Investigating the Determinants of Satisfaction and Usage of Mobile IT Services in Four Countries

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ABSTRACT

This study integrates marketing and IS theories to investigate the antecedents and consequences of end-user satisfaction and usage with mobile IT services. Research findings, based on the collection and Partial Least Squares analysis of data from 736 individuals located in four countries, support the viability of utilizing an extension of the American Customer Satisfaction Model to investigate the behavior of global wireless services users. Specific differences in the customer satisfaction of mobile service end-users in Canada, Singapore, Finland, and Israel are also presented.

KEYWORDS

Mobile services, mobile commerce, satisfaction, use, cross-national

INTRODUCTION

This paper investigates the antecedents and consequences of user satisfaction with mobile IT services in four different countries. User interaction with mobile services warrants investigation since mobile services are an integral part of various societies around the world. It was recently estimated that there are over 1.3 billion cell-phone users worldwide (Lonergan et al. 2004), and that penetration rates have passed 80% in some countries (Mallinson 2003). To retain customers in these somewhat-saturated global markets, mobile service operators need to understand how their clients utilize these services and how satisfied they are with them. Thus, satisfaction and use of mobile services are important problem areas to investigate.

Though such statistics describe the global diffusion of mobile services, and some wireless service providers operate in several countries, cross-national data on how perceptions of these services determine their use are rare (one notable, however, is by Meso et al. 2005). More specifically, little is known about the antecedents and consequences of end-user satisfaction with wireless services across the various countries where mobile IT services are deployed. The purpose of this paper is to

bridge that void and to shed light on the factors which drive end-user uptake across different global markets.

To do so, we specifically set out to capture the perceptions and behaviors of mobile IT services users across four different countries – namely Canada, Singapore, Finland, and Israel – which represent four dissimilar wireless market conditions in terms of culture, technological infrastructure and regulatory environments. To this end, we extend a marketing model based on information systems theories. By doing so, we hope to understand mobile IT service subscribers' determinants and effects of satisfaction in different global areas. The goal is to provide insights which can lead future research in this area and offer practical suggestions and recommendations for international wireless service providers.

As a means of structuring this investigation, we utilize and extend the American Customer Satisfaction Model (ACSM) (Fornell et al. 1996). Previous successful applications of this model in general (e.g., Gorst et al. 1999), and in the wireless sector in particular (Turel and Serenko 2006) suggest the potential viability of using the ACSM to describe the satisfaction and use of mobile IT services on a global basis. Furthermore, beyond the examination of causal relationships, this model provides a standardized satisfaction score that has predictive capabilities with regards to firms' performance (Anonymous 2005). The workings and extension of this model are described in the next section of this paper. That section introduces the development of the theoretical model which links satisfaction as measured by the ACSM with service usage, and the related research hypotheses. From there, the paper's research design is described and statistical results are presented. This is followed by a discussion of the study's findings. The last sections of the paper offer conclusions, outline limitations, and describe directions for future research.

THEORETICAL MODEL

The concept of user satisfaction with information systems has been discussed for over thirty years. Many specific measurement instruments and scales were developed for various usage contexts (e.g., Doll et al. 2004). Furthermore, the antecedents and consequences of user satisfaction with IS have been extensively studied (Mahmood et al. 2000), and the satisfaction concept was integrated into the technology acceptance literature (Wixom and Todd 2005). Satisfaction in the IS literature, however, is not a cohesive concept, and many satisfaction measures may be redundant (Zmud and Boynton 1991). Indeed, a recent meta-analysis of IS satisfaction literature indicates that there are three categories of user satisfaction measures: user attitudes towards an IS, user satisfaction in terms of information quality, and user satisfaction in terms of perceived IS effectiveness (Bokhari 2005). Thus, by using these instruments, it is difficult to compare user satisfaction levels with different technologies.

To effectively study mobile services one may need to deviate from the abovementioned IS literature and extend it for two reasons. First, each use of mobile services typically costs money. Therefore, value for money assessments should be

taken into account for the determination of users' cognitions and behaviors with mobile services. Second, in such a pay-per-use context, there are many important outcome variables, such as repurchase likelihood and intention to complain, that are typically not addressed in the IS literature. As such, in order to obtain a better understanding of the processes underlying satisfaction assessments and their behavioral outcomes in the wireless services context, the present study takes a marketing perspective on mobile IS satisfaction.

The extant marketing literature suggests that consumers typically consider quality and utility gains versus the price paid for a service or product (Zeithaml 1988); mobile services users are consumers because they pay a fee each time they use an information system or a monthly fee for the use of the information system (depending on the plan they opt for). As such, in order to better understand consumer-relevant perceptions of mobile users, this study adapts a model that considers these tradeoffs, namely the American Customer Satisfaction Model (ACSM) (Fornell et al. 1996). It is a general, cross-industry model that provides a market-based performance measure for firms, industries, sectors, and nations. It measures the quality of the goods and services as experienced by consumers, and gauges their actual and anticipated consumption experiences (Anderson and Fornell 2000). According to the model, there is a positive association between prior customer expectations, perceived quality, perceived value and satisfaction. In turn, satisfaction has a positive association with loyalty and a negative association with complaint behavior.

One of the advantages of ACSM is the ability to generate a satisfaction score, namely the American Customer Satisfaction Index (ACSI). That is a direct measure of user satisfaction with a product or service. ACSI scores are provided quarterly for select industry sectors in North America. Such standardized scores were recently reported (Q1, 2006) for the U.S. sector of mobile services. These standardized values are important since they demonstrate high predictive capabilities. Several researchers have identified a strong positive association between ACSI and the following period's corporate earnings. Other scholars have shown that firms with high ACSI produce significantly higher value for their shareholders than those with lower ones (Anonymous 2005). As such, in addition to its academic application to explain consumer behavior, the model may potentially provide insights for industry practitioners and regulators.

The application of the ACSM to investigate the behaviors and perceptions of cell phone users in different countries is believed to be viable for two reasons. First, the ACSM, as well as its adaptations, has been validated in other IS contexts (e.g., Dow et al. 2006). Second, the notion to employ marketing concepts in information technology investigations is not new. For instance, marketing models and their adaptations were utilized to study the usage of Short Messaging Services (e.g., Turel et al. 2005).

In order to operationalize this model, a set of constructs and causal relationships is defined. The prior customer expectations (**PE**) construct represents both previous

experience with the service and forward-looking beliefs regarding a provider's ability to offer the desired quality. Perceived quality (**PQ**) is the served market evaluation of recent service usage experience. It is derived from the degrees of customization and reliability of the service. Perceived value (**PV**) adds the price dimension to perceived quality and therefore addresses the perception of quality for money. In addition, it controls for differences in income and budget constraints that enables cross-industry comparisons (Fornell et al. 1996). These three constructs lead to customer satisfaction (**CS**), which is defined as a subscriber's reaction to his or her judgment of the state of fulfillment (Oliver 1997).

According to Fornell et al. (1996), satisfaction in turn affects loyalty and complaint behavior. Loyalty in the ACSM is conceptualized as favorable attitude towards a specific service provider that consists of two dimensions: (1) repurchase likelihood (**RL**) and (2) price tolerance (**PT**) towards the service provider's price and towards competitor pricing (Turel and Serenko 2006). This conceptualization captures financial and quality sacrifices users make when staying with a specific service provider. The model also includes an endogenous construct capturing the self-reported number of formal and informal customer complaints (**CC**) made to a service provider.

To achieve this study's goals, the abovementioned ACSM relationships are extended. According to the IS literature, satisfaction is believed to affect usage. Prior investigations found a strong positive effect of satisfaction with an information system on its usage (see review by Zviran and Erlich 2003). A meta-analysis of 55 studies that empirically tested the relationship between satisfaction with IT systems and their use found a mean correlation of 0.26 between these two concepts (positive medium effect size) (Bokhari 2005). Accordingly, two dimensions of cell phone usage are added to the ACSM as direct outcomes of the satisfaction with the service. These include the daily number of calls (**DC**) and the amount of daily airtime used (**DA**). The addition of usage to the ACSM represents an integration of the IS literature (which has shown that satisfaction leads to usage) and the marketing literature (which focuses on other outcomes of satisfaction, such as loyalty and complaint behavior). Accordingly, Figure 1 presents the model adapted in the present study.

Based on this theoretical model, the following research questions and hypotheses are suggested. The first research question pertains to the validation and application of ACSM in terms of the satisfaction with mobile IT services across various countries (as opposed to just the United States where it has been applied thus far):

RQ1: Does the American Customer Satisfaction Model provide an accurate description of end user satisfaction with respect to mobile services on a global basis?

H1: There is a positive association between prior customer expectations and perceived quality of mobile services on a global basis.

H2: There is a positive association between prior customer expectations and perceived value of mobile services on a global basis.

H3: There is a positive association between prior customer expectations and customer satisfaction with mobile services on a global basis.

H4: There is a positive association between perceived quality and perceived value of mobile services on a global basis.

H5: There is a positive association between perceived quality and customer satisfaction with mobile services on a global basis.

H6: There is a positive association between perceived value and customer satisfaction with mobile services on a global basis.

H7: There is a positive association between customer satisfaction and price tolerance with respect to a particular provider of mobile services on a global basis.

H8: There is a negative association between customer satisfaction and the number of customer complaints on a global basis.

H9: There is a positive association between customer satisfaction and repurchase likelihood from a particular provider of mobile services on a global basis.

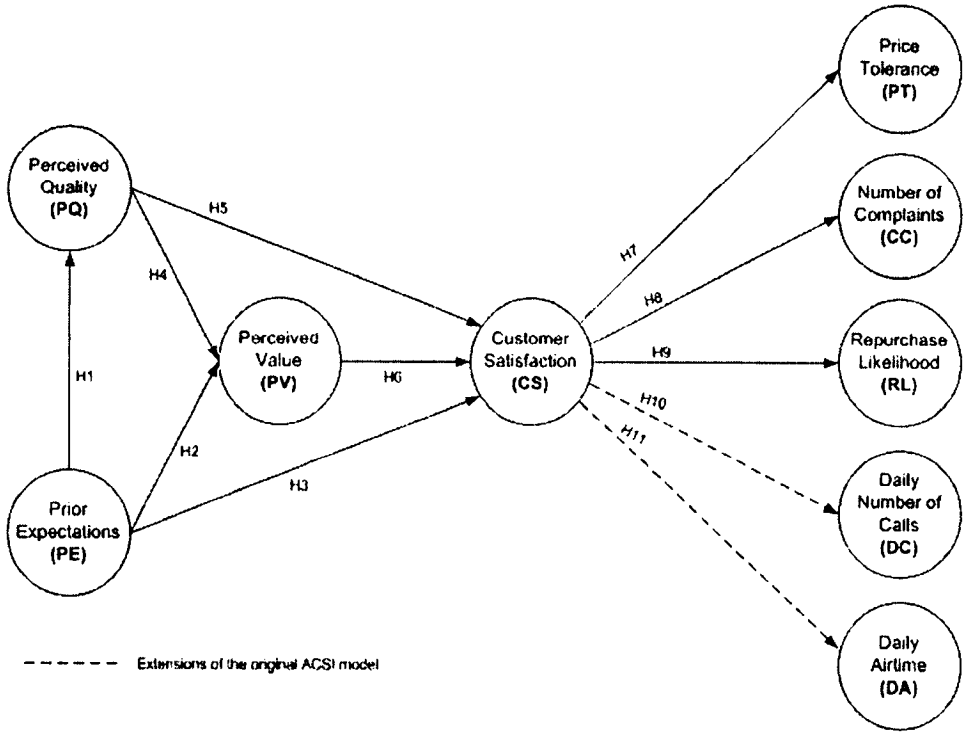

Figure 1. The Research Model

The second research question pertains to the extension of the ACSM to include mobile service usage as an outcome. That is, based on the established link between satisfaction and information systems use, user satisfaction with mobile IT services is expected to affect not only marketing outcomes (e.g., loyalty) but also the usage of these services.

RQ2: Does the degree of satisfaction with mobile services affect mobile services usage on a global basis?

H10: There is a positive association between customer satisfaction and the usage of mobile services in terms of the number of outgoing calls on a global basis.

H11: There is a positive association between customer satisfaction and the usage of mobile services in terms of the total time spent using mobile services on a global basis.

The third research question relates to the utilization of nationality (represented by country of residence) as a moderator variable to assess potential discrepancies in the various perceptions of mobile services among individuals living in different countries. National differences in user perceptions and behaviors were demonstrated in other IS studies (e.g., Igbaria and Zviran 1991). Specifically, nationality was shown to affect technology adoption constructs and relationships (Straub et al. 1997). It should be noted that culture is only one factor of the nationality effects on IS adoption. Other national attributes such as economic conditions (e.g., GDP and level of income inequality) and demographics (e.g., ethnical diversity) impact the adoption of information technologies as well (Bagchi et al. 2004). Nationality effects are especially important in the wireless services context since countries differ in their technological infrastructure, culture and government regulations, and these factors may affect the diffusion of wireless services (Banks 2001). As such, this study focuses on general national differences, and does not empirically examine their various antecedents (e.g., culture, income levels, cost of wireless services, availability of services, etc.). While national and individual level culture effects are investigation worthy, these are not the foci of this study.

It should be noted that the four examined countries differ on some of the previously mentioned national attributes, if not all of them. That is, the four selected countries differ in technological infrastructure, cultural dimensions, and wireless industry regulations. For example, these four countries have different levels of Hofstede's (1989) culture dimensions. These include power distance (i.e., the degree of equality, or inequality, among people in the country), uncertainty avoidance (i.e., the level of tolerance for uncertainty and ambiguity within the country), individualism (i.e., the degree the society reinforces individual or collective accomplishments and interpersonal relationships), and masculinity (i.e., the degree the society reinforces, or

does not reinforce, the masculine work role model of male achievement, control, and power). See Table 1 for the culture dimensions of these countries.

Table 1. Hofstede's (1989) culture dimensions for the selected countries

Country	Power Distance	Uncertainty Avoidance	Individualism	Masculinity
Canada	39	48	80	52
Singapore	74	8	20	48
Finland	33	59	63	26
Israel	13	81	54	47

In addition, these countries differ in their technological infrastructures. For example, while the Global System for Mobile Communications (GSM) is the only family of standards used in the Finnish market, in Israel there are GSM, Time-Division Multiple Access (TDMA) and Code-Division Multiple Access (CDMA) operators, and in Canada there are GSM and CDMA operators. That is, several countries have a fragmented technological infrastructure — a fact that can influence usage, interconnection cost, switching behavior, etc. (Turel and Yuan 2006). Furthermore, the telecommunications regulations in each country vary in focus and locus of control. Based on these national differences, we suggest the following research question:

RQ3: What are the differences on the structural level of the study's model among mobile services among users in Canada, Singapore, Finland, and Israel?

The fourth research question refers to the computation of the ACSI in different countries. Although this index is labeled American, it may be successfully applied in other countries without any specific modifications because the scores that measure the level of satisfaction are obtained at the individual level (e.g., see Gorst et al. 1999). In fact, this index is based on a Swedish satisfaction barometer (Fornell 1992). In addition, the calculation of a satisfaction index by the employment of the same set of questions and methodology generates comparable results. Currently, this index is available for the U.S. wireless sector only, and no comparison of this index is available. As such, we propose the following research question. It should be noted that while this question provides mostly practical value, it may also yield some academic observations and provide insights for future research in this field.

RQ4: What is the American Customer Satisfaction Index with mobile services in Canada, Singapore, Finland, and Israel?

METHODOLOGY

To answer the study's research questions and hypotheses, a self-administered paper-based survey of 736 undergraduate and graduate students in Canada, Singapore, Finland, and Israel was conducted. Four English-based versions of the survey (one per country) were used; each national version contained the names of the local wireless carriers for the questions "Who is your current service provider?" Only respondents who had used a cell phone for at least four months participated in the study. This period was believed to be sufficient to establish reliable perceptions and opinions towards the service. All respondents had good command of English, and no instrument translation was required.

The survey instrument consisted of two parts. The first one solicited demographic information and usage characteristics, such as number of calls made and time spent talking over the phone. Traditionally, usage levels of an information technology have been considered a degree of its success. Time spent using the system and the system use frequency are the two most universal constructs of usage (e.g., Igbaria 1996) that are represented by a single item (Gefen and Keil 1998). In the present study, daily number of calls (DC) (i.e., the self-reported average daily number of wireless phone calls the user originates) and daily airtime (DA) (i.e., the self-reported average daily number of minutes the user spends talking over a cell phone) relate to the usage frequency and time spent while using a cell phone and are employed as dependent variables.

The second part presented 10-point Likert-type scales to measure PE, PQ, PV, CS, and RL adapted from Fornell et al. (1996). The usage of a high number of scale points enabled respondents to make better discriminations that is a common practice in marketing research (Andrews 1984). To evaluate face validity of the questionnaire, an independent group consisting of IS academics, industry practitioners, and cell phone users, was consulted. Based on their suggestions, several questionnaire items were adjusted. Overall, it was concluded that the use of this research instrument would facilitate the collection of reliable and valid data.

In addition, a set of responses containing 1,203 unique data points on customer satisfaction with mobile services in the U.S. was provided by the University of Michigan[1] as per agreement with the authors. The questions in University of Michigan's survey pertaining to the American Customer Satisfaction Index were identical to those utilized in the present study. This set of data was employed to calculate the ACSI score for the U.S. (i.e., it was not included in the model's

[1] The ACSI is produced by the Stephen M. Ross Business School at the University of Michigan, in partnership with the American Society for Quality (ASQ) and the international consulting firm CFI Group

estimation since some questions pertaining to other constructs slightly differed). To ensure the homogeneity of subject groups in terms of their age, only responses of U.S. residents of the same age as in all other datasets were selected.

DATA ANALYSIS AND RESULTS

Descriptive Statistics

The study's survey instrument was administered in Canada, Singapore, Finland, and Israel by the authors and their colleagues; 736 usable responses were obtained. **Error! Reference source not found.** outlines basic user demographics and experience with wireless services.

Table 2. User Demographics

	Canada	Singapore	Finland	Israel	Total
Number of responses	204	194	204	134	736
Average age – [Mean] (std. dev.)	25 (6.3)	21 (1.2)	23 (3.9)	25 (1.9)	23.2 (4.4)
Gender - male / female	94 / 109	53 / 141	94 / 78	91 / 43	332 / 371
Average experience with current handset [Months] (std. dev.)	14.30 (12.4)	11.1 (9.3)	16.7 (14.1)	15.9 (11.2)	14.4 (12.1)
Average experience with current service provider [Months] (std. dev.)	22.86 (25.1)	29.6 (19.2)	30.3 (32.8)	44.2 (32.1)	30.6 (28.3)
Percentage of users who have used different handsets before	71.9%	95.4%	93.6%	94.0%	88.1%

Measurement Model

Partial Least Squares (PLS) was utilized to estimate the measurement model. PLS was chosen over covariance-based methods (e.g., LISREL) because it places less restrictions on data normality, works well with small samples, and has advantages for assessing moderation effects (Gefen et al. 2000). Table 3 offers item statistics and loadings. As such, all item loadings exceeded the required threshold of 0.7, residuals were low, and item-to-total correlations were above 0.35. Therefore, no items were removed.

A matrix of loadings and cross-loadings was constructed to assess the discriminant validity of the measures. According to this matrix, the loadings of every item to its associated factor were higher than its cross-loadings. Table 4 and Table 5 offer construct statistics, and correlation matrix and discriminant validity assessment. All constructs demonstrated high reliability (i.e., Cronbach's Alpha), and the Fornell and

Larcker's (1981) measures of composite reliability and average variance extracted (AVE) were greater than 0.7 and 0.5 threshold respectively. The Fornell and Larcker's (1981) measure of discriminant validity was calculated as the square root of the average variance extracted and compared to the construct correlations. All values along the diagonal were greater than those in corresponding rows and columns. Overall, it was concluded that acceptable level of the psychometric properties of the instrument was achieved.

Table 3. Estimated loadings for the total set of measurement items

Item	Mean	Loading	Error	Item Total Correlations
PE1	7.33	0.822	0.323	0.661
PE2	7.34	0.883	0.220	0.696
PE3	7.55	0.887	0.213	0.727
PQ1	6.90	0.908	0.176	0.790
PQ2	7.01	0.904	0.183	0.776
PQ3	7.00	0.888	0.211	0.757
PV1	6.29	0.948	0.102	0.790
PV2	6.09	0.941	0.114	0.790
CS1	6.67	0.894	0.202	0.704
CS2	5.72	0.771	0.406	0.581
CS3	6.28	0.874	0.236	0.701
PT1	5.40	0.815	0.337	0.507
PT2	3.76	0.912	0.168	0.507
CC	1.17	1.000	0.000	
RL	6.96	1.000	0.000	
DC1	4.75	0.987	0.026	0.963
DC2	4.99	0.993	0.013	0.963
DA	23.39	1.000	0.000	

Table 4. Construct Statistics

	PE	PQ	PV	CS	PT	DC
Arithmetic Mean	7.41	6.97	6.19	6.22	4.58	4.87
Cronbach's Alpha	0.83	0.88	0.88	0.81	0.71	0.98
Composite Reliability	0.899	0.928	0.843	0.884	0.855	0.990
AVE	0.748	0.810	0.892	0.719	0.747	0.980

Table 5. Correlation Matrix and Discriminant Validity Assessment

	PE	PQ	PV	CS	PT	DC
PE	**0.865**					
PQ	0.513	**0.900**				
PV	0.314	0.600	**0.944**			
CS	0.347	0.728	0.726	**0.848**		
PT	-0.071	0.110	0.088	0.128	**0.864**	
DC	-0.015	-0.027	-0.025	0.005	0.023	**0.990**

Structural Model

Bootstrapping was done to derive t-statistics, and 200 re-samples were generated that provides adequate parameter estimates (Chin 2001). Figure 2 presents the structural model.

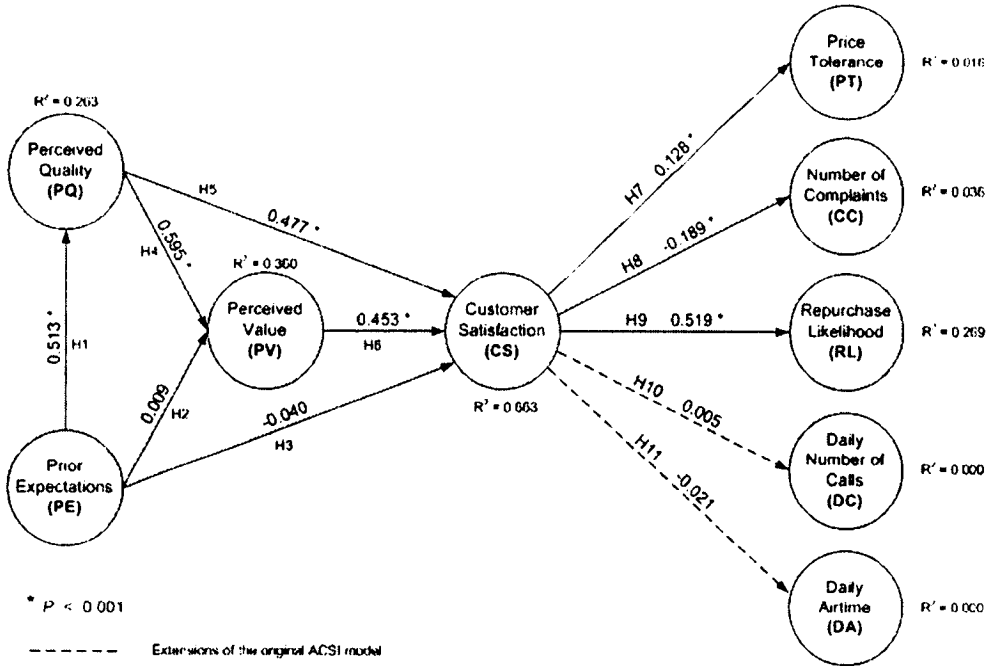

Figure 2. The Structural Model

According to the results, all hypotheses except for H2 (PE – PV), H3 (PE – CS), H10 (CS – DC), and H11 (CS – DA) were supported at the 0.001 significance level. To ensure the insignificance of the rejected hypotheses, these four relationships were dropped, and the model was re-evaluated. A visual inspection showed only a minor change in CS R^2-value from 0.663 to 0.662, and no other standardized path coefficients and t-values were affected.

The American Customer Satisfaction Index Scores

Based on the formula suggested by Anderson and Fornell (2000), an index score was calculated for the customer satisfaction construct for each country. The average respondent age in the U.S. sample was 44, whereas the average age in samples obtained through primary data collection was 23.2. Age is believed to be an important factor in determining satisfaction levels. Therefore, a normally distributed sub-sample of 132 U.S. responses with the mean of 23 was created that was comparable to the ones collected by the authors. As such, the U.S. ACSI for young-adult subscribers was calculated based on this sub-sample. In addition, the data collected by the authors

enables the calculation of a satisfaction index for each service provider. Note that U.S. ACSI scores for individual mobile service providers may not be reported as per agreement with the University of Michigan. Table 6 outlines the ACSI scores for countries and providers.

Table 6. ACSI Scores for countries and service providers

Country	Wireless Services ACSI	Provider	N	ACSI
U.S.	56.7	No data for specific service providers		
Canada	54.8	Rogers	85	54.6
		Telus	49	59.4
		Fido	21	57.6
		Bell	44	48.3
Singapore	59.1	SingTel	89	61.9
		StarHub	34	55.8
		MobileOne	69	57.1
Finland	63.4	Sonera	60	64.5
		Radiolinja	57	60.3
		Finnet	38	62.6
		Alands	31	69.5
Israel	57.7	Cellcom	55	57.5
		Pelephone	38	55.9
		Orange	41	59.6

Moderator Variables

In order to answer research question #3, the country of a respondent's current residency was employed as a moderator variable. For this, the sample was split by country into four sub-groups, and four corresponding PLS models were estimated. While this is a common practice in moderator research, a recent paper by Carte and Russell (2003) argues that a problem may take place when researchers compare PLS models from different sub-samples. Particularly, they claim that since "the construct-level scores are subsequently estimated using different item weights in each sub-sample," (p. 493) differences in the structural models may result from changes in the measurement models rather than from actual distinctions among sub-groups. To mitigate this risk, all moderated relationships were estimated by both PLS and moderated multiple regressions (MMR) as suggested by Bontis and Serenko (2007). To determine whether the coefficients of corresponding links were statistically different, the Chow test (Chow 1960) was conducted on the relationships of the MMR (see Appendix).

Based on these results, two key points are noted. First, despite several minor differences, both PLS and MMR produce similar results with respect to standardized

coefficients. As such, the employment of MMR did not change the findings obtained through the usage of PLS. Second, similar to the entire structural model (Figure 2), the PE-PV, PE-CS, CS-CC and CS-DA links for every country had very low, non-significant beta coefficients. Analyses of the general structural model and country-based differences are outlined in the discussion section.

DISCUSSION

Recall, the study addresses four associated research questions through the application of structural equation modeling techniques to a dataset of 736 responses from cell phone users. With regards to the first research question, the empirical analysis reveals that the ACSM is somewhat suitable for explaining perceptions and behaviors of mobile IT users on a global basis, and not just for the U.S. As such, the model is appropriate for use by an international community of practitioners and academics. For example, investors may now employ national ACSI scores to predict wireless service providers' future market performance, individuals may consider ACSI scores for purchase decisions, and international researchers may employ the model to examine wireless service related behaviors in different regions of the world.

It should be noted that while the original ACSM hypothesizes effects of customer expectations on perceived value and customer satisfaction, our findings suggest that the effect of customer expectations on these concepts is fully mediated through perceived quality. That is, customers do not assess the value of wireless services or satisfaction with theses services based on expectations, but rather they do so by contrasting their expectations with perceived quality. This finding is congruent with previous ACSI studies and the IS literature on expectation-disconfirmation processes. For example, Gorst, Wallace, and Kanji (1999) report on an insignificant effect of expectations on quality as well as a weak direct effect of expectations on satisfaction. In the IS literature, disconfirmation (the contrast between ones expectations and the actual observed utility) has been shown to have the strongest effect on satisfaction (Bhattacherjee and Premkumar 2004). One plausible explanation of this deviation is that service experience moderates the strengths of the relationship between PE, PV, and satisfaction. That is, less experienced users rely on expectations for evaluating value and satisfaction, whereas experienced users rely on the observed quality for determining value and satisfaction, and their subjective quality perceptions are influenced by their expectations. Most users in our study were experienced, and as such, demonstrate strong reliance on actual quality, rather than on expectations. This proposition may be investigated in future research.

The abovementioned finding also demonstrates the viability of applying marketing models to study information systems phenomena in the wireless services context. According to the Work System Framework suggested by Alter (2002) organizations may potentially have two types of information systems – these which facilitate business processes and ones that face customers and are offered as products or services. While the extant technology adoption literature (e.g., Venkatesh et al. 2003)

is mostly geared towards dealing with business process systems as it focuses on job related utility gains, the marketing literature may be more appropriate for dealing with customer facing information systems, as it deals with various other value gains and tradeoffs. These differences between business process systems and customer facing data services are especially apparent in the wireless services context, since users pay a fee each time they utilize the service (or at least pay a monthly subscription fee) and may have exit barriers in the form of contractual obligations. These value tradeoffs are mostly ignored in traditional IS adoption models. Similar successful triangulations of marketing and MIS views were recently demonstrated (Turel et al. 2005). As such, future research may apply the body of knowledge accumulated in the marketing discipline for studying user behavior with wireless services.

Regarding the second research question, in contrast to the authors' expectations, no significant effect of satisfaction with mobile services on subscribers' mobile usage was found. This finding indicates that wireless services differ from other commonly examined information systems, for which satisfaction affects use. This, combined with the low R-squared of the usage variables, may imply that in the wireless services context there are other factors that affect usage. These may include culture, the existing technological infrastructure of the examined countries (Banks 2001), economic conditions and demographics (Bagchi et al. 2004). For example, in countries where there is a popular culture of frequent cell phone usage and the technological infrastructure enables constraint-free utilization of mobile services, it would be reasonable to believe that subscribers would employ such services frequently, regardless of their satisfaction levels with the service. In contrast, in countries in which there is no adequate coverage (i.e., an infrastructure issue), wireless services users cannot use the service even if they are satisfied with it. That is, infrastructure attributes may serve as external facilitating conditions for wireless services usage. Similar external facilitating conditions were found to have a direct effect on behavioral intention to use various information systems (e.g., Taylor and Todd 1995). While satisfaction has no significant effect on wireless service usage, the findings indicate that it is a strong determinant of retention, price tolerance and complaining behavior. Thus, regardless of their country of operation, wireless carriers need to strive to promote satisfaction since it may lead to important desirable market effects.

As for the third research question, several differences were found on the structural level of the study's model among users in Canada, Singapore, Finland, and Israel. First, since most changes in R-squared values were significantly different (see the Appendix), it is concluded that the explanatory power of the ACSM differs from one country to another. The variance explained in the CS in Finland and Israel is the lowest. This finding provides some academic guidance since it implies that in Israel and Finland there might be external factors that need to be added to the model in order to better explain the variance in user satisfaction (i.e., service expectation, actual service quality, and value for money perceptions alone are insufficient to explain a major portion of the variance in user satisfaction).

Second, the significantly low R-squared of PV in Israel indicates that the model does not predict PV in Israel as strongly as it does in other countries. In addition, the PQ-PV relationship is weaker in Israel than those in other states. This means that value perceptions of Israeli mobile service users are not as strongly predicted by quality as they are in other countries. This national divergence may be explained through the infrastructure or regulatory conditions in Israel. The observed difference may imply that the service quality in Israel has reached such a high level (i.e., great coverage all over the country due to a good infrastructure and/or regulatory coverage requirements) so there is little variance in it and thus it is taken for granted. This explanation suggests that, in Israel, value is mostly determined by the cost of the service rather than by its quality, and that there are other antecedents of PV that are missing in the Israeli model.

Third, the PE-PQ relationship is significantly stronger in Finland than those in the other countries. This indicates that, in Finland, prior expectations are better determinants of quality perceptions. This finding may stem from the somewhat high tolerance of the Finnish people to ambiguity (see Table 1). Such tolerance may lead to the acceptance of higher discrepancies between expectations and actual quality. Nevertheless, other countries with higher tolerance for ambiguity (e.g., Israel) did not exhibit the same magnitude of PE-PQ relationship. From a practical standpoint, this suggests that Finnish service providers may develop reasonable expectations in order to foster quality perceptions. This strategy may be more useful in Finland than in other countries.

Fourth, the PQ-CS path is significantly stronger in Finland than those in Canada and Singapore. Therefore, in Finland, perceived quality is a better determinant of satisfaction than it is in most other countries. This suggests Finnish operators need not only develop reasonable expectations, but also must ensure that actual quality meets such expectations.

Last, the PV-CS relationship is significantly weaker in Israel and Finland than those in Singapore and Canada. Thus, in the latter-mentioned countries, value-for-money perceptions have stronger effect on user satisfaction with mobile services than in the former-mentioned countries. This suggests that enhancing PV in Canada and Singapore (e.g., by reducing prices) should have a greater impact on satisfaction.

Overall, we have a reason to believe that a combination of national attributes (e.g., culture, infrastructure, regulations, etc.) has led to structural differences among the four examined countries. While this study provides some propositions with regards to the drivers for these differences, future projects should examine these propositions and others as a means of better understanding the underlying mechanisms for this observed national divergence.

With respect to the fourth research question, ACSI scores were calculated for young-adult subscribers in the four examined countries (see Table 6). Across the countries, these scores were somewhat low in comparison to those with other IT services in the

U.S. For example, the ACSI scores of fixed-wire telephone services and the e-commerce sectors were 72 and 80.8 respectively in Q1 2004. Nevertheless, this is a rather unfair comparison given that the sample population in our study differs from the one used to obtain the American scores in other IT sectors. Comparing the satisfaction scores with wireless services of the different countries participating in this study reveals that young Finnish subscribers are more satisfied with the mobile services in their country, than other young mobile users are. This may partially explain the tremendous penetration of mobile services in Finland, which surpluses 90% (Statistics Finland 2004) .

Most importantly, the study demonstrates that the well established effect of satisfaction on IS usage does hold in the wireless context. It is proposed that national attributes such as technological infrastructure, socio-economic factors, and culture may be salient antecedent of mobile services use, rather than satisfaction with these services. Future investigations may empirically examine the effects of individual and national cultural predispositions, national telecommunications regulations and infrastructure attributes on the use of wireless services. In addition, several new moderator variables, such as age, gender and type of contractual obligation (i.e., prepaid vs. postpaid fee structures), may be included to test both the comprehensive all-country model and individual countries models. Future investigations may also include users in other global regions not covered in this study (e.g., Africans or South Americans). In addition, as suggested in this section, country-specific antecedents should be added to the model to better depict mobile user behavior in local contexts.

LIMITATIONS

Despite its innovativeness, this project has several limitations. The first is that this study employs a convenience rather than probabilistic sampling approach. Future research may employ somewhat more probabilistic data collection techniques, such as randomized phone-based surveys. At the same time, we believe that the subjects were the true representatives of the actual user population. The second limitation is that this study explains differences in the level of satisfaction, perceptions and usage of mobile services based on the country of residence. On the one hand, the country of residence may serve as a proxy for different technological infrastructures, service levels, regulations or cultural dimensions. On the other, there may be region-based differences within countries. For example, some areas may be underserved by wireless carriers and other areas may have a greater coverage, wider range of service offerings, and higher quality of service. To fully understand the effect of national differences, future investigations should collect data from different regions of the countries under investigation. The third limitation is that this investigation cannot explain why country-wise differences take place. For example, it can be assumed that various institutional factors (e.g., regulatory regime and business atmosphere) may play a role. Residents of different countries may also have different perceptions of usability, usefulness, ease of use, or enjoyment given the same quality of service due to cultural differences, subjective norms, or mobile service operators' performance. While future

research can easily include questionnaire items that measure individual level cultural orientation, it is challenging to account for other antecedents of national differences, such as the regulatory environment, service coverage, and technological fragmentation. The authors hope that future investigations will shed some light on the determinants of national differences. Future research may also wish to analyze the ACSM across different providers since this may account for some differences in user perceptions and behaviors.

CONCLUSIONS

The purpose of this study was to explore factors that affect satisfaction with mobile IT services, and the behavioral outcomes of this satisfaction assessment. In that regard, the study has been successful. We collected and analyzed data on real-life end-users of mobile IT services from four different countries. From our analysis, we showed the viability of utilizing an extension of the American Customer Satisfaction Model to describe the satisfaction and use of mobile IT services across different countries. Based on that, it was suggested that marketing models may be appropriate for examining IS phenomena in pay-per-use contexts, such as mobile IT services. In addition, we empirically demonstrated that the use of wireless services is not driven by satisfaction with them; rather we suggested that national regulations, culture and technological infrastructure may be better alternative predictors. We also illustrated specific differences in the application of this model and the customer satisfaction scores for mobile service end users in Canada, Singapore, Finland, and Israel.

The contributions of this study are along the lines of the abovementioned findings. First, we have extended the marketing-based American Customer Satisfaction Model through integration with the IS literature. This integration may form the foundation for future research in the domain of wireless services. Second, we have included a cross-national comparison of mobile IT user behaviors that may partially explain national differences in the use of wireless services, and it may offer insights for future investigations of such services. Third, we revealed wireless service-specific issues that are not so common in other IS contexts (e.g., the insignifcant effect of satisfaction on use). We have gained insights on some key differences between pay-per-use mobile IT services and free of charge organizational information systems, and on global differences in the use and satisfaction with mobile IT services. These insights were utilized to provide guidance for future research in this area. Overall, we believe that this study makes a significant contribution to our understanding of user interaction with mobile IT services.

APPENDIX

PLS and MMR Country Moderation Effects

Link – beta (p-value)	R^2PV	R^2CS	PE-PQ	PE-PV	PE-CS	PQ-PV	PQ-CS	PV-CS	CS-PT	CS-CC	CS-RL	CS-DC	CS-DA
PLS													
Canada (n=204)	.512	.751	.469 (.001)	- .028 (n.s.)	- .043 (n.s.)	.728 (.001)	.406 (.001)	.546 (.001)	.241 (.001)	- .247 (.01)	.588 (.001)	- .074 (n.s.)	-.012 (n.s.)
Singapore (n=194)	.328	.698	.578 (.001)	- .051 (n.s.)	.016 (n.s.)	.600 (.001)	.374 (.001)	.556 (.001)	.073 (n.s.)	.098 (n.s.)	.507 (.001)	.082 (n.s.)	-.035 (n.s.)
Finland (n=204)	.278	.609	.617 (.001)	.024 (n.s.)	- .085 (n.s.)	.511 (.001)	.571 (.001)	.368 (.001)	.112 (n.s.)	- .046 (n.s.)	.481 (.001)	.046 (n.s.)	.079 (n.s.)
Israel (n=134)	.210	.538	.492 (.001)	.115 (n.s.)	.042 (n.s.)	.390 (.001)	.460 (.001)	.376 (.001)	.114 (.n.s.)	- .193 (.05)	.388 (.001)	.024 (n.s.)	.051 (n.s.)
MMR													
Canada (n=204)	.507	.745	.464 (.001)	- .033 (n.s.)	- .044 (n.s.)	.726 (.001)	.393 (.001)	.555 (.001)	.245 (.001)	- .194 (.05)	.579 (.001)	- .049 (n.s.)	-.013 (n.s.)
Singapore (n=194)	.327	.633	.574 (.001)	- .053 (n.s.)	.030 (n.s.)	.601 (.001)	.362 (.001)	.518 (.001)	.031 (n.s.)	- .098 (n.s.)	.484 (.001)	.089 (n.s.)	-.060 (n.s.)
Finland (n=204)	.270	.598	.632 (.001)	.020 (n.s.)	- .111 (n.s.)	.507 (.001)	.598 (.001)	.353 (.001)	.135 (.1)	- .072 (n.s.)	.497 (.001)	.009 (n.s)	.055 (n.s.)
Country – Israel (n=134)	.203	.534	.477 (.001)	.122 (n.s.)	.024 (n.s.)	.380 (.001)	.473 (.001)	.379 (.001)	.069 (n.s.)	- .194 (.05)	.371 (.001)	.026 (n.s.)	.042 (n.s.)
CHOW TEST (p-value)													
Canada – Singapore	n.s.	n.s.	0.000	n/a	n/a	n.s.	n.s.	n.s.	n/a	n/a	n.s.	n/a	n/a
Canada – Finland	.01	.005	0.000	n/a	n/a	.01	.01	.000	n.s.	n/a	n.s.	n/a	n/a
Canada – Israel	.000	.005	n.s.	n/a	n/a	.000	n.s.	.000	n/a	n.s.	n.s.	n/a	n/a
Singapore – Finland	n.s.	.000	.05	n/a	n/a	n.s.	.000	.000	n/a	n/a	n.s.	n/a	n/a
Singapore – Israel	.005	.000	n.s.	n/a	n/a	.01	.1	.05	n/a	n/a	n.s.	n/a	n/a
Finland – Israel	.05	n.s.	.001	n/a	n/a	.05	n.s.	n.s.	n/a	n/a	n.s.	n/a	n/a

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