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The Influence of Interactivity on E-service Offerings: An Empirical Examination of Benefits and Risks

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Abstract

News reports of Internet-based security breaches, identity theft, fraud, and other dangers may increase the perceived risk and decrease the perceived benefits of using electronic services (or e-services). We examine whether interactivity serves as a means to diminish the perceived risks and increase the perceived benefits of using e-services. To examine interactivity's influence on consumers' perceptions, we conducted a laboratory experiment using a simulated web-based, online payment system. When compared to a non-interactive preview of an online payment system, we found that consumers who used an interactive e-service simulation reported higher perceived involvement and authenticity as well as higher intangibility and risks of e-services. Further, we found that interactivity moderated relationships such that consumers were more likely to report higher intentions to use e-services. The paper concludes with implications for research and practice.

Keywords: Interactivity, e-services, perceived risk, perceived benefits, situational involvement, information diagnosticity, mental intangibility, and authenticity

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INTRODUCTION

The service sector accounts for over 80% of the U.S. economy (Davidson, 2010). This significant shift toward a service based economy (Alter, 2009) underscores the practical importance of information systems research that examines e-services (Rai and Sambamurthy, 2006). Electronic services, or e-services, refer to “interactive content-centered and Internet-based customer service[s], driven by customers and integrated with related organizational customer support processes and technologies with the goal of strengthening the customer-service provider relationship” (de Ruyter et al., 2001 p. 185). In contrast to e-commerce websites that sell physical products, e-services offer consumers intangible, experiential services, such as customer service or billing systems. As such, e-service research transects topics germane to the information systems, services, and consumer behavior literatures.

E-services are an extension of the traditional service sector in that they offer convenient access to information for its review and management. Many service providers that traditionally offered face-to-face consumer experiences (e.g., banking, medical services, retirement planning, government permitting) have transitioned to using self-service websites. For example, use of online banking doubled in less than 5 years (Fox and Beier, 2006), with more than 70% of all Internet users reporting that they utilize these financial services (Sachoff, 2009). Through using such e-services, consumers may realize many benefits, such as convenience and access. In contrast to paper-based, phone-based or face-to-face methods of customer service, users may access e-services regardless of location or time of day. Further, through accessing e-services, users who may lack the ability to use traditional customer service alternatives, because of limited mobility due to age or illness, become capable of conducting private, secure transactions.

Surprisingly, encouraging e-services use can be problematic. Intangible goods require one to directly experience a service or interact with a service provider to evaluate their worth (Kempf and Smith, 1998; Klein, 1998; Mitra et al., 1999; Nelson, 1974; Wright and Lynch, 1995). When a service is delivered in person, consumers can assess its attributes through direct interaction with service providers and their service-space, or actual use of the service. In contrast, e-services often rely on static web demonstrations (e.g., web pages with text and images) that offer consumers limited ability to experience the actual service. Also, lacking experience with the services, consumers may find it difficult to trust online service providers (McKnight et al., 2002). Further, because information is readily shared over the web, consumers may suffer personal losses from e-service transactions; therefore, they perceive risk (Featherman and Pavlou, 2003; Van der Heijden et al., 2003). Hence, due to e-services’ intangibility and perceived riskiness, evidence indicates that significant numbers of consumers choose not to adopt e-services (Prins and Verhoef, 2007).

To encourage e-service use, some researchers suggest web vendors offer consumers highly interactive web-based demonstrations of e-services (Schlosser, 2003). For tangible goods, research suggests that interactive demonstrations improve consumers’ ability to evaluate product quality (Jiang and Benbasat, 2004), recall the product’s attributes (Li et al., 2002), and make decisions (Griffith and Chen, 2004). For intangible e-services, interactive demonstrations have the potential to improve consumers’ understanding of how an e-service delivers services. Therefore, the purpose of this research is to investigate whether interactive demonstrations improve consumers’ ability to evaluate e-services prior to their purchase. Furthermore, this research investigates whether an interactive demonstration moderates intentions towards using an e-service. Specifically, we focus on the following questions:

- In e-services, how do differing levels of interactivity influence perceptions of risk?
- In e-services, how do differing levels of interactivity influence perceptions of benefits?

Our study responds to Venkatesh’s (2006) call for service research to include design characteristics. For instance, he notes that service research must examine “questions related to consumers’ trust in such indirect use of technology, risks involved, expected consequences (good and bad), design characteristics and features (e.g., poka-yokes) that could prevent errors, and communication gaps between expression of consumer needs” (p. 510). Furthermore, Venkatesh and Bala (2008) suggest that “interventions,” such as interactivity, may provide “...a realistic preview of the system so that potential users can develop an accurate perception regarding systems features” (p. 292). Within the context of e-services, we respond to these calls by examining the influence of interactivity embedded in websites on consumers’ beliefs and intentions.

Our examination of e-services and interactivity unfolds as follows: First, we review the contemporary literature to develop a baseline understanding of risk, benefit, and interactivity. Second, rooted in the information systems and marketing literatures, we develop model that explains how consumers evaluate e-services and tie it to hypotheses. Next, we report the results of an experiment that tested interactivity’s influence on our model. The paper concludes with a discussion of results and implications for research and practice.

CONCEPTUAL FOUNDATION

Risks and Benefits

Product or service previews shape consumers' assessments of risks and benefits related to their use. The extant product and service assessment literature includes a rich history of non-technology mediated consumer interactions (Dowling and Staelin, 1994; Kaplan and Szybille, 1974; Peter and Tarpey, 1975; Stone and Gronhaug, 1993). In these traditional environments, consumers' evaluations of service providers are often based on information acquired from direct experience, mental image processing, and discursive searches (Petty and Cacioppo, 1986). When such direct experience is absent, Wells et al. (2011) argue that information asymmetries develop between consumer and vendors that increases perceived risks of transactions. This includes risks tied to performance (e.g., privacy, financial, physical) and psycho-social (e.g., ego or embarrassment) aspects of service provision. Although recent research has documented the influence of such risks on consumers' intentions and behavior (Featherman and Pavlou, 2003; Park et al., 2004), scant research has examined how variance in web-based previews relates to perceptions of e-services.

Websites are the primary means through which consumers preview or experience e-services. Understanding the influence of website design on consumer evaluations of e-services is important for two reasons. First, e-services are intangible (Featherman and Wells, 2010; Mitchell and Greatorex, 1993). Even if vendors claim to efficiently and effectively deliver a service, consumers lack the ability to see, touch and assess its quality prior to adoption. Websites offer e-service vendors the opportunity to make an intangible product more concrete in the minds of a consumer (i.e., less impalpable and mentally intangible). Second, given interaction with consumers is virtual, e-service providers lack the ability to provide physical and observable indicators of likely service performance, such as personal interaction with a customer service agent or a facility such as a branch of a bank. For example, although a consumer may trust the service provider, they lack the ability to directly assess the quality of security measures designed to protect personal information (e.g. health or financial) that is transmitted or stored over the Internet (Malhotra et al., 2004; Van Slyke et al., 2006). Hence, we propose that in the context of e-services, web based demonstrations offer consumers a pre-purchase means to vicariously observe e-service performance, service quality, and security guarantees, thereby diminishing perceptions that e-services are risky to use and increasing perceptions that the advertised benefits will be realized.

Interactivity

In the human-computer interaction (HCI) literature, interactivity has been studied for some time (Steuer, 1992). In terms of website design, interactivity research examines how technology elements provide to consumers a means to conduct richer pre-purchase evaluations of goods and services (Campbell et al., 2011; Liu, 2003; Liu and Shrum, 2002). Interactivity in general has several divergent definitions that have been utilized in online research (Liu and Shrum, 2002; Liu and Shrum, 2009). In our research, we define interactivity as a consumer's ability to manipulate objects in an online environment (Campbell et al., 2011; Schlosser, 2003; Shneiderman, 1987). Interactivity research suggests that website design must be congruent with the type of product or service offered by a vendor (Wells et al., 2011). To effectively communicate the quality of goods and services, Wright and Lynch (1995) suggest that the diagnosticity of the website's information must be congruent with the nature of the goods or services. Furthermore, this research posits that the type of information offered by a website should vary with the unique attributes of the products or services offered. Jiang and Benbasat (2004) provide evidence that interactive elements within a website (e.g., product virtualization) may influence consumers' affect toward the product. Perhaps, as Wells et al. (2011) suggest, that signals about product or service quality embedded in websites create a 'media congruency effect' that subsequently affects evaluations of intangible goods. This effect is sub-optimal when websites offer static, indirect previews (e.g., text, images, and video) of experience goods, and optimal when they provide realistic previews of goods or services with interactive demos (Ariely, 2000).

Increasing the interactivity of web-based demonstration offers an opportunity to deepen consumers' understanding of e-services. When interacting with static interfaces, consumers' perceptions of e-service attributes and processes are based on passive experiences of vendor-provided text, pictures, or video clips. When offered interactive hands-on demonstrations that simulate software processes, which we refer to as virtual e-service experiences (VESEs), consumers form perceptions based on simulated trial experiences with an e-service, which should sharpen their understanding of an e-service's attributes (Schlosser, 2003; Shneiderman, 1987). When compared to images and media embedded in less interactive demonstrations and viewed passively, highly interactive VESEs should result in increased understanding, reduced uncertainty, and more positive perceptions of an e-service and its provider because they require more involved cognitive elaboration processes (Jiang and Benbasat, 2007; MacInnis and Price, 1987; Petty and Cacioppo, 1986).

RESEARCH MODEL

We now turn to developing a model that explains interactivity's relationships with consumer behavior. Specifically, we investigate interactivity's relationship with established antecedents of perceived risks and perceived benefits, as well as intentions to complete transactions using an e-service (see Figure 1). These antecedents are: 1) situational involvement (a measure of consumer interest), 2) information diagnosticity (a measure of information usefulness), 3) mental intangibility (a measure of mental clarity), and 4) authenticity (a measure of beliefs that an e-service is legitimate). In the following paragraphs, we describe the logic behind interactivity's influence on these constructs and their interrelationships.

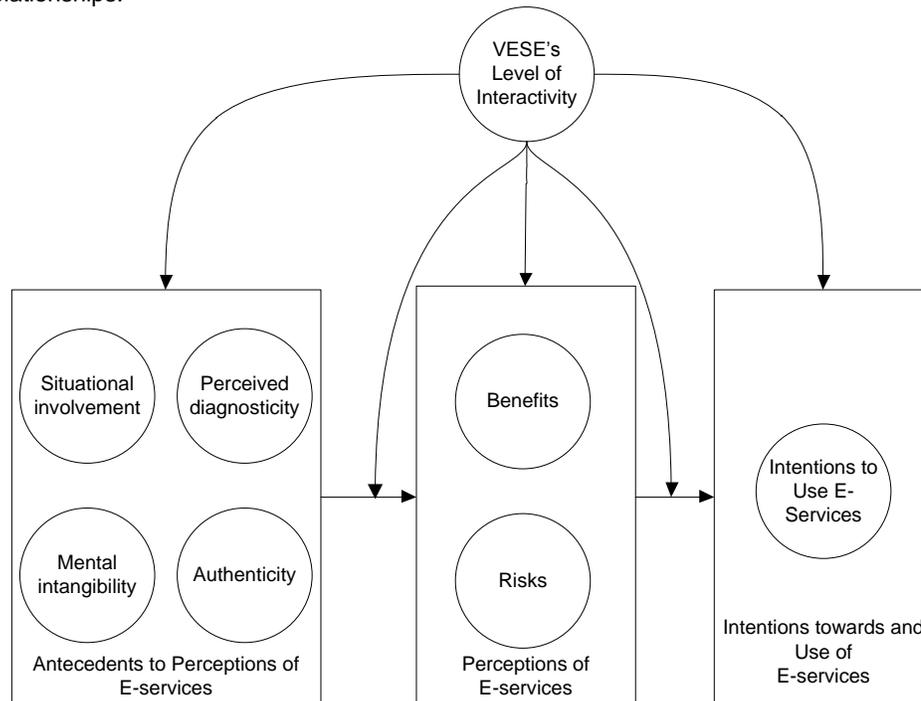


Figure 1: Conceptual Model of Interactivity's Effect on E-Services Using VESE (Virtual E-Service Experiences)

In addition to making these transitions to greater participation, many people terminate their participation for a variety of reasons, which is not shown explicitly in Figure 1. There is also a time dimension within the four activities. For each activity, there are the uncertain first steps, sometimes followed by repeat visits that can mature into a growing sense of confidence and increased activity as a reader, contributor, collaborator, or leader. There are at least two paths to maturation: participants may become more active within one stage or may move on to begin another stage.

Consumer Intent to Use an E-service

Because e-services require interaction with a website, consumers may be more likely to decide to use them when e-service providers offer VESEs. Research suggests that product demonstrations may shape consumers' expectations about e-services (e.g., making a purchase or storing information) by improving their ability to imagine themselves using an e-service (see Anderson, 1983; Kahneman and Tversky, 1982; MacInnis and Price, 1987). VESEs do this by providing more tangible experiences with how services are delivered (e.g., time, skills, and information required for their use) as well as their outcomes (e.g., charts, tables, and reports). Similarly, the concept of trial ability suggests that the more an individual can experiment with an innovative product or service on a limited basis before purchasing it, as with a VESE, the more likely they are to purchase the innovation (Rogers, 1995). For tangible goods, website interactivity has been found to increase consumers' purchase intention toward products (Schlosser, 2003) as well as increase their positive perceptions of those products (Li et al., 2002). Consistent with prior work on product demonstrations and tangible goods, we believe that interactivity in website demonstrations will increase intent to use e-services. Hence,

H1: The level of interactivity within a VESE will influence a consumer's intention to use the e-service.

Risks

When considering purchasing services, consumers seek to increase their understanding of service processes, outcomes, and risks (Shimp and Bearden, 1982; Tan, 1999). When relying on verbal descriptions or printed materials, consumers typically evaluate services using less than optimal indirect virtual cues and mental image processing (MacInnis and Price, 1987) in lieu of more substantial discursive processing of their attributes and processes (Petty and Cacioppo, 1986). Consumers who rely on passive content must use mental visualization to construct their evaluation of processes, performance efficacy, and outcomes of purchasing a service. Lacking direct experience with a vendor, consumers typically deem these services as riskier purchases (Mitra et al., 1999).

Perceived risk refers to the belief that a loss will result from completing a transaction (Featherman and Pavlou, 2003). A highly interactive VESE should reduce perceived risk. The theory of media richness (Daft and Lengel, 1986; Trevino, 1987) suggests that 'richer' media with instant feedback and multiple cues will better convey an equivocal message (e.g., an e-service provider's claims of performance efficacy and promised benefits). Similarly, providing consumers with experience should help improve their mental models (Klein and Crandall, 1995) of how the e-service works, thereby reducing the perceived risk of using the e-service. Hence,

H2a: The level of interactivity within a VESE will influence a consumer's perceived risk.

Further, when information is presented using a highly interactive VESE, the salience and effects of risk concerns about e-service use should decline. Trial sampling of a product or service is considered an effective risk-reducing strategy for selling tangible products (Derbaix, 1983; Tan, 1999). Virtual product demonstrations should reduce perceived risk because they are an analog for trial sampling in an online environment (Biocca, 1992; Hoffman and Novak, 1996). The basic premise is that if consumers improve their understanding of an online service through an interactive preview, such as a VESE, the perceived risk of purchasing or utilizing the e-service should be lessened. Hence,

H2b: The level of interactivity within a VESE will moderate the relationship between perceived risk and a consumer's intent to use the e-service.

Benefits

One reason that e-services are difficult to market is that, prior to actual use, consumers purchase only the promise of future benefits. Benefits refer to a consumer's belief about the extent to which he or she will become better off from using a specific e-service website (Kim et al., 2008). Lacking direct experience, consumers are often skeptical that they will realize the advertised benefits for many products and services that have experiential attributes (Ford et al., 1990). Thus, to encourage e-service use, the critical challenge is convincing online consumers that they will realize promised benefits.

Directly interacting with a service offers one means to facilitate consumers developing a deeper understanding of its benefits. Advertising research has found that directly interacting with a product through trials or samples is more effective than passive advertising designed to encourage consumers to understand the benefits of tangible products (Smith and Swinyard, 1982; Smith and Swinyard, 1988). Within the context of e-commerce, research suggests that when a website's message is more persuasive, it will evoke vivid mental images leading to more favorable brand judgments (Coyle and Thorson, 2001; Green and Brock, 2000).

Presenting a demonstration of e-service efficacy using an interactive, realistic VESE should enable consumers to evoke mental models of potential utility gains (e.g., convenience, efficiency, and ease of use) derived from usage. Interactivity embedded in virtual product experiences provides consumers with tangible product experience (Jiang and Benbasat, 2004; Jiang and Benbasat, 2007). These interactive tools offer consumers an avenue to produce mental models that should also aid in the diagnosticity of the e-service. Specifically, a highly interactive VESE should help consumers form stronger experience-based beliefs that the e-service will perform as advertised and deliver promised benefits. Hence,

H3a: The level of interactivity within a VESE will influence a consumer's perceived benefits.

A better exposition of e-service features and processes via a VESE should improve consumers' knowledge and appreciation of the e-service's benefits. Therefore, when consumers experience an e-service via VESE, ties from perceived benefits to purchase decisions should be strengthened. Consumers rely on vendor signals of service quality, such as high perceived advertising expenses (Kirmani, 1990; Nelson, 1974), when forming product/service evaluations. Given that signaling of service quality can be embedded in the website experience it (Wells et al., 2011), it follows that when a vendor deploys an interactive VESE, it signals a commitment to providing services. Highly interactive VESE's should signal commitment because of the cost and difficulty associated with providing a demonstration that allows consumers to actually experience using the service. Given that consumers of this study are

being exposed to a vendor's strong message of e-service performance efficacy, we expect that the highly interactive VESE will not only more effectively portray the benefits of e-service usage, but also strengthen the influence of perceived benefits on consumers' intention to use an e-service. Hence,

H3b: The level of interactivity within a VESE will moderate the relationship between perceived benefits and a consumer's intent to use the e-service.

Situational Involvement

Interactivity should influence consumers' levels of situational involvement and its relationship with e-service evaluations. Situational involvement refers to consumers' "temporary perception of product (or service) importance based on the consumer's desire to obtain particular extrinsic goals that may derive from the purchase and/or usage of the product" (Bloch and Richins, 1983 p. 72). Consumers experience situational involvement when they tie a decision to matters of personal importance, such as managing finances, planning for their future, or making an investment decision (Celsi and Olson, 1988; Laurent and Kapferer, 1985; Richins and Bloch, 1986). High situational involvement encourages consumers to pay attention to, process, and retain information on product attributes and benefits (Celsi and Olson, 1988).

Highly interactive VESEs may increase consumers' situational involvement as they may be more immersive than passive previews of services. A similar tool, Virtual Product Experience, has been shown to improve consumer's situational involvement (Jiang and Benbasat, 2004). Websites that utilize passive content provide an indirect experience of the e-service. In effect, the consumer is a passive spectator, indirectly witnessing service provision. In contrast, highly interactive VESE's are dynamic and involve the consumer, requiring them to navigate and manipulate features to learn about e-service provision. When compared to websites with low interactivity, highly interactive VESEs increase situational involvement by providing consumers direct experience with the service, opportunities to customize content to their specific circumstances, and previews of the service that are more personally interesting and relevant. Hence,

H4a: The level of interactivity within a VESE will influence a consumer's situational involvement.

Consumers who express higher situational involvement will more carefully evaluate the e-service's risks and benefits. As argued by Folkes (1988), higher situational involvement may simply encourage consumers to discount prior service experiences (e.g., personal, within their social network and news reports) and focus their attention on the present service provider. E-commerce consumers with low situational involvement tend to place more focus on peripheral cues, such as website design factors (Lee and Huh, 2010). Further, those e-commerce consumers with high situational involvement tend to seek "trust-inducing" arguments (Lee and Huh, 2010), such as perceived risk and perceived benefits. Interactive website factors, such as VESEs, can operate to increase situational involvement in online purchasing decisions. Consequently, as situational involvement increases, perceived risk should be mitigated and perceived benefits should increase. To the extent that a highly interactive VESE helps consumers become involved and learn about the performance of an e-service, consumers with higher situational involvement should also evaluate e-service usage as being more beneficial and less risky. Hence,

H4b: The level of interactivity within a VESE will moderate the relationship between situational involvement and perceived risk.

H4c: The level of interactivity within a VESE will moderate the relationship between situational involvement and perceived benefits.

Information Diagnosticity

Marketers of e-services face the often daunting task of explaining unfamiliar e-services to online shoppers. Therefore, the diagnosticity of promotional materials warrants analysis in the e-services context. Information diagnosticity refers to the notion that parcels of information vary in their usefulness for pre-purchase decision-making (Kempf and Smith, 1998). A parcel of information's perceived diagnosticity refers to "the extent to which inferences based on the information alone would be adequate to make a decision" (Aaker and Joachimsthaler, 2000 p. 374). Product or service trials provide a vivid, informative and diagnostic experience for consumers (Kempf, 1999; Kempf and Smith, 1998) because participants gain direct, sensory experience interacting with the object (Fazio and M.P., 1978; Fishbein and Ajzen, 1975).

Interactive virtual product experiences provide consumers with more diagnostic experiences. The media congruency effect (Wright and Lynch, 1995) suggests that a product's experience attributes are best demonstrated through personal trial, rather than indirect observation. A vivid presentation format has been shown to make the evaluative cues richer, encouraging consumers' message processing and aiding message recall (Kisielius and Sternthal, 1984; Kisielius and Sternthal, 1986). Interactivity lends itself to diagnosticity in an online environment. Jiang and Benbasat

(2004, 2007) found that interactive virtual product experiences (in comparison to more passive means) increase the perceived diagnosticity of vendor messages when displaying physical products. In their more recent study, they found that a VESE that demonstrated the functions available on a wristwatch improved consumers' reports of a website's diagnosticity toward the product. In an e-service context where there is no physical product, it is important to evaluate whether website design increases the diagnosticity of an e-service. VESEs may offer the ability to experience the e-service pre-purchase more so than even a physical product VESE. For example, if consumers are able to work with an online tax preparation service before they actually purchase the e-service, logically the Website's diagnosticity should be improved over a less interactive presentation. Therefore, we believe that consumers can evaluate information on e-services' experiential attributes more effectively through involvement with a highly interactive VESE than passive content. Hence,

H5a: The level of interactivity within a VESE will influence a consumer's perceived diagnosticity.

In addition to improving the information diagnosticity of a website, highly interactive VESEs should strengthen ties between consumer evaluations of information and assessments of risks and benefits. Lim and Benbasat's (2000) finding that a multimedia interface leads to a lower perceived equivocality and higher perceived usefulness for hard to analyze tasks, suggests that more diagnostic information (as afforded by a VESE) may reduce perceived uncertainties and risk while simultaneously increasing consumer appreciation and therefore evaluations of an e-service's benefits. When interactivity encourages higher perceived information diagnosticity, consumers may more readily comprehend e-service benefits. Hence,

H5b: The level of interactivity within a VESE will moderate the relationship between perceived diagnosticity and perceived risk.

H5c: The level of interactivity within a VESE will moderate the relationship between perceived diagnosticity and perceived benefits.

Perceived Authenticity

Authenticity refers to whether one perceives an e-service provider's assurances of safe, reliable service delivery to be credible and legitimate (Featherman et al., 2006). Due to frequent reports of Internet-enabled fraud, security breaches, and identity theft, consumers' evaluations of a vendor's authenticity may influence their evaluations of risks and benefits. Beliefs about the authenticity of a vendor's offerings influence perceptions of products (Belk and Costa, 1998; Brown, 2001; Goldman and Papson, 1996), processes underpinning e-commerce transactions (Koiso-Kanttila, 2004) and evaluations of e-services (Featherman et al., 2006). A highly interactive VESE may foster perceived authenticity because it signals consumers that vendors have invested in their service and in tools required to interact with potential customers (Kirmani, 1990). More importantly, a highly interactive VESE offers opportunities to experience how a vendor delivers services, and should foster perceptions of an e-services' reliability and credibility. Hence,

H6a: The level of interactivity within a VESE will influence a consumer's perceived authenticity.

Consumer beliefs that a website is legitimate and authentic decrease perceived risks of e-service usage (Featherman et al., 2006). When compared to non-interactive content, a highly interactive VESE is more congruent with actual e-service provision, likely to foster a sense of situational normality (McKnight et al., 2002), and reduce the risk-inducing effect of an e-service that is perceived to be non-authentic. Also, when consumers are not concerned with the legitimacy of e-service providers, they will be more likely to form positive perceptions of the potential benefits of e-service usage. Furthermore, in online environments, web design elements clearly affect the perceived authenticity of a physical product (Wells et al., 2011). Moreover, research has found that higher levels of interactivity in online learning lowers perceived risk while also increasing the authenticity of the course (Swan, 2001). Taken together, these studies suggest that the use of web design elements can create mental models that may mitigate feeling such as perceived risk while highlighting possible benefits. Hence,

H6b: The level of interactivity within a VESE will moderate the relationship between perceived authenticity and perceived risk.

H6c: The level of interactivity within a VESE will moderate the relationship between perceived authenticity and perceived benefits.

Mental Intangibility

Prior research argues that because e-services are physically intangible, the focus should remain on the level of mental intangibility that the e-service creates for consumers (Featherman and Wells, 2010). Mental intangibility refers to consumers' inability to visualize, comprehend, and evaluate a vendor offering (Bateson, 1979; McDougall and

Snetsinger, 1990; Zeithaml, 1981). Consumers of services may not readily perform mental imagery processing (forming mental images of the service experience) based on passive text, pictures and video. Because static advertisements may be interpreted in many ways, consumers may not be able to clearly visualize how an e-service works or its distinct attributes, and as a result may report higher mental intangibility. When consumers have difficulty visualizing or defining a clear, concrete mental image of a service, they report higher levels of mental intangibility (Laroche et al., 2003; Laroche et al., 2005; McDougall and Snetsinger, 1990).

Interactivity decreases mental intangibility by helping consumers form a clear and concrete understanding of an electronically enabled product or service. Imagined consumption based on static advertising results in consumers using less diagnostic mental imagery processing (MacInnis and Price, 1987; Petrova and Cialdini, 2005) which leads to less clarity in understanding of an e-service's features and capabilities. We contend that interactivity enables concrete first-hand experiences of a service in action and enables more effective discursive processing that leads to reduced mental intangibility (Escalas, 2004; MacInnis and Price, 1987; Petrova and Cialdini, 2005; Schlosser, 2003; Thompson and Hamilton, 2006). Hence,

H7a: The level of interactivity within a VESE will influence a consumer's mental intangibility.

Mental intangibility may increase perceived risk (Laroche et al., 2005) and diminish perceived benefits of using an e-service. Also, enabling consumers to control the flow of information with an interactive demonstration can increase consumer learning about a product's attributes (Ariely, 2000; Hoffman and Novak, 1996). Therefore, using highly interactive VESEs that allow consumers to gain experience with the e-services' functionality should diminish the negative effect of intangibility as a contributor to consumer perceptions of risk, and increase the e-service's perceived benefits. Hence,

H7b: The level of interactivity within a VESE will moderate the relationship between mental intangibility and perceived risk.

H7c: The level of interactivity within a VESE will moderate the relationship between mental intangibility and perceived benefits.

METHOD

Participants

Participants were recruited at a large U.S. university in the Pacific Northwest. Participation was voluntary and participants were compensated with nominal course credit (~1%). The study was conducted among 166 participants (66 women) whose average age was 21.2 years. Participants self-rated their PC skills, with 6 (3.6%) reporting themselves as below average, 68 (41.0%) as average and 92 (55.4%) as above average. This sample is appropriate for our investigation of e-services and interactivity for two reasons. First, at this university, students are required to use e-services to view grades, download course materials, and upload assignments. While we did not conduct our experiment using a course management system, our participants' experience with e-services ensures that they possessed the familiarity necessary to interact with and offer a meaningful assessment of the system. Second, participation was limited to students who were responsible for paying bills. To evaluate the hypotheses, we used a simulation of an e-bill payment website. Because our participants were drawn from a sample frame that has experience using e-services and pays monthly bills, they are particularly well-suited for assessing the influence of interactivity on perceived risks and benefits of e-services.

Experiment

We conducted a laboratory experiment to examine the influence of interactivity on e-services' perceived benefits and perceived risks. Participants were randomly assigned to one of two treatment conditions: (1) a low-interactive demonstration; or (2) a highly interactive demonstration (See Appendix A). Participants (N=78) in the first condition viewed the low-interactive demonstration, which blended screen shots and animated text to present information in an infomercial format. This low-interactive demonstration was built using Adobe Flash CS3. In the low interactivity condition, participants could only stop/pause, or replay the infomercial. Participants (N=88) in the second condition interacted with the VESE. On a web page, the VESE used a tabbed dialog box interface to provide participants with interactive, realistic control over information flow and learning. For example, screens displayed a check register, bill inbox, approved payments, and reports of payments by category. Sample screen shots of the vendor's content are presented in Appendix A. To emulate real web pages, all subjects were provided with access to supplementary text-based web pages with details of the e-service offering (e.g., FAQ's, pricing and service level). To confirm the interactivity of the virtual experience, we assembled a panel of five experts in e-commerce (two from industry and three from academia) and asked them to evaluate each condition's level of interactivity (Likert 1 to 7 scales). All

raters agreed unanimously that the high interactivity and low interactivity conditions were named appropriately (MVESE=6.0; Mflash=2.8).

The research team ran eleven sessions in a laboratory with 30 computers running Windows XP software that included Windows Explorer 7.01. After the participants arrived, they were randomly assigned to one of the two conditions. In both conditions, they were asked to view (or interact with) information, describing an e-service provider's virtual offerings. These features included: 1) viewing and paying bills, 2) verifying account balances, 3) viewing check register information and 4) analyzing prior payments. Across each treatment, special attention was paid to holding the information constant; this enabled the investigation of interactivity's influence on e-service evaluations. For each group, the average length of time required to complete the experiment was 29 minutes. After participants interacted with the treatments, they evaluated the e-service provider using an online survey.

Measurement

Validated measures were used to collect data on situational involvement (Zaichkowsky, 1985), perceived authenticity (Featherman et al., 2006), risk (Featherman et al., 2006), mental intangibility (Laroche et al., 2005), and intent to use an e-service (Venkatesh and Davis, 2000). An expansion of Kempf and Smith's (1998) perceived diagnosticity scale was utilized. Appendix B lists the scales used in our data collection. Consistent with guidelines in the methods literature (Straub, 1989), an original scale was developed to measure benefits of e-services. Items capturing the perceived benefits assess whether consumers believe e-services afford the lifestyle benefits of increased levels of control, convenience, speed and organization to monthly bill-paying. Items capturing utility gains include allowing the user to make fewer errors, improving the quality of their bill paying task performance and their personal bill paying effectiveness. Table 1 presents descriptive statistics, reliabilities and correlations for each construct in each condition. Appendix C reports the loadings for the constructs.

Table 1: Descriptive Statistics, Reliabilities and Correlations for Study Conditions

Construct		Mean	SD	ICR ^a	Correlation of Constructs and AVEs ^b							
					(1)	(2)	(3)	(4)	(5)	(6)	(7)	
Low-Interactive VESE (N=78)	Involvement (1)	4.47	1.33	0.89	0.82							
	Diagnosticity (2)	4.89	1.04	0.82	-0.01	0.78						
	Authenticity (3)	3.70	1.12	0.92	0.39***	0.11	0.84					
	Intangibility (4)	3.69	1.13	0.85	-0.33**	-0.29**	-0.50***	0.86				
	Risk (5)	4.74	1.04	0.86	-0.20	-0.12	-0.66***	0.41***	0.82			
	Benefits (6)	4.13	1.36	0.96	0.31**	0.42***	0.48***	-0.58***	-0.29**	0.89		
	Intent (7)	3.08	1.43	0.96	0.23*	0.37***	0.19	-0.52***	-0.16	0.71***	0.96	
High-Interactive VESE (N=88)	Involvement (1)	5.28	1.01	0.86	0.79							
	Diagnosticity (2)	5.09	0.92	0.79	0.34**	0.75						
	Authenticity (3)	4.33	1.14	0.92	0.27*	0.52***	0.84					
	Intangibility (4)	3.58	1.11	0.82	-0.20	-0.44***	-0.65***	0.83				
	Risk (5)	4.14	1.08	0.84	-0.13	-0.33**	-0.56***	0.44***	0.80			
	Benefits (6)	4.33	1.36	0.96	0.23*	0.40***	0.39***	-0.31**	-0.29**	0.89		
	Intent (7)	3.36	1.69	0.96	0.33**	0.29**	0.20	-0.16	-0.33**	0.63***	0.96	

Correlation coefficients marked with * are significant at 0.05.

Correlation coefficients marked with ** are significant at 0.01.

Correlation coefficients marked with *** are significant at 0.001.

^a Internal Composite Reliability (ICR) = $\sum (\lambda_i)^2 / [\sum (\lambda_i)^2 + \sum (\text{var}(\epsilon_i))]$ where λ_i = component loading to an indicator and $\text{var}(\epsilon_i) = 1 - \lambda_i^2$.

^b The bold numbers on the leading diagonal are the square root of the average variance shared between the constructs and their measures. Off diagonal elements are the correlations among constructs. For discriminant validity, diagonal elements should be larger than off-diagonal elements.

RESULTS

The hypotheses were tested in two steps. Hypothesis 1 and the “a” portion of Hypotheses 2-6 propose that there will be a mean difference between the main effect of the low and high interactivity conditions. To test these hypotheses, we used SAS (ver. 9.1.3) to conduct MANOVAs. The “b” and “c” portions of Hypotheses 2-7 propose that the path coefficient between constructs will be different among the two conditions. To test these hypotheses, we used EQS to conduct a multi-group analysis in structural equation modeling. We present the ‘a’ hypotheses tests first, and then we present the “b” and “c” hypotheses tests.

MANOVA results (Hypotheses 1a-7a)

To test for mean differences, we conducted a MANOVA using SAS ver. 9.1.3. This test was significant (Wilk's $\Lambda = 0.82$, $F_{(7, 158)}=4.83$, $p < 0.01$) and indicates that any differences seen in the ANOVAs are not due to chance (Maxwell et al., 2003). Table 2 summarizes the results. Four of the seven hypotheses were supported, suggesting interactivity significantly influenced many of the study constructs.

Table2: Review of Main Effect Hypotheses.

Hypothesis	Construct	High-Interactive mean	Low-Interactive mean	Support
H1	Intent	3.36	3.08	no
H2a	Risk	4.14	4.73	yes
H3a	Benefits	4.33	4.13	no
H4a	Involvement	5.28	4.47	yes
H5a	Diagnosticity	5.09	4.89	no
H6a	Authenticity	4.33	3.69	yes
H7a	Intangibility	3.58	3.69	yes

In sum, behavioral intention (H1) was not significantly different between conditions, $F_{(1, 164)}=1.37$, $MSE=2.48$, $p=0.24$, $\eta^2=0.01$, suggesting that after controlling for perceived benefits and risks, interactivity did not uniquely influence purchase intention. Perceived usage risk (H2a) significantly differed between conditions, $F_{(1, 164)}=17.13$, $MSE=0.86$, $p<0.01$, $\eta^2=0.10$. Individuals in the high-interactivity condition perceived less risk than those who were in the low-interactivity condition. Perceived benefits (H3a) was not significantly different between conditions, $F_{(1, 164)}=0.95$, $MSE=1.85$, $p=0.33$, $\eta^2=0.01$. Increasing the interactivity of the evaluation information and content apparently did not contribute to more positive e-service evaluations. Situational involvement (H4a) was significantly higher for the high-interactivity condition, $F_{(1, 164)}=19.51$, $MSE=1.37$, $p<0.01$, $\eta^2=0.11$. This suggests that individuals in the high-interactivity condition were more interested and engaged than those in the low-interactivity condition. Information diagnosticity (H5a) was not significantly different between conditions, $F_{(1, 164)}=1.77$, $MSE=0.96$, $p=0.19$, $\eta^2=0.01$. The mean values reported in Table 1 suggest that, as expected, individuals in the high-interactivity condition reported higher information diagnosticity than those in the low-interactivity condition, however, the differences are not significant. Authenticity (H6a) significantly differed between conditions, $F_{(1, 164)}=12.83$, $MSE=1.28$, $p=0.01$, $\eta^2=0.07$. Consumers in the high-interactivity condition reported that the e-service was more authentic than consumers in the low-interactivity condition. Mental intangibility (H7a) significantly differed between conditions, $F_{(1, 164)}=10.00$, $MSE=1.53$, $p=0.0019$, $\eta^2 = 0.06$.

Multi-Group SEM Results

To test H2b – H7b and H2c – H7c, we used EQS 6.1 build 94. Testing the path differences requires three steps for each hypothesized relationship (Klein, 2005). First, the model is specified. Next, all paths are constrained to require that the beta weights for each condition are the same. Then, a model is estimated and a baseline χ^2 is calculated. Finally, to test each hypothesis, a single path constraint is released and a χ^2 difference test is conducted. If this test is significant, then there is a difference between groups for that path. The formula for the χ^2 difference test (Bentler, 2006, Bonett and Bentler, 1983) is as follows:

$$\chi^2_{diff} = [(-2\text{LogLikelihood}_{constrained}) - (-2\text{Likelihood}_{unconstrained})] \quad (1)$$

In the first step, when all paths are constrained to be equal, the baseline $\chi^2_{22} = 70.99$. This χ^2 represents the difference between a perfect fit and the current model. Lower numbers are desirable because a model χ^2 of zero

indicates perfect fit (Klein, 2005). We use this χ^2 as a baseline to estimate χ^2 difference tests for hypotheses. When paths are constrained, the coefficients (β) between groups are forced to be equivalent. In a single sample instance, when the model is fitted it creates a Q function given by the formula (Bentler, 2006, Bentler and Weeks, 1979, Bentler and Weeks, 1980, Bonett and Bentler, 1983, Weeks and Bentler, 1982):

$$Q = (s - \sigma(\theta))'W(s - \sigma(\theta)) \quad (2)$$

When this function is minimized it yields \hat{Q} and is used to create a test statistics useful in determining the degree of fit given by the equation:

$$T = (N - 1)\hat{Q} \quad (3)$$

T is distributed as χ^2 and is the model χ^2 reported elsewhere in this work. With multiple groups come multiple Q functions and T statistics. When paths are forced to be equivalent the Q functions have to be equivalent between groups such that:

$$(s_1 - \sigma_1(\theta_1))'W_1(s_1 - \sigma_1(\theta_1)) = (s_2 - \sigma_2(\theta_2))'W_2(s_2 - \sigma_2(\theta_2)) \quad (4)$$

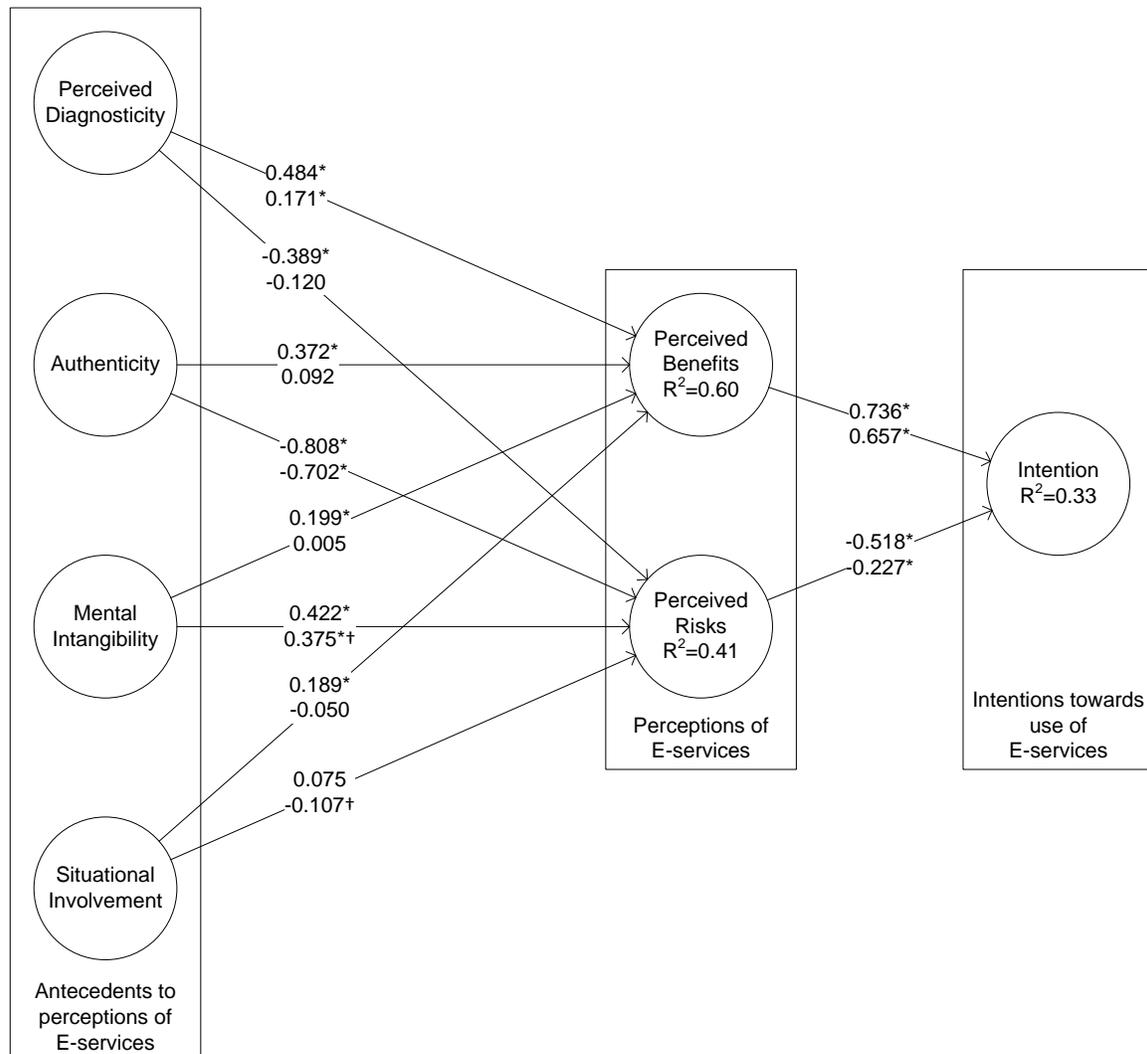
Because the Q functions are forced to be equivalent between groups, the \hat{Q} is equivalent for both groups as is the T statistic. Further, because the underlying covariance matrix is not the same between groups, the Q function cannot be optimally minimized and instead has to be minimized given the equality constraints imposed. This necessarily indicates that the \hat{Q} , T and resultant model χ^2 will increase provided the constraint is invalid. If the constraint is valid and the paths truly are not different, then the \hat{Q} , T and resultant model χ^2 will not increase.

In the next step, we released the path (hypothesis) under investigation and re-estimated the model to evaluate whether fit improves. We take the new model chi-square and subtract it from the baseline chi-square. The difference becomes the chi-square with 1 degree of freedom that we use to evaluate whether a significant difference exists across groups. When the chi-square is significant, the analysis suggests that path coefficients are significantly different across groups. To test hypotheses 2b and 3b, the constraint placed in the baseline model (forcing the path coefficients between the two conditions to be equal) was released.

Table3. Review of Moderation Hypotheses

<i>Hypothesis</i>	<i>Moderated Path</i>	χ^2	χ^2 Diff.	<i>p</i>
Baseline Model	None	70.99	-	-
H2b	Risk --> Intent	64.93	6.06	0.01
H3b	Benefit --> Intent	66.89	4.10	0.04
H4b	Involvement -->Risk	70.89	0.10	0.75
H4c	Involvement -->Benefit	66.87	4.12	0.04
H5b	Diagnosticity --> Risk	66.84	4.15	0.04
H5c	Diagnosticity --> Benefit	65.6	5.39	0.02
H6b	Authenticity --> Risk	65.56	5.43	0.02
H6c	Authenticity --> Benefit	66.65	4.34	0.04
H7b	Intangibility --> Risk	70.86	0.13	0.72
H7c	intangibility --> Benefit	65.44	5.55	0.02

To test Hypotheses 4b/c – 7b/c, we estimated two additional models for each test. In the first model (testing Hypotheses 4b-7b), the constraint between the antecedents and risk was released. In the second model (testing Hypotheses 4c-7c) the constraint between the antecedents and benefits was released. Results for difference tests across the two conditions are reported in Figure 2 with the high-interactivity condition and the low-interactivity condition. The results, after executing the three-step multiple group procedure for χ^2 difference testing, are reported in Table 3. This includes the reporting of the baseline model, each model when the appropriate path constraint is released, and the level of significance for the difference test.



Model fit statistics: Model $\chi^2_{10}=26.98$ NFI=0.94 CFI=0.96 SRMR=0.049 RMSEA=0.144.
 Path results for high-interactivity (top) and low-interactivity (bottom) conditions.
 Pairs of paths marked with † are *not* significantly different from each other ($\alpha<0.05$).
 Paths marked with ** are significant predictors ($\alpha<0.05$)

Figure 2: Results of Multi-group Analyses

DISCUSSION

Motivated by a desire to identify levers that encourage e-service use, our research examined the relationship between the interactivity of web-based demonstrations and consumers' perceptions of an online bill payment system. Understanding the influence of interactive web-based demonstrations is important because consumers base e-service usage decisions on the information provided by websites. We used an experimental design to investigate two sets of hypotheses that tie interactivity to important consumer perceptions and intentions toward e-services. The first set of hypotheses investigated whether interactivity of web demonstrations influences consumers' assessments of, and intentions towards, e-services. The second set of hypotheses tested whether interactivity moderates the network of relationships among antecedents to, and consequences of, e-service's perceived risks and perceived benefits. In the following paragraphs, we discuss our findings and their implications for our understanding of e-services.

We found mixed support for interactivity's influence on antecedents to perceived risks and benefits of e-services. Consistent with our hypotheses, consumers who used the highly interactive VESE reported significantly higher situational involvement (H4a), greater authenticity (H6a), lower levels of mental intangibility (H7a), and perceived risk

(H1a) associated with e-services. The rationale for these hypotheses was that the highly interactive VESE provides a realistic simulation of the actual e-service, and should make promotional materials more authentic, informative, and interesting for potential customers. For example, after interacting with a highly interactive VESE, we reasoned that consumers should be able to more easily construct a mental model of and develop a deeper understanding of the e-service. Generally speaking, our findings suggest that interactivity fostered more positive perceptions of e-services in our respondents. These findings underscore that interactivity may represent a powerful means to shape consumer perceptions of e-services.

It is worth noting that interactivity did not influence diagnosticity (H5a) across conditions. This result may be an artifact of the sample, which was composed of participants who are more computer savvy, experienced users of e-services than the general adult population. For example, the sampling frame (e.g., undergraduate students in the U.S.) is accustomed to using e-services to purchase songs, ring-tones, and games from vendors. Hence, even though the sample was screened for previous use of the financial e-service, our participants' general understanding of e-service transaction systems may have mitigated the influence of interactivity on perceived diagnosticity. Given we did not find statistical significance, and our suggestion that this finding may be related to the sample, we believe that diagnosticity remains a useful direction for future research on interactivity and e-services in different populations of web users in different contexts. For example, it would be useful to examine whether interactive e-service previews influenced elderly online consumers' perceptions of the diagnosticity of online medical records. If interactive previews increased elderly citizens' intention to use e-health services, then medical service providers, insurance companies, and government agencies may realize substantial savings through providing more realistic previews of how they manage records. For elderly citizens, adopting e-services affords opportunities to surmount issues tied to mobility and access to medical services. This topic is of great practical relevance given the aging United States population and the current interest in improving medical records management.

As reported in Table 2, interactivity had mixed implications for perceived risks, perceived benefits, and intention to use e-services. Consistent with our expectations, we found that interactivity functioned as a risk reducing factor (H2a). Highly interactive VESE users reported lower perceived risk than Flash users. However, interactivity did not influence perceived benefits (H3a) or intention to use e-services (H1). Our results may be attributable to the consistency of the promotional content across conditions as well as the sample's experience with online transactions. Given our sample had experience with this class of e-services, our findings should be interpreted with caution when considering other kinds of e-services. Similar to the invariance across groups for diagnosticity, the participants in this sample may have transferred their understanding of financial e-services' benefits, regardless of interface style, from prior experience completing online transactions. If consumers are less familiar with a particular class of e-services, interactivity may demonstrate a different pattern of effects on perceived risks and benefits of a specific e-service. As a result, we believe that future research examining e-services less familiar to web users, such as medical records or tax payment systems, may remain a useful direction for future research.

Mixed results were found for interactivity's influence on the relationships between situational involvement, diagnosticity, authenticity, and perceived risk. We reasoned that interactivity would strengthen the negative relationship between these constructs and risk (i.e., led to lower risk). We also reasoned that interactivity would weaken the risk-inducing effect of mental intangibility. Higher situational involvement reported by the VESE group did not function as a risk reliever any more effectively than the low interactivity treatment. Interactivity did not moderate the influence of situational involvement on risk (H4b). We found that interactivity resulted in a stronger risk-reducing effect of diagnosticity (H5b) and authenticity (H6b). Also, we found that higher levels of interactivity did not moderate (weaken) the harmful effect of consumers' mental intangibility (H7b) on risk. This suggests that although the highly interactive VESE helped consumers construct clearer mental models of e-services, mental intangibility continued to contribute to perceived risk for both conditions. Combined with our finding that overall risk levels were lower for the highly interactive VESE group, our results suggest that for e-services, interactivity diminishes the perceived risks of use.

Interactivity moderated relationships between situational involvement (H4c), perceived information diagnosticity (H5c), authenticity (H6c), mental intangibility (H7c) and perceived benefits. Due to the media congruency effect (Wright and Lynch, 1995), our rationale was that interactivity should enhance consumer involvement, which would then allow easier visualization of e-service benefits. Results suggest that the interactivity of the VESE allowed consumers' perceptions of benefits to be based more on interest and involvement with the provided information, and the increasing diagnosticity of the information.

While increasing consumer involvement and perceptions of information diagnosticity are very important findings, the moderating effect of interactivity that increased the effect of authenticity on perception of e-service benefits is a key finding of this research, because many consumers do not adopt e-services that lack authenticity and therefore seem risky. The effect of consumers' mental intangibility on perceived benefits was moderated by interactivity; however the highly interactive VESE group's mental intangibility acted to strengthen rather than reduce perceived benefits. A similar finding is reported by Laroche et al. (2005). Higher intangibility levels may cause consumers to rely on prior knowledge and experience rather than the evaluation of specific e-service information. Taken together, these findings

are consistent with the notion that interactivity is a tool that e-service providers can employ to reduce risk and increase benefits perceived by potential customers.

Finally, interactivity increased rather than decreased the effects of risk (H2b) and magnified the effects of benefits (H3b) on intention to use e-services. While the effects of risk on intent increased for the high-interactivity group, Table 3 results indicate that intent to use the e-service was higher. This suggests that while consumers were increasingly mindful of the risks of usage when deciding whether to use them, they were also more willing to accept the usage risks to obtain the benefits. These findings bolster our argument that interactive web demonstrations are an effective strategy for increasing intention to use e-services. Although consistent with our hypotheses, these findings suggest additional directions for future research. For example, we did not examine how our study's participants perceived characteristics of the interactive and non-interactive demonstrations. When it is easier to manipulate demonstrations, theory suggests that consumers find information more persuasive and easier to understand (Hoffman and Novak, 1996), and are required to use fewer cognitive resources to process it (Kahneman and Tversky, 1982). As a result, future research could examine whether the difficulty level of, or specific features of, interactive demonstrations influence their risk-reducing and benefit-magnifying effects.

Limitations

Our operationalization of e-services might not generalize to other types or contexts for e-service use. Specifically, research examining online bill payments might not generalize to other e-service offerings such as records management, where the perceived benefit and risk paradigm could be far different. For example, one might perceive more risk associated with managing personal health information than with financial services. Alternately, because one might avoid long waits, one might perceive more benefits from renewing a driver's license online than from using a bill payment service. Further research is needed to assess how consumers might react to different levels of interactivity in other e-services contexts.

Another limitation of the current research is the sample. While screened for prior or current use of similar financial e-services, our sample may have had an above-average comfort-level and understanding of financial payment services. Our respondents were technology-savvy consumers whose risk aversion may differ from less savvy populations. A more heterogeneous sample including older, less computer-experienced adults may provide further insights into interactivity's implications. Hence, future research should examine VESE's influence on perceptions of different e-services within different populations.

Contributions to Theory

Our findings provide three important contributions to research on consumers' perceptions of e-services. First, this research clarifies the effects of interactive software simulations on consumer perceptions of experiential e-services. Our findings suggest that the media congruency effect is a powerful tool that Web-based e-service providers can use to build a relationship with consumers (Wright and Lynch, 1995). Consumers who evaluated the e-service by 'test-driving' interactive demonstration software (that was congruent with the interactivity of the actual e-service) were more involved and reported higher ratings of the e-service's benefits. In future research, we believe it would be interesting to extend our findings and examine whether "media congruency effects" exert a pervasive influence across a range of different services and types of information (from retirement planning to medical information).

Our second contribution is extending research on risk-reducing strategies from tangible goods to intangible e-services. Much of the work concerning-commerce and interactivity has examined the selling of physical products (Campbell et al., 2011; Jiang and Benbasat, 2004; Jiang and Benbasat, 2007; Li et al., 2002; Wells et al., 2011). We have provided evidence that interactivity can also affect the perceptions of risks and benefits beyond physical products and into e-service offerings. Specifically, although the challenges of attracting consumers to experiential products and services are well-known in traditional environments (Alba et al., 1997; Ford et al., 1990; Klein, 1998; Mitra et al., 1999), our findings provide evidence that the interactivity of Web-based promotional materials improves consumers' cognitive processing of information during pre-purchase evaluations, and also reduces perceived risks of e-service usage. Similar to prior research that suggests that the interactivity of promotional materials aids pre-purchase product evaluations of tangible products (Griffith and Chen, 2004; Jiang and Benbasat, 2004; Schlosser, 2003), the VESE aided consumers' pre-purchase evaluations by reducing perceived risk and increasing perceived authenticity of e-services. Not unlike physical products, our findings suggest that factors such as authenticity and diagnosticity are germane to understanding consumers' understanding of experiential and intangible goods or services. This is specifically true for e-services that are hard to market in any medium. Our findings suggest that future research on interactivity may deepen the understanding of effective risk reduction and benefits improvement strategies on vendor websites.

Our final contribution is in taking a first step towards modeling the complexity of e-service use decisions. Our research model examines both risks and benefits that influence intentions to use e-services. If we had exclusively examined risk, our findings would have suggested that interactivity exerts a far less pervasive influence on

consumers' perceptions of websites. By acknowledging that e-service use decisions involve evaluations of risks and benefits, our research offers a more realistic, comprehensive model of web consumer behavior. By utilizing a risk-benefit research model, the effects of risk reducing or benefit-inducing strategies can be better investigated. Strategies to reduce consumer risk concerns may have unintended effects on consumer appreciation of e-service benefits. Hence, our findings lay a foundation for future research that improves our understanding of consumers' evaluations of experiential information technology products, information systems and e-services.

Contributions to Practice

For practice, our research underscores that perceived risk can be diminished by offering consumers interactive web-based previews of e-services. Website developers responsible for deploying e-services should recognize that interactive promotional materials can allay consumer apprehension, improve benefit assessments, and increase intention to use e-services. For providers of experiential and credence e-services that consumers hesitate to adopt, this finding is critical. Although designing interactive e-services is often more expensive when consumers are afforded the opportunity to 'test-drive' a financial e-service, they will perceive it as more authentic, legitimate, and less risky than when consumers only use a passive interface to evaluate the e-service. With a reduced focus on potential dangers and losses, consumers can better focus on the afforded benefits.

Additionally, practitioners should keep in mind that interactive web-based demonstrations positively influence e-services benefits and their antecedents. This suggests that cost associated with developing interactive web demonstrations e-service may be good investments for new and established e-service providers. For example, rather than simple 'YouTube' demonstration videos, which are similar to low-interactivity demonstrations, firms should invest in creating authentic software simulations of e-services processes. By doing so, developers can increase the likelihood that consumers will have positive impressions of an e-service's authenticity and legitimacy, and by extension, its provider.

Finally, web designers are often faced with implementing interactive tools that influence consumers' perceived risk and benefits. Included in this design process should be a dialogue of other factors that interactivity may act as moderators. This research provides four factors (Situational Involvement, Perceived Diagnosticity, Authenticity, and Mental Intangibility) on which practitioners can when designing interactive web elements. For example, consider a web designer who implements an interactive demonstration tool for a Salesforce.com add-in. This designer should be cognizant of not only how this tool best mitigates risks while enhancing benefits, but also how to best capture a consumer's situational involvement. Tools such as games or immersive full-featured virtual e-service experiences can decrease the mental intangibility of the product.

CONCLUSION

News reports of Internet-based security breaches, identity theft, fraud, and other dangers may increase the perceived risk and decrease the perceived benefits of using e-services. In this paper, we investigated whether interactivity serves as a means to ameliorate concerns about, and increase the perceived benefits of, using e-services. We found that simply affording consumers the ability to use an interactive simulated e-service increased perceived involvement and authenticity, and decreased intangibility and perceived risks of e-services. Further, we found that interactivity moderated relationships such that consumers were more likely to report higher intentions to use e-services. Theoretically, this article places an importance on interactive elements to the adoption of e-service. This in turn leads to an understanding of how perceptions of e-services can be influenced by these interactive elements. Collectively, we believe that our findings provide vendors with useful evidence that investing in interactive web-based promotional materials might be a sound investment for e-service providers.

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APPENDIX A: INTERACTIVE VESE (VIRTUAL E-SERVICE EXPERIENCES)

Bill Inbox

- Bills awaiting payment instructions

[Make a payment to payee not currently in your Inbox](#)

Due Date	Payee	Total Due	Min Due
09/19/2002	Sallie Mae	\$621.14	\$621.14
09/20/2002	DirecTV	\$78.32	\$78.32
09/22/2002	Philadelphia Gas Works	\$50.97	\$50.97
09/22/2002	American Express Card	\$1,040.50	\$1,040.50
09/23/2002	PECO Energy	\$148.03	\$148.03
Totals:		\$1,938.96	\$1,938.96

Pay Bill

-Enter payment information and click the Pay button

Due Date	Biller	Total Due	Min Due
09/20/2002	DirecTV	\$78.32	\$78.32

Your SmartBalance as of 9/11/2002 is \$916.83

William Barrows
123 Nassau Street
Princeton, NJ 08540

Date: September 13 2002

Pay to: **DirecTV** Amount: \$78.32

Acct: MY CHECKING

Memo: Category: Cable

ACCT #: 5555555 [Signature On File](#)

Payment Outbox

- Payments that have been scheduled

Pay Date	Payee	Payment Account	Number	Pay Amt
09/11/2002	Water Revenue Bureau	MY CHECKING	7034	\$43.40
Total:				\$43.40

SmartBalance

Select the bank account you would like to view activity for: MY CHECKING

Account Summary Last Updated 09/11/2002

Available bank account balance: \$960.23

Total uncleared Bill Center transactions: -\$43.40

SmartBalance: \$916.83

Uncleared Bill Center transactions for the last 30 days

Date	Number	Description	Amount
	7034	Water Revenue Bureau	\$43.40
Total uncleared Bill Center transactions:			\$43.40

Cleared bank transactions for the last 30 days

Date	Number	Description	Amount
08/16/2002	7030	Check - Water Revenue Bureau	-\$43.40
08/18/2002		ATM Withdrawal - Alexander Road	-\$60.00
08/20/2002		MyBank Monthly Service Charge	-\$2.50
08/21/2002	7031	Check - Philadelphia Gas Works	-\$44.20

Reports

Select options and Run Report

Items To Show: Inbox Outbox Paid Filed

Report from: 08/12/2002 through: 09/12/2002

Pick Payee: --All Payees-- Sort Results By: Date

[RUN REPORT](#)

Date	Number	Payee	Amount	Status
08/12/2002	7030	Water Revenue Bureau	\$43.40	Paid
08/16/2002	7031	Philadelphia Gas Works	\$44.20	Paid
08/23/2002	7032	PECO Energy	\$148.03	Paid
08/24/2002	7033	American Express Card	\$59.40	Paid
Total:			\$295.03	
Report Total:			\$295.03	

APPENDIX B: ITEMS BY CONSTRUCT

Situational Involvement (Zaichkowsky, 1985)

Involvement 1	Paytrust's e-billpay service is important to me/unimportant to me*
Involvement 2	Paytrust's e-billpay service is irrelevant/relevant
Involvement 3	Paytrust's e-billpay service means a lot to me/means nothing to me*
Involvement 4	Paytrust's e-billpay service is boring/interesting
Involvement 5	Paytrust's e-billpay service is appealing/unappealing*

Perceived Diagnosticity(Kempf and Smith, 1998)

Perceived Diagnosticity 1	Overall, how helpful was the content you evaluated today, to judge the quality and performance of Paytrust's e-billpay service
Perceived Diagnosticity 2	The content I viewed today enabled me to understand how Paytrust's e-billpay service works
Perceived Diagnosticity 3	I was exposed to enough information today to make my evaluation of Paytrust's e-billpay service
Perceived Diagnosticity 4	I learned enough about Paytrust's e-billpay service today to be able to decide whether I want to use it

Authenticity (Featherman et al., 2006)

Authenticity 1	Bills received on-line don't seem real to me*
Authenticity 2	Receiving bills on-line and paying them with online checks seems like a non-authentic service*
Authenticity 3	Images of on-line bills and checks don't appear to be authentic*
Authenticity 4	Bills and checks that can't be touched or felt don't feel genuine*
Authenticity 5	Filling out a computer image of a check to pay bills on-line seems artificial*

Mental Intangibility (Laroche et al., 2005)

Mental Intangibility 1	Paytrust's e-billpay service is not the sort of item that is easy to picture
Mental Intangibility 2	Paytrust's e-billpay service is a difficult item to think about

Perceived Benefits (Developed for this study)

Perceived Benefits 1	I could pay my bills faster if I used Paytrust's e-billpay service
Perceived Benefits 2	I would have greater control over my bill paying if I used Paytrust's e-billpay service
Perceived Benefits 3	My billpaying would be organized better if I used Paytrust's e-billpay service
Perceived Benefits 4	I would be more efficient in my monthly billpaying if I used Paytrust's e-billpay service
Perceived Benefits 5	I would make less errors in my bill-paying if I used Paytrust's e-billpay service
Perceived Benefits 6	Using Paytrust's e-billpay service would improve the quality of my bill paying efforts
Perceived Benefits 7	I would have less late penalties if I used Paytrust's e-billpay service

Perceived Risk (Featherman and Pavlou, 2003)

Perceived Risk 1	Using Paytrust's e-billpay service exposes you to financial risk
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Perceived Risk 2	My financial situation might get worse if I use Paytrust's e-billpay service
Perceived Risk 3	Paytrust's e-billpay service will have problems executing transactions
Perceived Risk 4	Paytrust's e-billpay service probably will make mistakes and process my payments incorrectly
Perceived Risk 5	The time lost from having to set-up and learn how to use Paytrust's e-billpay service makes it risky
Perceived Risk 6	Using Paytrust's e-billpay service would lead to a loss of convenience for me because I would have to waste a lot of time fixing payment errors
Perceived Risk 7	Using Paytrust's e-billpay service will cause me to lose control over the privacy of my payment information
Perceived Risk 8	Using Paytrust's e-billpay service would lead to a loss of privacy for me because my personal information would be used without my permission
Perceived Risk 9	Using Paytrust's e-billpay service exposes me to potential identity theft, because a crook (hacker) can steal my checking account number and make fraudulent purchases

Intent to Use E-Services (Venkatesh and Davis, 2000)

Intent 1	Assuming I had access to the Internet, I intend to use Paytrust's e-billpay service to pay my bills within the next six months
Intent 2	Given that I had access to the Internet, I predict that I would use Paytrust's e-billpay service to pay my bills within the next six months

* Indicate reserve coded items

APPENDIX C: CROSS LOADINGS

	<i>Situational Involvement</i>	<i>Authenticity</i>	<i>Intent</i>	<i>Diagnosticity</i>	<i>Mental Intangibility</i>	<i>Risk</i>	<i>Benefits</i>
Sit. Involve 1	0.86	0.28	0.26	0.16	-0.23	-0.16	0.26
Sit. Involve 2	0.86	0.37	0.34	0.24	-0.29	-0.19	0.33
Sit. Involve 3	0.72	0.23	0.09	0.08	-0.12	-0.18	0.10
Sit. Involve 4	0.86	0.42	0.26	0.10	-0.28	-0.26	0.26
Authenticity 1	0.33	0.86	0.28	0.39	-0.47	-0.66	0.32
Authenticity 2	0.33	0.89	0.30	0.31	-0.48	-0.55	0.39
Authenticity 3	0.26	0.76	0.29	0.25	-0.47	-0.40	0.39
Authenticity 4	0.38	0.86	0.33	0.35	-0.46	-0.50	0.34
Authenticity 5	0.41	0.84	0.31	0.37	-0.57	-0.54	0.40
Intent 1	0.28	0.19	0.87	0.34	-0.35	-0.26	0.64
Intent 2	0.31	0.22	0.87	0.26	-0.28	-0.29	0.63
Intent 3	0.24	0.37	0.88	0.47	-0.39	-0.36	0.75
Intent 4	0.25	0.44	0.88	0.48	-0.45	-0.35	0.74
Diagnosticity 1	0.18	0.31	0.28	0.77	-0.36	-0.25	0.26
Diagnosticity 2	0.09	0.04	0.26	0.52	-0.10	-0.08	0.15
Diagnosticity 4	0.14	0.39	0.45	0.92	-0.37	-0.22	0.53
Men. Intangibility 1	-0.21	-0.42	-0.26	-0.32	0.81	0.34	-0.30
Men. Intangibility 2	-0.28	-0.55	-0.45	-0.36	0.88	0.35	-0.44
Risk 1	-0.19	-0.58	-0.38	-0.23	0.32	0.89	-0.31
Risk 2	-0.11	-0.47	-0.19	-0.30	0.39	0.68	-0.18
Risk 3	-0.28	-0.50	-0.29	-0.10	0.32	0.86	-0.25
Benefits 1	0.31	0.46	0.72	0.47	-0.46	-0.31	0.86
Benefits 2	0.30	0.40	0.70	0.47	-0.40	-0.33	0.90
Benefits 3	0.34	0.47	0.68	0.46	-0.41	-0.32	0.87
Benefits 4	0.26	0.42	0.68	0.46	-0.43	-0.27	0.91
Benefits 5	0.27	0.31	0.77	0.42	-0.40	-0.27	0.91
Benefits 6	0.24	0.32	0.71	0.48	-0.33	-0.18	0.90
Benefits 7	0.17	0.30	0.67	0.41	-0.34	-0.21	0.86

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2006-2007: Traci Hess	2007-2008: Wei-yin Hong	2008-2009: Eleanor Loiacono
2009-2010: Khawaja Saeed	2010-2011: Dezhi Wu	2011-2012: Dianne Cyr

