

User Satisfaction with Mobile Services in Canada

Ofir Turel

turelo@mcmaster.ca

DeGroot School of Business, McMaster University
1280 Main Street West, Hamilton, Ontario, Canada L8S 4M4
Tel: (905) 525-9140 # 26358

Alexander Serenko

serenkav@mcmaster.ca

DeGroot School of Business, McMaster University
1280 Main Street West, Hamilton, Ontario, Canada L8S 4M4
Tel: (905) 525-9140 #26179

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Abstract:

While satisfaction and loyalty in regards to physical goods and some services have been studied to a great extent in marketing and information systems research, there is little research on these factors with respect to mobile telecommunications services. Furthermore, there is no standard measure for satisfaction with these services. This study taps into these voids and examines the antecedents of satisfaction and loyalty through an empirical study of 80 cellular subscribers in Ontario, Canada. Results of the study suggest that most causal relationships depicted by the American Customer Satisfaction Model are valid in the mobile telecommunications sector. However, due to the switching barrier, loyalty to a wireless service provider is no longer a unidimensional construct, but rather comprised of two independent factors – repurchase likelihood and price tolerance. This investigation also suggests that there are some differences in service perceptions between prepaid and post-paid cell phone users. Based on the model, a satisfaction index is calculated for Canadian wireless service providers. This index is found to be low in comparison to those of other sectors and industries. Overall, this study forms the foundations for future benchmarking of the performance of wireless network operators in terms of satisfaction and loyalty.

Introduction

The remarkable diffusion of mobile services has outperformed experts' expectations. From a marginal industry in the shadow of other telecommunications providers (e.g. fixed line and the Internet), it has become a leading sector providing commoditized services. As such, the penetration of mobile phones is almost twice as high as that of personal computers. While only 9.9% of the world's population owned PCs in 2002, 19% of the population possessed cell-phones (ITU 2003).

At the beginning of 2004, there were over 1.3 billion cell-phone users. Over the next three years, a demand for mobile services is predicted to grow at an average annual rate of 9.1% (Loneragan et al., 2004). However, this growth mainly stems from the deployment of new networks in developing countries rather than from an inclining penetration in developed states. In the latter group of countries, the market has almost saturated and the install base has reached over 80% penetration. For instance, at the end of 2003, 88.3% of the UK's population had cell phones. According to the Yankee Group (2004), the install base in Canada is expected to grow from 45.6% by the end of 2003 to 53.7% in 2007 with a declining annual growth – from 10.8% in 2004 to 5.1% in 2007.

The saturated markets in developed countries, combined with the de-regulation of the telecommunication industry and the increasing number of wireless service providers, drives competition. For instance, an average number of wireless operators in most OECD¹ countries doubled from 1998 to 2000 (Paltridge 2000) and in 2001, new subscriber acquisition costs of Vodafone, UK were over \$180 (Yunus 2002). Thus, in order to be competitive and cost efficient, mobile operators need to adjust their marketing strategies and focus on retaining existing customers rather on acquiring new subscribers and increasing market shares. This retention battle is further fueled by the removal of switching barriers. Partial regional standardization (i.e., CDMA in the Far-East and GSM in Europe) allows individuals to switch from one provider to another while keeping a previous handset. In addition, due to Number Portability regulations that emerged in some countries, a person may even keep the same phone number when switching to another provider. The recently mandated Wireless Local Number Portability (WLNP) regulation in the US is an example of a legislation that is predicted to dramatically increase the competition on wireless markets (FCC 2003).

The aforementioned changes in the competitive landscape in developed countries demonstrate the importance of identifying factors affecting customer loyalty in the mobile services industry. The motivation for understanding and improving loyalty stems from empirically validated links between loyalty, retention, and profitability (Dawkins 1990; Reichheld and Sasser 1990; Reichheld and Teal 1996). Specifically, in the domain of mobile services, several studies were conducted on a regional level in an attempt to explore the antecedents of customer satisfaction, loyalty, and retention (for example, see Gerpott et al. (2001), and Kim, Park and Jeong (2004)). However, these studies mainly focus on the identification of service features and characteristics that affect satisfaction, loyalty and retention, but provide no standard measure for these constructs. A standard measure is required for benchmarking. For instance, a comparison of the relative performance of companies within the wireless industry, benchmarking indicators of various wireless market segments, and comparing the performance of the wireless industry relatively to other industries is feasible through an application of a standard measure. As noted by DeSouza (1992), retention measurement and the analysis of factors affecting customer retention rate are one of the key business success factors. Can one imagine understanding the antecedents of inflation rate without providing a standard measure for it?

To fill this void and to provide standardized measures for several major factors affecting the behavior of cell-phone users, this research adapts the American Customer Satisfaction Model methodology. It is

¹ OECD is the Organization for Economic Cooperation and Development

believed that the usage of the American Customer Satisfaction Model may yield an accurate depiction of the perception and behavior of mobile phone users, provide recommendations for practitioners, and offer valuable insights for future research.

The rest of the paper is structured as follows. The next section provides the study's background and introduces research hypotheses. The following two sections outline the research methodology and offer statistical results. The last section presents a summary of the findings, conclusions, and directions for future research.

Theoretical Background

The American Customer Satisfaction Model

The American Customer Satisfaction Index 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 (Fornell et al., 1996) and gauges their actual and anticipated consumption experiences (Anderson and Fornell 2000). Figure 1 presents the model adapted in the present study.

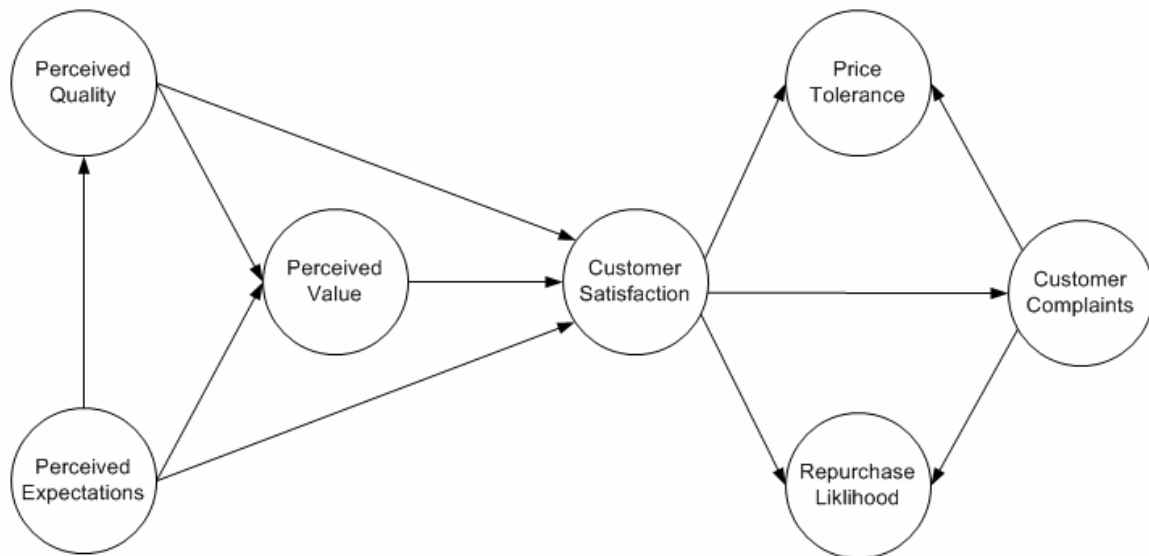


Figure 1: The American Customer Satisfaction Model (Adapted from Fornell et al. (1996))

According to the model, there is a positive association between perceived customer expectations, perceived quality, perceived value and satisfaction. In turn, satisfaction has a positive association with loyalty and a negative association with complaints (the “voice” of customers). Thus, loyalty is directly explained by customer satisfaction and customer complaints regarding the products or services.

In order to operationalize this model, a set of constructs is defined. The perceived 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 and enables cross-industry comparisons (Fornell et al., 1996). These three constructs lead to customer satisfaction (ACSI), which is determined by the difference between the actual usage experience and service expectations. Thus, satisfaction is the subscribers' reaction to their judgment of the state of

fulfillment (Oliver 1997). Loyalty is the ultimate construct in this model consisting of two independent constructs: repurchase likelihood (RL) and price tolerance (PT) towards the service provider's price and towards competitors pricing. The rationale for splitting the loyalty construct is presented later in this section. In a more general manner, Reichheld (2003) defined loyalty as the willingness to make a personal sacrifice in order to strengthen a relationship. The ACSI model's operationalization of the loyalty construct is inline with the general definition since it captures financial and quality sacrifices users make when staying with a specific service provider. The model also includes a construct measuring customer complaints (CC) to a service provider.

The ACSI model, as well as its adaptations, has been utilized in many studies in various industries. For example, variations of the ACSI were used to examine banking services (Mukherjee, Nath and Pal 2003), conferences (Gorst, Wallace and Kanji 1999), transportation and communications sectors (Grigoroudis and Siskos 2004), and retailing industries (Arnett, Laverie and Meiers 2003). As of March 2004, the Thomson Corporation's ISI Web of Science® Social Sciences Citation Index (SSCI) ® listed 84 journal citations to the article that introduced the ACSI. Such studies demonstrate the fruitfulness and viability to apply this model to investigate the behaviors and perceptions of mobile phone users.

In addition to the measurement of standardized values, the model demonstrates high predictive capabilities. Several researchers have identified a strong positive association between the 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 low one². As such, in addition to its academic application to explain consumer behavior, the model may potentially provide insights for industry practitioners and regulators. The ACSI indexes are provided quarterly for select industry sectors in North America. However, the sector of mobile phone services is missing in this reporting system, and, therefore, could not be benchmarked against other sectors.

Research Model Development

A review of relevant marketing literature in the field of consumer behavior reveals that customer relationship with a manufacturer or service provider is a composite concept consisting of at least two independent areas – loyalty and retention. In the mobile services context, loyalty is defined as a favorable attitude towards a specific service provider that leads to a combination of repurchase likelihood of additional services from the same providers and price tolerance towards their services. Customer retention is depicted as actual maintenance of relationships with a specific provider. Typically, the retention of wireless subscribers is measured through churn rates.

Preceding studies in the field of loyalty and retention demonstrated a link between these constructs and companies' profitability (Dawkins 1990) and provided a wealth of information on the association between some of the constructs: profitability, loyalty, retention, customization, quality, and satisfaction (Bolton 1998; Keaveney 1995; Price, Arnould and Tierney 1995; Rust, Zahorik and Keiningham 1995). As these studies were mainly concerned with over the counter goods sold in unconnected individual transactions in mature markets (Gerpott et al., 2001), a body of literature on the association between the aforementioned constructs in the specific domain of mobile services has recently appeared (for example, see Ho and Kwok (2003), Kim et al. (2004)). Both general and industry-specific loyalty studies usually suggest that retention and loyalty are achieved through the enhancement of service quality and satisfaction (Fornell 2001; Zeithaml and Bittner 1996). However, this viewpoint is not fully valid in the context of mobile services due to the contractual nature of customer-operator relationships. Wireless operators may "lock-in" subscribers for long periods of time. Therefore, it can be assumed that, even though subscribers may

² For more information about the ACSI model and its predictive capabilities, visit the ACSI Website at <http://www.theacsi.org>.

be dissatisfied, and disloyal to their current service provider, they will still use its services and yield a relatively high retention rate.

In addition, previous research demonstrates that customer retention has a limited capability in enabling growth, but rather is more likely to drive sustainability over the long-run. This is mainly due to the notion that retention reflects the rate in which “the bucket is emptying” rather than filling. As such, it is more appropriate to explore loyalty than to investigate retention as the ultimate construct. It is also believed that loyalty will become a key determinant of a mobile operator’s success, especially in saturated wireless markets. Thus, mobile service providers should strive for loyal customers (and not just to retain them). Loyal customers create a viral effect and talk up a company to their friends, families, and colleagues (Reichheld 2003). Consequently, wireless operators can utilize loyalty to create a massive network of unpaid sales persons.

A closer analysis demonstrates that the original ACSI model examines the association between satisfaction and loyalty where customer loyalty is employed as a uniform construct. However, the moderating effect of the switching barrier on loyalty, identified by (Kim et al., 2004) distinguishes between the two components of loyalty. The likelihood of repurchase should not be affected by switching barriers, since repurchase refers to a hypothetical case where no barriers exist (i.e., when acquiring a new service, individuals may freely choose any service provider they want since they are not tied by previous contractual obligations). In contrast, price tolerance of subscribers is measured with respect to the actual situation where switching barriers exist (i.e., due to prior contractual obligations). In line with this notion, it is suggested that, in case of mobile services, loyalty consists of two distinct components: repurchase likelihood and price tolerance.

An additional industry-specific issue that needs to be explored is the moderating role of the type of subscriber-operator relationship. As the binding nature of these relationships can affect customer loyalty and retention, this moderator should be investigated. The mobile industry provides two distinct types of service provider-customer relationships: 1) low commitment relationship (prepaid); and, 2) high commitment relationship (post-paid). Prepaid users do not have contractual relationships with service providers. They pay in advance for a limited amount of services. Whenever these users want to consume more airtime, they refill their cards by paying service providers or their channel merchants. In contrast, post-paid users have long term (typically, at least 1 year) contractual relationships with a provider and pay on a monthly basis according to the usage of services in the previous billing period.

These two categories of contractual obligations allow distinguishing two groups of customers who may potentially develop different perceptions of mobile services. Given that both forms of relationships are currently widely utilized, it is important to understand the differences in customer behaviors between these two groups. Though initially the industry introduced only the post-paid payment method, prepaid services became widely popular in recent years. By the end of 2003 prepaid users accounted for over 50% of the install base worldwide (Lonergan et al., 2004). As such, it is suggested that the type of payment mechanism is a moderator to all relationships in the proposed model. As of today, literature offers no evidence on potential differences in customer perceptions and behaviors based on the type of payment methods.

Research Questions

In order to explore the aforementioned arguments, this study adapts the ACSI model to address the three following research questions. The first question pertains to the validation and application of the American Customer Satisfaction Model to test user satisfaction and perceptions of mobile services:

- 1) Does the American Customer Satisfaction Model provide an accurate description of user behaviour with respect to mobile services?

Consistent with previous studies that employed the ACSI model, a number of hypotheses are suggested:

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

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

H3: There is a positive association between perceived customer expectations and customer satisfaction with mobile services.

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

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

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

H7: There is a positive association between customer satisfaction and repurchase likelihood from a particular provider of mobile services.

H8: There is a positive association between customer satisfaction and price tolerance with respect to a particular provider of mobile services.

H9: There is a negative association between customer satisfaction and customer complaints.

H10: There is a negative association between customer complaints and repurchase likelihood from a particular provider of mobile services.

H11: There is a negative association between customer complaints and price tolerance with respect to a particular provider of mobile services.

The second research question refers to the examination of differences between prepaid and post-paid users in terms of the components of the model. Recognizing differences in the attitudinal antecedents that lead to loyalty and retention may help both academics and practitioners to understand the behavior of wireless consumer segments.

2) Are there significant underlying differences between prepaid and post-paid users which may lead to different levels of repurchase likelihood and price tolerance?

To explore this research question, the means of all constructs pertaining to two groups of customers (prepaid vs. post-paid) should be compared. The following hypotheses are proposed:

H12: There is a difference in the mean of the perceived expectations construct between prepaid and post-paid users.

H13: There is a difference in the mean of the perceived quality construct between prepaid and post-paid users.

H14: There is a difference in the mean of the perceived value construct between prepaid and post-paid users.

H15: There is a difference in the mean of the customer satisfaction construct between prepaid and post-paid users.

H16: There is a difference in the mean of the repurchase likelihood construct between prepaid and post-paid users.

H17: There is a difference in the mean of the customer price tolerance construct between prepaid and post-paid users.

H18: There is a difference in the median of the customer complaints construct between prepaid and post-paid users.

The third research question relates to the computation of the American Customer Satisfaction Index (ACSI) based on this model. The calculation of this index will allow comparing the degree of user satisfaction with mobile services with the extent of individual satisfaction with services in other sectors. Furthermore, it can provide the basis for future comparative and longitudinal studies:

- 3) What is the American Customer Satisfaction Index (ACSI) with mobile services in Canada, and how does it compare to other industries?

Methodology

In order to answer the suggested research questions and test the hypotheses, a survey of 80 users of mobile phones was conducted. The questionnaire employed in this study is presented in Appendix I. The following subsections report on the selection of subjects and present the rationale for the creation of the instrument.

Subjects

Respondents to the self-administered survey comprised of two groups. The first group included 60 individuals who were randomly chosen undergraduate and graduate students as well as staff and faculty members of a Canadian university. The second group comprised 20 indiscriminately selected mobile phone users who were personally known to the researchers, and who resided in Canada. In order to control for country-specific effects, residents of only one country (Canada) were surveyed. Although there is a view that this data collection approach corresponds to a convenience rather than a probabilistic sampling method (Kitchenham and Pfleeger 2002), it is believed that surveying this sample population would yield statistical results generalizable to the entire user population for the following reasons. First, all respondents used mobile phones for at least 4 months that is sufficient to establish reliable perceptions and opinions regarding the service. Second, as indicated in the “Results” section of this paper, this sample is an actual representation of the entire Canadian user population based on the comparison of demographic data.

Measures

The Likert scales for measuring all constructs were adapted from Fornell et al. (1996). In measures of customer satisfaction, the skewness of the frequency distributions is a serious threat to validity (Anderson and Fornell 2000). In order to avoid that problem, a ten-point Likert-type scale was used because it enables respondents to make better discriminations (Andrews 1984). The use of a fairly high number of scale categories as well as multiple questions per constructs was expected to yield valid data. In addition to questions pertaining to the ACSI model, several responses pertaining to demographic information, current service providers, and types of contractual obligation (i.e., prepaid vs. post-paid) were solicited.

In order to assess face validity of the research instrument, a group consisting of industry practitioners, academics, and mobile phone users was consulted. As a result of their feedback, a few scales were slightly modified and several questions were adjusted. Overall, it was believed that the use of this research instrument facilitated the collection of reliable and valid data that may help answer the proposed research questions and related hypotheses.

Data Analysis and Results

Descriptive Statistics

Recall the study involved 80 individuals who were current users of mobile phones and who resided in Canada. Two questionnaires were returned incomplete, and they were excluded from data analysis. Overall, 78 valid responses were obtained out of which 64 were post-paid users and 14 were prepaid users. There were 39 female and 39 male participants. Table 1 outlines some descriptive statistics on their demographics:

Table 1: Demographics

	Under 20	20-25	26-35	Over 35
Male	1	18	15	5
Female	6	20	12	1
Total	7	38	27	6

The analysis demonstrates that most respondents used cellular phones mainly for personal communications (93%), but some used them for work as well (36%)³. 83% of the respondents paid phone bills themselves. In some cases, phone bills were paid by parents, employer, etc. The majority of respondents had only one mobile phone (94%) but some used two handsets simultaneously (6%). Nokia was the dominant handset brand among the respondents (25%), followed by Motorola (22%). The rest of the respondents used various other handset brands (e.g., Audiovox, LG, etc.). 26% of the respondents had a color screen phone, and 6% had an integrated digital camera.

The respondents had various levels of experiences with mobile services and the functionalities of their phones. For less than 22% of the respondents, the current cell-phone was their first one. Table 2 offers descriptive statistics on the respondents' experience with their current service providers and current handsets. Table 3 reports on user experience with value added services.

Table 2: Respondents' Experience with Current Service Provider and Current Handset

	Under 6 Months	7-12 Months	13-24 Months	25-36 Months	Over 36 Months
Current Handset Purchase	20	18	21	11	8
Connection to current service provider	14	13	16	11	22

Table 3: Experience with Value Added Services

Feature	Respondents who use this feature⁴
Voicemail	74%
Text Messaging	65%
SMS based Information Services	42%

³ The sum is more than 100% since some individuals used mobile phones both for personal communication and for work.

⁴ The total is more than 100% since many individuals used two or more services.

Feature	Respondents who use this feature⁴
Play Games	24%
Voice Activated Dialing	23%
Wireless Internet Access	15%
Download Ringtones and Icons	14%
Picture Messaging	5%
Download Games	4%

Further analysis demonstrates that an average respondent spent 21 minutes per day on the phone, sent and received 1 text message (SMS) per day, and spent 56 Canadian Dollars per month. Thus, the monthly average revenue per user (ARPU) of the obtained data sample is almost identical to the average ARPU in the Canadian population (54\$ in 2002, according to CWTA (2004)).

Table 4 outlines the distribution of respondents in terms of wireless service providers, compared to the distribution of subscribers in Canada. Although there are some differences in numbers, it is believed that the obtained sample fully represents the general population's distribution and the results are generalizable to the entire Canadian mobile phone user population.

Table 4: Service Providers' Distribution

Wireless Operator	Sample	Population⁵
Rogers AT&T Wireless	40.26%	28.22%
Telus	31.17%	25.50%
Bell Mobility	20.78%	37.01%
Microcell (Fido)	7.79%	9.27%

As one can see, Rogers and Telus are somewhat overrepresented in our sample while Fido and Bell-Mobility are under-represented. However, a Chi-Square test for goodness of fit reveals that market shares in our sample and in the Canadian market do not differ significantly at the 1% level, (Chi Square test statistic of 10.47 on 3 degrees of freedom for which the *p*-value is 1.5%).

Measurement Model

The loadings of the total set of all items were estimated by using Partial Least Squares (PLS) (Chin 1998; Gefen, Straub and Boudreau 2000). PLS is suitable for this kind of a project because it fits both exploratory and confirmatory research, places less restriction on the data, and requires smaller sample sizes. In addition, since the prior ACSI-based studies utilized PLS, the usage of this technique allows comparing the results obtained in the present investigation with those of previous projects.

Table 5 presents the measurement model. The results demonstrate that the loadings of all items exceeded the required threshold of 0.7, and, therefore, explain over 50% of the variance in an observed item. At the same time, the instrument showed high internal reliability since the Cronbach's Alphas were above 0.7 for all scales. The item-to-total correlations of all indicators were greater than 0.35. As such, no items were removed from the model.

⁵ Based on the Subscriber Data report from the Canadian Wireless Telecommunications Association (2004).

Table 5: Estimated loadings for the total set of measurement items

Item	Mean	Std. dev	Loading	Error	Item-total correlations
PQ1	6.766	1.661	0.9163	0.1604	0.8093
PQ2	7.247	1.656	0.8734	0.2372	0.7051
PQ3	7.091	1.687	0.8937	0.2013	0.7668
PE1	8.103	1.813	0.7681	0.4100	0.6137
PE2	8.103	1.672	0.9265	0.1416	0.7337
PE3	8.179	1.665	0.9007	0.1888	0.7548
PV1	6.442	2.149	0.9513	0.0950	0.8024
PV2	6.156	2.165	0.9473	0.1026	0.8024
ACSI1	6.753	1.961	0.9126	0.1671	0.7675
ACSI2	5.688	1.734	0.8876	0.2121	0.7415
ACSI3	6.104	2.056	0.8540	0.2706	0.7022
CC	0.558	0.500	1.000	0.0000	1.0000
RL	6.628	2.787	1.000	0.0000	1.0000
PT1	5.090	1.895	0.7456	0.4441	0.5378
PT2	3.803	1.782	0.9412	0.1141	0.5378

In order to test for discriminant validity, a matrix of loadings and cross-loadings was constructed (see Table 6). By using this matrix, the loadings of an item with its associated factor (or construct) to its cross-loadings were compared. All items had higher loadings with their corresponding factors in comparison to their cross-loadings. Therefore, it was concluded that there is some confidence in the discriminant validity of the measures and their corresponding constructs.

Table 6: Matrix of Loadings and Cross-loadings

	PQ	PE	PV	ACSI	CC	RL	PT
PQ1	0.9163	0.2877	0.6959	0.7194	-0.3002	0.6699	0.2979
PQ2	0.8734	0.4258	0.6921	0.7373	-0.2482	0.4343	0.2320
PQ3	0.8937	0.3307	0.6744	0.6880	-0.2638	0.6049	0.1814
PE1	0.2860	0.7681	0.2225	0.2430	0.2946	0.1849	0.0842
PE2	0.3232	0.9265	0.3380	0.3326	0.1082	0.2034	-0.1281
PE3	0.3127	0.9007	0.3079	0.3196	0.2068	0.2608	-0.1570
PV1	0.7721	0.3702	0.9513	0.8001	-0.3673	0.6421	0.2305
PV2	0.6867	0.3373	0.9473	0.8204	-0.2396	0.5624	0.2348
ACSI1	0.8069	0.3918	0.8448	0.9126	-0.1797	0.7110	0.3079
ACSI2	0.6559	0.2375	0.7536	0.8876	-0.2975	0.5983	0.3152
ACSI3	0.6489	0.3894	0.6520	0.8540	-0.1853	0.6029	0.2524
CC	-0.3024	0.1728	-0.3209	-0.2482	1.0000	-0.1178	-0.0855
RL	0.4985	0.2470	0.4991	0.5570	0.0035	1.0000	0.3442
PT1	0.1690	-0.0563	0.1266	0.2083	0.0763	0.3015	0.7456
PT2	0.1527	-0.1663	0.1513	0.1905	-0.0889	0.3225	0.9212

Table 7 presents construct statistics. First, tests for reliability of the measurement items relating to four constructs were conducted by estimating the Cronbach's Alpha. Based on the results, it was concluded that all scales behaved consistently. Secondly, internal consistency and convergent validity measures were calculated. The analysis demonstrated high internal consistency and convergent validity since the scores exceeded 0.7 and 0.5 threshold respectively (Fornell and Larcker 1981). Thirdly, measures of

discriminant validity were calculated as the square root of the average variance extracted compared to the construct correlations. All values were greater than those in corresponding rows and columns. Table 8 offers the correlation matrix and discriminant validity assessment.

Table 7: Construct Statistics.

	PQ	PE	PV	ACSI	PT
Arithmetic Mean	7.035	8.128	6.299	6.182	4.487
Cronbach's Alpha	0.875	0.836	0.890	0.859	0.701
Internal Consistency	0.9232	0.9010	0.9480	0.9156	0.8360
Convergent Validity	0.8004	0.7532	0.8921	0.7720	0.7378

Table 8: Correlation Matrix and Discriminant Validity Assessment⁶

	PQ	PE	PV	ACSI	PT
PQ	0.8946				
PE	0.391	0.8679			
PV	0.769	0.373	0.9445		
ACSI	0.800	0.384	0.853	0.8786	
PT	0.265	-0.098	0.245	0.331	0.8589

Based on the obtained measurement model, several key observations were made. First, the loading of the perceived personalization item was higher than those of indicators pertaining to the same construct. This finding is consistent with the results obtained by Fornell et al. (1996, p. 13-14) who concluded that the average loading of the perceived personalization indicator should be high for the communications industry. Table 9 presents the loadings of the perceived expectations construct. This empirical evidence demonstrates that mobile phone users expect mobile service providers to accurately meet their personal needs. Tailoring offerings to user requirements has a higher impact on the degree of perceived customer expectations, which, in turn, increases the extent of perceived quality of mobile services.

Table 9: The Perceived Expectations Construct

	Fornell et al. (1996)	Present study
PE1	0.81	0.77
PE2	0.85	0.93
PE3	0.68	0.90

Second, the cross-loadings of items pertaining to two presumably independent constructs: repurchase likelihood and price tolerance are low (PT1 = 0.3015 and PT2 = 0.3225). This observation confirms that mobile phone users perceive repurchase likelihood and price tolerance as relatively independent factors.

Third, the loading of the PT1 indicator (0.75) was lower than the loading to the PT2 item (0.94). Recall that the corresponding questions pertained to the probability of switching to a competitor given the competitor reduces prices (PT1) or staying with the same service provider given that the service provider increases prices (PT2). The difference in the loadings suggests that even a slight increase in the current fees accounts for more variability in loyalty than a similar price reduction by a competitor. For example, a

⁶ Fornell and Larcker (1981) measure of discriminant validity which is the square root of the average variance extracted compared to the construct correlations. The values are greater than those in corresponding rows and columns as per Fornell and Larcker.

five-percent increase in current charges will have a greater negative impact on customer retention than a five-percent decrease in fees by competitors. In addition, the mean of PT1 (5.09) is higher than that of PT2 (3.80). A paired *t*-test of the means of these items confirmed a significant difference ($p > 0.01$, $t = 5.9$). This confirms that cell phone users will consider changing a current provider if it raises prices by 13%, whereas they may tolerate any competitive price reductions up to 20% (see the questionnaire for more detail).

Structural Model

Jackknifing was done to derive *t*-statistics to assess the significance level of the model's coefficients and to test the hypotheses. Figure 2 presents the structural model. As such, seven out of eleven hypotheses were supported (H1, H4, H5, H6, H7, H8, and H9) and four hypotheses were rejected (H2, H3, H10, and H11). The beta coefficients for the rejected hypotheses were close to a zero and all *t*-values were below one. In order to further confirm the insignificance of the rejected hypotheses, the linkages corresponding to those hypotheses were dropped, and the PLS model was re-estimated. The analysis revealed that the beta coefficients and *t*-values of the remaining model were strong and significant. In addition, none of the R-squared values changed that manifests the statistical validity of the remaining linkages.

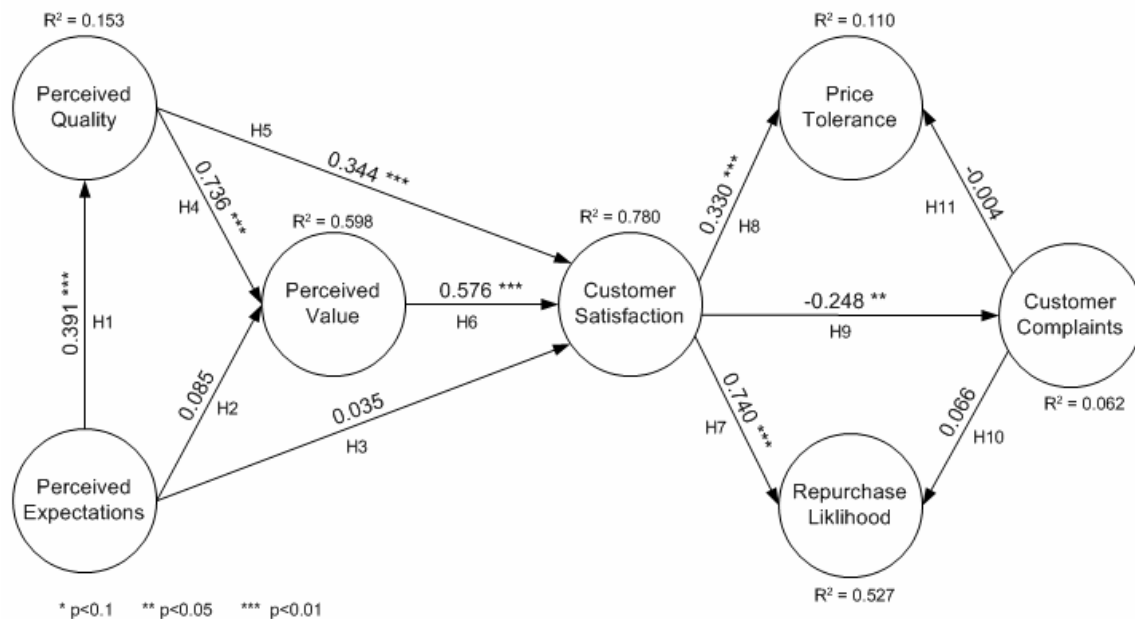


Figure 2: Structural Model

Contractual Obligation Differences

Recall that the sample included 64 post-paid users and 14 prepaid users. The application of the Chi-square test to examine the respondents' distribution (18% prepaid and 82% post-paid) in comparison to the general population's distribution (24% and 76% respectively) reveals that the obtained sample represents the population (p -value > 0.22). Key differences between these two groups of users were examined in two ways.

First, a direct question on the likelihood of switching to the other form of payment was asked ("If you use prepaid cards, how likely is that you will switch to a monthly billing service in the next six months?" or "If you use a monthly billing service, how likely is that you will switch to a prepaid service in the next six months?"). Both groups of users demonstrated low likelihood of changing their current payment method since the average response was around 2 on a 1 to 10 Likert-type scale. The average switching likelihood of prepaid users was higher than that of post-paid users (2.64 and 1.92 respectively). A Wilcoxon Rank

Sum Test (Aczel 1996)⁷ was applied to examine the median difference between the samples. The p -value of 0.29 suggests that there is some evidence to support the hypothesis that there is no difference between the medians of the user groups.

Second, an index score was calculated for all of the constructs (excluding Customer Complaints (CC)) for each observation based on the formula suggested by Anderson and Fornell (2000):

$$Index_j = \frac{\sum_{i=1}^n w_i \cdot x_i - \sum_{i=1}^n w_i}{9 \cdot \sum_{i=1}^n w_i} \times 100 \quad (1)$$

Where n is the number of items that load on construct j , w_i is the weight of the i^{th} item obtained from the outer model generated by PLS and x_i is the score of the i^{th} item that loads on construct j . Next, 78 observations were divided into two groups: post-paid users and prepaid users, and the distribution of the index scores was examined by using density plots in SPSS. It was evident that all of the indexes, except for Customer Complaints, were relatively normally distributed. Thus, a series of t -tests to examine differences between the means was performed. As the Customer Complaints (CC) construct is bimodal (either 1 or 0) a non-parametric Wilcoxon Signed Rank Test was used to examine it. Table 10 reports the results.

Table 10: T-test for differences between prepaid and post-paid users

Construct	t -value	DF	p -value	H0: Difference between means=0
PE	0.0116	18.635	0.9908	H12 – Reject
PQ	0.9839	62.322	0.3290	H13 – Reject
PV	3.0890	37.472	0.0038	H14 – Accept
ACSI	1.4148	31.254	0.1670	H15 – Reject
RL	1.0326	20.413	0.3139	H16 – Reject
PT	-0.9013	26.846	0.3754	H17 – Reject

A Wilcoxon test for CC shows that there is no difference between the distribution of complaints of post-paid users and the distribution of complaints of prepaid users (W statistics of 459 with p -value of 0.784). Thus, H18 is rejected.

This analysis demonstrates that there is no difference in perceived expectations, perceived quality, satisfaction, and loyalty between prepaid and post-paid users. However, it shows that there is a statistically significant difference between these groups in terms of perceived value of mobile services. The index of perceived value of prepaid users was significantly higher than that of post-paid ones (70.23 and 56.39 respectively). This difference might be an outcome of the two different levels of contractual commitment (low for prepaid users and high for post-paid users). Thus, the freedom to disconnect from the current service provider, even though paying higher airtime fees, increases the perceived value of mobile services for post-paid users.

The American Customer Satisfaction Index of Mobile Services

Based on formula (1), the ACSI score for the Canadian mobile services was calculated. Surprisingly, this score (57.86) was relatively low compared to the scores reflecting customer satisfaction with products and services in other industries in Canada in Q4, 2003. Table 11 outlines this comparison.

⁷ A non parametric test is used here rather than Chi-square test since the data is not normally distributed. It is identical to the Mann-Whitney U test when applied to unpaired data.

Table 11: ACSI for select industry sectors⁸

Sector	ACSI
E-Commerce	80.8
Retail	75
Finance/ Insurance	74.7
Fixed-Wire telephone services	72
Scheduled Airlines	67
Publishing/ News Papers	64
Cable & Satellite TV	61
Mobile Services	57.86

Discussion, Conclusions, and Directions for Future Research

The purpose of the study was three-fold: 1) to apply the American Customer Satisfaction Model to the area of mobile services; 2) identify possible differences in perceptions of mobile services between individuals using prepaid and post-paid payment methods; and, 3) to calculate the ACSI and compare it with indexes of other industries. Regarding the first research question, the study demonstrates that the American Customer Satisfaction Model adequately describes the perceptions and behavior of mobile phone users. Particularly, the degrees of perceived quality and perceived value are the key factors affecting a person's perception of the quality of provided services. The perception of quality influences the extent of loyalty. As such, highly satisfied customers tend to demonstrate a high likelihood of repurchase and higher tolerance to price increases by providers or price decreases by competitors. Furthermore, it was found that due to the moderating role of switching barriers, loyalty, in the context of mobile services, is not a unified construct but rather one with at least two distinct dimensions: repurchase likelihood and price tolerance. A negative link between satisfaction and customer complaints shows that the more satisfied a customer is, the less he or she is prone to complain.

With respect to the second research question, it was found that mobile phone users perceive the level of services similarly regardless of the nature of their contractual obligations (prepaid vs. post-paid). However, it was discovered that prepaid users develop a higher degree of perceived value of the received services. In fact, although prepaid users pay higher per-minute rates and have lower monthly usage and charges, they receive the same quality of services. More research is needed to explain this finding.

With regards to the last research question, it can be said that the respondents to the survey reported a surprisingly low degree of satisfaction with mobile services, which is even lower than those of cable companies and satellite TV providers. This suggests that Canadian mobile operators need to further improve their offering through a better understanding of their subscriber base and their needs.

Despite its contribution, this study had several limitations. First, a convenience data sample was used. Although it was concluded that this data collection procedure produced reliable and valid results, the employment of random samples is necessary to judge upon the generalizability of findings. Second, the sample of 78 valid responses is adequate for an exploratory investigation only, and larger sample sized are required for future confirmatory studies.

With respect to future research initiatives, several avenues can be explored. First, a large-scale study utilizing a data sample of at least 400 respondents is required to further confirm the viability and applicability of the model. It is also desirable to survey several thousands of mobile phone users by asking the questions pertaining to the satisfaction scale that will yield a more accurate measurement of the

⁸ Data obtained from www.theacsi.org

ACSI. However, the authors caution that such an investigation should be conducted within a short period of time, not more than a few weeks, since respondents' perceptions may change under the influence of external factors. Secondly, a longitudinal study is necessary to monitor the evolution of customer behavior over time. Ideally, mobile services should be added on the list of the industries for which the ACSI is calculated quarterly. Thirdly, similar studies should be conducted in other countries.

To the knowledge of the authors, this was the first documented attempt to apply the American Customer Satisfaction Model to investigate user perceptions and behavior towards mobile services. Overall, it is believed that this study has formed the foundation for further explorations of the field of mobile commerce.

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References

- Aczel, A.D. *Complete business statistics*, (3 ed.) Irwin, Chicago, 1996.
- Anderson, E.W. and Fornell, C. "Foundations of the American Customer Satisfaction Index," *Total Quality Management & Business Excellence* (11:7) 2000, pp 869-882.
- Andrews, F.M. "Construct validity and error components of survey measures: A structural modeling approach," *The Public Opinion Quarterly* (48:2) 1984, pp 409-442.
- Arnett, D.B., Laverie, D.A., and Meiers, A. "Developing parsimonious retailer equity indexes using partial least squares analysis: A method and applications," *Journal of Retailing* (79:3) 2003, pp 161-170.
- Bolton, R.N. "A dynamic model of the duration of the customer's relationship with a continuous service provider: The role of satisfaction," *Marketing Science* (17:1) 1998, pp 45-65.
- Chin, W.W. "The Partial Least Squares approach for Structural Equation Modeling," in: *Modern methods for business research*, G.A. Marcoulides (ed.), Lawrence Erlbaum Associates, Mahwah, N. J., 1998, pp. 295-336.
- CWTA "Subscriber Statistics," Canadian Wireless Telecommunications Association. Available online at <http://www.cwta.ca>, 2004.
- (CWTA), C.W.T.A. "Subscriber Statistics," Canadian Wireless Telecommunications Association, Canada, 2004.
- Dawkins, P.M., Reichheld, F.F. "Customer retention as a competitive weapon," *Directors & Board* (14:Summer) 1990, pp 42-47.
- DeSouza, G. "Designing a customer retention plan," *The Journal of Business Strategy* (13:2) 1992, pp 24-28.
- FCC "Wireless Local Number Portability (WLNP): Consumer facts," Federal Communications Commission. Available online at <http://www.fcc.gov/cgb/consumerfacts/wirelessportability.html>, 2003.
- Fornell, C. "The science of satisfaction," *Harvard Business Review* (79:3) 2001, pp 120-121.
- Fornell, C., Johnson, M.D., Anderson, E.W., Cha, J., and Bryant, B.E. "The American Customer Satisfaction Index: Nature, purpose, and findings," *Journal of Marketing* (60:7) 1996, pp 7-18.
- Fornell, C. and Larcker, D.F. "Evaluating structural equation models with unobservable variables and measurement error," *Journal of Marketing Research* (18:1) 1981, pp 39-50.
- Gefen, D., Straub, D., and Boudreau, M.-C. "Structural Equation Modeling and Regression: Guidelines for research practice," *Communications of the Association of Information Systems* (4:7) 2000, pp 1-77.
- Gerpott, T.J., Rams, W., and Schindler, A. "Customer retention, loyalty, and satisfaction in the German mobile cellular telecommunications market," *Telecommunications Policy* (25:4) 2001, pp 249-269.
- Gorst, J.K., Wallace, W., and Kanji, G.K. "Customer satisfaction at the Sheffield World Congress," *Total Quality Management* (10:4/5) 1999, pp 561-568.
- Grigoroudis, E. and Siskos, Y. "A survey of customer satisfaction barometers: Some results from the transportation-communications sector," *European Journal of Operational Research* (152:2) 2004, pp 334-353.
- Ho, S.Y. and Kwok, S.H. "The attraction of personalized service for users in mobile commerce: An empirical study," *ACM SIGecom Exchanges* (3:4) 2003, pp 10-18.
- ITU "World Telecommunications Indicators," International Telecommunications Union. Available online at <http://www.itu.int/ITU-D/ict/statistics>, 2003.
- Keaveney, S.M. "Customer switching behaviour in service industries: An exploratory study," in: *Journal of Marketing*, 1995, pp. 71-82.

- Kim, M.K., Park, M.C., and Jeong, D.H. "The effects of customer satisfaction and switching barrier on customer loyalty in Korean mobile telecommunication services," in: *Telecommunication Policy*, 2004, pp. 145-159.
- Kitchenham, B.A. and Pfleeger, S.L. "Principles of survey research part 5: Populations and samples," *Software Engineering Notes* (27:5) 2002, pp 17-20.
- Loneragan, D., Swain, W., Guy, A., Yunus, F., Jackson, J., Mallinson, K., Barrabee, L., Minoru, L., hatton, M., Entner, R., Putcha, S., Hoffman, G., and Quigley, M. "Asia-Pacific region to drive global wireless revenue," The Yankee Group, Boston, MA, 2004, pp. 1-14.
- Mukherjee, A., Nath, P., and Pal, M. "Resource, service quality and performance triad: A framework for measuring efficiency of banking services," *Journal of the Operational Research Society* (54:7), July 2003, pp 723-735.
- Oliver, R.L. *Satisfaction: A behavioural perspective on the consumer*, Irwin McGraw-Hill, Boston, 1997.
- Paltridge, S. "Current statistics: Mobile communications update," *Telecommunications Policy* (24:5) 2000, pp 453-456.
- Price, L.L., Arnould, E.J., and Tierney, P. "Going to extremes: Managing service encounters and assessing provider performance," *Journal of Marketing* (59:2), April 1995, pp 83-97.
- Reichheld, F.F. "The one number you need to grow," *Harvard Business Review*), December 2003, pp 46-54.
- Reichheld, F.F. and Sasser, W.E. "Zero defections: Quality comes to services," in: *Harvard Business Review*, 1990, pp. 105-111.
- Reichheld, F.F. and Teal, T. *The loyalty effect: The hidden force behind growth, profits, and lasting value*, Harvard Business School Press, Boston, MA, 1996.
- Rust, R.T., Zahorik, A.J., and Keiningham, T.L. "Return on quality (ROQ): Making service quality financially accountable," *Journal of Marketing* (59:2) 1995, pp 58-70.
- The Yankee Group "Global Wireless/ Mobile Forecast," 2004.
- Yunus, F. "Adapting to prepaid realities in Europe," Yankee Group Report, Boston, MA, 2002, pp. 1-12.
- Zeithaml, V.A. and Bittner, M.J. *Services marketing*, McGraw-Hill, Singapore, 1996.

Author Bios:

Ofir Turel is a PhD candidate at the DeGroote School of Business, McMaster University. Ofir holds an MBA in technology management and a B.Sc. in industrial engineering. Before joining McMaster University, Ofir has held senior positions in the information technology and telecommunications industries. He was a member of the GSM Association working committees, and contributed to the development of value added wireless services. Ofir's research interests include mobile services, human computer interaction, and Web-based dispute resolution.

Alexander Serenko is a Ph.D. candidate in Management Science/Systems at the DeGroote School of Business, McMaster University. Alexander holds a M.Sc. in computer science and an MBA in eBusiness. His research interests pertain to interface agents, knowledge management, and innovation. His dissertation explores the adoption and use of interface agents for electronic mail. Alexander is the Director of the Doctoral Consortium at the McMaster World Congress.

Appendix 1: Survey

Part A. Mobile Phone Usage.

Please check the box or circle the number that best matches your mobile phone (cell-phone) usage. Feel free to skip any questions if you consider them personal or inappropriate.

Are you using more than one mobile phone?

- Yes If yes, how many mobile phones are you currently using? _____
- No

Please answer the questions below with respect to your current mobile phone, or the mobile phone you are most frequently using, or the phone you were using.

What is the phone's brand? _____ Model (if known) _____

Does it have a color screen? Yes No

Does it have a digital camera? Yes No

Who is your current service provider?

- Rogers Telus Fido Bell Other (specify) _____

When did you purchase / receive this phone?

_____ months ago

When did you connect to your current service provider?

_____ months ago

Is this your first mobile phone? Yes No

Do you personally pay your mobile service bills?

- Yes
- No If no, please specify who pays your bills: _____

What do you primarily use your mobile phone for? (check all applicable categories)

- work personal emergencies Other (explain) _____

Please specify all mobile services you use (check all applicable categories)

- voice calls
- download games
- play games
- text messaging (SMS, MMS)
- picture messaging (picture exchange)
- voicemail
- download ringtones and icons
- voice activated dialing

- wireless Internet access
- roaming (using your mobile phone in a foreign country)
- information services (e.g., news, stock quotes, weather, etc)

The average number of calls you make per day (i.e., when you call someone first)
 _____ calls

The average number of calls you receive per day (i.e., when someone calls you first)
 _____ calls

The average number of text messages (SMS, MMS) you send per day (if any)
 _____ messages

The average number of text messages (SMS, MMS) you receive per day (if any)
 _____ messages

How much time do you spend talking over your mobile phone per day?
 _____ minutes

What are your average monthly expenses? (i.e., your average monthly mobile phone bill)
 \$ _____

Part B. Pre-purchasing expectations.

Please answer the questions below based on your general experience with the mobile phone and service **you are currently using**. If you are using more than one phone, consider the **most frequently utilized** one.

Definitions: You use a **pre-paid** service if you purchase calling cards for your mobile phone.

You use a **monthly billing** service if you receive a monthly bill from your provider and you pay it within a certain period of time by check, money transfer, credit card, pre-authorized payment from your banking account, at a bank in person, etc.

What category (or type) of program are you using?

- Pre-paid** (i.e., you purchase calling cards for your mobile phone)

If you use pre-paid cards, how likely is that you will switch to a monthly billing service in the next six month?

very unlikely very likely

1 2 3 4 5 6 7 8 9 10

- Monthly billing** (i.e., contract-based, you receive a monthly bill from your provider and you pay it within a certain period of time by check, money transfer, credit card, pre-authorized payment from your banking account, at a bank in person, etc.)

If you use a monthly billing service, how likely is that you will switch to a pre-paid service in the next six month?

very unlikely very likely

very dissatisfied very satisfied
1 2 3 4 5 6 7 8 9 10

ACSI 2. Considering your expectations, to what extent have these mobile services fallen short or exceeded your expectations?

fell very short exceeded by far
1 2 3 4 5 6 7 8 9 10

ACSI 3. How close are the services offered by this provider to your ideal mobile services?

very far from ideal very close to ideal
1 2 3 4 5 6 7 8 9 10

RL1. If you required a new mobile phone, how likely is it that you would choose your current provider for mobile services?

very unlikely very likely
1 2 3 4 5 6 7 8 9 10

PT1. If a competitive provider offers you the same range and quality of services as you currently receive, by how much should their prices be lower than those you are currently paying for you to change your current provider?

1% 5% 10% 15% 20% 25% 30% 40% 50% over
50%

PT2. If your current service provider increases prices given the same range and quality of services, how much would they have to increase their prices for you to consider switching to a competitor?

1% 5% 10% 15% 20% 25% 30% 40% 50% over
50%

CC1. Have you ever complained (either formally or informally) about mobile services you receive?

- Yes
- No

Part D. Demographics.

Your age: _____ years

Your gender: male female