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## The Effects of Service and Consumer Product Knowledge on Online Customer Loyalty

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### Abstract

Customer loyalty is a key driver of financial performance for online firms. The effect of service quality on customer loyalty has been well established. Yet, there is a paucity of research that has studied the cost of obtaining service quality during the service process and the service outcome influenced by such cost. We extend previous research and propose the 3S Customer Loyalty Model by integrating sacrifice and service outcome as additional important service dimensions together with service quality when predicting online customer loyalty, and examining how their influences on loyalty vary across customers with different degrees of product knowledge. Further, we theorize that service quality and sacrifice – as service process dimensions – influence service outcome, and we theorize how “live help” technology improves customer perceptions of service quality and sacrifice. The empirical results indicate that 1) customer loyalty increases with higher perceived service quality, lower perceived sacrifice, and better perceived service outcome, 2) service quality and sacrifice influence service outcome, 3) customer product knowledge negatively moderates the relationship between service quality and online customer loyalty and positively moderates the relationship between sacrifice and customer loyalty, and 4) live help technology enhances service quality and reduces sacrifice. These findings support the theoretical importance of including sacrifice and service outcome (parallel with service quality) as antecedents of online customer loyalty. Our study also advances the theoretical understanding of what service process consists of and how the service process (i.e. service quality and sacrifice) influences service outcome.

**Keywords:** Service Quality, Sacrifice, Service Process, Service Outcome, Customer Product Knowledge, Live Help Technology, Online Customer Loyalty, 3S Customer Loyalty Model.

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# The Effects of Service and Consumer Product Knowledge on Online Customer Loyalty

## 1. Introduction

Customer loyalty is important for the survival of online businesses. Previous research suggests that customer loyalty is based primarily on service quality (Gefen, 2002; Heskett, Jones, Loveman, Sasser, & Schlesinger, 1994; Reichheld & Sasser, 1990; Reichheld & Scheffer, 2000). The proliferation of self-service technologies has increasingly changed the way customers interact with firms to create the service outcome (Meuter, Ostrom, Roundtree, & Bitner, 2000). For example, self-service technologies (e.g., kiosk, Internet) require the participation of customers in order to shift part of the work of providing service to the customers themselves as a means of increasing productivity and reducing costs. Thus, service quality alone might not be sufficient to explain the loyalty of online customers. Given the lack of understanding of online customer loyalty, there is a need to explore what other key factors will improve online customer loyalty, and in particular, what online technologies can be employed to impact these key factors.

Customers do not always choose the highest-quality service (Olshavsky, 1985), since greater sacrifice might be required to obtain better service quality. Sacrifice is defined as that which is given up to acquire a service (Brady et al., 2005; Dodds, Monroe, & Grewal 1991; Heskett, Sasser & Hart, 1990; Zeithaml, 1988). The concept of sacrifice is particularly important to the IS domain as more and more companies implement self-service technologies that inherently require the direct participation of customers. However, little research has been conducted to investigate how service quality and sacrifice together influence online customer loyalty. In addition, purchasing online appears to be a very goal-directed behavior (Zeithaml, Parasuraman, & Malhotra, 2002). Thus, we need to consider the service outcome (what a customer receives during the exchange, Mohr & Bitner, 1995) that is the consequence of the service process (i.e., service quality and sacrifice). Furthermore, while prior research (e.g., Sampson & Froehle, 2006) acknowledges that customers can be heterogeneous in their needs and vary in terms of training, experience, and product knowledge, there is a paucity of research regarding how this individual variability will impact the effects of service process and service outcome on online customer loyalty.

To meet these ends, we draw on Unified Services Theory (UST, Sampson, 2001; Sampson & Froehle, 2006) and service evaluation literatures (Dabholkar & Overby, 2005) to derive two important factors, namely sacrifice and service outcome, respectively, that potentially impact online customer loyalty. We also draw on Social Exchange Theory to predict how sacrifice, service outcome, and service quality influence online customer loyalty. Henceforth, we refer to the proposed nomological network as the 3S<sup>1</sup> Customer Loyalty model. UST integrates previous service theories and proposes the magnitude of customer inputs as the distinctive difference between service production processes and non-service production processes (i.e., manufacturing process). UST defines a service production process as one that relies on customer inputs. As customers need to provide inputs in exchange for service, we contend that it is necessary to capture the sacrifice that customers make during the service process to determine whether such sacrifice is justified. In addition, given that most online behavior is goal-directed (Zeithaml et al., 2002), and many online customers are concerned with what they can obtain from the e-service eventually, we believe that it is essential to examine the impact of perceived service outcome on online customer loyalty. In the 3S Customer Loyalty Model, we also distinguish service process from service outcome; examine what constitutes the service process; and investigate the relationship between service process (i.e., service quality and sacrifice) and service outcome.

As we propose that service quality and sacrifice will influence service outcome and customer loyalty, the second goal is to examine how service quality and sacrifice can be improved through service technologies. This is important, as there has been increasing concern in the MIS research community regarding the scant attention paid to the IT artifact (Benbasat & Barki, 2007; Benbasat & Zmud, 2003; Orlikowski & Iacono, 2001). The lack of interpersonal interaction has been considered a key defining characteristic of e-business (Gefen & Straub, 2004; Grewal, Krishnan, & Lindsey-Mullikin, 2008). However, this assertion has become far less true with the relatively recent introduction of “live help” technology. Live help is used to facilitate interactions directly between online customers and human

<sup>1</sup> 3S stands for Service quality, Sacrifice, and Service outcome.

customer service representatives. Live help is typically delivered through “chat” mechanisms such as instant messaging and provided as a function built into the company’s website. It is important to examine the effect of live help, as it is a unique service technology that is able to add a human element to the online service environment. While many companies (e.g., Dell.com, LandsEnd.com) have provided live help functions through their websites, little is known concerning the contributions of this type of technology to online customers’ perceptions of service quality and sacrifice. Live help is very expensive to implement because of the cost of the chat or web contact software, the cost of training company staff to use it, and more importantly, the labor cost of having staff attend to customers. It is, thus, essential to study whether live help technology will improve customers’ perceptions of sacrifice and service quality, two service process variables that impact service outcome and online customer loyalty. Given the interactive nature of the interaction between customers and “live help,” we will base our theory on Rafaeli’s (1988) interactivity theory to hypothesize the effect of “live help” on perceived service quality and perceived sacrifice.

Consistent with the notion that it is meaningful to investigate the moderating effects of customer traits in the service environment (Dabholkar & Bagozzi, 2002), the third goal is to test a customer’s product knowledge as an important characteristic that may moderate the relationships between the three service dimensions and online customer loyalty. This will allow us to further understand under what circumstances service quality, sacrifice, and service outcome best predict online customer loyalty.

By achieving the goals identified above, we expect to make the following four theoretical contributions. First, we extend prior IS research (e.g., Gefen, 2002) and propose the 3S Customer Loyalty Model by integrating sacrifice and service outcome with service quality and empirically testing the joint effects of these constructs on online customer loyalty. This is important in that previous research has primarily focused on how service quality can impact online customer loyalty, but this research has largely ignored the other factors that can lead to higher levels of online customer loyalty. Within the 3S Customer Loyalty Model, we further theorize and empirically test the relationships between service process and service outcome. Specifically, we conceptualize that service process consists of two key aspects: *service quality* (the gains) and *sacrifice* (the losses). We propose that increased service quality and decreased sacrifice lead to a higher perceived service outcome. By doing so, we also contribute to the service evaluation literature, as previous studies on the role of service process have focused on service quality, while neglecting an important dimension: sacrifice. Third, we evaluate how sacrifice and service quality can be improved by employing live help technology, the results of which will provide actionable IT design prescriptions to practitioners. Finally, we examine how customers with varied product knowledge place different weights on sacrifice, service quality, and service outcome in signaling their loyalty. By incorporating this user characteristic, we can form a more complete picture of the dynamic nature of individual perceptions about service technology (Venkatesh, Morris, Davis, & Davis, 2003; Xu, Liao, & Li, 2008). For practitioners, this research can help merchants to develop strategies for customizing their online presence to best fit the unique characteristics of their customers.

In the next section, we review prior literature and develop our model: 3S Customer Loyalty Model. We then develop the hypotheses, describe the research method, and present the analysis of results. We finally conclude the paper by discussing the theoretical and practical implications and limitations as well as suggestions for future research.

## 2. Theory Development

We first review the concepts of customer loyalty and Social Exchange Theory, followed by a crucial antecedent of loyalty -- service quality. As prior literature has mainly examined the role of service quality in influencing customer loyalty, we draw upon the cost-benefit diagram as well as the Unified Service Theory to derive the sacrifice construct (cost to receive service) as a parallel antecedent of service equality (benefit obtained during the service) to predict customer loyalty. Next, as past literature focuses on service process (i.e., service quality) in forming online customer loyalty, but overlooks service outcome, we review the service evaluation literatures and propose the third service dimension -- service outcome -- to predict online customer loyalty.

## 2.1. Customer Loyalty and Social Exchange Theory

Customer loyalty expresses an intended behavior related to the service or the company (Andreassen & Lindestad, 1998). Continuing to purchase from a company, increasing business with it in the future, and providing positive word-of-mouth are key indicators of customer loyalty (Andreassen & Lindestad, 1998; Selnes & Hansen, 2001; Zeithaml, Berry, & Parasuraman, 1996).

Achieving customer loyalty is one of the most important goals for vendors. It is often the case that increasing customer loyalty is an economic necessity, given the relatively long period between repeat purchases and the need to recoup the average initial cost of attracting the customer to the website (Gefen, 2002; Reichheld & Scheffer, 2000). Customer loyalty is a key driver of financial performance in service organizations (Ganesh et al., 2000; Jones & Sasser, 1995; Kim & Son, 2009; Mithas, Ramasubbu, Krishnan, & Fornell, 2006-2007; Reichheld & Teal, 1996) and may be a more important determinant of profit than market share and position (Heskett et al., 1994). Loyal customers are also more inclined to recommend the vendor to other customers, increasing the customer base at no additional advertising expense (Heskett et al., 1994; Reichheld & Sasser, 1990; Zeithaml et al., 1996). Customer loyalty is regarded as an even more prominent factor in the survival of online businesses because recommendations and support from loyal customers can be spread faster online as compared to offline (Reichheld & Scheffer, 2000).

An increasing body of IS research has recognized the importance of online customer loyalty, as it is an important predictor of customer behavior in online service settings (Gefen, 2002; Kim & Son, 2009; Park & Kim, 2006; Thatcher & George, 2004). By identifying the key factors leading to online customer loyalty and understanding the relative impact of these factors, practitioners can better design online service technologies to enhance these factors to achieve higher levels of online customer loyalty.

As we will elaborate below, if customers perceive increased service quality, decreased sacrifice, and increased service outcomes in using the online service, they will reciprocate by recommending the vendor to others and continuing their own relationship with the vendor. Given the reciprocal relationship between the level of service provided to customers and their loyalty to merchants, Social Exchange Theory provides a logical theoretical foundation for the study of the impact of service quality, sacrifice, and service outcomes on online customer loyalty.

The gist of Social Exchange Theory is that human behavior is, in essence, an exchange, particularly of rewards (Homans, 1961). Exchange represents the basis of human behavior (Homans, 1961) and is pervasive throughout social life (Coleman, 1990). Social Exchange Theory posits that individuals provide one another with mutual gratifications to sustain social relations (Zafirovski, 2003). Applying the theory to our context, customer loyalty is a behavioral intention such that customers desire to do more business with the vendor and to recommend that vendor to other customers (Zeithaml et al., 1996).

## 2.2. Service Quality: First Antecedent of Online Customer Loyalty

Service quality is the overall evaluation and judgment made by a customer regarding the excellence of service he or she receives (Santos, 2003; Parasuraman, Zeithaml, & Berry, 1985, 1988). Service quality has been a long-standing and highly relevant construct with respect to customer service situations (Dabholkar & Overby, 2005; Grönroos, 1998; Parasuraman et al., 1985, 1988). Although typically applied to traditional offline contexts, it is also important for firms to provide service quality using technology (Bitner, 2001; DeLone & McLean, 2003; Ding & Straub, 2008; Zeithaml et al., 2002). Although technology has profoundly changed the ways in which companies interact with and serve their customers, customer desires for quality service do not show any signs of changing (Bitner, 2001). Service quality is a vital component of any organization's success in the Internet age (Song, 2003; Yang, 2001).

The study of the effect of service quality on customer loyalty is relevant to IS research, as e-business has shifted the focus of information technology (IT) utilization from internal management tools to customer-directed applications (Straub & Watson, 2001), and it has compelled a dramatic expansion of IT into the provision of all types of customer service (Bitner, Brown, & Meuter, 2000). Consequently, the

deployment of IT is characterized not only by technical issues but also by service quality issues (DeLone & McLean, 2003; Ding & Straub, 2008; Jia, Reich, & Pearson 2008; Koufaris, 2002). Previous research suggests that customer loyalty is based primarily on service quality (Gefen, 2002; Heskett et al., 1994; Reichheld & Sasser, 1990; Reichheld & Scheffer, 2000). We contend that this can be derived from the Social Exchange Theory. Simply put, if a customer perceives that he or she has been well served by the B2C website, he or she is likely to be more loyal to the website, in general.

While the extant literature has supported that online service quality influences online customer loyalty, it has neglected the other important antecedents to online loyalty. In the following two sections, we draw upon the cost-benefit paradigm, the service evaluation literature, and the Unified Service Theory to propose sacrifice and service outcomes as two additional antecedents that influence online customer loyalty.

### **2.3. Sacrifice: A Second Antecedent of Online Customer Loyalty**

We propose perceived sacrifice as a construct that captures the time and effort that customers spend when receiving service, parallel with the service quality that captures the benefit of service delivery. Such a proposal can not only be derived from the cost-benefit paradigm, but is also supported by the Unified Services Theory (UST).

#### **2.3.1. Cost-Benefit Paradigm and IS Literature on Sacrifice**

The inclusion of sacrifice together with service quality to predict online customer loyalty is in line with the essence of the cost-benefit paradigm (Beach & Mitchell, 1978; Jarvenpaa, 1989; Payne, 1982), which posits that human behavior is based on a person's tradeoff between the cost required to perform an action and the benefit of completing the action. The cost-benefit paradigm has been utilized as one of the most important lens to develop the Technology Acceptance Model, which stipulates perceived usefulness (benefit) and perceived ease of use (cost) as two antecedents of behavioral intention (Davis, 1989).

It should be noted that perceived sacrifice is distinguished from perceived ease of use, i.e., a person's belief that "using a particular system would be free of effort" (Davis 1989). Perceived sacrifice is a more encompassing construct than perceived ease-of-use. Perceived sacrifice includes, among other things, the user's time and mental effort in determining what inputs to provide in the service process, the interactions with the technologies that link the user to the service provider, the consideration of how to reply to the questions posed by the service provider, and the assessment of the advice provided. Thus, perceived ease of use is just one component of perceived sacrifice, which can also include overall perceptions of effort, time, risk, and associated monetary aspects (e.g., Brady et al., 2005; Zeithaml, 1988).

Perceived sacrifice is particularly relevant in the online environment where customers are co-producers of the services they receive. The concept of sacrifice has also been recognized in IS (e.g., Liang & Huang, 1998; Kim & Son, 2009; Mantel & Teorey, 1988), though surprisingly few studies have taken both service quality and sacrifice into account as antecedents of online customer loyalty. Interestingly, one of the most commonly used service quality instruments, SERVQUAL (Parasuraman et al., 1988), does not explicitly include any sacrifice items. To obtain a more balanced view of how customers become loyal to online vendors, we propose integrating service quality and sacrifice to predict online customer loyalty.

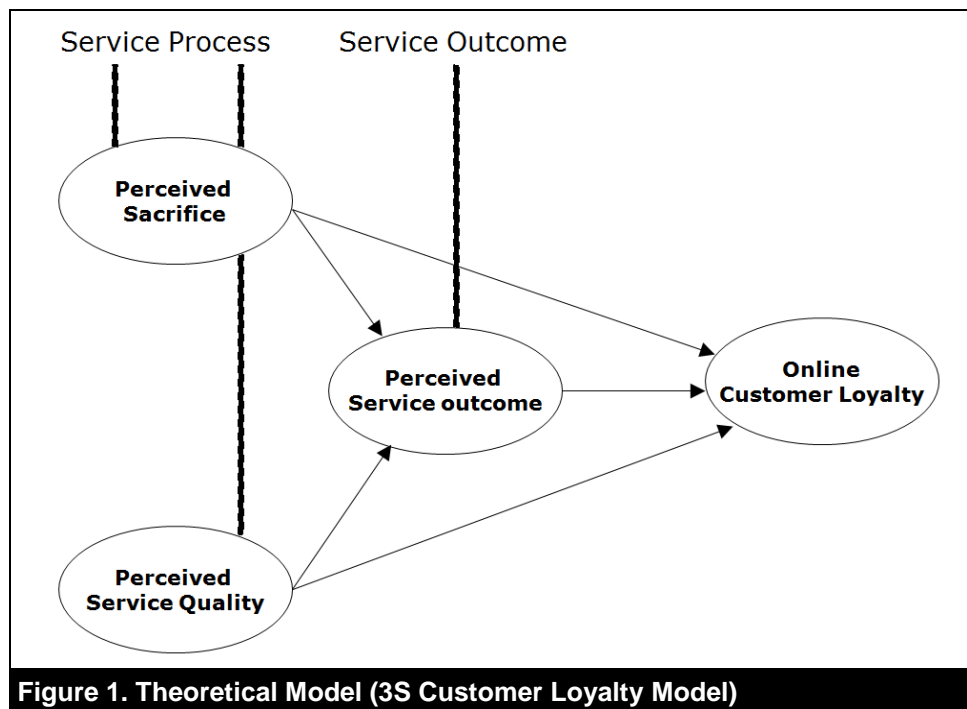
#### **2.3.2. Unified Services Theory (UST)**

Production process is a broad concept that includes both service production process and non-service production process (i.e., manufacturing process) (Boyer & Metters, 2004). UST delineates service processes from non-service processes and identifies the key commonalities across seemingly disparate service businesses (Sampson, 2001; Sampson & Froehle, 2006). UST is primarily a generalization of various theories of services that have been previously offered. Specifically, it reveals principles that are common to the wide range of services and provides a unifying foundation for various theories and models of service operations, such as the traditional "characteristics of services" and customer contact theory (Chase, 1981; Chase & Tansik, 1983). UST defines a service production process as one that relies on customers' inputs. The presence of these inputs establishes a

production process as a service process. In contrast, in manufacturing processes, customers may contribute ideas to the design of the product, but their only participation in that process is to select and consume the output (Sampson, 2001; Sampson & Froehle, 2006). UST has been used to explain and analyze various kinds of online service applications, human interface design (Pinhanez, 2007), customer experience (Hartuiker, 2008), management and technical consulting services (Smedlund, 2008), and industrial services operations (Ala-Risku, 2007). As customers need to sacrifice time and effort to provide their inputs, we need to take the sacrifice construct into account to predict online customer loyalty.

## 2.4. Service Outcome: A Third Antecedent of Online Customer Loyalty

It has long been recognized that services have both process and outcome components (Bell, Auh, & Smalley, 2005; Brown & Swartz 1989; Grönroos, Heinonen, Isoniemi, & Lindholm, 2000). Mohr and Bitner (1995) define service process as “the manner in which the outcome is transferred to the customer.” In the service and marketing literatures, there is a fairly wide acceptance of a natural link between service quality evaluations and process factors (Dabholkar & Overby, 2005; Parasuraman et al., 1988; Zeithaml, 1988). That is because service quality typically captures aspects such as responsiveness, assurance, and empathy. Similar with our argument about the important role of sacrifice associated with service quality to predict loyalty, we believe it is important to examine the sacrifice dimension during the service process as well. Thus, the service process consists of two constructs: service quality and sacrifice (see Figure 1).



**Figure 1. Theoretical Model (3S Customer Loyalty Model)**

Service outcome is “what a customer receives during the exchange” (Mohr & Bitner 1995). The overall service evaluations a customer makes of a vendor are related to both service process and service outcome (Dabholkar & Overby, 2005; Zeithaml, Parasuraman, & Berry, 1990). For example, in the legal service context, Johnson, Zinkhan, and Ayala (1998) found that both service outcome and service process influenced service referral, though the influence of service process was more significant. In the context of receiving a haircut, Dabholkar and Walls (1999) found that both process and outcome factors were linked to service evaluation and switching behavior, but service outcome was more important. Others have observed that process and outcome are equally important (Richard & Allaway, 1993). Although there are slight differences in these studies, all suggest that it is essential to examine *both* service outcome and service process. Given that online shopping is more likely to be goal-oriented than offline shopping, we propose including service outcome to predict online customer loyalty.

Although service process and service outcome are separate concepts, they are also related. In the service and marketing literatures, service process has been posited to influence service outcome (Dabholkar & Overby, 2005), although the view of service process is limited to service quality only. Service process can influence service outcome because evaluations of service process are mostly cognitive (Oliver, 1997; Parasuraman et al., 1988), while evaluations of service outcome often have an affective component (Dabholkar, 1995; Oliver, 1997; Yi, 1990). In typical service situations, customers will evaluate the service rationally and subsequently form an overall affective evaluation based on these cognitions (Dabholkar, 1995; Dabholkar & Overby, 2005).

### 3. Hypothesis Development

We will develop our hypotheses within the online service context, with a particular emphasis on the requirement and specification service stage of the Customer Service Life Cycle (CSLC, Ives, & Mason, 1990). This service stage describes those activities that access customers' preferences of product attributes and recommend relevant product alternatives to assist them in choosing appropriate products. We investigate the effectiveness and the relative importance of service quality, sacrifice, and service outcome in creating online customer loyalty, and the relationships between service process (i.e., sacrifice and service quality) and service outcome. We also look into the effect of live help technology on sacrifice and service quality. In addition, we examine the moderating role of customer product knowledge in influencing the effect of these three service dimensions on online customer loyalty.

#### 3.1. Effects of Sacrifice, Service Quality, and Service Outcome on Loyalty

It has been argued that the presence of customers' input distinguishes a production process from a service process (Sampson & Froehle, 2006). For example, to obtain product advice service from "live help" (i.e., interact directly with human employees using an online medium), customers need to first provide their product attribute preferences, which requires a certain degree of sacrifice of time and effort, in addition to the sacrifice involved in waiting for the response from the live help, followed by the sacrifice needed to evaluate the products. During this service process, the live help technology relies on customers to explain exactly what they want. Conversely, the customer is dependent on the live help to execute his or her requests to create a successful exchange.

If an unnecessary sacrifice is made by customers during the service process, customer loyalty will be negatively affected. If vendors can help customers reduce their sacrifice perceptions, we believe that customers are more likely to be loyal. On one hand, shortcomings in service quality (such as lack of care) may be offset by a perceived reduction in sacrifices (e.g., time, effort, and price). On the other hand, some customers might not desire the highest service quality if it requires them to sacrifice more time and effort to achieve it (Olshavsky, 1985). This is consistent with the cost-benefit paradigm that customers trade off between the service quality they received and the sacrifice they expended to form their perceptions of customer loyalty. If significant sacrifice is required to achieve service quality, customer loyalty will be abridged. Consequently, we posit:

**H1:** *Perceived sacrifice has a negative effect on online customer loyalty.*

In order to build and sustain a competitive edge, service organizations need to maintain a superior quality of service in an effort to gain customer loyalty, hence improving customer retention rates (Kandampully, 1998). Based on the Social Exchange Theory, providing high quality service should increase the customers' willingness to return and to conduct more business with the vendor, as quality service is desired by customers. For example, compared to a website with limited service, a website that shows concern and care for a customer's specific requirements and responds to his/her needs promptly is more likely to enhance the customer's loyalty. In contrast, a website that disregards a customer's reasonable request and presents a distant and aloof image will be more likely to drive the customer away. Research in the offline context has showed that service quality leads to customer loyalty and attraction of new customers (Berry, Bennett, & Brown, 1989; Boulding, Kalra, Staelin, & Zeithaml, 1993; Wong & Sohal, 2003; Zeithaml et al., 1996). In an online context, Gefen (2002) found that service quality leads to customer loyalty. In contrast, customers who experience low service quality tend to have unfavorable behavioral intentions (Olorunniwo, Hsu, & Udo, 2006). Thus, we posit:

**H2:** *Perceived service quality has a positive effect on online customer loyalty.*

As mentioned earlier, service outcome is what a customer receives during the exchange (Mohr & Bitner, 1995). In the requirement and specification stage of the CSLC, the final service outcome is the product choice made by the customer. Thus, the perception of the service outcome is the customer's overall evaluation of his or her product choice. This notion of considering product choice as a service outcome is consistent with the service and marketing literatures (Bean, Clow, & O'Bryan, 1996; Clow and Beisel, 1995). Applying the Social Exchange Theory, if customers perceive the service outcome to be unfavorable, they might withdraw from the service exchange. In contrast, if customers have a good impression of the service outcome, they are expected to broadcast the benefits they have gained to others and be more loyal to the service provider. Thus, we posit:

**H3:** *Perceived service outcome has a positive effect on online customer loyalty.*

### 3.2. Effects of Service Process on Service Outcome

The preceding hypotheses investigate the effects of service quality, sacrifice, and service outcome on customer loyalty; we now present our rationale for why the two service process variables (service quality and sacrifice) should influence service outcome. Service outcome has been considered to be closely associated with emotion (Dabholkar & Walls, 1999; Johnson et al., 1998), while evaluations of service process are mostly based on cognition (Oliver, 1997; Parasuraman et al., 1988). Under normal conditions (vs. extreme conditions), customers will evaluate the service rationally and cognitively and then provide an overall, global, affective evaluation based on these cognitions (Dabholkar & Overby, 2005). Dabholkar and Overby investigated real estate agent service and found that service process influences service outcome.

In the current study context, what customers receive as a service is product advice. As this kind of service is intangible, customers will rely on the evaluation of the service process to form their perception of service outcome (Grönroos, 1998). That is, when customers perceive that the merchants sincerely show assurance and empathy and/or competency in helping customers to reduce their effort and time throughout the service process, customers will be more likely to perceive the service outcome favorably. Thus, we posit:

**H4:** *Perceived sacrifice has a negative effect on perceived service outcome.*

**H5:** *Perceived service quality has a positive effect on perceived service outcome.*

### 3.3. Moderating Effect of Customer Knowledge

In addition to hypothesizing the direct effects of sacrifice, service quality, and service outcome on loyalty, we also investigate how their effects will be moderated by the customer's product knowledge. Prior research has indicated that moderating factors can enhance the explanatory power of a model (e.g., Dabholkar & Bagozzi, 2002). For example, Venkatesh et al. (2003) tested eight models and found that the predictive validity of six of the eight models significantly increased after the inclusion of moderating variables. All online vendors deal with a degree of customer heterogeneity, and one of the key differences among customers is the degree of knowledge a given customer has about the product being sold. It has been shown that product knowledge affects the learning and organization of product information (Cowley & Mitchell, 2003), and in particular, loyalty (Bennett, Härtel, & McColl-Kennedy, 2005; Chiou, Droge, & Hanvanich, 2002). It should be stressed, however, that there has been no prior explicit investigation of how customer product knowledge moderates the effects of sacrifice, service quality, and service outcome on online customer loyalty.

We draw upon Alba and Hutchinson's (1987) work on consumer expertise, which has been widely cited (more than 1,600 citations) to analyze the influence of product knowledge on product evaluation (Rao & Monroe, 1988), brand evaluation (Muthukrishnan & Weitz, 1991), attitude formation (Chang, 2004), and information search behavior (Gursoy & McCleary, 2004). According to Alba and Hutchinson (1987), customers with differing levels of product knowledge may weigh the evaluative criteria differently in evaluating and using information. Even when they base their decisions on the



same set of product-related attributes, customers with less product knowledge are more likely to weigh highly those attributes that are easily understood or peripheral, such as a store's physical environment or a product's package. In contrast, customers with high product knowledge will place more weight on functional product information, such as the inherent product quality.

Applying Alba and Hutchinson's (1987) work on the formation of customer loyalty, we expect that service quality, as a peripheral cue, will be weighted more heavily by customers with low product knowledge, as they cannot fully rely on their own product knowledge to perform the online shopping task successfully, and might instead rely on relational and tangible cues characteristic of service quality to form their product evaluation (Sharma & Patterson, 2000). In contrast, as customers with high product knowledge are able to rely on their product knowledge to select a desirable product, they will attach less importance to service quality in forming their loyalty toward online merchants. Thus, we predict that:

**H6:** *Customer product knowledge has a negative moderating effect on the association between service quality and online customer loyalty.*

For customers with low product knowledge, the relative importance of the perception of sacrifice will decline, as customers may take more time to interpret product information. In addition, due to the lack of product knowledge, customers may have difficulty assessing the service outcome and, thus, may be less certain in evaluating that outcome. Thus, the link from service outcome to loyalty would not be as strong as for those with high product knowledge.

For online shopping, selecting the right product with a minimal sacrifice of time and effort is the goal of most customers (Zeithaml et al., 2002). Thus, service outcome and sacrifice, as functional cues, will be weighted more heavily by customers with high product knowledge. As these customers can process product information more effectively, they are expected to be better able to evaluate the service outcome and be more efficient at processing information (Eisingerich & Bell, 2008) to achieve their online shopping goal. Compared with customers who have less product knowledge, they will be less tolerant of a less desirable service outcome (i.e., product choice) and high sacrifice. Thus, for customers with high product knowledge, service outcome and sacrifice will carry more weight in influencing loyalty toward the online service provider, while there will be a corresponding decrease in the importance of service quality. Hence, we hypothesize:

**H7:** *Customer product knowledge has a positive moderating effect on the association between sacrifice and online customer loyalty.*

**H8:** *Customer product knowledge has a positive moderating effect on the association between service outcome and online customer loyalty.*

### 3.4. Effect of Live Help Technology on Service Process

Hypotheses H4 and H5 posit the anticipated effects of sacrifice and service quality on service outcome. We now focus on how live help technology can be used to improve perceived sacrifice and service quality. We draw on Rafaeli's (1988) Interactivity Theory to develop the hypotheses about the effect of live help technology. Interactivity is defined as the degree to which participants in a communication process have control over, and can exchange roles in, their mutual discourse (Williams, Rice, & Rogers, 1988). Person interactivity is defined as interactivity between people that occurs through a medium or is unmediated, as in the case of face-to-face communication (Hoffman & Novak, 1996). Rafaeli's (1988) interactivity theory provides a conceptual basis for identifying key features of interactivity perceptions, and posits that message quality (i.e., the content of the response message) positively influences customers' perceptions of interactivity and site effectiveness. Interactivity has been considered instrumental for differentiating between successful and failing websites (Newhagen & Rafaeli, 1996), and beneficial for online firms to build a good relationship with their customers (Ghose & Dou, 1998).

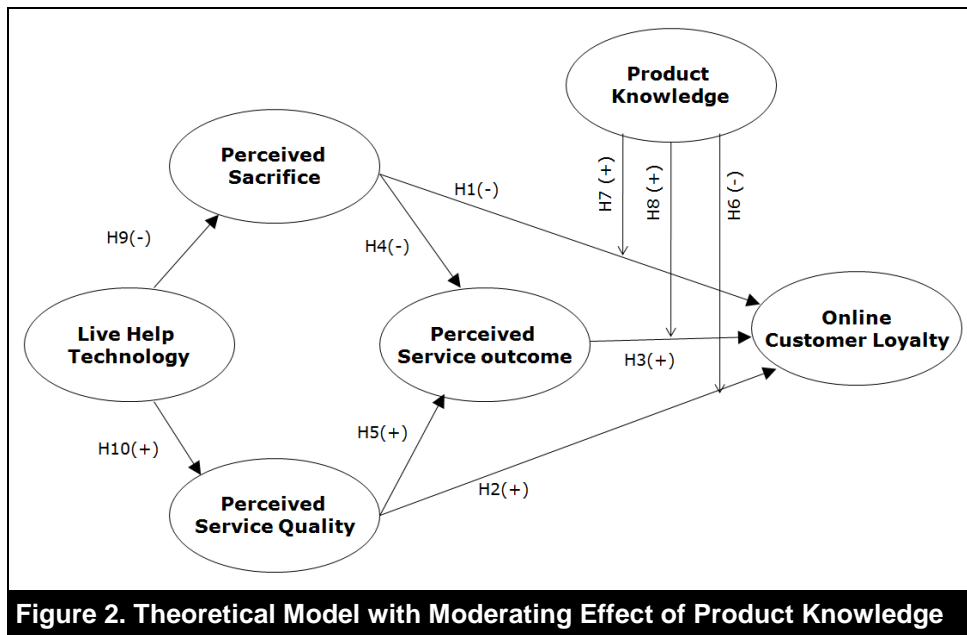
Live help technology is distinguished from other online consumer support functions in that customers interact directly with human customer service representatives using an online medium (Aberg &

Shahmehri, 2003). Integrating human assistance into web pages makes a site more fun to use, increases customers' trust in the site, and improves the site's atmosphere (Aberg & Shahmehri, 2003). Based on Rafaeli's and others' work on interactivity, we expect that the interactivity enabled by the live help technology will lead to a lower level of perceived sacrifice, because with the use of live help technology, whenever customers have questions as they browse through the website, they can always count on the availability of live help. The synchronous and suitable response from the service representatives provides users with prompt acknowledgement of their concerns, can instill positive user attitudes toward a system, and can enhance user competence and self efficacy in gathering information (Jiang & Benbasat, 2007; Kettanurak Ramamurthy, & Haseman, 2001). Thus, we hypothesize that:

**H9:** *The presence of live help technology will reduce perceived sacrifice.*

As defined earlier, service quality comprises consumer evaluations and judgments made regarding the excellence of service provision. The most widely applied service quality framework is SERVQUAL (Parasuraman et al., 1985, 1988), which articulates customers' salient perceptions about a vendor's service reliability, assurance, empathy, and responsiveness, as well as the tangible aspects of the vendor's infrastructure and/or appearance. As compared to a non-human service function (e.g., FAQ), human service representatives are in a much better position to interact with customers and handle the high variance in customers' concerns (Sampson & Froehle, 2006). That is, a human representative can better recognize and accommodate each customer's requirements and express personal attention and care. Consequently, we posit the following:

**H10:** *The presence of live help technology will positively influence perceived service quality.*



**Figure 2. Theoretical Model with Moderating Effect of Product Knowledge**

In summary, H1 through H3 depict how service process and service outcome influence online customer loyalty (main effects), with H1 and H2 denoting service process (based on sacrifice and service quality) and H3 representing service outcome. H4 and H5 depict the relationships between service process and service outcome. H6 through H8 represent the moderating effects of customer product knowledge on H1, H2, and H3. H9 and H10 delineate the effects of live help technology on sacrifice and service quality. Figure 2 summarizes these hypotheses. We describe the empirical testing of these hypotheses in the next section.

## 4. Research Method

### 4.1. Study Setting

Each subject was asked to shop for a laptop computer for a friend through a website. We provided each subject with the friend's product requirements. Prior to the study, the subjects were informed that they would each receive \$10 as a reward for their participation. In addition, as in many other experimental studies (e.g., Mao & Benbasat, 2000), we offered the top 20 performers an extra amount (\$25) to motivate participants to increase their involvement in the shopping task. We told the participants before the experiment that they would be asked to provide their justifications for their choices and that we would judge their performance based on these justifications.

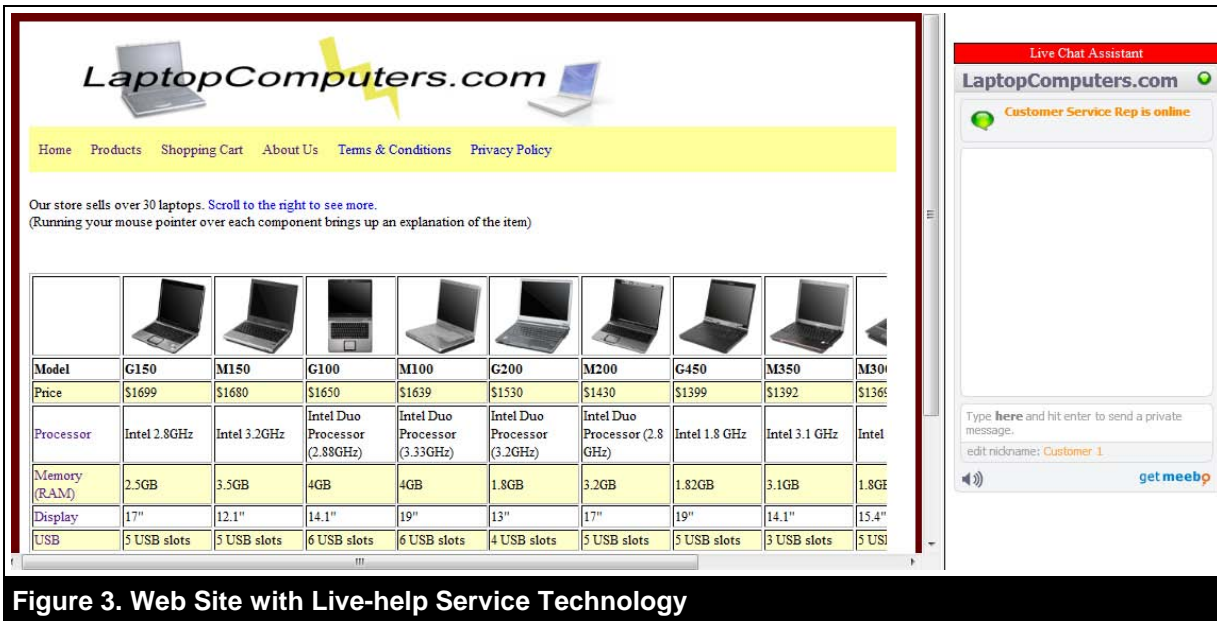


Figure 3. Web Site with Live-help Service Technology

We utilized websites that would represent the range of variance that is possible when designing sites with different levels of service process and service outcome. Therefore, we tested the research model in an experiment involving websites that used different online service technology<sup>2</sup>: (1) a simple comparison matrix that provides an overview of product alternatives and attributes, (2) a software recommendation service technology in addition to comparison matrix (3) a text-based live help technology in addition to the matrix, and (4) a hybrid of these two latter technologies that combines the live help technology with the software recommendation technology, in addition to the matrix. It should be noted that live help technology is not available in the first two conditions, while it is in the latter two conditions. The different service conditions provide an appropriate environment with service variants that range from a low level of service (i.e., without live help) to a high level of service (i.e., with live help). Such a setting should be able to create an adequate amount of variance in the measured variables in order to test the research model adequately and evaluate the relative importance of service quality, sacrifice and service outcome. The subjects were each assigned randomly to one of the four conditions: comparison matrix, software recommendation technology, live help technology, and hybrid technology, with 32 individuals assigned to each treatment condition. Except for the treatment differences, all other information on the website was constant across conditions. Figure 3 is the screen capture for the experimental website with the live help technology.

<sup>2</sup> The comparison matrix condition provides a convenient summary of the product information, with rows displaying product attributes and columns displaying product models. In the software recommendation service treatment, based on the task description, subjects utilized the service by indicating their preferences regarding the product attributes and the weights assigned to the attributes. The software then ranked the products based on the customer's indicated preferences and presented the top five product recommendations accordingly. In the live help technology treatment, the subjects indicated their product preferences to the live help. The live help assistant, unbeknownst to the customer, had access to the same software as in the software recommendation service treatment. The live help assistant then input the customer's product preferences to the software and presented the top five recommendations generated by the software to the customer.

## 4.2. Measurements

We adopted the measures for service quality, sacrifice, and service outcome from scales validated in prior studies (see Table 1). We measured service quality with a three-item scale adopted from leading service marketing studies (e.g., Dabholkar, Shepherd, & Thorpe, 2000; Spreng & Mackoy, 1996; Wang, Lo, & Yang, 2004), because direct measures of overall service quality serve as better predictors of behavioral intentions than an index of service quality computed from measured dimensions of SERVQUAL (Dabholkar et al., 2000). We adapted measures for sacrifice from scales used in both online and offline contexts (e.g., Brady et al. 2005; Cronin, Brady, & Hult, 2000; Kim et al., 2007), and we prefaced this measure with the B2C website as the target object of the scale. Our measure of service outcome has been used both in IS and marketing research (e.g., Jiang & Benbasat, 2007; Kempf & Smith, 1998). We assessed online customer loyalty as a composite of three behavioral intentions (Selnes & Hansen, 2001; Zeithaml et al., 1996): motivation to continue the relationship, to talk favorably about the supplier, and to expand the relationship. We coded live help technology as a dichotomous variable based on the experimental treatments (without vs. with live help). We developed the two items for product knowledge specifically for this study.

**Table 1. Measurement Items for the Constructs**

Construct	Items	Sources
Service quality	Overall, the level of service quality I received from the website during the laptop selection task is good.	Dabholkar et al. 2000; Spreng and Mackoy. 1996; Wang et al. 2004
	Overall, the level of service quality I received from the website during the laptop selection task is excellent.	
	Overall, the level of service quality I received from the website during the laptop selection task is high.	
Sacrifice	The website let me finish my laptop selection task quickly.	Brady et al. 2005; Cronin et al. 2000; Kim et al. 2007
	Without spending too much time, I was able to select a laptop through the website.	
	I was able to get the benefits of the website with minimal effort.	
Service outcome	I like the laptop that I have just chosen in the website.	Jiang and Benbasat 2007; Kempf and Smith 1998
	I have formed a favorable impression toward the laptop that I have just chosen in the website.	
	The laptop that I have just chosen in the website is good.	
Online customer loyalty	I will continue to use the website for future purchases.	Selnes and Hansen 2001; Zeithaml et al. 1996
	If a friend asked for my advice, I would recommend the website.	
	If I should be in need of a new laptop computer, I would choose to use the website.	
Customer product knowledge	Compared to an expert, to what degree would you say that you have a good knowledge of attributes (e.g., memory, CPU) of laptop computer?	Developed for this study
	I am familiar with basic computer attributes (e.g., memory, CPU).	

## 4.3. Data Analysis

We recruited the 128 subjects<sup>3</sup> in the study at a public university; they were from 14 faculties/schools and more than 50 majors, representing very diverse backgrounds. According to a power analysis for the between-subject design, 32 subjects for four groups (hence 128 subjects) can assure enough statistical power of 0.80 for a medium effect size ( $f = .25$ ) (Cohen, 1988).

Among the 128 subjects, 88 were females and 40 males. Five were nonstudents, 25 were graduate students, and the rest undergraduates. The average age was 23.4. On average, the subjects had been using the Internet for 9.2 years, spending 28.8 hours on the Internet each week. In general, they

<sup>3</sup> Originally, the hybrid service group had 50 subjects, and each of the other three service groups had 32 subjects. Though subjects in the live help group all interacted with the live help, 18 subjects in the hybrid service group did not utilize the live help technology. As the exclusion of the 18 subjects did not influence the significance of our results, we excluded them in the subsequent data analysis to maintain an equal sample size of 32 across the four experimental groups.

were familiar with online shopping (5.20/7). The average reported knowledge level of the product used in the task—laptop computers—was 4.42/7.

Table 2 shows the construct means of service quality, sacrifice, service outcome, and customer loyalty by two levels of product knowledge (low/high) and two levels of live help technology (with/without). As product knowledge is a continuous variable, we use a median-split to label the subjects above the median as customers with high product knowledge, and those below the median as customers with low product knowledge.

**Table 2. Means for the With/Without Live Help Technology Across Low/High Customer Product Knowledge**

Dependent Variables/Treatment	Low product knowledge			High product knowledge		
	Without live help (n=30)	With live help (n=32)	Combined (n=62)	Without live help (n=34)	With live help (n=32)	Combined (n=66)
Service quality	0.92 <sup>a</sup>	2.63 <sup>b</sup>	1.80	1.04 <sup>a</sup>	2.66 <sup>b</sup>	1.82
Sacrifice	1.14 <sup>a</sup>	1.63	1.39	1.27	1.95 <sup>b</sup>	1.60
Service outcome	0.57 <sup>a</sup>	1.28 <sup>b</sup>	0.94	1.05	1.28 <sup>b</sup>	1.16
Customer loyalty	0.96 <sup>a</sup>	2.27 <sup>b</sup>	1.63	1.29 <sup>a</sup>	2.07 <sup>b</sup>	1.67

Note: Different superscripts in the same row indicate that difference between means is significant ( $p < 0.05$ ). The high number in the sacrifice row represents low actual sacrifice, due to the negative wording of the items.

#### 4.4. Test of the Research Model

We analyzed our proposed research model using partial least squares (PLS) structural equation modeling, a component-based approach (Lohmöller, 1989). PLS allows the simultaneous testing of the measurement model (the psychometric properties of the scales used to measure a variable) and the estimation of the structural model (the strength and direction of the relationships between the variables). We used the software SMART PLS 2.0 (Ringle, Wende, & Will, 2005) to conduct our analyses. It is based on the same method as PLS-Graph (Chin, 2001) and offers similar features with an improved graphical interface.

##### 4.4.1. Measurement model

Assessments of measurement models should examine: (1) individual measurement item reliability, (2) internal consistency, and (3) discriminant validity (Barclay, Higgins, & Thompson, 1995). To support individual item reliability, we examined the loadings of the individual measurement items on their intended constructs and compared these to recommended tolerances of 0.60 or, ideally, 0.70 (Barclay et al., 1995; Chin, 1998). All of the measurement items met this latter threshold (Table 3). To support internal consistency of the constructs, we calculated composite reliability and Cronbach's alpha for each construct. All met suggested tolerances ( $> 0.70$ , Fornell & Larcker, 1981) with results reported in Table 4.

The diagonal elements in Table 4 represent the square roots of average variance extracted (AVE) of latent variables, while the off-diagonal elements are the correlations between latent variables. For adequate discriminant validity, the square root of the AVE of any latent variable should be greater than the correlation between this particular latent variable and other latent variables (Barclay et al., 1995). All construct pairs met this requirement. Moreover, as shown in Table 3, the loadings of a given construct's indicators are higher than the loadings of any other, and these same indicators load more highly on their intended construct than on any other construct. This lends further support to discriminant validity.

Since all of our items were measured with the same method, we tested for common method variance using Harman's one-factor test (Podsakoff & Organ, 1986). Using a principal component analysis for all of the variables measured in the study, we found multiple factors with eigenvalues greater than one, and no single factor explained the majority of variance. Therefore, common method bias was not significant.

**Table 3. Loading and Cross Loading of Measures**

	Service quality	Sacrifice	Service outcome	Customer loyalty	Product knowledge
Service quality1	<b>0.952</b>	-0.535	0.435	0.568	-0.007
Service quality2	<b>0.956</b>	-0.512	0.395	0.567	-0.04
Service quality3	<b>0.973</b>	-0.582	0.381	0.604	-0.02
Sacrifice1	-0.490	<b>0.938</b>	-0.439	-0.623	-0.03
Sacrifice2	-0.453	<b>0.951</b>	-0.389	-0.573	-0.08
Sacrifice3	-0.598	<b>0.822</b>	-0.297	-0.564	0.08
Service outcome1	0.364	-0.404	<b>0.919</b>	0.496	0.061
Service outcome2	0.458	-0.386	<b>0.898</b>	0.425	0.064
Service outcome3	0.343	-0.357	<b>0.938</b>	0.464	-0.022
Customer loyalty1	0.478	-0.623	0.446	<b>0.932</b>	-0.037
Customer loyalty2	0.653	-0.635	0.471	<b>0.960</b>	-0.103
Customer loyalty3	0.583	-0.596	0.521	<b>0.959</b>	-0.075
Product knowledge1	0.028	-0.006	0.038	-0.057	<b>0.858</b>
Product knowledge2	-0.063	-0.015	0.029	-0.077	<b>0.925</b>

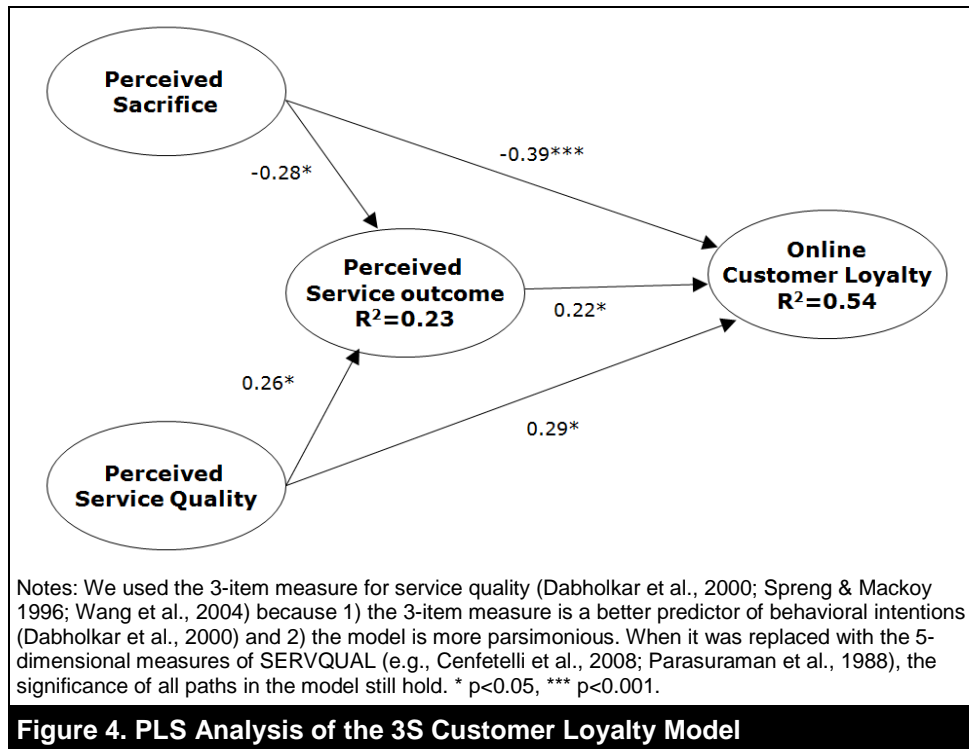
**Table 4. Internal Consistency and Discriminant Validity of Constructs**

	Composite reliability	Cronbach's alpha	SQ	S	SO	OCL	CPK
Service quality (SQ)	0.97	0.96	<b>0.96</b>				
Sacrifice (S)	0.93	0.88	-0.56	<b>0.91</b>			
Service outcome (SO)	0.94	0.91	0.42	-0.42	<b>0.92</b>		
Online customer loyalty (OCL)	0.96	0.95	0.60	-0.65	0.50	<b>0.95</b>	
Customer product knowledge (CPK)	0.88	0.75	-0.02	-0.01	0.04	-0.08	<b>0.89</b>

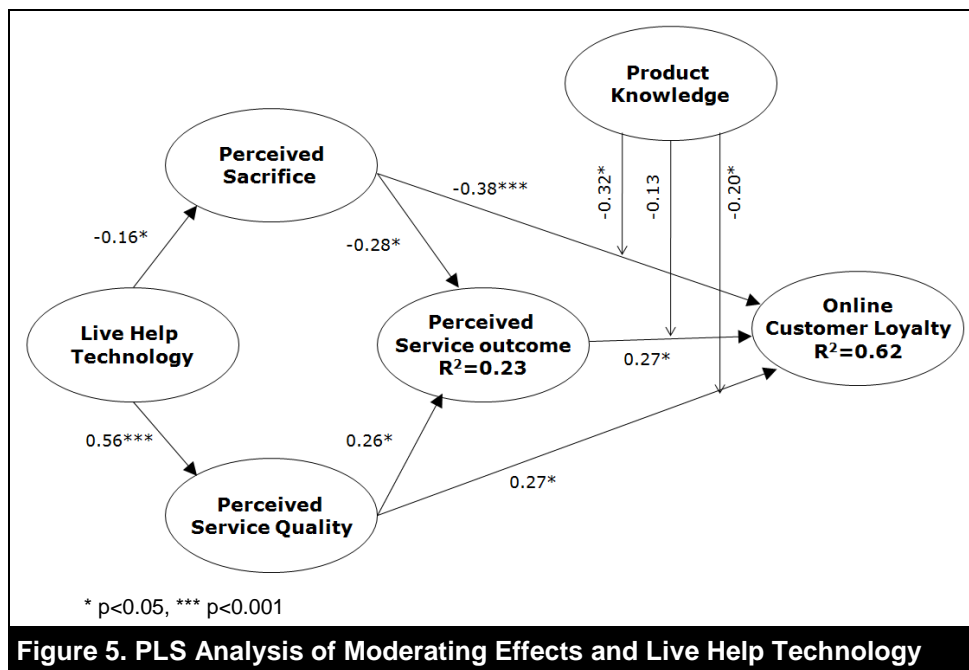
**4.4.2. Analysis of Structural model**

We next analyzed the structural model to examine the significance and strength of the relationships of each of our hypothesized effects. This analysis was done using two PLS models. The first model examined the main effects specified in H1 through H5, while the second model added the moderating effects (H6-H8) and live help effects (H9-H10). Results of the analysis for each phase, including standardized path coefficients, path significances, and variance explained ( $R^2$ ) for each dependent variable, are presented in Figure 4 and Figure 5, respectively.

The main effects model (Figure 4) examined the influence of sacrifice (H1), service quality (H2), and service outcome (H3) on online customer loyalty. All three paths in this model were statistically significant. Sacrifice had a strong and significant negative effect on customer loyalty ( $\beta = -0.39$ ;  $p < 0.001$ ), providing support for H1. Consistent with H2, service quality had a significant effect ( $\beta = 0.29$ ;  $p < 0.05$ ) on customer loyalty. Additionally, customer loyalty was influenced significantly by service outcome ( $\beta = 0.22$ ,  $p < 0.05$ ). Service quality, sacrifice, and service outcome jointly explained 54 percent of the variance in online customer loyalty, with sacrifice contributing to a larger proportion of that explanation. Regarding the relationships between service process and service outcome, both sacrifice ( $\beta = -0.28$ ,  $p < 0.05$ ) and service quality ( $\beta = 0.26$ ,  $p < 0.05$ ) had a significant influence on service outcome, supporting H4 and H5, respectively. These two service process variables explained 23 percent of the variance in service outcomes.



The moderating effects model (Figure 5) tested the extent to which customer product knowledge moderated the main effects hypothesized in H1 through H3. The interaction terms were modeled in PLS as products of each item belonging to the underlying scales, as recommended by Chin, Marcolin, and Newsted (2003), and added to the main effects model in Figure 4. We also included the main effect of product knowledge on customer loyalty in this model in order to statistically separate the hypothesized moderating effects from all statistically possible main effects (the main effect is not reported here because of its lack of theoretical significance).



As shown in Figure 5, including the moderating effect increased variance explained ( $R^2$ ) in online customer loyalty from 54 percent in the main effects model to 62 percent in the moderating effects model. Mathieson, Peacock, and Chin (2001) described a “pseudo F-test” technique to measure whether the substantive change in the explained variance ( $R^2$ ) of the target variable is statistically significant after the influences of the external variables are taken into account. The effect size ( $f^2$ ) can be estimated as  $(R^2 \text{ full} - R^2 \text{ excluded}) / (1 - R^2 \text{ full})$ , where  $R^2 \text{ full}$  is the explained variance including the influences of the external variables, and  $R^2 \text{ excluded}$  is the explained variance in usage without these external influences. Multiplying  $f^2$  by  $(n - k - 1)$ , where  $n$  is the sample size, and  $k$  is the number of independent constructs, provides a pseudo F test for determining whether the  $f^2$  statistic is significant with 1 and  $n - k$  degrees of freedom. Using this approach, F-tests (Mathieson et al., 2001) comparing the  $R^2$  for the online customer loyalty between the main and moderating effects models found the increase in explanatory power to be statistically significant at  $p < 0.001$ . This confirmed our expectation that the hypothesized moderating effects indeed provide a better explanation of customer loyalty over and above their corresponding main effects.

Examining individual paths in the moderating effects model, we found that customer product knowledge had a significant negative moderating effect on the association between service quality and customer loyalty ( $\beta = -0.20$ ;  $p < 0.05$ ) in accordance with H6. Further, product knowledge positively moderated<sup>4</sup> the effects of sacrifice on customer loyalty ( $\beta = -0.32$ ;  $p < 0.05$ ) in accordance with H7. Contrary to expectations, H8 was not significant, indicating that product knowledge did not moderate the association between service outcome and online customer loyalty. We explore possible reasons for these unexpected effects below (Section 4.5).

Finally, live help technology had a significant effect ( $\beta = -0.16$ ;  $p < 0.05$ ) on sacrifice, thereby supporting H9. Live help also had a significant effect on service quality ( $\beta = 0.56$ ;  $p < 0.001$ ), demonstrating support for H10.

#### 4.5. Discussion

Overall, we found support for nine of the ten hypothesized relationships in our proposed model. Our results support the idea that service quality and sacrifice (elements of service process) impact perceived service outcome, and these three service dimensions are influential in forming customer loyalty toward websites supported by service technologies. Our findings also suggest that the effectiveness of the service dimensions on online customer loyalty may be moderated by customers' product knowledge.

The finding of positive and significant relationships among the three service dimensions and online customer loyalty is consistent with the Social Exchange Theory. If online vendors provide better service quality and service outcomes to customers, customers are more likely to reciprocate and be more loyal to the online vendors. The effect of sacrifice on customer loyalty was also significant, which lends support to the foundational core of the UST: “with service processes, the customer provides significant inputs into the production process.” Thus, sacrifice is an important service dimension that cannot be overlooked. The path coefficient of sacrifice on loyalty is the highest among the three service dimensions, underscoring the importance of including the construct of sacrifice in evaluating customer relationships with online service providers. This also suggests that the sacrifice component of the service process (e.g., time and effort spent) is perhaps easier to interpret and, therefore, more relevant than the service outcome (e.g., how good the laptop is) and service quality in shaping customer loyalty toward the service vendors. Service quality and sacrifice still significantly influence customer loyalty when they are linked to service outcome. Statistically, it means that service outcome does not fully mediate either service quality or sacrifice on service outcome, which further supports the importance of including customers' evaluations of *both* service process and service outcome when predicting customer loyalty.

The significant effect of service quality and sacrifice on service outcome indicates that service process and service outcome are interrelated. Dabholkar and Overby (2005) found the positive effect

<sup>4</sup> The relationship between perceived sacrifice and customer loyalty is negative. Thus, the negative sign on the moderation effect means that product knowledge positively moderates this relationship.



of service process on service outcome in the offline real estate agent service setting, but their view of service process was limited to service quality only. We add a sacrifice perspective to the service process and find that sacrifice has an effect on service outcome comparable to that of service quality. This result substantiates the necessity of customers having to provide their own input into the service process in the online service context.

Turning to the moderating effects of customer product knowledge, the addition of this construct explained 8 percent more of the variance in online customer loyalty. The findings suggest that the loyalty of customers with high product knowledge is influenced more heavily by low sacrifice than by high service quality. Consistent with the extant literature, customers with high product knowledge tend to be more efficient in their selection and assessment of information (e.g., Eisingerich & Bell, 2008) and, hence, require less service. Thus, it is reasonable that they will weigh lower sacrifice more than high service quality. Conversely, those who possess limited product knowledge rely more on the service quality in determining their intent to stay with the online service provider, and they have to take more time to process and assimilate the product information. Thus, they weigh high service quality over lower sacrifice.

The insignificant effect of customer product knowledge regarding service outcome was surprising, as customers with high product knowledge are expected to be able to assess the outcomes associated with the service more confidently, and thus, place more weight on outcomes in determining their loyalty. One possible explanation might be that the service technologies (e.g., live help) have effectively reduced the product consideration set and freed up customers' cognitive processing capacity so that they can evaluate the product alternatives more fully. Thus, the difference between customers with high and low product knowledge in their ability to evaluate service outcome is reduced, which then diminishes the moderation effect. This explanation is evident by observing Table 2, which demonstrates that, regardless of a customer's product knowledge, customers' service outcomes are almost exactly the same when live help technology is provided. However, when live help technology is absent, customers with high product knowledge perceive a better service outcome than those with low product knowledge.

Our results support the notion that websites with live help technology are more effective in reducing perceived sacrifice and improving perceived service quality, as compared to sites that lack such service. We found that live help technology had the stronger positive effect on service quality than sacrifice, which is evident in the path coefficients (0.56 vs. -0.16). In addition, Table 2 also indicates that, regardless of customers' product knowledge, a website with live help technology is perceived to have significantly higher service quality than a website without live help technology, all other things being equal. This is consistent with the prediction that a customer's overall perceptions of website service functionality will increase that customer's perceptions of website service quality (Cenfetelli et al., 2008). Live help technology is one type of service functionality that provides advice to help customers reach their shopping goals, which leads to better perception of service quality, and subsequently to online customer loyalty.

## 5. Contributions, Limitations, and Future Research

### 5.1. Theoretical Contributions

In this paper, we propose the 3S Customer Loyalty Model by taking into account the sacrifice and service outcome together with service quality to predict online customer loyalty, and delineating how service process (i.e. sacrifice and service quality) influences service outcome. Previous IS research has established the effect of service quality on online customer loyalty. We extended this stream of research by including sacrifice and service outcome to predict online customer loyalty. The inclusion of sacrifice is based on the cost-benefit paradigm and UST, the latter of which recognizes the role of customer input in the service process as opposed to the non-service process. For example, in manufacturing, customers' roles are limited to the selection and consumption of the outputs, they do not need to be physically present or provide input when products are manufactured. Thus, their sacrifice of time and effort are minimal. In contrast, when obtaining online services, such as an advice service, as in the case of our study, customers need to be online simultaneously and provide their

personal product preferences when the service is being provided. This is why the sacrifice construct studied in this research goes beyond the scope of the ease-of-use construct often used in IS adoption studies. Our results supported the importance of sacrifice and the examination of the cost side in addition to the benefit side.

Online customers are mainly concerned about purchasing products in an efficient and timely manner to achieve their goals with a minimum of sacrifice and irritation (Monsuwe, Dellaert, & Ruyter, 2004; Wolfinbarger & Gilly, 2001). To fully understand what factors drive online customer loyalty, it is important that future research should not only investigate the benefit side (e.g., service quality) that is brought to the customers, but also their potential sacrifices of time, effort, price, violation of privacy, and psychosocial risk. Most of the existing theories (e.g., IS success model, SERVQUAL) capture factors that measure benefits with the assumption that the customer's response implicitly takes into consideration the costs associated with such behavior. The joint consideration of benefit and cost offers a better understanding of customers' online behavior.

We demonstrate that the service process and outcome are both effective means of improving online customer loyalty. The study indicates how important the service process and service outcome are: over half of the variance of customer loyalty is explained primarily through customer perceptions of service quality, sacrifice, and service outcome. To our knowledge, this is the first paper that investigates how online customer loyalty can be created by simultaneously considering service outcome and service process, represented by both service quality and sacrifice. The sole evaluation of outcome is likely to be adequate when the evaluation target is physical goods or services that are more tangible. In the context of a more intangible online advice service, the consideration of the service process is particularly important. In addition, we consider the service outcome, a dimension that is more relevant online than offline. Purchasing online for most customers is a goal-directed behavior (Zeithaml et al., 2002) and goal-directed customers are more concerned about the service outcome. In short, our research underpins the importance of including both process and outcome elements to predict online customer loyalty in the online service context.

We apply the Social Exchange Theory and examine how service quality, sacrifice, and service outcome can influence customer loyalty on websites, particularly those supported with service technologies. We contribute to the Social Exchange Theory by empirically testing it in the online service context. Although prior studies have examined the effect of service quality in the online environment without a human service agent, we advance the literature by incorporating the role of a human service agent on a website through the implementation of live help technology. Through the live help technology (e.g., as in Dell.com), customers can interact directly with human customer service representatives using an online medium (Aberg & Shahmehri, 2003). This is becoming a more common means of online service provision. Our findings suggest that live help technology can effectively improve online customer loyalty.

Further, the current research expands our understanding of factors influencing perception of service outcomes. Prior research has established relationships between service process and service outcome, but their view of service process has been limited to service quality. We propose the sacrifice construct to capture the cost aspect in the service process in addition to the benefit aspect, namely, service quality. The findings suggest that even though service quality is adequately provided, service outcome will be negatively affected if significant sacrifice occurs during the service process. The model presents an exposition of how service quality and sacrifice symmetrically (inferred from the path coefficients) contribute to the perception of service outcome, thus, providing researchers and practitioners with a better understanding of the formation of perceived service outcome.

We also contribute to the literature by examining the moderating role of customer product knowledge in influencing the association among the three key service dimensions and online customer loyalty. Although prior IS studies have suggested that service quality drives customer loyalty among online customers, exactly under what circumstances the desired results can be effectively achieved is still largely unknown. This study constitutes an important theoretical contribution to explain the phenomenon of why service quality and sacrifice are more important for certain customers and less important for others. Thus, researchers should not only continue to examine what factors will

influence online customer loyalty but also evaluate how differences among individuals with different backgrounds or characteristics impact the effect of these factors on online customer loyalty.

Finally, we apply the interactivity theory to the context of live help technology and find that the interactivity enabled by live help technology has a significant effect on sacrifice and service quality. We also demonstrate the relative impact of live help technology on sacrifice and service quality, with service quality being much more strongly influenced by the live help technology.

## 5.2. Practical Contributions

The results of this study have important implications for firms, especially within the context of managing online services facilitated by service technologies. Firms often invest tens of thousands of dollars in websites with the goal of generating customer loyalty. Firms can benefit from knowing what service dimensions can be shaped to create online customer loyalty and under what circumstances these attributes are likely to succeed or fail. This research presents three alternative ways, namely, improving service quality, reducing sacrifice, and enhancing service outcome, which firms can employ to create online loyalty in customers. More loyal customers tend to be more profitable and allow the vendor to outperform competitors with smaller operating expenses. To improve service quality, we recommend practitioners consider employing live help technology, given its significant improvement of service quality across customers with either low or high product knowledge.

Additionally, firms should understand that a “one size fits all” approach to fostering online customer loyalty may not lead to the desired effects, given the wide variation in customer product knowledge. Instead, they need to be aware of the various perceptions of customers with different product knowledge. In addition to their focus on selling superior service products, firms need to be increasingly oriented toward the customers of those products and the fulfillment of customer needs. Specifically, customers who have low product knowledge are influenced more by perceived service quality, while those with high product knowledge are influenced more by perceived sacrifice. Targeting a customer group with the wrong type of service dimensions may be counterproductive.

Practitioners can also benefit from our investigation of live help technology in three ways. First, our findings suggest positive impacts of providing live help technology on reducing perceived sacrifice and enhancing perceived service quality. Online service firms are advised to consider incorporating live help technology into their websites. Second, given a significant amount of cost to implement the live help technology, our results demonstrate in what aspects live help technology will be most effective, because the impacts of live help technology on service quality and sacrifice are not similar. Although live help technology also has a significant influence on sacrifice, practitioners should be aware that this is not the greatest strength of live help technology. In other words, live help technology will be best employed in a context where service quality is a firm’s top priority, as we provide new evidence on the enormous potential effect of live help technology on service quality. Third, practitioners should be aware that providing live help technology will be more influential in enhancing loyalty for customers with low product knowledge, because live help technology can improve service quality, and service quality carries more weight for customers with low product knowledge to signal customer loyalty. Another reason is that live help technology can boost service outcome for customers with low product knowledge but not for those with high product knowledge.

## 5.3. Limitations and Future Research

The limitations and the possible future research suggestions are as follows. First, the parsimony of our proposed model suggests that some additional variables might help explain key variables and moderate the strength of relationships within the model. For example, product category and cultural element might also moderate the impact of the main service dimensions on loyalty. Second, we focus only on the requirement and specification service stage of the CSLC. However, we believe that this service stage is the most important one where customers need service most, and the result has implications for other services as well. Further research might be necessary to confirm whether results from other service stages of the customer life cycle will be comparable to those found in the current study. Third, we did not find that product knowledge moderates the relationship between service outcome and customer loyalty. One likely reason is due to the small sample size and lack of

statistical power. Future research is necessary to test this moderating effect with a larger sample size. In addition, our operationalization of sacrifice focuses on time and effort perception. The next step is to broaden the operationalization of sacrifice to include financial and psychological sacrifice in the online service context. Finally, we used text-based live help to implement live help technology, as it is considered more efficient and cheaper than voice-based live help (Gilbert & Berson, 2003). However, other kinds of live help technology deserve further research attention to determine whether the results from the current study still hold.

#### **5.4. Conclusions**

The present research proposes the 3S Customer Loyalty Model by considering sacrifice as an important parallel service dimension to service quality during the service process. We highlight the importance of the simultaneous consideration of service process and service outcome in evaluating online service. Based on the Social Exchange Theory, we posit that service process (i.e., service quality and sacrifice) and service outcome together influence online customer loyalty. We further articulate how sacrifice complements service quality in influencing service outcome. The empirical results supported these hypotheses in the online service context. The findings reveal the significant effect of customer product knowledge in moderating the effect of service quality and sacrifice on online customer loyalty. It also demonstrates that live help technology is an important contributor to greater service quality and less sacrifice. This study represents an important step toward developing our theoretical understanding of the determinants of online customer loyalty and under what circumstances they matter most. The results, thus, provide insights for online service merchants to devise effective interventions to achieve planned outcomes.

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