Antecedents and Consequences of User Satisfaction with E-Mail Systems

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ABSTRACT

E-mail is an important component of the e-collaborative environment. This study contributes to the literature by using the American Customer Satisfaction Index (ACSI) framework to model the antecedents and consequences of customer satisfaction with e-mail systems. We employ a survey to gather empirical evidence to test the modified ACSI model for e-mail systems. Additionally, we test whether spam has an influence on a user's satisfaction with his or her e-mail system. Our results generally support the notion that the ACSI framework can be used to model e-mail user satisfaction, but we do not find statistically significant evidence that spam affects overall user satisfaction with their e-mail system.

Keywords: American Customer Satisfaction Index (ACSI); electronic collaboration; electronic mail; unsolicited (spam) e-mail; user satisfaction

INTRODUCTION AND BACKGROUND

E-mail is a form of computer-mediated communication that facilitates important aspects of e-collaboration. It may be conceptualized as a socio-technical system comprised of two components. The first component of e-mail includes technology, software, user training, industry standards, and practices. The second component consists of the social and psychological factors shap-

ing individual acceptance and usage (Lucas, 1998).

Information communication technologies such as e-mail are the foundation for collaborative efforts that allow geographically dispersed individuals to work as a team (Kock, 2005). The pervasive use of e-mail provides evidence of its importance as a communication medium. It has been reported that in 2003, 31 billion e-mail messages were sent daily world wide with an average of 56 e-mails per e-mail address and 174 e-mails per person (Industry Canada, 2004). Over 600 Million individuals around world wide were using e-mail systems by the end of 2004 (Radicati Group Inc., 2004). The phenomenal number of users was brought about partially by the declining costs of computing, fees for long-distance communication (Sproull & Kiesler, 1991), and advances in computer and telecommunications technologies.

The widespread use of e-mail also has introduced some problematic situations. For example, extreme user overload has resulted from the proliferation of e-mail as a communications medium (Ireland, 1997; Sherwood, 2002). At the same time, the increasing number of unsolicited commercial e-mail messages (typically regarded as junk mail or spam) (Boykin & Roychowdhury, 2005; Buderi, 2005; Erbland, 2005; Goodman, Heckerman, & Rounthwaite, 2005; Holmes, 2005; Pfleeger & Bloom, 2005; Van Duine, 2005; Whitworth & Whitworth, 2004) has exacerbated the information overload problem. Unwanted communication is often credited as being

the most critical component of e-mail overload (Hinde, 2002).

Currently, the flood of unsolicited messages is growing significantly and may soon account for half of all U.S. e-mail traffic (Krim, 2003). An average e-mail user receives 6 spam messages per day. Among the salient drivers for this growth of spam is that senders find it more expensive to target their e-mail messages to potential customers rather than simply send the same message to large distribution lists (Gopal, Walter, & Tripathi, 2001). In addition, there are insufficient and effective anti-spam regulations in place. At the moment, only 26 countries have mandated anti-spam laws, leaving the opportunity for legal spamming activities in more than 100 other countries.

Spam messages range from irritating e-marketing offers to potentially dangerous messages with infected files (Anonymous, 2004). Consequences of the growing flood of unsolicited commercial messages are that the usefulness of e-mail as a communication means may be impinged upon (Hall, 1998), productivity is lost (Whitworth & Whitworth, 2004), and users are harassed (Khoo & Senn, 2004). From the perspective of e-mail service providers, the negative effects of spam may hinder prospective future business. The magnitude of e-mail communication represents a potentially lucrative business opportunity for e-mail service providers. For them, the volume of e-mails and subscribers can translate into advertising dollars and in some cases, user fees. Accordingly, it is believed that spam can have crucial effects on both users' use of e-mail

and on e-mail service providers' profitability. However, there is little empirical academic research on the impact of spam on the interaction of users with e-mail systems. Our study seeks to contribute to the literature by studying the antecedents and consequences of user satisfaction with e-mail, and to explore the potential impact of spam on user satisfaction.

In the personal communications space, Web-based e-mail services such as Hotmail, Yahoo! and America Online lead the market. However, the emergence of various service providers and the entrance of established Internet firms to the e-mail messaging domain increase competition. Comcast and Google are examples of companies with established Internet and search engine services who have entered the market as e-mail providers. This increased competition drives the importance of satisfaction and loyalty in the e-mail space. While user satisfaction and the events surrounding it have been researched in the IS (e.g., Abdinnour-Helm, Chaparro, & Farmer, 2005; Armstrong, Fogarty, Dingsdag, & Dimbleby, 2005; Likourezos et al., 2004; Nelson, Todd, & Wixom, 2005; Wixom & Todd, 2005) and the marketing fields (e.g., Christianson, Parente, & Feldman, 2004; Kohli, Devaraj, & Mahmood, 2004; Leo & Philippe, 2002; Luna-Arocas, Tang, & Du, 2004; Oliver, 1997; Walsh, Wiedmann, & Groth, 2004), there is a lack of empirical research that examines the effect of e-mail specific phenomena, such as spam, on user satisfaction with e-mail as a communication system.

To survive in the competitive environment of technology services, it is essential to both attract and retain customers. User satisfaction is a critical factor in the determination of loyalty to a service provider (Dawkins, 1990; Reichheld, 2003). Customer turnover can be costly because of resources expended to replace customers lost, and the possibility of damage to an e-mail provider's reputation. On the other hand, satisfied customers may reduce the cost of attracting new subscribers through word-of-mouth advertising. Findings from empirical studies suggest that when customers perceive a firm is providing superior products or services, those firms enjoy higher financial returns than firms with less satisfied customers (Anderson & Fornell, 2000).

As such, our study contributes to the literature by testing the impact of individuals receiving spam (junk e-mail) on their perception of customer satisfaction. We employ the American Customer Satisfaction Index (ACSI) model developed in the 1990s (Fornell, Johnson, Anderson, Cha, & Bryant, 1996) in our study. The ACSI was created by leading researchers in customer satisfaction, Claes Fornell and Eugene Anderson, to measure overall customer satisfaction in a way that can be compared between companies or between industry segments. Customer satisfaction has increasingly become important as companies have become service-oriented, and customers are faced with many alternative providers from which to choose services and products.

The value of customer satisfaction measured by the ACSI is built on the

Figure 1. The E-Mail Services Customer Satisfaction Model (Adapted from the American Customer Satisfaction Model by Anderson and Fornell, 2000)
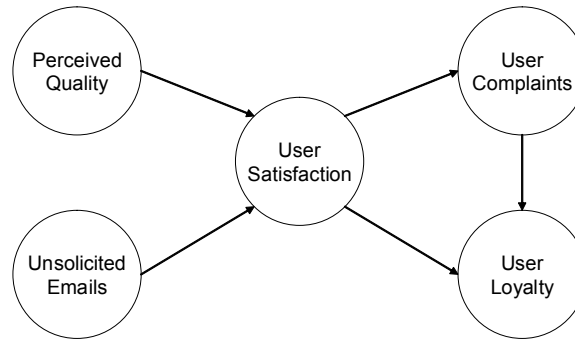
premise that without satisfied customers, economic prosperity is not possible. ACSI was designed to measure customer satisfaction in a standardized way that would provide insights into the consumer economy for companies, industry trade associations, and government agencies. The developers of the ACSI felt that their methods would help to meet the need for an overall measure of the consumption experience. The index measures the quality of goods and services as perceived by those who consume them, and is designed primarily to explain customer loyalty.

There are two principal concepts underlying the ACSI model. First, the constructs of the model represent different types of customer evaluations that can only be measured indirectly. This is why the ACSI uses a multiple indicator approach that measures customer satisfaction as a latent variable. Second, the ACSI is built on a series of cause and effect relationships that allows the antecedents and consequences of overall user satisfaction to be examined. In the case of this paper,

we examine user satisfaction with e-mail systems. Figure 1 illustrates the modified ACSI model and relationships between variables used in our study, including spam. The goal of this model is to present a set of causal relationships among several quality-related constructs. The variables will be further discussed in the next section where we develop the hypotheses tested in this paper.

The remainder of the paper is structured as follows. The next section develops the hypotheses we test. The subsequent section outlines the research methodology and statistical results. The discussion, conclusions and directions for future research are provided in the last section.

HYPOTHESES DEVELOPMENT

This study seeks to employ the ACSI framework to generate a satisfaction score for e-mail services that may be compared to those with other services. This score, coupled with a causal model, may depict the perceptions, beliefs and behaviors of e-mail users. In addition, the model is ex-

pected to test whether there is an effect of unsolicited e-mail on user satisfaction.

As seen in Figure 1, overall customer satisfaction has two antecedents and two consequences in the model proposed by Fornell et al (1996). We have modified the model for this study by omitting the variables related to the perceived value construct because the e-mail services are generally free for any given Internet service provider.

There are two primary research questions addressed in this paper:

1. What is the level of user satisfaction with electronic mail measured by the American Customer Satisfaction Index?
2. What is the relationship between spam messages and the degree of user satisfaction with electronic mail?

Satisfaction with e-mail is a users' reaction to their judgment of the state of fulfillment (Oliver, 1997). Users have a set of perceptions regarding their e-mail based on either previous experience or external influences. While using their e-mail system, these perceptions are compared with their actual experience and a set of beliefs regarding the extent to which the e-mail service has met their expectations is developed. As a result, individual e-mail users adjust their perceptions accordingly.

The American Customer Satisfaction Index (ACSI) (Fornell, Johnson, Anderson, Cha, & Bryant, 1996) has become one of the most frequently utilized satisfaction measures in the marketing literature. The ACSI represents a customer-centered quality measurement system to evaluate the performance of individual companies, industries, economic sectors, and national economies. The index is calculated quarterly for many industries, including information technology. The ACSI is available for online news and information services, portals, search engines, online retailers, and telecommunications companies.

The contemporary literature presents a variety of models that measure the degree of customer satisfaction with products or services (c.f. Bansal, Irving, & Taylor, 2004; Parasuraman, Zeithaml, & Berry, 1988). In our study, the ACSI was adapted because it demonstrates good psychometric capabilities and enables the generation of a standardized satisfaction score, which is comparable across industries and sectors.

According to this model, the degree of perceived quality of an e-mail system positively influences the level of user satisfaction with it. It is derived from the degrees of personalization and reliability of the e-mail service. Further, the number of unsolicited e-mail messages, which is frequently cited as the major e-mail dissatisfaction reason, is posited to have a direct negative effect on satisfaction. Accordingly, the related hypotheses we test are:

H1: The degree of perceived quality of an e-mail application has a positive association with the overall level of user satisfaction.

H2: The number of unsolicited spam messages received by a user is negatively

associated with the overall level of user satisfaction.

Prior research has found that satisfaction has a positive effect on both loyalty and retention (Bolton, 1998; Gerpott, Rams, & Schindler, 2001) and a negative causal effect on the number of customer complaints (c.f. Anderson & Fornell, 2000; Bolton, 1998; Kim, Park, & Jeong, 2004; Price, Arnould, & Tierney, 1995). Marketing scholars have argued that in industries where some switching barriers exist, it is more valuable to examine loyalty than to measure retention (Reichheld, 2003). In high-switching barrier industries (such as e-mail), customers that are dissatisfied might still remain with their service provider. In these industries, disloyal customers that remain with a company due to these high switching costs may ultimately have a negative effect on new customer acquisition as they share their opinions and beliefs with others (Reichheld, 2003).

In the case of e-mail systems, there are at least two potential switching barriers. First, for Web-based systems, one main barrier is the e-mail address (which is not portable to other service providers). In general, users find it inconvenient to regularly change their e-mail addresses because they have to locate all people and notify them about the change. Second, in the case of PC-based applications, the main barriers are the cost associated with the purchasing of new software, for example, Microsoft Outlook and the setup efforts. It follows that the extent of user satisfaction is negatively associated with an individual's propensity to either formally or informally complain about services. At the same time, user satisfaction with e-mail positively influences the degree of loyalty to a specific e-mail system. User loyalty is a favorable attitude towards a specific e-mail system that leads to choosing the same system given a need for a new e-mail application. Accordingly, the related hypotheses we test are:

H3: The overall level of user satisfaction with an e-mail application is negatively associated with the frequency of user complaints.

H4: The overall level of user satisfaction with an e-mail application has a positive association with the degree of loyalty to an e-mail system.

Following the ACSI framework, we test the relationship between the endogenous outcomes of overall satisfaction. There are no direct ways to test the efficacy of how an e-mail company deals with handling customer complaints. If a customer becomes satisfied with the way their complaints were handled, this treatment could engender loyalty. However, if the customer is dissatisfied with the manner in which complaints are addressed, the effect on loyalty would be expected to be negative. Therefore, we can only hypothesize that an association exists. Accordingly, the related hypothesis we test is:

H5: The frequency of user complaints about an e-mail application is associated with the degree of loyalty to an e-mail system.

Figure 2. The study model with hypotheses
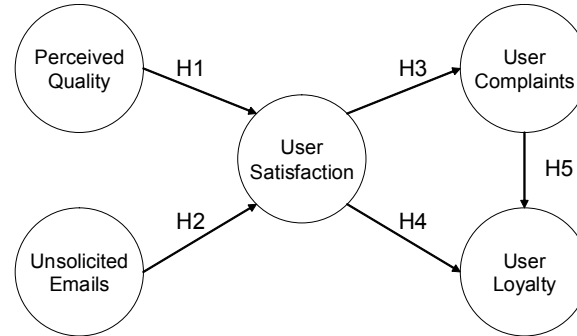
These five hypotheses can be represented on the ACS model as depicted in Figure 2.

METHOD AND DATA ANALYSIS

Survey Instrument and Construct Measures

A survey was used to sample subjects from a population of e-mail users located in Canada. All responses were kept anonymous; however some demographic data was collected to determine the nature of the sample. The survey was administered to 200 undergraduate and graduate students of Canadian universities. The completion of the questionnaire was voluntarily, and no rewards or incentives were offered to the subjects for completion of the survey. Overall, 200 questionnaires were administered and 186 questionnaires were returned (93% of the subjects agreed to participate in the study). Eight instruments were either incomplete or partially complete and were excluded from data analysis. The final sample consisted of 178 usable responses (89% usable response rate).

The measures used in this study were adopted from previously validated instruments (Fornell, Johnson, Anderson, Cha, & Bryant, 1996) and also from existing literature to create measures for the five constructs used in this study to minimize the potential for measurement error. While it is acknowledged that all latent measures are imperfect, using existing and previously validated measures provides more of a consensus for appropriate representation of the constructs detailed in this paper. The Appendix contains a listing of the constructs used in this study and their corresponding measures.

Perceived quality (of an e-mail system) is simply an individual's judgment about the e-mail systems excellence or superiority and it relates to the consumers perception of quality, based upon their prior expectations about how well the product fits personal requirements and whether expectations about reliability are met. Satisfaction is a measure of an individual's experience based on their evaluation of the e-mail system and can be thought of as the overall evaluation of the total consumption experience. Cus-

tomer Loyalty expresses an individual's intended behavior related to the e-mail system and it is operationalized with a single item used to reflect an individual's likelihood to remain loyal to the e-mail system. Customer Complaints can be thought of voicing dissatisfaction and is measured with a single dichotomous item to reflect whether or not individual users have complained about their e-mail system. If subjects have complained, then they indicated to what extent have they have done so. Unsolicited e-mail is a categorical representation of the number of unsolicited e-mails received by the user on a daily basis. This is operationalized with a 7-point categorical scale reflecting the range of unsolicited e-mails received daily.

In addition to questions pertaining to the model, subjects were asked a set of limited demographic questions and on their e-mail usage patterns. As such, respondents indicated their age, sex, name and type of the most frequently utilized e-mail system. In addition, actual e-mail usage details, such as the number of messages sent or received daily (excluding spam) and time spent working with an e-mail application were reported. The development of the research instrument followed an iterative process to ensure face validity of the questionnaire. Specifically, a small group of information technology practitioners and academics was consulted and asked whether the items proposed in the instrument adequately measured the desired constructs. As a result of their feedback, several minor modifications to the questionnaire were made.

Descriptive Statistics

The subjects surveyed in this study represented a diverse sample. Their ages ranged from 18 to 50 with 51% of the subjects are male while 49% are female. A majority of respondents indicated that Hotmail was the most frequently utilized e-mail system, followed by MS Outlook and Yahoo! Only a few people preferred country or university-specific e-mail environments, for example, Univmail (a proprietary e-mail system that is administered by a large University) or Sina.com (a predominantly Chinese portal). On average, respondents utilized this system for five years ranging from three months to 14 years. Overall, 83% of these e-mail environments are accessed through a Web-based interface. Table 1 outlines descriptive statistics for each of the items used in the survey. Table 2 outlines the Pearson correlations among the variables included in this study.

It should be noted that the correlation between Perceived Quality and Satisfaction is relatively high. We believe, however, that this does not threaten the validity of the model for several reasons. First, the loadings of these items on the constructs to which they belong are higher than their cross-loadings. Second, these two constructs represent an independent and a dependent variable that are expected to be correlated. As argued by Straub, Boudreau, and Gefen (2004, p. 25), "loadings across what are traditionally known as independent and dependent variables are not relevant to the issue of construct validity and such tests may/should be avoided in PCA [principle com-

Table 1. Descriptive statistics

Item	N	Minimum	Maximum	Mean	Std. Deviation	Skewness	Kurtosis
QUALITY 1	178	2	10	7.06	1.31	-0.83	1.47
QUALITY 2	178	3	10	7.38	1.41	-0.52	0.05
QUALITY 3	178	2	10	7.25	1.60	-0.56	0.30
UNSOLICITED E-MAILS	177	0	7	2.29	1.61	1.06	0.28
ACSI 1	178	2	10	7.28	1.43	-0.52	0.85
ACSI 2	177	3	10	6.59	1.39	-0.43	-0.13
ACSI 3	178	3	10	6.72	1.51	-0.43	-0.13
LOYALTY	176	1	10	6.94	1.96	-0.60	0.13
COMPLAINTS	175	0	3	0.22	0.46	2.24	6.91

Table 2. Correlation matrix of variables in model

	Perceived Quality	Unsolicited E-Mails	ACSI	Customer Complaints	Loyalty
Perceived Quality	1.000				
Unsolicited E-Mails	-0.114	1.000			
ACSI	0.828	-0.079	1.000		
Customer Complaints	-0.105	0.203	-0.187	1.000	
Loyalty	0.531	0.021	0.573	-0.085	1.000

ponent analysis]." Third, other studies that utilized or adapted the American Customer Satisfaction Index framework also report high correlations between quality and satisfaction. All of these studies argue that there is a reasonable confidence in the discriminant validity, and treat quality and satisfaction as distinct. For example, researchers have consistently uncovered a high correlation between quality and satisfaction (Babakus, Bienstock, & Scotter, 2004; Choi, Lee, Lee, & Kim, 2004; O'Loughlin & Coenders, 2004). Overall, it should be noted that even though some of the correlations in our model are fairly high, they are still within the norm, and as such are not inconsistent with the discriminant validity of our constructs.

The American Customer Satisfaction Index

To help better understand the results, knowing how the ACSI is calculated is helpful. The ACSI index number was calculated for e-mail systems (both in the aggregate and for each individual e-mail provider) based on the formula suggested by Anderson and Fornell (2000):

$$ACSI = \frac{\sum_{i=1}^{3} w_i \cdot \bar{x}_i - \sum_{i=1}^{3} w_i}{9 \cdot \sum_{i=1}^{3} w_i} \times 100$$

(1)

Table 3. Loadings and cross-loadings for each item and construct

	Perceived Quality	ACSI	Unsolicited E-Mail	Complaints	Loyalty
PQ1	0.863	0.702	-0.073	-0.132	0.402
PQ2	0.888	0.735	-0.069	-0.099	0.491
PQ3	0.841	0.708	-0.129	-0.042	0.484
ACSI1	0.818	0.864	-0.094	-0.160	0.543
ACSI2	0.547	0.778	-0.101	-0.156	0.345
ACSI3	0.698	0.893	-0.037	-0.163	0.541
JUNK	-0.104	-0.089	1.000	0.185	0.062
UC	-0.105	-0.187	0.185	1.000	-0.085
UL	0.531	0.537	0.062	-0.085	1.000

Where, w_i represents the weight of the ith item obtained from the outer model generated by PLS, and $\bar{x}_i$ represents the average of the ith item that loads on the ACSI construct.

Partial Least Squares Analysis

PLS is a regression-based technique, with roots in principal-components analysis that can estimate and test the relationships among latent constructs. PLS produces factor loadings between the individual items and latent constructs as well as estimates standardized coefficients (i.e., beta coefficients) for the paths between constructs. One benefit of PLS is that there are fewer demands on the data. Specifically, data do not have to be normally distributed, the scales may be ordinal or nominal, and the sample size can be small (Chin, 1998).

Item Reliability. Item reliability indicates whether the indicators for a particular latent variable measure that latent variable only. Guidelines provided by Hair et al. (1995) were used in determining the item reliability for each latent variable. Following their suggestion, only items with loading greater than or equal to 0.50 were retained. As can be seen in Table 3, each of the factor loadings are above the minimum threshold of 0.50. As such, all individual items were retained for the final structural model.

Convergent Validity. Construct validity indicates the degree to which a latent construct is representative of the true construct. It is often measured using Cronbach's alpha. A popular rule of thumb is that 0.70 (Fornell & Larcker, 1981). All values for the Cronbach's alphas exceeded this rule of thumb. Given this, the convergent validity criteria has been satisfied.

Discriminant Validity. Discriminant validity represents the extent to which measures of a given latent construct differ from measures of other latent constructs in the same model. Essentially, a latent construct should share more variance with its indicators than it shares with other latent

Figure 3. Results of hypotheses testing
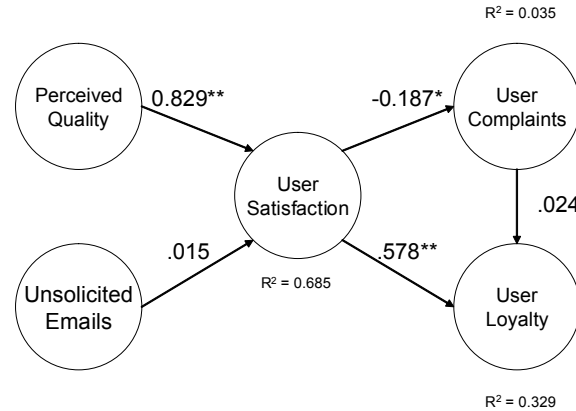
* *Significant at p < 0.05*
** *Significant at p < 0.01*

constructs. To assess discriminant validity, Fornell and Larker (1981) suggest the use of Average Variance Extracted — simply the average variance shared between a construct and its measures. The average variance extracted is obtained by the sum of the loading squared, divided by the number of items in the construct, whereas the variance shared between two constructs corresponds to the square of the coefficient of correlation between the latter. This measure should be greater than the variance (squared correlation) shared between the latent construct and other latent constructs in the model. Each construct passed the test for discriminant validity. The loadings and cross-loadings for each construct in the study can be found in Table 3.

RESULTS

Partial Least Squares Model

We employed the PLS Graph software package (Chin, 2001) to evaluate the structural paths in our model. Statistically significant levels of the estimated path coefficients were determined using the bootstrap procedure. The t-values we obtain are estimates of the bootstrap path coefficient divided by the standard error.

Figure 3 and Table 4 show the results of PLS analysis. The significant paths indicate that three of the five hypotheses are supported. Specifically, as hypothesized, the path coefficient from perceived quality to user satisfaction (0.829, $p < 0.01$) support H1, that the degree of perceived quality of an e-mail application is positively associated with user satisfaction. The results however, do no support H2. This suggests that spam does not have a strong effect on user satisfaction. The path coefficient from user satisfaction to user complaints (-0.187, $p < 0.05$) support H3, that user satisfaction is negatively associated with complaints. H4, user satisfaction is positively associated with the degree of loyalty, is supported by the results

Table 4. Table of hypothesis testing

Hypothesis	Estimate	T-Value	P-Value	Supported?
H1: PQ → ACSI	0.829	30.682	<0.01	supported
H2: JUNK → ACSI	0.015	0.334	not significant	rejected
H3: ACSI → UC	-0.187	2.437	<0.05	supported
H4: ACSI → UL	0.587	8.394	<0.01	supported
H5: UC → UL	0.024	0.297	not significant	rejected

(0.578, p < 0.01). Finally, the path coefficient from user complaints to user loyalty was not statistically significant and does not support H5. In summary, most of the hypothesized linkages in the ACSI model were supported by our findings; however, spam did not appear to affect user satisfaction as predicted by H2.

American Customer Satisfaction Index Results

The mean ACSI scores calculated for each e-mail service indicated is listed in Table 5. The satisfaction rating across all of the e-mail providers was fairly consistent, and t-tests show that the mean scores are not significantly different from each other. An average ACSI score for all of the e-mail services was calculated to be 65.5, as seen in Table 6. This table is presented to get a sense of ACSI scores for other industries North America for Q4, 2003. Table 6 outlines the specific comparison of e-mail systems. As can be seen, the satisfaction score for e-mail service ranks just below that of the airline industry, and just above that of the publishing/ news papers industry.

DISCUSSION

Our findings largely support the relationships between the elements of the ACSI model, suggesting that the ACSI index is a feasible measurement of customer satisfaction related to e-mail usage. The degree of perceived quality of an e-mail application appears to strongly influence an individual's level of satisfaction with this e-mail system. A more satisfied e-mail user complains less about their e-mail experience and demonstrates a high degree of loyalty to a particular e-mail system.

An interesting finding of our study is that unsolicited e-mail making it through the many spam filters of e-mail providers was not a significant determinant of customer satisfaction. This finding is surprising because the literature (Anonymous, 2004) seems to indicate that spam is a real problem to e-mail users. We suspect that, in general, issues that are beyond the control of the technology do not seem to negatively impact the level of satisfaction with this e-collaborative technology. As such, users appear to be coping with these downside issues better than the experts would have predicted.

Alternatively, this finding may be partially explained by the motivational premises of attribution theory. This theory explains how people make causal explanations about events and describes the processes and behavioral outcomes of

Table 5. The ACSI for individual e-mail systems[1]

E-Mail System	n =	ACSI
Microsoft Hotmail	113	65.1
Microsoft Outlook	25	65.7
Yahoo	21	67.3
Others	18	66.8

Table 6. The ACSI for select industries in North America

Sector	ACSI
Telephone-Long Distance	82
E-Commerce	80.8
Telephone-Local	79
Retail	75
Finance/ Insurance	74.7
Fixed-Wire Telephone Services	72
Scheduled Airlines	67
E-Mail Systems	65.5
Publishing/ News Papers	64
Cable & Satellite TV	61
United States Postal Service	60

those rationalizations (Heider, 1958; Jones & Davis, 1965; Kelly, 1972; Weiner et al., 1972). According to attribution theory, people tend to give credit to themselves for events with positive outcomes and blame the external environment for events with a negative outcome.

When a spam e-mail message arrives, a person spends some time to determine the relevance of this message and to delete it. This is a negative outcome situation that e-mail users may blame on external factors, such as the quality of an e-mail system, a spammer, the lawmakers delaying anti-spam legislation, and so forth. Research in the area of human-computer interaction (HCI) suggests that people tend not to hold software responsible for mistakes, problems, or bugs because users

expect computer applications to be generally unreliable (Lieberman, Rosenzweig, & Singh, 2001). Therefore, it is plausible that a recipient of spam attributes it to factors not associated with their e-mail application. For example, a spammer is considered directly responsible for the spam, not the e-mail service provider whose spam filters did not detect and remove the spam.

On the surface, the ACSI index calculated for e-mail services appears to be relatively low compared with those of related products and services in other industries in North America. However, the proper way to use the ACSI score may be to compare scores from one period to the next instead of in cross-section among other goods and services. Alternatively,

comparisons to similar service are more meaningful than industry or sector cross-sectional comparisons. For example, the 65.5 e-mail ACSI score could be compared with the score of 61 for Cable & Satellite TV.

Finally, we found no evidence of a relationship between a user's tendency to complain about an e-mail system and their level of loyalty to the particular e-mail service. This may be due to high switching barriers that prevent people from moving from one e-mail system to another. Even though an e-mail service might be free of charge, the change of an e-mail address, time to install a new application, and software acquisition costs create high switching barriers for e-mail users. Therefore, even though people complain about their e-mail experience, they tend to stay with their current e-mail system. In addition, there are few substitutes for e-mail.

CONCLUSION

E-mail is increasingly important as a modality in the e-collaborative environment, and customer satisfaction has significant economic implications for e-mail providers. Satisfaction with e-mail systems is an important topic because of the significant role that e-mail plays in communication and e-collaboration. Our study employs the ACSI customer satisfaction model to offer insights into the antecedents and consequences of user satisfaction with e-mail systems.

We find evidence that perceived quality is a determinant of user satisfaction. In turn, user satisfaction is positively related to user loyalty, and negatively associated with user complaints. Our findings generally support the ACSI model of customer satisfaction. Surprisingly, unsolicited e-mail was not a statistically significant determinant of user satisfaction, which was an unanticipated finding based upon the literature discussing the potential effect of spam on e-mail users. Additionally, user complaints did not appear to have an effect on user loyalty, as some of the literature on customer loyalty might suggest. The findings of this paper may be of value not only to e-mail users, e-mail providers, but also to researchers interested in other e-collaborative technologies.

Our study has its limitations. The sample consisted mostly of young Canadian students which may not be generalizable to the entire e-mail user population. However, we feel that this population has strong familiarity with and dependence on e-mail, making them typical of regular e-mail users (Fallows, 2002). Ideally, it would have been preferable to survey a larger sample that draws from a cross-section of individuals that includes people from business and governmental sectors, of heterogeneous geographical dispersion using a wider variety of e-mail systems. Future research may employ a broader cross section of e-mail users to modify, validate, or expand on our findings.

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ENDNOTES

[*] The order of authorship is presented alphabetically. All authors contributed equally to this research.

[1] A ttest was performed to ascertain the statistical difference in the ACSI between the e-mail systems. The results of this test indicated that there is no difference in ACSI across e-mail systems.

APPENDIX

Constructs and Their Measures

Construct	Item
Quality	What is your overall evaluation of the quality of this e-mail system? Anchored by Very Low………Very High
	What is your evaluation of the extent to which this e-mail system meets your personal requirements? Anchored by Very Low………Very High
	What is your evaluation of the extent to which this e-mail system is reliable? Anchored by Very Low………Very High
Satisfaction	Overall, how satisfied are you with this e-mail system (all things considered)? Anchored by Very Dissatisfied………Very Satisfied
	To what extent has this e-mail system fallen short or exceeded your expectations of a good communications medium? Anchored by Falls Very Short………Exceeded by Far
	How close are the services offered by this e-mail system to your ideal e-mail system? Anchored by Very Far From Ideal………Very Close to Ideal
Loyalty	If you required a new e-mail system, how likely is it that you would choose your current e-mail system? Anchored by Very Unlikely………Very Likely
Customer Complaints	Have you ever complained (either formally or informally) about this e-mail system to the service provider or other people? Anchored by Yes or No
	If yes, indicate the number of times that you have complained. A numeric response
Unsolicited E-Mails	The average number of **junk e-mails** you receive per day by using this system is

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