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Abstract

With the increasing prevalence of online shopping, many companies have begun to provide “live help” functions on their Web sites to facilitate interactions between online consumers and customer service representatives. However, little is understood as to the effect of live help service contributing to online consumers’ perceptions. We investigate the effect of live help service on system quality, information quality, and service quality. Based on the Herzberg’s hygiene-motivator theory, we empirically test the DeLone and McLean extended IS success model within the e-service context. Results suggest that 1) live help service has a positive effect on consumers’ perceived system, information, and service quality, 2) service quality has a positive effect on both satisfaction and intention, 3) information quality has a positive effect on satisfaction, but not intention, and 4) system quality does not have a significant effect on either satisfaction or intention. Implications for researchers and practitioners are discussed.

1. Introduction

With the increasing prevalence of online shopping, many companies (e.g. Dell.com) have provided “live help” functions. This service is typically delivered through instant text chatting on the company’s Web site and used to facilitate interactions between online consumers and customer service representatives. However, little is known concerning the contributions of live help service to online consumers’ perception of system quality, information quality, and service quality. As compared to self-service technologies [25], live help service 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. Will live help service generate better website perceptions to the consumers? The first objective of our paper is to shed some light on this question, and in particular, to investigate the effect of the availability of live help service on system, information, and service quality.

The second objective of our paper is to test the DeLone and McLean extended IS success model in the e-service context. DeLone and McLean [10] comprehensively reviewed IS success measures and concluded with a model of interrelationships between six IS success variable categories: (1) system quality, (2) information quality, (3) IS use, (4) satisfaction, (5) individual impact, and (6) organization impact. Pitt et al. [33] and others stressed that the DeLone and McLean model [10] had to be adjusted to recognize the expanded role of the IS department, and they augmented this list to include service quality as a measure of IS success. Based on this, DeLone and McLean [11] updated their model and recommended that "service quality" be added as an important dimension of IS success.

Chen and Cheng [5] and Wang [47] note that, other than their two studies, the DeLone and McLean [11] extended IS success model has not been validated in the e-commerce context, so an empirical study of its applicability to e-commerce is essential for further development and validation of their conceptual framework. They further summarised the following differences between an e-commerce system and other organizational IS systems: 1) different usage purposes (shopping needs vs. work purposes), 2) constancy differences (unstable visitors vs. stable workers), and 3) contextual differences (identical website for many shoppers vs. context-specific proprietary system).

Indeed, e-commerce requires distinct theorisation from the traditional IS literature [31]. By service quality, Pitt et al. [33] and DeLone and McLean [11] referred to the service provided by the IS-department, not the services provided by the website itself in the e-commerce context. We theorize on the role of this latter type of service quality and define this service quality as the overall consumer evaluations and judgments made regarding the excellence of service provision in the virtual marketplace [41].

Petter and McLean [32] conducted a meta-analytic assessment (with identified 52 studies until middle of
test the model within the Herzberg’s hygiene-motivator theory. Specifically, we McLean model within the e-service context, based on relationships [38].

customers, and to build long-term customer computation, as a means of learning more about advantage of the inherent nature of the online networks [39]. The new e-service paradigm takes defined as the provision of service over electronic paradigms known as “e-service” [38]. E-service is defined as the provision of service over electronic networks [39]. The new e-service paradigm takes advantage of the inherent nature of the online environment to feature information flows and computation, as a means of learning more about customers, and to build long-term customer relationships [38].

To this end, we tested the extended DeLone and McLean model within the e-service context, based on Herzberg’s hygiene-motivator theory. Specifically, we test the model within the requirement and specification service stage of the Customer Service Life Cycle (CSLC). The CSLC is a framework that describes the series of interactions that take place between consumer and merchant before, during, and/or after the core purchase, including a consumer’s initial learning of a product, acquisition and ownership of the product, and finally disposal or replacement of the product. It is an important resource toward providing services to augment and add value to a core product or service transaction across all of the interactions the CSLC describes [4, 19]. The requirement and specification stage of the CSLC describes those activities where consumers ascertain their product needs as well as which product and product features are most appropriate for them.

The rest of the paper is structured as follows: the next section reviews the interactivity theory and Herzberg’s hygiene-motivator theory, and develops the hypotheses. Section 3 and section 4 describe the research method and the data analysis respectively, followed by the discussion in section 5. The final section concludes the paper by discussing the theoretical and practical implications and limitations as well as suggestions for future research.

2. Theoretical foundation and hypothesis development

2.1. The effect of “live help” service on system, information, and service quality

Interactivity is defined as the degree to which participants in a communication process have control over, and can exchange roles in their mutual discourse [48]. 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 [18]. Rafaeli’s [35] 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 consumers’ perceptions of interactivity and site effectiveness. Interactivity has been considered as instrumental in differentiating between successful and failing Web sites [26], and beneficial for online firms to build a good relationship with their customers [14]. Interactivity also has positive effects on the sense of satisfaction and effectiveness with information delivery [44], and can lead to shopping enjoyment [20] and favourable attitude towards a website [21].

Live help service is distinguished from other online consumer support functions in that consumers interact directly with human customer service representatives using an online medium [1]. Integrating human assistance into Web pages makes a site more fun to use, increases consumers’ trust in the site, and improves the site’s atmosphere [1]. Based on Rafaeli’s [35] and others’ work on interactivity, we expect that the interactivity enabled by the live help service will lead to better perceptions of system, information and service quality.

According to DeLone and McLean [11], system quality in the Internet environment measures the desired characteristics of an e-commerce system. Examples of system qualities could include availability, adaptability, and response time [11]. With the use of live help service, whenever consumers have questions as they browse the website, they can always count on the availability of live help. Service representatives can interact with and respond to customers quickly and attend to their specific needs. Thus, we hypothesize that:

Hypothesis 1: The presence of live help service will positively influence customer perceived system quality.

Information quality of a website captures the quality of the content of a system [11]. If the
information provided is personalized, complete, relevant and up-to-date, then the website is perceived to have good information quality. Live help service is implemented with an intention to pay individual attention to each consumer’s concerns. Forrester Research surveyed 110 large companies and found that IVR (interactive voice response) self-service technology systems met consumer needs only 18% of the time—less than any other type of customer contact [43]. The key reason is that IVR is not at all personalized and relevant. Again drawing from interactivity theory, since live help can provide additional advice beyond that already presented in a website, the information should be perceived to be more complete and relevant and generally of higher quality. Thus, we hypothesize that:

**Hypothesis 2:** The presence of live help service will positively influence customer perceived information quality.

As defined earlier, service quality comprises overall consumer evaluations and judgments made regarding the excellence of service provision in the virtual marketplace [41]. The most widely applied service quality framework is SERVQUAL [29, 30], which articulates consumers’ 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 purely technology derived service function (e.g., collaborative filtering), human service representatives are in a much better position to interact with consumers and handle high-variance consumer concerns [40]. A representative can recognize and accommodate the uniqueness of each consumer’s requirements, and express personal attention and care. Consequently, we posit the following:

**Hypothesis 3:** The presence of live help service will positively influence customer perceived service quality.

### 2.2. The effect of system, information and service quality on satisfaction and intention.

Herzberg’s hygiene-motivator theory [15, 16, 17] suggests that certain characteristics tend to be consistently related to job satisfaction whereas others are consistently related to job dissatisfaction. Factors (e.g. safety) that have the potential to lead to job dissatisfaction were referred to as hygiene factors by Herzberg because they are necessary but not sufficient conditions for satisfaction in normal work environments. Herzberg referred to other factors (e.g. personal recognition) as motivators as their absence would not cause job dissatisfaction, but their presence could lead to job satisfaction. In the consumption context, satisfaction is defined as “the summary psychological state resulting when the emotion surrounding disconfirmed expectations is coupled with the consumer’s prior feelings about the consumption experience” [3, 28].

IS researchers (e.g. Zhang and von Dran [50]) adapted Herzberg’ hygiene-motivator theory to Web user interface studies and proposed a Two-Factor model. The model states that there should be basically two types of Website design factors: hygiene and motivator. Hygiene factors are the ones whose presence makes a Website useful and serviceable, and whose absence cause consumer dissatisfaction. “Live/broken links” is a hygiene factor, because a live link is taken for granted; but if the link is broken, consumers are frustrated and dissatisfied [50]. Motivators, on the other hand, are those that contribute to consumer satisfaction. Based on their empirical study [50], six categories of website features (e.g. technical aspects and navigation) were identified as hygiene factors, while the other six categories of website features (e.g. opportunities for interaction and enjoyment) identified as motivators.

In the same vein of reasoning, we apply Herzberg’s hygiene-motivator theory to the e-service context and believe that not being dissatisfied does not mean being satisfied. Among system, information and service quality, we contend that system quality is a hygiene factor, because a website is supposed to be always accessible 24/7 and provide timely response to consumers’ web page requests. Consistent with the classification of system loading/responding time, and stability/instability of the website availability as hygiene factors [50], we posit the following:

**Hypothesis 4:** System quality will not positively affect satisfaction in the e-service context.

While satisfaction measures consumers’ opinions of an e-commerce website, “Intention to use” is an attitude [11] and is the expected future consumption of an Information systems or its output [32]. According to Oliver [27, 28], satisfaction is conceptually distinct from attitude in that satisfaction is a transient, experience-specific affect, while attitude is a relatively more enduring affect transcending all prior experiences. Thus, as system quality is not expected to have the transient effect on consumers, we do not expect that it will influence consumers’ intention in the long term.

**Hypothesis 5:** System quality will not positively affect intention in the e-service context.

As classified by Zhang and von Dran [50], category of information content (amount and type of information covered) is considered as a hygiene factor, but category of organization of information (arrangement and summary of the information content) is judged as a motivating factor [50]. In our context, the live help service provides product advice to the consumers based on their indicated product preference.
Such information of product recommendation has gone beyond the summarization of information content. Thus, information quality is likely to be judged as a motivator factor that affects customers’ satisfaction and intention.

**Hypothesis 6:** Information quality will positively affect satisfaction in the e-service context.

**Hypothesis 7:** Information quality will positively affect intention in the e-service context.

Satisfaction is the dominant and most salient consequence of service quality, whether in general or in the e-service context [4, 37]. The live help provides online service while consumers search for specific merchandise and answer shoppers’ questions instantly through real-time communications. A Web site with real-time text-based live help functionality can provide consumers with better experiences [34]. It provides opportunities for user interactions, and empowers consumers to choose ways of interacting with the Website. Based on the Two-Factor Model [50], such features are characteristics of motivators, thus we expect that higher service quality enabled by such service technology will positively influence consumers’ satisfaction and intention to a website.

**Hypothesis 8:** Service quality will positively affect satisfaction in the e-service context.

**Hypothesis 9:** Service quality will positively affect consumers’ intention in the e-service context.

As DeLone and McLean [11] suggest, increased satisfaction will lead to increased intention to use. Indeed, satisfaction has been found to influence intention ranging from product purchase (e.g., [9]) to B2C channel adoption [12] and e-service [4]. Therefore, this study tests the following hypothesis:

**Hypothesis 10:** Satisfaction will positively affect consumers’ intention in the e-service context.

The entire research model is shown in Figure 1.

3. **Research method**

3.1. **Study setting and procedures**

We tested the proposed model in an experiment involving websites that are supported either with or without text-based live help service technology. Each subject was tasked with shopping for a laptop computer for a friend, whose product requirements were described to each participant in written form. Prior to the study, the subjects were informed that they would each receive $10 for their participation. As in many other experimental studies (e.g., [24]), to motivate participants to view the experiment as a serious online shopping session and to increase their involvement, we offered the top 20 performers an extra amount ($25). The participants were told before the experiment that they would be asked to provide justifications for their product choices and that we would judge their performance based on these justifications.

Participants were required to complete a questionnaire in order to record their demographic and control variables. The subjects were each assigned randomly to one of the four website conditions:

1. 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...
simple comparison matrix that provides an overview of product alternatives and attributes, (2) a software recommendation service in addition to comparison matrix (3) a live help service in addition to the matrix, and (4) a software recommendation service and a live help service, in addition to the matrix. It should be noted that the first two conditions represent websites without live help service, and the latter two conditions represent websites with live help service. Before they began the shopping task, subjects in the live help service group were informed about the correspondent service technology available in the Web site. After the shopping task, the subjects answered questions related to the dependent variables.

3.2 Measurement scales

The study adapted existing validated scales and experimental procedures whenever possible. The service quality scale was adapted from leading service marketing studies (e.g., [9, 42]). Items for information quality and system quality were borrowed from the study by Wixom and Todd [49]. Items for satisfaction were adapted from the study by Bhattacherjee [3]. Items for Intention were based on those of Coyle and Thorson [8].

Table 1 shows the measurements used in the questionnaire. We create dummy variable for the construct of live help service with 0 representing condition without live help service and 1 representing condition with live help service.

4. Data analysis

The 128 subjects in the study were recruited in a public university; they were from 14 faculties/schools and over 50 majors, representing very diverse backgrounds. Among the 128 subjects, 88 were females and 40 males. Five were non-students, 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. In general, they were familiar with online shopping (5.20/7).

<table>
<thead>
<tr>
<th>Table 1. Measurement items for the constructs</th>
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<td><strong>Construct</strong></td>
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*Removed measurement items
We analyzed the research model using partial least squares (PLS) structural equation modeling, a component-based approach [23]. 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 SmartPLS 2.0 [36] to conduct our analysis, which is based on the same method as PLS-Graph [7].

4.1 Measurement model
Assessments of measurement models should examine: (1) individual measurement item reliability, (2) internal consistency, and (3) discriminant validity [2]. 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 [2, 6]. All of the measurement items met this latter threshold (Table 2). To support internal consistency of the constructs, we calculated composite reliability and Cronbach’s alpha for each construct. All met suggested tolerances (>0.70, [13]) with results reported in Table 3.

<table>
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<tr>
<th>Table 2. Loading and cross-loading of measures</th>
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<th>Table 3. Internal consistency and discriminant validity of constructs</th>
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<tr>
<td>Composite reliability</td>
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<td>System quality (SQ)</td>
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<td>Information quality(QQ)</td>
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<td>Service quality (SEQ)</td>
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<td>Satisfaction (SAT)</td>
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<td>Intention (INT)</td>
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<td>Live help (LH)</td>
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Note: Diagonal elements are the square root of AVE. These numbers should exceed the interconstruct correlations for adequate discriminant validity. This condition is satisfied for each construct.
4.2 Structural model

We next analyzed the structural model to examine the significance and strength of relationships of each of our hypothesized effects. Results of the analysis, including standardized path coefficients, path significances, and variance explained ($R^2$) for each dependent variable are presented in Figure 2.

The model examined the effect of live help service technology on system quality (H1), information quality (H2) and service quality (H3). All three paths in this model were statistically significant. Consistent with the hypothesis, live help service technology had a significant effect ($\beta = 0.36; p < 0.001$) on system quality, thereby supporting H1. Live help service had a significant effect on information quality ($\beta = 0.41; p < 0.001$) demonstrating support for H2. Additionally, service quality was significantly influenced by live help service ($\beta = 0.56, p < 0.001$), consistent with H3. Live help service explained 13, 17, and 32 percent of the variance in system, information, and service quality respectively.

Examining the DeLone and McLean extended model in the e-service context, we found that both information quality ($\beta = 0.21; p < 0.05$) and service quality ($\beta = 0.55; p < 0.001$) had a significant effect on satisfaction, but system quality ($\beta = 0.06; p > 0.05$) did not. Thus, H4, H6, and H8 are all supported. System, information and service quality jointly explained 55 percent of the variance in satisfaction, with service quality contributing a larger proportion to that explanation.

In terms of intention, system quality did not influence intention ($\beta = 0.02; p > 0.05$), consistent with H5; service quality ($\beta = 0.26; p < 0.05$) had a significant effect on intention to return, in accordance with H9; information quality ($\beta = 0.01; p > 0.05$) did not have effect on intention, thus H7 is not supported. Finally, as hypothesized in H10, satisfaction ($\beta = 0.47; p < 0.001$) had a significant and positive effect on intention to return. System quality, information quality, service quality, and satisfaction, taken together, explain 47 percent of the variance in intention to return.

5. Discussion

The objectives of the present research were to evaluate the effect of live help service technology on system quality, information quality and service quality, and empirically test the extended DeLone and McLean IS Success Model in the e-service context. The model (Figure 1) was successful in explaining the mechanisms through which the availability of live help service influences the three qualities which subsequently influence consumer satisfaction and intention to return to a website.

Our results support that Web sites with live help service are more effective in improving system, information, and service quality as compared to sites that lack such service. We found that live help service has the strongest positive effect on service quality, followed by information quality, and then system quality, which is evident in both the path coefficient (0.56 vs. 0.41 vs. 0.36) and the amount of variance explained (32 vs. 17 vs. 13). The effect of live help on service quality is consistent with the prediction that a customer’s overall perceptions of Web site service
functionality will increase that customer’s perceptions of Web site service quality (Cenfetelli et al. 2008). Live help service are one type of service functionality that provide advice to help customers reach their shopping goals; thus, perceived service quality is influenced.

The use of live help increases relevance of an information request and results in a higher perceived information quality of a Web site. System quality also appears to improve with the availability of live help service. However, we observe that system quality is the factor least affected by the availability of live help service among the three quality features under study.

In terms of the effect of system, information, and service quality on satisfaction and intention, as theorized, service quality and information quality significantly influences satisfaction, which is consistent with Wang [47] and Chen and Cheng [5]’s study in the e-commerce context. In addition, service quality is significantly related to intention to return, as with the findings in Chen and Cheng [5]’s study.

As predicted by the Herzberg’s hygiene-motivator theory, system quality does not significantly influence either satisfaction or intention in the e-service context. This result is different with many other previous studies (e.g., [5, 32, 46, 47]). We contend that this is caused by the contextual difference. As characterized by Rust and Kannan [38], the service-focused paradigm uses two-way dialogue to build customized service offerings, counting on knowledge about the consumer to build strong customer relationships. Thus, in the e-service context, good system quality simply provides the basic conditions needed to provide high level of personalized service and social bonds, which might be more reflected in service quality and information quality.

It should be empathized that the less importance of system quality in the e-service context does not mean that it is always so in the other contexts. Identifying exactly which factor is hygiene and which is motivator is context dependent [50]. System quality might be still very important in organizational information systems, such as data warehouse system, while service quality might be secondary in that context.

It is also noteworthy that the path coefficient of service quality to either satisfaction or intention is the highest among the three qualities. This suggests that service quality may be the largest contributing factor in forming consumer’s overall satisfaction and intention to return to a website in the e-service context. The result that satisfaction acts as a strong antecedent to intention to return to a Web site reinforces previous findings in the e-commerce context [5, 47]. This implies that higher satisfaction with a Web site contributes to the formation of more favourable intention to return.

Information quality has a significant effect on satisfaction. However, contrary to our expectations, it does not have a significant effect on intention to return. Information quality is hypothesized as a motivator rather than hygiene factor. This is likely because the information provided by the live help service is generally personalized, which goes beyond the criteria of becoming a motivator as specified by Zhang and von Dran [50]. One possible explanation for the insignificant effect is that satisfaction is a temporal experience, while intention to return is a relatively long-term affect transcending all prior experiences [27, 28]. As such, information quality could influence people’s short-term satisfaction, but for long term commitment, information quality may still not be sufficient to retain the consumers.

6. Implications, limitations and conclusions

This study accomplishes several theoretical objectives. First, we apply the interactivity theory to the live help service technology and found that the interactivity enabled by live help service has a significant effect on system quality, information quality, and service quality. Second, we also demonstrate the relative impact of live help service on these three types of quality with service quality being the most influenced by live help. Third, although the DeLone and McLean extended IS success model has been empirically tested in the context of e-government [46], online learning systems [22], and the e-commerce context [5, 47], we complement these literatures by applying it to the e-service context, a context that is substantially different than the e-commerce paradigm [38], not to mention others. More important, we apply Herzberg’s hygiene-motivator theory and Zhang and von Dran [50]’s two-factor model for website design and evaluation to the e-service context, and found that system quality is hygiene, while information quality and service quality are motivators.

Practitioners can also benefit from this investigation in three ways. First, our findings suggest positive impacts of providing live help service on how customers perceive a website’s system quality, information quality, and service quality. Online service firms are advised to consider incorporating live help services into their website. Second, given a significant amount of cost to implement the live help service, our results demonstrate in what aspects live help service will be most effective, because the impact of live help service on the three types of quality are not similar. Although live help service also has a positive influence on system quality and information quality, practitioners should be aware that these are not the greatest strengths of live help service. In other words, live help service 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 service on service quality. Finally, our results show that system quality is considered as a hygiene factor in the e-service context, and it is not sufficient to satisfy consumers. Information quality and service quality are the motivators that can increase consumers’ satisfaction, but it is service quality that will motivate their return to a Website. In summary, if live help service is employed appropriately, it is likely to induce positive behavioral outcomes beyond satisfaction alone, and increase intentions to return to a website.

There are several limitations to this study that should be noted, which might open avenues for future research. The first limitation is that only high level of system quality, information quality, service quality are measured in this study, future research should investigate the sub-dimensions of these quality in more details. Second, the insignificant effect of system quality on both satisfaction and intention could be due to the lack of statistical power. Future research might be necessary to test these relationships with larger sample size. Third, we only implemented text-based live help service, as it is the commonly adopted mode in many current websites, future research might investigate the effect of voice-based live help service. Second, given that the variance explained by live help service on system quality and information quality is not as high as that of service quality, future research could focus on how to design alternative IT artifacts to enhance system and information quality.

In conclusion, while more and more online companies have adopted live help service, it is still unclear as to how exactly live help service influences system, information and service quality. This study endeavours to bridge the gap in contemporary literature by demonstrating that live help service is an important contributor to service quality, information quality, and system quality. In addition, we apply Herzberg’s hygiene-motivator theory and the adapted two-factor model to the e-service context and empirically test the DeLone and McLean’s extended IS success model, the result of which indicate that unlike in other IS contexts, system quality is no longer a motivator in the e-service context, but service quality and possibly information quality are the influential ones.

References


