E-Services: A Synthesis and Research Agenda

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ABSTRACT

Services marketing research increases in both intensity and relevance as services contribute an increasing share of the world's economy and as firms and their customers increasingly interact through electronic networks. E-services present sharp new challenges to both researchers and practitioners, because the processes from beginning to end of the e-service value chain are markedly different than those for offline services and because the electronic environment offers increased flexibility throughout the value chain. This flexibility creates the requirement to impose some sort of structure on all of the possible service and channel design choices. E-service flexibility creates an opportunity, and the need, to think about the consumer early in the design process. Finally, flexibility makes it difficult, but critically important, to consider various scenarios suggesting future developments in e-services. Our goal is to provide an overview of the past and some projections for the future in the new field of e-services.

KEYWORDS

E-Services, Flexibility, Self-Service Technologies, Service Processes

INTRODUCTION

The spread of electronic networks continues to transform business, marketing, and consumer behavior. One feature of this transformation is the appearance of the e-services phenomenon that arises at the border of two business domains of study: services marketing and e-commerce. Although some think about e-commerce in terms of the marketing of tangible goods (such as books, clothing, and electronics) online, a growing proportion of online activity is strictly devoted to the consumption of experiences; both hedonic and utilitarian.

Of course, in the eyes of many observers, selling tangible goods online is itself an e-service, one which substitutes for physical retailing. It is therefore natural that services scholars would turn their attention to what is arguably the most important innovation in retail service delivery in many years, namely the ability to deliver service to a mass market with little to no direct human intervention. But the online world has seen a new category of service emerge which is neither a substitute for, nor a complement to, any offline offering. The emergence of purely virtual value chains, for example, in the form of Web portals, is frequently ignored in both e-commerce and services marketing texts (but see Fisk, Grove, and John 2003 for a notable exception). This new product category presents researchers with the need to develop and extend marketing theory, to investigate the new topics the theories suggest, and to formulate actionable recommendations for e-service managers. In order to further clarify the opportunities posed by e-services, we begin with some examples and a simple classification scheme.

Three Prototypical Examples of E-Service

We discuss examples illustrating three extant types of e-services: (1) complements to existing offline services and goods, (2) substitutes for existing offline services, and (3) uniquely new core services.

Organizations may add value to existing goods and services with complementary e-services. For instance, FedEx enhances the perception of tangibility while reducing both perceived and actual risk by letting customers track packages online. Major airlines allow passengers to conveniently change seats online. Cisco offers technical support and other after-purchase services on its website. As an additional benefit, use of this direct channel allows firms to unobtrusively collect information about their customers, thus permitting service improvements based on customer knowledge (Iqbal, Verma, and Baran 2003).

Many firms utilize e-services as virtual substitutes for classic offline services. Retailers do this when they provide additional benefits online (e.g. more sizes or colors, longer product lines, backordering capability, and cost reduction). For instance, Amazon provides extensive availability compared to bricks-and-mortar bookstores, and offers value-added features, such as book reviews to assist in selection. Netflix makes it possible to search tens of thousands of movie titles and receive DVDs by mail along with pre-labeled return packages. Recommendation (Ansari, Essegaier, and Kohli 2000) and customization (Rust and Kannan 2003) strategies are typically implemented more efficiently online than in person; they can generate significant competitive advantage both through lower cost and increased customer benefits.

Finally, firms are developing new core e-services in the form of offerings that do not and generally could not exist as offline services. For instance, the online game provider World of WarCraft simultaneously hosts hundreds of thousands of gamers interacting in a shared virtual universe. Google Map's geographic service is available to an out-of-towner trying to find an address, to a business creating a real time parking spot exchange in Manhattan, to a government agency performing epidemiological analysis, and to a real estate broker offering an infomercial on local housing offerings. Google Maps can provide a unique pattern of benefits with greater flexibility and more information than a traditional paper map. However, the benefits are limited by service design considerations as we note that directions provided in person may offer greater customization as well as responses to specific questions that may not be answered online.

Complementing an offline service, substituting for an offline service, and offering a purely virtual core service are all identifiable as e-services. In all three cases service is provided by a programmed algorithm using network software rather than offered using human interaction. We now discuss related observations, beginning with a more formal definition of e-services.

What Is an E-Service?

E-services have previously been defined as "those services that can be delivered electronically," (Javalgi, Martin, and Todd 2004, p. 561) and similarly as "provision of services over electronic networks" (Rust and Kannan 2003, p. 38). Boyer, Hallowell and Roth (2002, p. 175) use the definition, "interactive services that are delivered on the Internet using advanced telecommunications, information, and multimedia technologies." The first two of these

definitions focus on the fact that delivery is electronic, and beg the question "what is a service?" or "what benefits are expected by the customer?" The third definition is concerned with the infrastructure necessary to deliver an e-service, but still does not define the term. Thus, it is important to clarify what we mean by "e-service" before we continue.

Lovelock and Wirtz (2004, p. 9) define service as "an act or performance offered by one party to another…an economic activity that creates value and provides benefits for customers…by bringing about a desired change in, or on behalf of, the recipient." This definition brings out both the process by which the service is produced and the outcome, in the form of benefits, that the customer receives. Both the service production processes and the outcomes are relevant when we consider e-services, as well.

Regarding the service production process, an e-service is created and stored as an electronic code comprised of binary numbers, because it exists in a digital environment. Building on this, we observe that, by definition, the result of translating an act or performance into binary numbers is called an algorithm. Hahn and Kauffman (2002) have also identified e-services with algorithms. Using this idea, we could define e-service as: *"an act or performance that creates value and provides benefits for customers through a process that is stored as an algorithm and typically implemented by networked software."* Thus our definition highlights the distinction between service production (a stored algorithm delivered by software) and service outcome (the desired benefit received by consumers).

We believe that the flexibility of algorithms and networked software combined with the requirement imposing structure on the service experience are distinguishing features of e-service which help to define the opportunities available to marketers. As an illustration, consider Yahoo!, which offers a calendar service to subscribers. The service production process begins with Yahoo! programmers who create and store the algorithms (procedures stored on computers which can be used to accomplish a task) that produce the calendar service. These algorithms can be programmed to behave in millions of different ways, producing different features, appearances, interactions and benefits, all of which might differ considerably from a physical calendar. Visually maintaining the metaphor of a paper calendar allows the consumer to bring her "calendar schema" to bear during the service experience. The benefit sought by a user of this service might be a reminder of an important birthday; thus, she creates a calendar entry for the date of the birthday either through her cell phone or Web browser. Before e-services were available, such a benefit might have been provided by a human personal assistant. Today the consumer might decide to have that Yahoo! reminder delivered to an email inbox or to a phone number, or she might receive the reminder through a cell phone, PDA, laptop or desktop machine. An e-service is logically independent of the devices that create, store, and deliver it. This logical independence of the service delivery process - perhaps we can dare to call it "separability" - creates an additional level of flexibility.

Given the above process- and outcome-oriented definition of e-services, the question arises: what should services researchers study in the e-services value chain? We believe researchers should consider the design of the service process, any customer interaction required by the process as the service is consumed, and the outcome of the process, the latter directly reflecting the service

benefits that the customer expects to receive. Emphasizing processes highlights flexibility and the arbitrariness of imposed structure in the design stage: e-service processes, as algorithms, may or may not be designed to imitate traditional service processes. In addition, they can be inventoried, repurposed, reassembled with different properties, recombined, customized, repackaged, re-branded, transferred or forwarded, delivered to various devices, and re-consumed. An e-service outcome, on the other hand, may be measured in the traditional way relative to customer expectations: satisfaction depends on reactions to any experiential aspects of the service delivery process and on the perceived results, as compared to expectations.

We wish to continue comparing production processes and outcomes of e-services to those of more traditional services; thus we next consider properties of services and how they might apply to e-services. We then offer a selective review of the e-services literature, primarily to aid in identifying important themes. Based on this review, we highlight additional topics that in our view could benefit from a service-centric approach, but which have received only minimal attention from services researchers.

PROPERTIES OF E-SERVICES

We proceed by discussing four commonly-cited properties of services and their managerial consequences: intangibility, heterogeneity, inseparability of production and consumption, and perishability (see Zeithaml, Parasuraman, and Berry 1985). In doing so we note that these traditional differences between services and goods have recently come under fire (see Lovelock

and Gummesson 2004) because they do not offer a clear distinction between services and goods, and because they represent a negative definition of services in terms of "what tangible goods are not" (Vargo and Lusch 2004b). For our purposes, however, they are useful in distinguishing e-services from more traditional services. Lovelock and Gummesson suggest identifying services as those purchases that do not result in ownership for the buyer; rather, benefits are obtained through access or temporary possession. This “nonownership” dimension is helpful in identifying e-services as a unique product category and we will use it also.

Intangibility

We might assume an e-service is less tangible than the same service delivered in person. In prototypical or pure cases of e-services, previous work on intangibility (i. e. Laroche, McDougall, Bergeron, and Yang 2004) will be especially relevant. In other cases, such as continuously delivered services (insurance), services which involve processing possessions rather than people (package delivery), or where there is an important symbolic component (plane reservation, ticket to a play) an e-service conveys increased tangibility.

The specific delivery mechanism (DVD, kiosk, hand held device, personal computer) and format (web page, email, video, text message, voice menu) also offer an important contribution to tangibility. Although an e-service designer has considerable choice and flexibility in terms of delivery options, an e-service consumer has only a fixed set of senses and limited information processing capability. Thus, choice of channel should take into consideration the specific type of intangibility (Laroche, Bergeron, and Goutaland 2001) and how that plays to the weaknesses and strengths of the human information processor.

To elaborate further on possible weaknesses, if the consumer must deal with more than a few items of information simultaneously, a large computer screen might be called for instead of a cell phone screen or an auditory e-service. Otherwise the limitations of short-term memory (Bettman 1979) might reduce the benefits of the service. Similarly, the richness of the interaction afforded by the combination of the available bandwidth and the input and output devices determines the sorts of problem-solving possible in the mediated environment (Yadav and Varadarajan 2005), the amount and type of product complexity that can be conveyed by the seller and specified by the buyer, as it also dictates how compelling the brand experience is for the e-service. Interaction design likewise might need to take into account whether the benefit is reduction in uncertainty (adding data points) or reduction in ambiguity (Daft and Lengel 1986). Many of the strengths of consumer information processing grow over time with experience. Visual metaphors (Carroll and Thomas 1982) that honor schemas can leverage previous consumer knowledge while rendering the service process more tangible.

Heterogeneity

Heterogeneity represents variability in the quality and essence of a particular service. Given the error checking capabilities of networked software, an e-service is likely to be far more homogeneous than other services because it is not labor intensive (from the point of view of the firm), and so therefore does not incur as much risk of human error. In fact, upon production, an e-service is more homogeneous than a typical physical good. Rather than study heterogeneity in this sense, e-services researchers have focused on the impact of variability due to consumer participation (Parasuraman 2000), on customization and personalization (Goldsmith 1999), and

on consumer heterogeneity in preferences for experience goods (Villas-Boas 2006). Variability is also added by the consumer's software configurations and preferences and hardware environment.

Inseparability of Production and Consumption

Because "place" is not a property attributable to networked software (Kobrin 2001), e-services are highly flexible in terms of physical separation between consumer and producer. A musical band can record a song, which is an experiential product, and sell it on a website. We might determine that the service production (performing the song) and the service consumption (listening to it) have been separated in both space and time. Of course, the same song can be copied by the consumer to different media or played on an MPEG player or the car or home stereo system, or sampled and used in creating a new work of art. This example shows that the flexibility of an e-service can render it more separable than a physical good. However, if we consider an online music retailer that offers a variety of access methods, including downloading, we might classify that as a case where the consumer must be "present" on the website in order to consume the service.

In either case, we believe that management's strategic goal should be to develop the ability to offer as many benefits as possible (Vargo and Lusch 2004a) by encouraging the sorts of transformations described above (e.g. copying, sampling), and by using updates, outtakes, newsletters, interactive chats with musical groups, and so forth.

Perishability

Vargo and Lusch (2004b) argue that, in some cases, services are not perishable and can be inventoried. An e-service, being an algorithm, offers an excellent example of just such an exception, as it can be stored indefinitely by the firm (server disk) or consumer (CD or other media). We conclude that e-services are not necessarily perishable, as a consumer who has enjoyed a downloaded copy of *The Iliad and the Odyssey* might confirm. Unlike goods or offline services, binary numbers delivered by software can be consumed over and over again without being used up. Further, unlike offline services, an e-service such as the downloaded song mentioned above can be copied and given to someone else and yet still be retained. While offline services cannot be inventoried, e-services, as illustrated by song exchange, frequently have the opposite problem in that they are too easily inventoried, *i.e.*, they are *non-excludable in supply* (Krishnan, Smith, and Telang 2003), meaning that management cannot prevent consumers from copying, storing and exchanging. Once again, a service-centric viewpoint helps to manage this problem. For example, game provider World of WarCraft gives away the PC software used to play the game, and charges players instead for access to the interactive server.

Nonownership

Lovelock and Gummesson (2004, p. 34) propose that nonownership uniquely identifies services, which is to say that there is no transfer of ownership in services. This is true for both offline services and online services, although e-services have the additional characteristic of being *non-rival in demand* (Asvanund, Clay, Krishnan, and Smith 2004) meaning that consumption can occur simultaneously without reducing the other consumer's utility.

Thus, e-services exist at the nexus of the intangible product and the use of software to perform functions previously carried out by humans. They embody the need satisfactions of traditional services, but using a unique technology. Before reviewing the current literature on e-services, we summarize the difference between goods, traditional services and e-services in Figure 1.

Insert Figure 1 about Here

E-SERVICE THEMES

We reviewed the e-services literature, considering theoretical, research and managerial issues raised for e-services by some of the traditional concerns of services marketing. The themes we discuss were selected because they addressed e-services in a marketing, e-commerce, or services context. Table 1 presents the framework for our discussion showing categories and sub-categories, some key articles, and a concise description of some key issues addressed.

Insert Table 1 About Here

We identify two frequent e-commerce application contexts, which marketers originally developed for offline services. First, much of e-services research focuses on online retailing, a substitute for a physical service. This is most clearly evident in work on e-service quality, historically an important research stream in offline services and now translated for the Web (e. g. Parasuraman, Zeithaml, and Malhotra 2005; Zeithaml, Parasuraman, and Malhotra 2003). A second and related point is that e-services are also frequently conceptualized as supplementary or peripheral services provided by companies whose main business is offline or whose value

proposition predates the Internet era. This is particularly evident in research on Self-Service Technologies (SSTs) (Dabholkar 1996) and Servicescapes (Bitner 1992). We now review these and other common themes that have emerged over the past few years. Our review of these e-service themes begins at the start of the e-service value chain with a discussion of e-service production; including multi-channel production, co-production, and self-service. In the second theme, the focus is maintained on back-office value-adding activities including service operations and fulfillment. In the third theme, we turn to more "customer facing" aspects of e-services, reviewing research on the servicescape and service quality. In the fourth theme we cover the classic services topics of e-service failure, recovery, satisfaction and loyalty. Our final theme concerns service relationship management.

Who produces the service?

Firms now have a variety of service channels at their disposal, which can be used alone or in combination with other channels. We begin this section by discussing e-service in the context of multi-channel service provision. In a multi-channel context, who produces the service becomes, at least partially, a strategic decision for the firm, endowing additional flexibility and potential for competitive advantage.

We note that there us a disparity, or at least difference in emphasis, that is apparent in the background literature on "who produces a service." Prahalad and Ramaswamy (2004) and Vargo and Lusch (2004a) make a general argument in favor of allowing customers to co-create offerings with self-service technology. Specific benefits to the consumer of adding an Internet channel include customization, interactivity, global access, real time access and multimedia

displays (Viswanathan 2005). There are also strategic benefits to the firm: channel flexibility (the information mix, product representation, and site and interface design), market lock-in (switching costs), and positive consumption externalities (many e-services become more valuable as more consumers use them), according to Viswanathan (2005).

We discuss externalities in the *Virtual Communities* section below, but for now, we need to acknowledge that the rosy picture painted by the above list of firm benefits is not universally shared. Bendapudi and Leone (2003) offer a cautionary view, pointing out that self-serving bias will lead to customers claiming more responsibility for a self-service success and taking less blame for a self-service failure. Similarly, self-service technologies reduce the impact of social bonds and feelings of social obligation (Selnes and Hansen 2001). There are important implications for loyalty in these cases. Surely more research is needed to determine exactly when and where co-production is beneficial, and how to mitigate its potential negative consequences for loyalty.

Despite these cautionary notes, managers should reap a net benefit in the increased flexibility derived from having multiple service channels. Factors that trade off in choice of service channels include labor market availability or shortages (Rayport, Jaworski, and Kyung 2005), the amount of customer support desired and the cost of that support (Simons, Steinfield, and Bouwman 2002), the channel's physical capacity to perform various service outputs (Seiders, Berry, and Gresham 2000; Wallace, Giese, and Johnson 2004), the fit between the user's task and the channel software (Dishaw and Strong 1999), and the level of service product complexity (Boyer et al. 2002).

Of course, consumers are not neutral with respect to how they deal with complexity; they bring their own preferences and abilities to this arena. Empirical research shows that the service channel features preferred by consumers vary greatly (Iqbal et al. 2003), adding to the difficulty of designing channel strategy. Consumers differ in self-efficacy (McKee, Simmers, and Licata 2006), need for social interaction (Dabholkar and Bagozzi 2002; Meuter, Ostrom, Roundtree, and Bitner 2000), readiness to accept self-service technology (Parasuraman 2000), and in their ability to perform the tasks demanded by it (e. g. Dellaert and Stremersch 2005). Both the cognitive limitations of consumers and the demands of branding tell us that consistency and seamlessness are important goals of management in a multi-channel service environment (Bendoly, Blocher, Brettha uer, Krishnan, and Venkataraman 2005; Sousa and Voss 2006).

At this point we note an interesting disparity between the SST literature, which tends to focus on adoption (Bhappu and Schultze 2006; Lee and Allaway 2002; Meuter, Bitner, Ostrom, and Brown 2005), and the customer relationship management literature, which is retention-oriented. We believe it would be useful for scholars to contemplate the full SST life cycle, a topic we address later. For now, we continue to address the e-service value chain, turning to service operations and fulfillment.

Service Operations and Fulfillment

Because e-service delivery is executed by software algorithms rather than human actors, the service development process differs from that of interpersonal services, resembling manufacturing operations more than classical service operations (Meyer and Zack 1996). In

addition to being software-intensive, e-services are data-intensive, and data availability and accessibility, or *data completeness* (Brohman, Watson, Piccoli, and Parasuraman 2003), is a key driver of e-service value and convenience. It is the nature of information assets, including both algorithms and customer data, to be capable of being used, reused and recombined in various ways. For example, Google combines software and feedback from customer search input to create added value for Web surfers. It combines historical search input with data on click through probability to create added value for advertisers. Recombining these sorts of company assets is at the heart of what strategy theorists refer to as dynamic capabilities (Amit and Zott 2001). Companies offering new core e-services are among the most dynamic in the economy.

For e-retailers, processes occurring behind the scenes can also be critical. We can divide online retail experience into pre- and post-sale time periods. Evidence is beginning to emerge of important recency effects; in particular, post-sale influences outweigh pre-sale factors in repurchase intention (Posselt and Gerstner 2005). The relationship between delivery waiting time, inventory policy, and operations decisions are examined in papers by Rabinovich (2004) and Cao and Zhao (2004). These provisions are important to the successful provision of e-services.

In the business-to-business marketing sphere, e-service is about collaboration and relationship building. B2B e-service plays an important role in the trend towards supply chain integration and coordination (Bridges, Goldsmith, and Hofacker 2005; Iyer, Germain, and Frankwick 2004). B2B suppliers often create more powerful electronic fulfillment mechanisms than do B2C e-retailers, and elaborate Enterprise Resource Planning (ERP) systems (Gardner, Hanna, and

LaTour 2002) are used to create and maintain the data functionality necessary for high service levels.

The Online Servicescape and Service Quality

We have just seen that e-service managers must make many decisions that impact the outcome of the interactive service encounter. Likewise, e-service designers must make numerous decisions about the interactive experience of the service. Such design decisions occur at many levels and include the structure, look and feel of the entire website, the structure and individual elements appearing on particular pages, and even wording and graphical representation at the level of individual links. Taken as a whole, these physical design decisions have a large impact on affective and attitudinal reactions on the part of customers (Chang, Simpson, Rangaswamy, and Tekchandaney 2002). Of particular interest are priming effects observed when background or otherwise subtle elements have a pronounced impact on attitude (Stevenson, Bruner, and Kumar 2000) and even choice (Mandel and Johnson 2002). Affective reactions to the functional and atmospheric design of a site ripple through to online behaviors from navigation to purchase (Boulding, Staelin, Ehret, and Johnston 2005). Among other variables, color, navigation structure, and links have been shown to affect the decision to browse a website (Dailey 2004; Menon and Kahn 2002). Thus consumer behavior, satisfaction and enjoyment critically depend on the online servicescape. Given the flexibility and scope of the e-service design space, it is clear that researchers have merely scratched the surface of what could be investigated.

A particularly popular goal is to measure e-service quality. Many of the factor analysis dimensions commonly uncovered in this work represent properties of software (Design, Ease of

Use), factors relating to trust (Security, Privacy) and interaction and fulfillment reliability. Sweeney and Lap (2004) however used the critical incident technique and found that quality perception is based on the dimensions of Ease of Use, Content Quality, and Process (User Control and Speed).

Recently, Bauer, Falk and Hammerschmidt (2006) have argued that previous e-service quality scales have been too utilitarian and ignore the hedonic qualities of a web site, which these authors see as related to enjoyment. In fact, they find that enjoyment is a leading influence in repurchasing behavior (Bauer et al. 2006).

Decades of offline service quality studies have converged reasonably well in terms of the dimensions uncovered (but see Brady and Cronin 2001). On the other hand, measuring e-service quality has so far resulted in only modest overlap from study to study. Some illustrative papers are presented in Table 2, along with the numerous dimensions reported. An important goal for future research should be to develop a more comprehensive understanding of what quality means for e-services, including how it can be measured, what common dimensions might be required across different e-services, and what aspects are unique to specific e-service contexts. At the very least, e-service quality researchers should note whether they are studying a complementary, substitute or core e-service.

Insert Table 2 About Here

E-Service Failure, Recovery, Satisfaction and Loyalty

Service failure and recovery have been examined extensively in offline situations (e. g. McCollough, Berry, and Yadav 2000; Tax, Brown, and Chandrashekaran 1998), but there is a paucity of research specific to the online environment. Here, we review some of the materials available for offline services, and then extend the findings to e-services.

When a service does not perform as the provider intended, or as the customer expected, resulting in customer dissatisfaction, we say that a service failure has occurred. Although only a small percentage of customers who experience failure tell the provider about it, those who do offer the firm the opportunity to engage in service recovery. Successful recovery efforts mitigate dissatisfaction and salvage the customer's loyalty to the firm. As Zhu, Sivakumar, and Parasuraman (2004) note, failures may occur during the service production process, or they may not be noticeable until they are observed in the service outcome. Thus, recovery efforts should be targeted to either the process or the outcome, as appropriate.

Smith, Bolton, and Wagner (1999) describe process failures as being more symbolic, or having to do with inconvenience or unpleasantness during the delivery, and outcome failures as functional failures in the core service. We note that although there may be some overlap between the delivery process and the core service, particularly for experiential services, the distinction between delivery process and outcome continues to be important for e-services. For instance, e-service process failures can occur when moving from one web page to another is not seamless or when navigation is otherwise

difficult, when error messages are seen instead of the desired screen, or when the steps involved in ordering service are slow, effortful, or unclear. Outcome failures can occur when the delivered service is not the same as what was requested, when the service is not delivered, or when it does not meet specifications.

Two articles (Holloway and Beatty 2003; Holloway, Wang, and Parish 2005) extend traditional theoretical models of service failure and recovery to online shopping by examining how the online purchasing experience differentially impacts consumer receptivity to online recovery efforts. Noting the absence of well-developed theoretical descriptions of online service failure, these researchers develop a typology of online service failures and describe how managers can avoid them. When failures do occur in e-services, recovery is particularly difficult, because the lack of a human front-line service provider means that a frustrated customer must deal with an unsympathetic technological interface (Kolesar and Galbraith 2000).

In addition to examining how service failure and recovery differ between offline and online service environments, we are interested in how e-service failure and recovery efforts influence online customer satisfaction and loyalty. We address this topic by reviewing literature describing customer satisfaction and loyalty in offline services, and then extending the ideas to e-services.

Service customer satisfaction is often described as a transactional comparison of perceived performance against expectations (e. g. Bitner 1990; Spreng and Singh 1993).

Using this definition, we note that a customer must have at least one experience with a particular service in order to be satisfied or dissatisfied with it. Further, satisfaction may change dramatically following each encounter, as a customer compares her perception of the service received with her expectations of what the provider would deliver during that encounter. We believe that this definition can be applied to e-services.

With regard to satisfaction, it is important to decide whether to measure the gap between the customer's perceived service and expectations by obtaining a single measure of the difference or by using separate measures and calculating the difference. Although both methods have been used in the literature, the results are not necessarily the same (Churchill and Surprenant 1982). Oliver (1980) points out that a scale anchored by "better than expectations" and "worse than expectations" may resolve this disparity by directly measuring the gap without referring to expectation levels.

Another interesting measurement issue related to customer satisfaction with e-services is whether a single scale should be used or multiple items are needed. Consistent with Rossiter (2002), who states that if customers are clear as to whether or not they are satisfied, a more accurate measure may be obtained by a single question, some researchers (e. g. Bolton and Drew 1991; Cronin and Taylor 1992) have effectively used single-item scales to measure overall satisfaction with service encounters. Other researchers (e. g. Oliva, Oliver, and MacMillan 1992; Spreng and Singh 1993) believe that satisfaction measurement requires separate items for each element of the service experience, such as the contact person, core service, and delivery experience. When

multiple items are used, they are typically combined in the analysis (often additively) to obtain a single measure of satisfaction. Because we are concerned with the customer's experience in the service delivery process as well as the outcome, and because these are distinct constructs, we conclude that separate measures of satisfaction with the e-service process and the outcome should be obtained.

The literature mentioned thus far in regard to customer satisfaction suggests that, if customers have low expectations of the e-service process or outcome, they are more likely to be satisfied. However, there is an alternative explanation: Bridges (1992) and Oliver (1993) note that customer expectations may have an equivocal direction of impact. Low expectations may lead to a positive disconfirmation (and higher satisfaction), but the same low expectations may result in reduced affect due to assimilation. High expectations may lead to negative disconfirmation (and greater dissatisfaction), but may concomitantly result in positive affect due to assimilation. Within a certain threshold, assimilation (of the perceived service toward expectations) is likely to occur, but as the gap between the expected and the perceived performance increases, contrast effects become increasingly likely. Thus, outside the threshold, the potential for equivocal impact is reduced – obfuscation of the results of conflicting influences is less likely. These results are important in e-services, because they impact decisions regarding marketing activities that influence customer expectations.

Some elements of the e-service experience may be especially important to customer satisfaction. For instance, Szymanski and Hise (2000) found convenience, website

design, and financial security to be critical. Meuter, Ostrom, Roundtree and Bitner (2000) supported their findings, and extended them to SSTs. In general, the antecedents and consequences of satisfaction offline also apply to an online setting (Bansal, McDougall, Dikolli, and Sedatole 2004). Further, as Bitner, Brown, and Meuter (2000, p. 124) observe, "Customers demand and expect effective service recovery when failures occur."

Satisfaction with and loyalty to e-service providers has been studied using theories derived from the offline study of these same topics. Several researchers observe that these constructs are the same online as offline, although they may be driven by unique characteristics of the two categories of service (Bitner et al. 2000; Shankar, Smith, and Rangaswamy 2003). Shankar *et al.* further observe that the relationship between customer satisfaction and loyalty is typically stronger in online services than it is in offline services. Not surprisingly, because of the need to reduce risk in online environments, trust is also a pivotal driver of consumer loyalty (Harris and Goode 2004). In addition, specific customer concerns when buying services online include divulging sensitive information, lack of responsiveness, and security (Gummerus, Liljander, Pura, and Riel 2004). Thus, although e-service satisfaction and loyalty are similar constructs to those used offline, they contain unique aspects and depend on different drivers that need to be described and studied.

It has been suggested in the trade press (Schrage 2001) that service customer loyalty may actually increase following a failure and recovery. Specifically, service providers are

advised that they can increase the likelihood that customers will make another purchase if there is a failure and a successful recovery. However, this does not mean that subjecting customers to service failure is always a good idea: several researchers (e. g. Maxham 2001; McCollough et al. 2000; Smith and Bolton 1998) find that satisfaction levels after recovery do not exceed satisfaction in the absence of a service failure, and they may actually be reduced. Harris, Grewal, Mohr, and Bernhardt (2006) apply these ideas in an online environment and observe that, because consumers feel more in control of the situation online, inadequate service recovery has less impact than it does offline. This suggests that online service providers have greater leeway in their recovery efforts following a failure.

Service Relationship Management

Researchers have begun to study e-customer relationship management (e-CRM) to provide useful insights for e-service managers. Rust and Lemon (2001) propose that there are three aspects of e-service that are critical in effectively interacting with consumers: true interactivity, customer-specific, situational personalization, and the opportunity for real-time adjustments to a firm's offering. Surprisingly, however, e-CRM may not be associated with customer traffic to a website (Feinberg and Rajesh 2002). Thus, it appears that e-retailers are not only behind in implementing e-CRM features, they also may not understand what aspects of e-CRM are important in customer satisfaction.

We propose that the goals of e-service managers are similar to the goals of offline marketing managers. First, they want to *acquire* customers, attracting them to the web site where it is hoped they will interact by seeking information, locating potential products, and ultimately buying. Second, e-service managers want to *retain* the most profitable customers who buy on the site by creating a relationship with them so that they revisit the site, it is hoped, as repeat buyers (Goldsmith and Bridges 2000). This is aspect of e-commerce is often referred to as "stickiness" (see Boyer *et al.* 2002). Third, managers want to *develop* these customers by means of up-selling and cross-selling to make them even more profitable. Fourth, they want to *consult* their customers as valuable sources of information about current and future market offerings, using customer input to improve marketing strategy. Finally, they want to *convert* their customers into brand representatives who promote the brand to other consumers through word-of-mouth both on and off line. For online services, e-CRM is a tool that will assist in achieving these goals.

The data found in company data warehouses can be mined to uncover unique and ever smaller customer segments, thereby revealing the needs, wants, and behaviors of distinct groups of customers already served by the firm. These target segments form "portfolios" of customer segments that can be managed for profitability (Selden and Selden 2006). New customers who fit the profiles of defined, desired segments can then be targeted by strategies to attract them to the website. Brohman et al. (2003) refer to this as a "profit-centric orientation" whereby the data are analyzed to reveal the most profitable customers. This activity would help to fulfill the customer acquisition task of e-service

managers by profiling profitable consumer segments so that potential buyers could be identified and targeted with strategies designed to attract them to the website. Thus, more effective strategies for acquiring customers can be developed by understanding existing customers and projecting this information to determine who the most likely future customers are to be. Moreover, converting existing customers into brand representatives will enhance the customer acquisition function.

Managers retain customers by satisfying their needs and wants and by creating value for them (Boyer *et al.* 2002). To accomplish these goals, managers should (1) specify the needs and wants their websites will satisfy for specific target markets, (2) make the websites simple, accessible, and easy to use, (3) promptly, completely, and accurately, fulfill orders, (4) provide information desired by customers about their transactions, and (5) provide any follow-up support desired by customers. These efforts should promote website loyalty among customers in the form of repeat visits to the website. Managers are aided in this effort by the phenomenon of "lock-in," or "consumers' decreased propensity to search and switch after an initial investment" (Zauberman 2003, p. 405). Research on lock-in shows that online consumers manifest a short-term orientation that leads them to pick a preferred site to use repeatedly even though this option may not lead to the lowest price for the sought product (Johnson, Bellman, and Lohse 2003). Consumers seem to avoid switching costs, trading off future lower prices or improved service in favor of the comfort and immediate utility of using familiar web sites (Zauberman 2003).

Once the relationship between customer and firm is established, managers should actively develop it to increase customer value and profit. However, customers differ in their levels of profitability. Some studies show that the top 20% of customers ranked by profitability create most of the profit, while the bottom 20% actually yield losses (Selden and Selden 2006). One aspect of developing e-service customer segments is to assist in deciding which customer are profitable and should be retained; it is also useful to understand what would be needed to make unprofitable customers profitable. Moreover, firms can increase customer share by using "permission marketing" to establish two-way communication with customers, leading to increases in the amount of business they do (Osenton 2002). Some of the actions needed include (1) improving service levels, (2) creating loyalty programs, (3) offering complementary products, (4) serving customers through additional channels, and (5) extending the product line with new options and price points (Sawhney and Zabin 2002). This is the function of e-CRM that uses the data warehouse to personalize the website for each customer, making it a valuable resource. Such features as reminders to customers of important purchase opportunities are possible with this technology.

The Internet enables companies to interact with customers as never before, learning ways to improve service, develop new products, and fine-tune marketing strategies. Managers may facilitate this by creating online brand communities. Managers can tap into the discussions of online brand communities to learn about current customer desires and concerns.

Word-of-mouth (WOM), one of the oldest marketing tools, has flourished on the Internet as eWOM, a powerful influence on the success of brands (Goldsmith 2006). Consumers are ready, willing, and able to communicate with vast numbers of their peers, sharing their opinions and information about brands. The management challenges include using eWOM to the advantage of the brand. Identifying, seeking out, and nurturing "brand evangelists" (McConnell and Huba 2003) should be a top priority. Not only are loyal customers more profitable, they may offer constructive information for improving the brand, new product ideas, and e-WOM. Their efforts on behalf of the brand will bring in new customers, thereby completing the circle: attract customers with a competitive value proposition and easy-to-use website, retain them with superior service, develop them into profitable customer segments, consult with them to gain valuable information, and convert them into brand evangelists so they will acquire new customers for the brand.

An important research endeavor would be to discover ways to lure customers from other websites, *i.e.*, to encourage brand switching. In the face of lock-in, this might prove to be a formidable task. Some possible strategies can be suggested, however. Websites might be made more attractive, easier to use, more personalizable, and more flexible, for example. Alternatively, websites might be designed to deliver more value in the form of greater capabilities. Reducing switching costs to permit easy transfer of information to the new site also might facilitate website brand switching. On the other side of the coin, the best ways to encourage lock-in should be uncovered. Continued satisfaction and increasing value are likely the most effective ways to do this, but the efficacy of creating switching barriers should be explored.

SUGGESTIONS AND CHALLENGES

Based on our selective review of e-services literature, we propose several new research topics that we feel are under-researched. In some cases, these new topics are extensions of one of the themes reviewed above, but we also find "out of the box" opportunities for research.

New Core Services

To date, the majority of e-services research relates to a previously existing offline service, as either a complement or a substitute. Key exceptions to this include van Riel, Liljander, and Jurriens (2001), Kim (2003), Gummerus, Liljander, Pura, and van Riel (2004), and Szmigin and Reppel (2004) who have looked at Web portal sites. Portals such as Google are altering the services landscape in a very profound way (O'Reilly 2005). Unlike its competitors (e.g. Microsoft), Google began as a pure e-service. While Microsoft struggles to produce desktop software updates once every several years, Google's networked software services are updated hourly. In addition, Google has redefined how advertising functions, moving from the traditional obtrusive model of broadcast media to leveraging the context afforded by networked software.

The blog hosting site MySpace is another interesting example of a new core e-service because it shows the potentially discontinuous relationship between e-service software

development and competitive advantage. Long before MySpace and similar sites existed, Internet users had the opportunity to create free home pages with various e-service providers such as Geocities. Those sites guided the user through the process of creating a home page, employing a simple editor. The software behind MySpace is nearly identical, but structures the user's output into a diary format. While sites that offer free home pages have languished, the News Corporation recently agreed to pay $580 million dollars for MySpace. E-service software details, especially where design elements impact social processes, can matter a great deal with respect to marketing outcomes.

For pre-existing businesses or businesses based offline, creating new e-services may involve rethinking the answer to "what business are we in?" Not only does the networked electronic environment imply changes for existing businesses (Raport, Jaworski, and Kyung 2004), it requires novel thinking to develop new products. Researchers can advance this goal by studying how successful e-service providers go about their development activities and reporting best practices in the literature. New e-sevices can be created by "decoupling" sections of the value chain from existing businesses and offering them online (Evans and Wurster 1999). Consumer researchers could contribute by studying how existing diffusion theory can be adapted to consumer behavior in the electronic world (e.g. Goldsmith 2000).

What Happens When Service Becomes Less Personal

Traditionally, services involved face-to-face interaction at some point in the exchange, and as such, the social psychology literature on interpersonal relations was especially

relevant as human resources were employed at all customer touch points. Today, business processes are amenable to radical reworking (Rayport *et al.* 2005); on the service development side of the value chain, successful e-service resembles nothing so much as software design (c. f. Verma, Thompson, Moore, and Louviere 2001). Clearly additional theories must be called into play in order to understand the totality of e-service strategy throughout the value chain. IT infrastructure must be brought into alignment (Henderson and Venkatraman 1993) with e-services strategy. At the consumption end, new services bring out the importance of usability (Venkatesh and Agarwal 2005) in the software-mediated environment. Recently, IBM has extolled a new academic curriculum under the heading "Services Science" which encompasses computer science, operations research, industrial engineering, business strategy, management sciences, social and cognitive sciences, and legal sciences (Chesbrough and Spohrer 2006). These efforts need to expand as researchers study how consumers react to the varied and contradictory forces involved in producing e-services: increasing personalization using technology and decreasing personal attention from real humans. Of particular interest is the development of human-like avatars; computer generated agents who assume the appearance and behavior of humans. How ordinary consumers will react to these selling agents, and other recommendation systems, remains to be understood fully.

Virtual Communities

Virtual communities have been studied by marketers primarily in the context of word-of-mouth processes (Godes and Mayzlin 2004). Considerably less is known about how these social structures function to provide service. Yet in many of the new core services

being offered online, important benefits are provided by the customers themselves (Grove and Fisk 1997) and value creation tends to be peer-to-peer. Examples of e-services where the customer co-produces service for other customers include auctions, blogging, video exchanges, movie fact databases, wikis, collaborative filtering, online gaming, ratings, and employment sites. Few services marketers have studied virtual community service processes; a key exception is offered by Wiertz, de Ruyter, Dellaert, and Mathwick (2005) suggesting insights on how C2C communities provide technical support, in effect, on behalf of a vendor. There are a host of unexplored issues that confront firms sponsoring virtual communities, including the level and types of control to impose, and how to nurture the sense of community and grow social capital in a way that allows the firm to capture revenue. Likewise, there is little research on e-services provided by B2B hub participants (Kaplan and Sawhney 2000).

In many cases, the value proposition of innovative e-services emerges from inter-group exchange in two sided markets. Consider again the blogging site MySpace, where the two sides of a market are represented by those wishing to write blogs and those seeking to read them. MySpace generates value by making the market between readers and writers.

Unlike offline services, e-services like MySpace function as a public good - they are non-rival in demand. This means that consumption of service experienced by one individual does not reduce the potential consumption available to others. In fact, we see positive externalities, meaning that consumers enjoy a benefit derived from the presence of other

consumers. Marketers and economists have studied the macro properties of systems with externalities (e. g. Srinivasan, Lilien, and Rangaswamy 2004), but how this phenomenon works at the level of the consumer has just begun to be studied (Chakravarti and Xie 2006). MySpace generates revenue by advertising, which is a cost imposed on participants. In the general case, we may ask about optimal pricing with respect to virtual communities, and how much sense it makes to subsidize one side or the other (Parker and Van Alstyne 2005).

The E-Service Life Cycle

When new technologies are first introduced, we are keenly aware of them. The properties of the newly designed interface are critical to mastering it. Management worries about adoption. Eventually, successful new technologies "disappear," becoming ubiquitous and part of the background to the way the world works (Weiser 1991).

In the U. S. prior to 1951, a human operator intervened to establish a long distance connection on behalf of a caller. Today, no one in the U. S. would consider direct dialing to be a self-service technology, but a half century ago it was. Likewise, young adults in the U. S. probably do not think of pumping their own gasoline as a self-service technology, although it is for their parents. The transition from visible self-service technology to embedded ubiquitous service (see also Watson, Pitt, Berthon, and Zinkhan 2002) should prove highly interesting to study.

This leads us to ponder the general process by which an interpersonal service becomes an e-service. Here, we propose a key role for algorithmic complexity, which is a measure of the quantity of information (Chaitin 2003) in an algorithm or any other set of data. We now briefly introduce the concept of algorithmic complexity and show how it could be useful in understanding the evolution of e-services.

Algorithmic Complexity

Simple services are amenable to automation, while more complex services require human intervention and knowledge. Further, the level of complexity that can be automated is increasing. In the 1950's, AT&T replaced operators with circuit switching equipment. In the last several years, B2B hubs have pioneered combinatorial online auctions that facilitate package bidding, where firms can make offers or accept them conditional on other offers being accepted or not in arbitrary combinations (Anandalingam, Day, and Raghavan 2005). Clearly the latter is more complex than the former.

Because an e-service is an algorithm (Hahn and Kauffman 2002), we propose that the ability to implement that algorithm depends on the complexity of the underlying service process. Pentland (2003) used a measure of algorithmic complexity to assess the variability of business processes. To do so, he assumed that a business process is a generative structure that might produce a routine outcome or, as would be more likely in service work, produce a variety of patterns or events. Measuring the algorithmic complexity of service processes would provide a guide as to when they are likely to be translated into e-services, as well as under what circumstances the e-service could be

optimally deployed (Boyer et al. 2002). It might also offer guidance as to how difficult those e-services will be to use (Dellaert and Stremersch 2005). On the B2B side, algorithmic complexity might be used to predict the degree of asset specificity (Rindfleisch and Heide 1997) of e-service processes, a key theoretical variable in transaction cost analysis.

CONCLUSIONS

Flexibility is a hallmark of an e-service (Bitner et al. 2000; Viswanathan 2005). Because an e-service exists without the logistical and physical constraints inherent in an offline service, there is flexibility of product design, in the choice of interface, features, and benefits. Further, because e-services are stored as an algorithms (Hahn and Kauffman 2002), there is flexibility in how they are "inventoried" and in the ability to manipulate and transform them in various ways. As e-services are delivered by networked software, there is flexibility in terms of when, where, how, and on what device each service is performed. All of this leads to a potential embarrassment of riches. If e-services make anything possible, what are the best choices? We trust that e-services researchers will help answer these questions by studying how customers interact with e-service processes.

TABLE 1

Theoretical, Research, and Managerial Progress in the Study of E-Services

Theme	Theory	Research	Management	Illustrative Citations
Who Produces the E-Service?				
Multi-Channel Service Provision	Rethink flexible B2C channel strategy in light of strengths and weaknesses of specific channels. There is a need in B2B to integrate sales force activities into e-channel functions.	There is variability in the way end-consumers experience channels. The B2B focus is less on channel dilemma and conflict and more on cooperation in a networked supply chain.	Transfer simple processes like order taking to the e-channel and use mass customization, sales and service force effort to increase order getting.	Boyer, Hallowell and Roth (2002) Montoya-Weiss, Voss and Grewal (2003) Bendoly, Blocher, Bretthauer, Krishnan and Venkataraman (2005) Johnson and Bharadwaj (2005)
Self-Service Technologies	Psychological notions such as affect, attitude, self-efficacy and need for cognition play an important role in SST adoption.	Optimism, innovativeness, need for human interaction, fun, and other variables have been investigated.	E-Services should be easy, reliable, convenient, and should minimize overload and risks.	Dabholkar (1996) Meuter, Ostrom, Roundtree and Bitner (2000) Parasuraman (2000) Bobbitt and Dabholkar (2001) Dabholkar and Bagozzi (2002) Meuter, Bitner, Ostrom, and Brown (2005)
Co-production	Co-production is a two-edged sword with possible advantages and disadvantages to the firm.	Self-service has a negative impact on social bonds and may not improve satisfaction due to	Managers should carefully integrate self-service into existing personal service rather than	Selnes and Hansen (2001) Bendapudi and Leone (2003)

		the self-serving bias.	replace personal service.	
Service Operations and Fulfillment				
Back Room Processes	Data "completeness" (no data gap) and post purchase support are critical for customer retention.	A new gap exists: the data gap, where customers and providers may not have access to necessary data. Coordinating fulfillment (guarantees) and inventory strategy (stockout likelihood) has been investigated.	Inventory policy, IT policy, organizational structure, and customer abilities, and customer needs, wants and expectations must all be aligned to provide quality E-Service.	Heim and Sinha (2001) Boyer, Hallowell and Roth (2002) Garnder, Hanna and LaTour (2002) Brohman, Watson, Piccoli and Parasuraman (2003) Piccoli, Brohman, Watson and Parasuraman (2004) Cao and Zhao (2004) Cao and Gruca (2004) Iyer, Germain and Frankwick (2004) Rabinovich (2004) Posselt and Gerstner (2005)
Online Servicescape and Service Quality				
Servicescape	Web site design can create flow, arousal, and other positive, or negative, affective reactions.	Aesthetics, professionalism and various design element details can prime attitude and behavior.	Create visually attractive and professional looking interfaces.	Hopkins, Raymond, and Grove (2003) Williams and Dargel (2004) Edvardsson, Enquist, and Johnston (2005) Vilnai-Yavetz and Rafaeli (2006) Stevenson (2000) Mandel and Johnson (2002)
Service Quality	E-Service quality dimensions do not perfectly overlap with offline service quality dimensions.	Ease of Use, Design, Trust Factors and Reliability imply quality to the consumer	Key goals are to provide reliable and responsive support, personalization, efficiency, credibility, and ease	Jiang, Klein, and Crampton (2000) Cox and Dale (2001) Yoo and Donthu (2001) Broderick and Vachirapornpuk (2002) Yang and Jun (2002) Santos (2003)

			of use.	Wolfinbarger and Gilly (2003) Zeithaml, Parasuraman, and Malhotra (2003) Parasuraman, Zeithaml, and Malhotra (2005) Collier and Bienstock (2006) Bauer, Falk and Hammerschmidt (2006)
E-Service Failure, Recovery, Satisfaction and Loyalty				
Service Failure, Service Recovery	Traditional models have been extended, and new models developed for new technologies and how consumers react to them.	Previous experience plays a key role in explaining how consumers react to service failure and recovery.	Describes specific steps managers can take to avoid failure and recover effectively.	Kolesar (2000) Holloway and Beatty (2003) Holloway, Wang and Parish (2005) Tax, Colgate, and Bowen (2006)
Satisfaction and Loyalty	Application of existing theory with extensions.	Confirms what we know about offline satisfaction. Adds new aspects.	Design sites and procedures to enhance satisfaction, ensure security, build trust.	Szymanski and Hise (2000) Meuter, Ostrom, Roundtree and Bitner (2000) Gummerus Liljander, Pura and van Riel (2004) Harris and Goode (2004) Evanschitzky, Iyer, Hesse and Ahlert (2004)
Customer Relationship Management	There are unique aspects of E-Service: including interactivity, personalization, and real-time adjustments in offerings. Online switching costs are surprisingly high.	Standard CRM features seem not to encourage traffic to a site. New features need to be developed.	Managers need to relearn how to build relationships with e-service customers and to develop new CRM techniques.	Rust and Lemon (2001) Feinberg and Rajesh (2002) Fruchter and Sigué (2005)

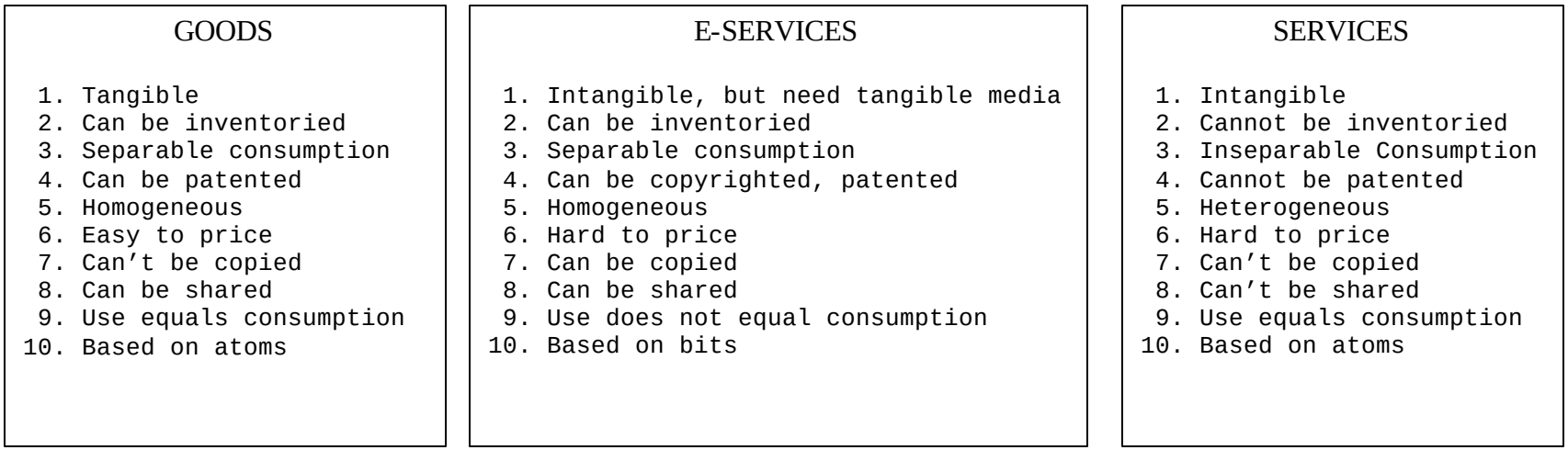
TABLE 2

Dimensions of Online Service Quality from Selected References

Service Quality Dimensions	Authors
Ease of Use, Aesthetic Design, Processing Speed, Security	Yoo and Donthu (2001)
Intangibility, Simultaneity, Heterogeneity, Perishability	Cox and Dale (2001)
Reliability, Access, Ease of Use, Personalization, Credibility, Security (Internet Purchasers), Security, Responsiveness, Ease of Use, Availability, Reliability, Personalization, Access (Internet Non-Purchasers)	Yang and Jun (2002)
Ease of Use, Appearance, Linkage, Structure and Layout, Content, Reliability, Efficiency, Support, Communications, Security, Incentive	Santos (2003)
Fulfillment/Reliability, Website Design, Privacy/Security, Customer Service	Wolfinbarger and Gilly (2003)
Efficiency, System Availability, Fulfillment, Privacy	Parasuraman, Zeithaml, and Malhotra (2005)
Responsiveness, Reliability, Process, Functionality, Enjoyment	Bauer (2006)
Ease of Use, Privacy, Design, Information Accuracy, Functionality, Order Condition, Timeliness, Order Accuracy, Interactive Fairness, Outcome Fairness, Procedural Fairness	Collier and Bienstock (2006)

FIGURE 1

Distinguishing Features of Goods, E-Services and Services



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