mart (Cluster 5). The retailers in this configuration are functionally closer to Mass Service Customization than to the low-tech Service Mart retailers. These retailers exhibit service-process characteristics developed from mixtures of HTML files

and templates, and CGI systems that manage the templates and query product databases. While the basic technology is CGI, the retailers in this configuration use the largest number of HTML files on average. Often, these CGI processes are used to insert customer ID numbers into static HTML files to track customers as they navigate through the site, and to link customers to their shopping basket. In this configuration, the retailers use CGI processes to create password systems. This is also the first configuration in the taxonomy in which a majority of the retailers dynamically calculate the total order and shipping cost for customers. However, in the event a customer does not trust these order systems, almost all of these retailers still provide information on how to order through mail, phone, and fax.

Service Mart–Mass Service Customization (Cluster 6). The retailers in this configuration appear to be positioned between the Service Mart and Mass Service Customization service-process stages of the conceptual classification scheme. While CGI is still frequently used to develop shopping cart systems, these retailers tend to remove mail and fax as alternative ordering channels. They provide customers with the option of on-the-fly calculation of order costs. The retailers in this configuration use HTML less frequently; the decrease in the average number of HTML files used indicates that the service-process has changed fully to a CGI program.

Mass Service Customization (Cluster 7). This configuration maps onto the Mass Service Customization stage in our conceptual classification scheme. The use of HTML and CGI decrease in this configuration, with technology such as Active Server Pages and Cold Fusion replacing CGI, and database systems serving as the basis for generating the shopping cart systems in the site. The retailers in this configuration almost universally employ security

procedures and dynamically report total order prices to the customer. Alliance partners are also frequently involved at this service-process stage.

Joint Alliance Service Customization. This configuration consists of the single outlier observation in the study sample identified prior to conducting the cluster analysis. The retailer in this configuration is an alliance between six different electronic retailers. The retailer redirects the customer from one to another participating retailing service, and both the retailer and the participating retailing services use technologies that are similar to those employed in Cluster 7. Since this configuration uses process technologies of all six retailers in the joint alliance, it is the most flexible service-process in the study sample.

5.2 Electronic Service-Process Configurations and Customer Satisfaction

We now examine the association between the electronic service-process configurations in the taxonomy and customer satisfaction. We collected publicly reported customer satisfaction survey data to examine this relationship. The customer satisfaction survey data were reported by BizRate.com (http://www.bizrate.com), a marketing research company that surveys customers on their actual online shopping experience. BizRate's ratings of electronic retailers are considered to be among the most credible indicators of online customer satisfaction (Hansell 1999; Weintraub 2000; Hallford 2001). We collected data from BizRate's 1998 customer satisfaction survey. The data were available for 52 of the retailers in our study sample, and the retailers' cluster-membership was distributed from Clusters 3 through 7. Table 6 contains the items in BizRate's 1998 survey.

Insert Table 6 about here

Table 7 presents results for our analysis examining the association between the configurations in the electronic service-process taxonomy and the items in the BizRate customer satisfaction survey shown in Table 6. We present Spearman correlation statistics, as well as F- and Kruskal-Wallis statistics for one-way ANOVA. Table 7 indicates that the configurations exhibit significant associations with several items in the customer satisfaction survey. Customer satisfaction with product information, product selection, web site aesthetics, web site navigation, customer support, and ease of return tends to increase across the taxonomy, and exhibits a significant positive correlation with the ordering of the electronic service-process configurations in the taxonomy. Customer loyalty, which indicates the likelihood of a customer's return to the electronic retailer for repeat purchases and is fundamental to long term business success of retailers, increases across the taxonomy. All in all, these results are an external validation of the taxonomy since the items in the customer satisfaction survey, which have significant and positive association with the ordering of configurations, are customer satisfaction dimensions that can be affected positively by electronic service-process flexibility.[3]

Insert Table 7 about here

[3] The analyses to examine the association between the configurations in the electronic service-process taxonomy and customer satisfaction were motivated by the suggestion of an anonymous reviewer. We are grateful to the reviewer for this suggestion.

6. Conclusion

In this paper, we developed a taxonomy of service-processes in electronic retailing. Fundamental to the development of the taxonomy is the notion that service-processes are founded on technologies that provide electronic retailers with flexibility to sense and respond online to the dynamic and complex needs of customers. The taxonomy is grounded in a conceptual classification scheme that differentiates electronic service-processes on a continuum of low to high flexibility.

We collected data on service-process dimensions from 255 electronic food retailers. Cluster analysis of the data yielded configurations of electronic service-processes that served as the empirical foundation of the proposed taxonomy. Examination of the configurations revealed systematic and significant differences among the configurations and nuances about service-processes within each configuration. We also observed a positive and significant correlation between the ordering of the configurations in the taxonomy and (i) customer satisfaction with product information, product selection, web site aesthetics, web site navigation, customer support, and ease of return, and (ii) customer loyalty. Taken together, the results of our empirical analyses demonstrate that the proposed taxonomy captures information and variety within and across electronic service-process configurations in ways that can be related to customer satisfaction and customer loyalty.

To the best of our knowledge, the proposed taxonomy of service-processes in electronic retailing developed from process-level data is the first of its kind. The taxonomy has the potential to aid both researchers and practitioners in comprehending the broad and complex mix of technologies underlying service-processes in electronic retailing and their association with customer satisfaction and customer loyalty. Hence, we believe that the taxonomy itself is the

primary contribution of this paper. The paper also contributes in demonstrating the value of taxonomic analysis in refining and empirically grounding the insights from conceptual classification schemes such as the one shown in Figure 1.

There are practical implications of the study's findings for electronic food retailers. At the present time, it appears that few food retailers have adopted process technologies that can be used to learn about – i.e., "sense" – their customers. Few food retailers have adopted audio-visual or entertainment technologies that can turn electronic retailing services into an experience for the customer, rather than just a computer-based task of searching and sorting. The infrequent implementation of these attributes indicates opportunities that food retailers might exploit to enhance their service-processes and, in turn, to improve customer satisfaction and customer loyalty.

The primary limitations of this study are that it has been exploratory and the fact that the empirical analysis had to be restricted to dichotomous data. Also, since the taxonomy was developed with data from electronic food retailers, the results to some extent are contingent on the context. However, the technologies available to electronic retailers are quite similar across contexts. For example, Amazon.com has been able to diversify its book retailing services to enter food retailing. Thus, we believe that the findings of this study are likely to be generalizable to other electronic retailing contexts as well. Nevertheless, it would be insightful to develop service-process taxonomies for other sectors of electronic retailing.

There are two logical extensions to this research. The *first* study would develop a taxonomy of electronic service-products that would aid in comprehending the mix of service-product attributes in electronic retailing. The *second* study would integrate the service-product and service-process taxonomies to develop an empirical product-process matrix for electronic

retailing operations. This matrix would aid in examining the fit between service-products and service-processes in electronic retailing, and how that fit affects customer satisfaction and customer loyalty. Besides product-process fit, other contingency issues, such as those related to market conditions and organizational infrastructure, could be the subject of future studies. Also, the scope of future investigations could be expanded to include other retailing sectors and be conducted over time. In closing, we believe that this research provides a systematic start toward empirically investigating service-processes in electronic retailing and that it will motivate other scholars and practitioners to pursue this line of inquiry.

Appendix: Glossary of Electronic Service-Process Technologies[4]

Active Server Pages. An alternative to CGI scripts. Active Server Page web pages include programming code used to interact with databases and programs on a server.

AIFF (*Audio Interchange File Format*). A digital audio file format from Apple®.

AVI (*Audio Video Interleaved*). A digital multimedia video file format from Microsoft®.

Client Application. A computer program used to deliver electronic service content to a computer or other service delivery device owned by a customer.

Cold Fusion. An alternative to CGI scripts. Cold Fusion web pages use the Cold Fusion Markup Language to interact with databases.

Collaborative Filtering. Technology that analyzes actions of a customer and compares them to prior actions of other customers. When a customer's actions are found to parallel those of a group of customers, the system can make recommendations to the customer based on the characteristics of that group.

CGI (*Common Gateway Interface*). A WWW-to-server interface that receives requests from a WWW server to execute programs stored on a server computer. The Common Gateway Interface executes these programs, and returns the program output to the WWW server, which in turn sends the output to the customer's service delivery device. Typically, CGI programs are written in scripting languages such as PERL, or are executable programs written in C or C++.

Consumer Agent. A computer program or system that can help customers accomplish some task, such as purchasing a product, based on decision criteria provided by the customer to the agent, such as a desired price range. For a futuristic example, see Alba et al. (1997).

Data Mining System. A system that facilitates either manual or automated examination of databases of customer information to discover patterns and relationships between variables.

Data Warehouse. A massive database that supports organizational decision making. Data warehouses integrate organizational data, such as operational data or a customer's purchasing history, into a single database management system.

Digital Certificate. A digital identification system that employs public key encryption. Digital certificates attempt to provide verification, through a trusted third party certification authority, that a participant in a transaction is in fact valid and that content sent during a transaction is from a certain participant.

Encryption. A security procedure that uses cryptography to encode electronic service content into a collection of computer bits that appear to be random, making them virtually impossible for

[4] For more detailed information, see the Techweb® Technology Encyclopedia (www.techweb.com/encyclopedia/).

anyone other than the service provider and customer to decode. Encryption is used in electronic services to protect customer credit card numbers and other sensitive data.

Expert System. A information system for problem solving that employs artificial intelligence procedures to make inferences from a knowledge base of human expertise.

Federated Databases. A system of independently managed, heterogeneous database systems that facilitate controlled sharing of data.

GIF (*Graphics Interchange Format*). A digital graphics file format developed by CompuServe®. GIF files can display one graphic, or several graphics presented in a repeatable sequence.

HTML (*HyperText Markup Language*). A presentation language used to define the page layout of digital documents on an electronic service delivery device.

Identity-based Access. A security scheme that uses an identifier to manage customer access to electronic services. Common schemes involve Internet Protocol (IP) address numbers, and cookie text strings placed on a customer's computer. Future electronic services may use identifiers such as digital fingerprints or smart cards.

Internet Service Provider. A company that resells digital telecommunication line capacity, leases server computer disk space, and leases digital technologies that can be used to develop and deliver electronic services. The companies also perform contract work to develop and manage electronic service operations.

Java® Applet. A computer program module, written in the computer language Java. Java was designed so that Java programs could theoretically run on any device capable of digital processing, including personal computers. Java applets are shipped as object code from a server to a customer's service delivery device, upon which they are run by a Java virtual machine programmed to run applets on that device.

JavaScript™. A scripting language embedded inside HTML that can be used to enhance electronic services and to control electronic service delivery devices, such as windows in a World Wide Web browser.

JPEG, JPG (*Joint Photographic Experts Group*). A compressed digital graphic file format.

Load Balancing System. A capacity management system that dynamically allocates electronic service processing to individual servers based on their current workloads.

MIDI (*Musical Instrument Digital Interface*). A digital audio file format.

MOV. The QuickTime® digital multimedia video file format, developed by Apple®.

MPEG (*Moving Pictures Experts Group*). A compressed digital video file format.

Password. A security scheme in which customers input a username and a password to access electronic services.

RA, RAM. RealAudio™ and RealVideo™ digital audio and video file formats playable by Progressive Networks®, Inc. programs. These file formats facilitate transfers of static audio and video files as well as streams of dynamically generated audio and video.

Scalability. How easily a system can be expanded without a breakdown or without requiring major changes in system procedures.

Scripting Language. Computer languages used to define the layout and timing of audio and visual elements of electronic services.

Security Scheme. A collection of security systems that limit access to electronic services to paying customers and forbid access to those who want to play with or damage the server computers used in the service operations.

Server. Software installed on a computer that receives service requests sent across a telecommunication network from a customer service delivery device. Servers fulfill these requests by sending documents, querying databases, or executing programs.

Server Side Include. Server side refers to operations performed at the server. Prior to sending the HTML file to the user, the server scans the HTML file for commands that require additional processing and insertion before sending the page to the user. The commands may request the insertion of boilerplate HTML or up-to-date data, or the execution of a CGI script.

SET (*Secure Electronic Transaction*). A secure credit card payment protocol developed by MasterCard® and Visa®.

Shopping Cart System. A computer program used by electronic retailers. The shopping cart system manages the list of products selected by each customer through the point of a successful payment transaction. Shopping cart systems also often facilitate the management of product information and prices presented to the customer.

SHTML. Server-parsed HTML in which a file extension, typically .shtml, identifies HTML pages that contain one or more Server Side Include commands.

SSL (*Secure Sockets Layer*). A security protocol developed by Netscape® Communications Corporation.

T1, T3. Point-to-point dedicated telecommunications lines. T1 communication lines operate at a capacity of 1.544 megabits per second. T3 lines operate at a capacity of 44.736 megabits per second.

WAV. A digital audio file format developed for Microsoft Windows®.

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Figure 1. A Conceptual Classification Scheme for Service-Processes in Electronic Retailing
(The Appendix contains a glossary of acronyms and terminology related to electronic service-process technologies.)

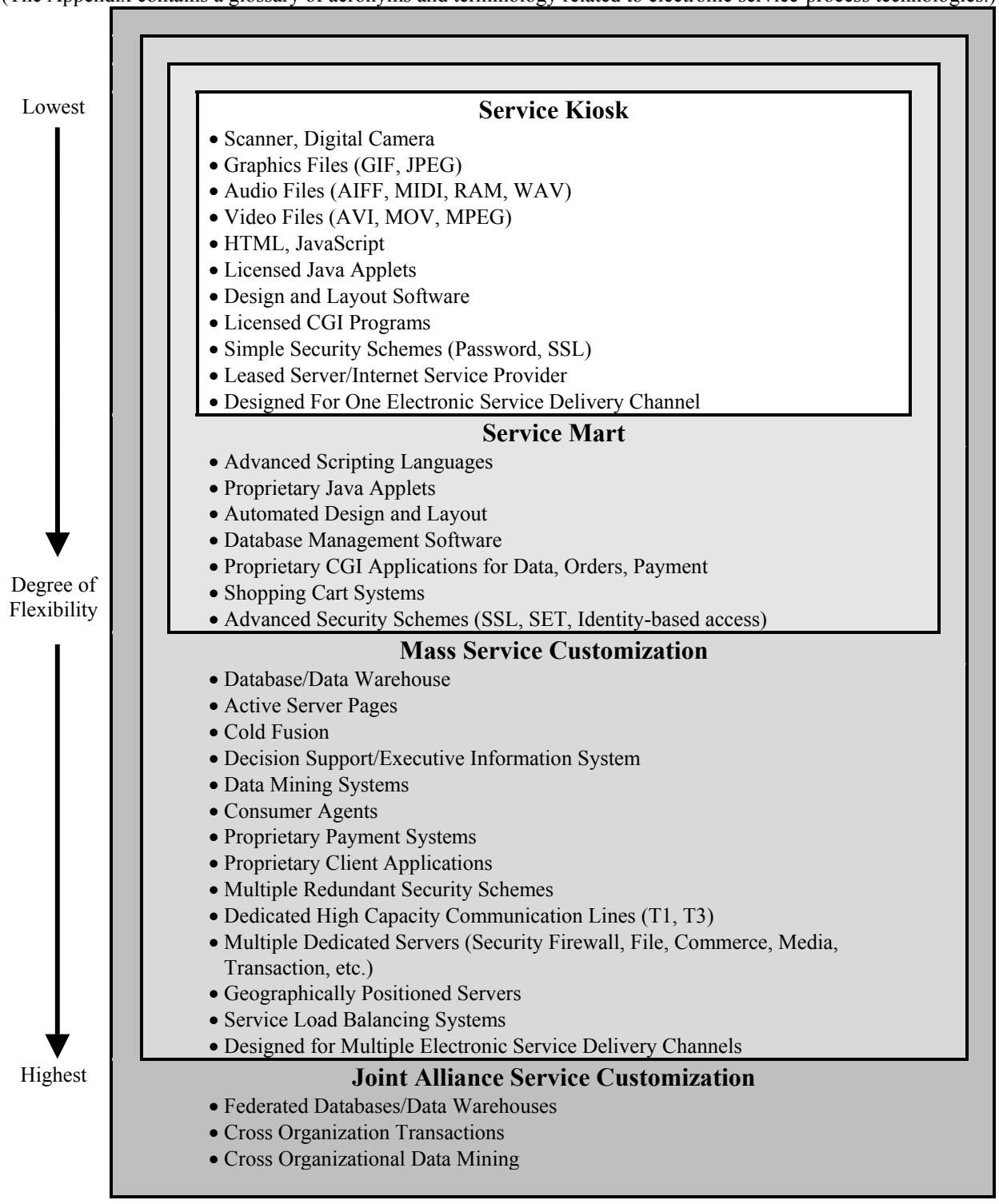

Table 1. Dimensions of Service-Process Flexibility in Electronic Retailing

Service-Process Flexibility Dimension	Type of Uncertainty	Description
Product and Customer Interaction		
• Mix	Market acceptance of different kinds of service-products	The ability to change the range of electronic service-products offered within a given period of time.
• Security	Privacy of the electronic transactions	The ability to keep electronic transactions private between provider and customer.
• Order Processing	Willingness of customers to order and pay during an electronic transaction	The ability to change the range of methods used for ordering and payment.
Intra Service-Process		
• Volume	Fluctuations in the aggregate service-product demand	The ability to respond to the aggregate level of service-product demand.
• Changeover	Variations in the length of the service-product life cycle	The ability to respond to the additions to and subtractions from the service-product mix over time.
Inter Service-Process		
• Backward Integration	Entry into or exit from other companies' networks	The ability to manage and modify partnerships to participate in other companies' networks.
• Forward Integration	Other companies' entry into or exit from a company's own network	The ability to manage and modify partnerships to allow other companies to participate in a company's own network.
• Full Integration	Entry into or exit from other companies' networks and a company's own network	The ability to manage and modify partnerships to participate in other companies' networks and allow other companies to participate in a company's own network.

Table 2. Salient Characteristics of the Study Sample (n = 255 Electronic Food Retailers)

	Number in Sample	Percent of Sample
Number of Products Offered		
1-10	62	24.3%
11-50	82	32.2%
51-100	30	11.8%
101-250	34	13.3%
251-500	23	9.0%
501-1000	14	5.5%
1001-10,000	9	3.5%
10,000+	1	0.4%
Primary Food Category		
Beverages (not Coffee)	35	
Coffee	23	
Meat/Seafood	35	
Fresh Produce/Vegetables	14	
Dairy	5	
Broad Grocery Services	6	
Dessert/Baked Goods	24	
Candy	20	
Gift Baskets	12	
Gourmet Food	27	
Ethnic Food	7	
Sauces/Hot Sauce	22	
Specialty/Other Foods	25	

Table 3. Electronic Service-Process Flexibility Dimensions and the Related Dichotomous (0/1)Variables Used in the Cluster Analysis

Flexibility Dimensions and Related Variables	Number of retailers in the study sample implementing the technology	Percentage of retailers in the study sample implementing the technology
Product and Customer Interaction		
Mix Flexibility		
Uses GIF files	248	97.6%
Uses JPG files	184	72.4%
Use client side JavaScript	48	18.9%
Uses audio files	23	9.1%
Uses client side Java	25	9.8%
Uses video files	3	1.2%
Security Flexibility		
Order/Payment form uses SSL	96	37.8%
Order/Payment form uses digital certificate	91	35.8%
Site uses password/username, or customer registration	30	11.8%
Order Processing Flexibility		
Order by phone	231	90.9%
1-800 number available for customers	183	72.0%
Order by mail	162	63.8%
Order online	179	70.5%
Order by fax	158	62.2%
Electronic order form uses CGI	149	58.7%
Offline order form for mail/fax	71	28.0%
Electronic order form use mailto: or email	60	23.6%
Site uses a shopping cart system	70	27.5%
Site has on-the-fly calculation of total order costs	63	24.8%
Electronic order form uses Cold Fusion	10	3.9%
Electronic order form uses Active Server Pages	7	2.8%
Intra Service-Process		
Volume Flexibility		
Uses ISP server	248	97.6%
Uses own server	8	3.1%
Changeover Flexibility		
Uses HTML files	244	96.1%
Uses CGI scripts	175	68.9%
Uses online database queries	31	12.2%
Uses SHTML files	11	4.3%
Uses Cold Fusion	9	3.5%
Uses Active Server Pages	5	2.0%
Inter Service-Process		
Backward Integration		
Participate in other firms' associate programs	8	3.1%
Forward Integration		
Offer own associate program to other sites	7	2.8%
Pay per click advertising program	2	0.8%
Full Integration		
Alliance partner: multiple firms operating the site	14	5.5%

Table 4. Frequencies of Electronic Service-Process Flexibility Variables by Cluster

Variable	Cluster 1 (n = 45)	Cluster 2 (n = 33)	Cluster 3 (n = 79)	Cluster 4 (n = 32)	Cluster 5 (n = 23)	Cluster 6 (n = 23)	Cluster 7 (n = 19)	$\chi 2$ (*p* value)	Spearman (*p* value)
Mix Flexibility									
Uses GIF files	97.8%	93.9%	98.7%	93.8%	100%	100%	100%	6.042[b] (0.418)	0.055 (0.380)
Uses JPG files	68.9%	72.7%	63.3%	75.0%	91.3%	78.3%	84.2%	9.512[a] (0.147)	0.120 (0.056)
Uses audio files	13.3%	12.1%	8.9%	6.3%	13.0%	4.3%		4.641[a] (0.591)	-0.104 (0.097)
Uses video files			2.5%	3.1%				3.980[b] (0.679)	0.014 0.828
Use client side JavaScript	15.6%	6.1%	12.7%	25.0%	60.9%	4.3%	31.6%	38.267[a] (0.000)	0.174 (0.005)
Uses client side Java	8.9%	6.1%	7.6%	6.3%	17.4%	8.7%	15.8%	3.319[a] (0.768)	0.056 (0.370)
Security Flexibility									
Order/Payment form uses SSL			2.5%	100%	100%	100%	89.5%	234.029 (0.000)	0.822 (0.000)
Order/Payment form uses digital certificate			1.3%	93.8%	100%	87.0%	89.5%	222.420 (0.000)	0.799 (0.000)
Site uses password/username, or customer registration			5.1%		52.2%	30.4%	36.8%	73.248[a] (0.000)	0.398 (0.000)
Order Processing									
Order online		12.1%	98.7%	100%	100%	100%	100%	232.363 (0.000)	0.795 (0.000)
Order by mail	93.3%	21.2%	69.6%	87.5%	100%		36.8%	111.388 (0.000)	-0.179 (0.004)
Order by phone	80.0%	97.0%	93.7%	93.8%	95.7%	82.6%	94.7%	11.910[a] (0.064)	0.073 (0.243)
Order by fax	46.7%	54.5%	68.4%	78.1%	95.7%	17.4%	73.7%	41.821 (0.000)	0.103 (0.101)
Offline order form for mail/fax	62.2%		20.3%	21.9%	65.2%	4.3%	21.1%	64.629 (0.000)	-0.133 (0.034)
1-800 number available for customers	53.3%	69.7%	64.6%	90.6%	91.3%	82.6%	84.2%	22.505 (0.001)	0.256 (0.000)
Electronic order form use mailto: or email			53.2%	50.0%	4.3%		5.3%	90.078[a] (0.000)	0.068 (0.279)
Electronic order form uses CGI		3.0%	91.1%	96.9%	78.3%	95.7%	26.3%	184.424 (0.000)	0.525 (0.000)
Site uses a shopping cart system	4.4%		11.4%	6.3%	100%	69.6%	100%	171.423 (0.000)	0.643 (0.000)
Electronic order form uses Cold Fusion		3.0%	1.3%				42.1%	79.790[b] (0.000)	0.244 (0.000)
Electronic order form uses Active Server Pages		3.0%			4.3%		26.3%	44.652[b] (0.035)	0.200 (0.001)

[a] One or more cells had expected counts below 5 but not below 1.
[b] One or more cells had expected counts below 1.

(*Table 4 continues on the next page*)

Table 4. Frequencies of Electronic Service-Process Flexibility Variables by Cluster (*continued*)

Variable	Cluster 1 (n = 45)	Cluster 2 (n = 33)	Cluster 3 (n = 79)	Cluster 4 (n = 32)	Cluster 5 (n = 23)	Cluster 6 (n = 23)	Cluster 7 (n = 19)	$\chi 2$ (*p* value)	Spearman (*p* value)
Volume Flexibility									
Uses ISP server	100%	100%	98.7%	96.9%	100%	100%	78.9%	32.270[b] (0.000)	-0.183 (0.003)
Uses own server			2.5%	3.1%			26.3%	37.559[b] (0.000)	0.193 (0.002)
Changeover Flexibility									
Uses HTML files	100%	100%	100%	100%	100%	87.0%	63.2%	68.127[b] (0.005)	-0.314 (0.000)
Uses SHTML files	4.4%	3.0%	3.8%		13.0%	4.3%	5.3%	5.893[b] (0.435)	0.035 (0.574)
Uses CGI scripts	22.2%	24.2%	94.9%	100%	91.3%	100%	31.6%	144.021 (0.000)	0.433 (0.000)
Uses Cold Fusion						4.3%	42.1%	90.498[b] (0.000)	0.308 (0.000)
Uses Active Server Pages		3.0%					21.1%	40.108[b] (0.000)	0.160 (0.011)
Uses online database queries			1.3%		39.1%	21.7%	84.2%	133.564[a] (0.000)	0.505 (0.000)
Site has on-the-fly calculation of total order costs			13.9%	12.5%	82.6%	56.5%	84.2%	122.903[a] (0.000)	0.586 (0.000)
Backward Integration									
Participate in other firms' associate programs		3.0%		3.1%	13.0%	4.3%	10.5%	14.913[b] (0.505)	0.167 (0.008)
Forward Integration									
Offer own associate program to other sites					13.0%		21.0%	38.825[b] (0.000)	0.231 (0.000)
Pay per click advertising program						4.3%	5.3%	10.287[a] (0.113)	0.133 (0.034)
Full Integration									
Alliance partner: multiple firms operating the site			6.7%	6.3%	4.3%	8.7%	21.0%	14.003[a] (0.030)	0.188 (0.003)

[a] One or more cells had expected counts below 5 but not below 1.
[b] One or more cells had expected counts below 1.

Table 5. Comparison of the Service-Process Stages in the Conceptual Classification Scheme, Clusters from the Cluster Analysis, and Service-Process Configuration in the Taxonomy

Service-Process Stages in the Conceptual Classification Scheme	Cluster No. from the Cluster Analysis	Service-Process Configurations in the Taxonomy
Service Kiosk	Cluster 1	Mail, Phone, or Fax Us—Service Kiosk
	Cluster 2	Please Call Us—Service Kiosk
	Cluster 3	Unsecure Order Form—Service Kiosk
Service Mart	Cluster 4	Secure Order Form—Service Mart
	Cluster 5	Secure Shopping Cart—Service Mart Service Mart
	Cluster 6	Service Mart—Mass Service Customization
Mass Service Customization	Cluster 7	Mass Service Customization
Joint Alliance Service Customization	Outlier observation in the study sample	Joint Alliance Service Customization

Table 6. Items in BizRate's 1998 Customer Satisfaction Survey

Product Information	Consider the quality, quantity, and relevance of information provided for making your purchase decision an informed one. (1 = Poor, 10 = Excellent)
Product Selection	Consider the breadth of product selection that the merchant has made available, keeping in mind the merchant's stated area of focus. (1 = Poor, 10 = Excellent)
Web Site Aesthetics	Consider not just how attractive the site was, but how appropriately graphics were used to enhance your shopping experience, not only slow it down. (1 = Poor, 10 = Excellent)
Web Site Navigation	Consider the overall layout/organization, movement around the site, and missing/non-functional links. (1 = Not Very Easy, 10 = Very Easy)
Customer Support	Consider the steps this merchant took to make sure you were informed of your order status and happy with the transaction. Also, consider how available and effective the merchant was in resolving any questions, complaints or problems that you encountered. (Leave blank if "Not Applicable.) (1 = Poor, 10 = Excellent)
Product Availability	Consider how many of the items that you wanted to order were immediately available. Do not include items not yet released by the manufacturer. (Leave blank if "Not Applicable.") (1 = Had no items, 10 = Had all items)
Ease of Return/Cancellation	If you found it necessary to return/cancel any of the merchandize that you purchased, please rate how easy the return/cancellation process was. (Leave blank if "Not Applicable.") (1 = Very Difficult, 10 = Very Easy)
Timeliness of Delivery	Consider timeliness in the context of the promised delivery date. (Leave blank if "Not Applicable.") (1 = Poor, 10 = Excellent)
Price	Consider the price of products relative to other merchants' prices in this category. (1=Very Expensive, 10 = Very Inexpensive)
Customer Loyalty	The next time you are going to buy such products, what is the likelihood that you will purchase from this merchant again? (1 = Poor, 10 = Very Likely)

Table 7. Relationship between Service-Process Clusters and Items in the Customer Satisfaction Survey

	Means of Indexes							
Items in the Customer Satisfaction Survey	**Cluster 3** (n = 8)	**Cluster 4** (n = 5)	**Cluster 5** (n = 17)	**Cluster 6** (n = 11)	**Cluster 7** (n = 11)	**Spearman (*p* value)**	**F (*p* value)**	**K-W (*p* value)**
Product Information	5.62	5.60	6.71	7.27	6.63	0.304 (0.029)	3.164 (0.022)	10.009 (0.040)
Product Selection	6.87	6.60	7.05	7.27	7.18	0.236 (0.093)	0.500 (0.736)	3.945 (0.413)
Web Site Aesthetics	5.62	6.00	6.12	6.63	7.36	0.457 (0.001)	2.655 (0.044)	11.170 (0.025)
Web Site Navigation	5.87	6.20	6.82	7.27	7.18	0.485 (0.000)	4.672 (0.003)	14.174 (0.007)
Customer Support	5.50	6.00	6.41	6.36	7.09	0.356 (0.010)	1.473 (0.225)	6.970 (0.137)
Product Availability	7.00	6.60	7.00	7.36	7.00	0.166 (0.238)	0.994 (0.420)	4.846 (0.303)
Ease of Return	2.75	5.20	5.00	5.73	5.45	0.336 (0.015)	2.723 (0.40)	9.652 (0.047)
Timeliness of Delivery	6.75	5.60	7.53	7.36	6.45	-0.068 (0.634)	0.296 (0.029)	7.431 (0.115)
Price	6.50	6.00	6.71	6.72	6.64	0.118 (0.405)	0.629 (0.644)	3.051 (0.549)
Customer Loyalty	5.87	5.80	6.76	7.00	6.72	0.395 (0.004)	4.611 (0.003)	13.897 (0.008)