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Assessing customer retention strategies in mobile telecommunications
Hybrid MCDM approach

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Abstract

Purpose – As wireless penetration continues to increase worldwide, competitors in the mobile telecommunication industry are changing their strategies from a growth model to a value-added one. The companies that can attract and retain customers in this highly competitive and increasingly saturated market stand poised to make considerable gains, and thus customer retention is an important field of study in this maturing market. Using the Canadian mobile phone market as an example, this work aims to study the major motivators of customer retention and their interrelationships, and assess the value that customers perceive with regard to the related advertising.

Design/methodology/approach – Based on a literature review and expert validation, the motivators of customer retention are divided into three dimensions and eight criteria. A systematic hybrid multiple criteria decision-making (MCDM) method that combines the decision making trial and evaluation laboratory (DEMATEL) technique and the analytic network process (ANP) is used to examine the customer retention framework and to evaluate the promotional strategies used by various market players.

Findings – The interdependence relation shows that phone service quality, customer service quality, and phone plan quality are three major motivators in terms of causality with regard to brand image, customer service quality, and complaint management, while phone service quality has become a hygiene factor with regard to customer satisfaction and retention. The findings from an assessment of the promotional strategies used by the major players in the Canadian mobile telecoms industry suggest that well-financed foreign entrants pose a risk to the major domestic carriers, and that successful promotional strategies will require strong leverage of their existing price and quality advantages.

Originality/value – This work adopted a hybrid MCDM approach to examine a major strategic issue in mobile telecoms, – i.e. customer retention – and demonstrated the strengths of using this method to investigate rapidly changing markets. The relative importance of the motivators of satisfaction and retention is investigated, and a strategy for customer retention in the mobile telecoms industry is provided to managers.

Keywords Multiple criteria decision-making,
Decision making trial and evaluation laboratory (DEMATEL), Analytic network process,
Customer retention, Mobile telecommunications, Strategy evaluation, Brand image,
Customer services quality

Paper type Research paper

1. Introduction

Communication technologies have evolved rapidly over the past two decades. Speed, quality, affordability, and information richness have all developed out of early systems. As the demand for simple and effective communication has increased, so has the adoption of personal communication devices. With the resulting economies of scale in place, the price of these technologies and associated services has dropped dramatically (Carr, 2003), and the information being delivered has expanded from simple voice-communications to more data-rich services (Kim *et al.*, 2004). The companies that can attract and retain customers in this highly competitive and increasingly saturated market stand poised to make considerable gains. As wireless penetration continues to increase worldwide, companies are changing their strategies from a growth model to a value-added one (Light *et al.*, 2010). One of the strategies available in the value-added model is innovation (Berry *et al.*, 2006), as well as increasing customer satisfaction (Rust and Zahorik, 1993).

While customer satisfaction is an important part of the relationship between a provider and customer, the real value of customer satisfaction is shown in retention. There have been several notable satisfaction and retention case studies in various mobile telecoms markets, such as those in France (Lee *et al.*, 2001), Germany (Gerpott *et al.*, 2001), South Korea (Kim *et al.*, 2004), Turkey (Türkyilmaz and Özkan, 2007), and Sweden (Fornell, 1992). However, these studies used conceptual models to undertake their causal analysis, without a comprehensive examination of the relationships among the various customer retention concern factors, and their relative importance. Moreover, the effectiveness of the current customer recruitment strategies that are implemented in the telecoms industry is unknown. This paper contributes to practice by increasing understanding of customer retention in mobile services, and the results can be used by service providers to improve their service offerings and competitive strategies.

To address some of the drawbacks in previous works, this research first reviews the mobile telecoms customer retention factors that appear in the literature, and then develops an MCDM hierarchy framework that is validated by experts. A novel hybrid MCDM method combining DEMATEL and ANP is then applied to examine the empirical case of the Canadian mobile telecoms industry. Based on an expert survey, the DEMATEL technique is used to analyze the causal relationships among various complex factors, and then to build an impact relation map among the dimensions and criteria in the MCDM hierarchy structure. The weights of each factor related to customer retention are then be derived by utilizing the ANP, and the results are ranked to identify the importance of factors. The evaluation objects are taken from the advertisements of four Canadian mobile telecoms companies, in order to assess their promotional strategies. Based on this work, a comprehensive view of the topic under discussion is offered and various promotional strategies are tested, and thus the results can serve as a reference for mobile telecoms service providers.

The rest of this paper is organized as follows. In section 2, the relevant literature regarding mobile telecoms and customer retention is review to develop the MCDM hierarchy framework. Section 3 reviews the hybrid MCDM method, which is the DEMATEL-based ANP. In section 4, an empirical study is presented to show the effectiveness of the method developed in this work. Section 5 presents a discussion of the research findings and their managerial implications. Finally, the concluding remarks are presented in section 6.

2. Literature review

The construct of customer retention focuses on repeat patronage, and it is different from, while closely related to, purchasing behavior and brand loyalty, in that in retention the marketer is seen as having the more active role in the customer-firm relationship (Hennig-Thurau and Klee, 1997). A number of factors may drive customer retention, such as satisfaction, quality, switching costs (Seo *et al.*, 2008), CRM (Verhoef, 2003), marketing strategies (Larry and John, 1993), and customer acquisition (Thomas, 2001). This work focuses on the major motivators of cost, quality, and customer experience.

Customer satisfaction and customer retention are often studied simultaneously because of the complex relationship between the two constructs (Hennig-Thurau and Klee, 1997), and the former is considered as a motivator of the latter. Customer satisfaction refers to a consumer's assessment of all the interactions they have with the products and services from a provider, relative to their expectations. While it seems logical that a highly satisfied customer would be a retained one, this is not always the case, and satisfied customers can still defect, while dissatisfied ones can still be retained. Customer retention refers to a customer engaging in a contract, either formal or informal, over a period of time, which includes repeated transactions. Therefore, there must be additional factors beyond customer satisfaction that motivate retention, and it is these that the current study aims to uncover.

Customer satisfaction has been studied extensively, and models of customer satisfaction (Fornell, 1992; Fornell *et al.*, 1996) and service quality (Parasuraman *et al.*, 1988) frequently proposed and reassessed. These models have been shown to provide insights into the mindsets of consumers with regard to a variety of products and services, measuring how customers perceive a consumed good or service in terms of personal satisfaction.

These models assume that a customer is the best judge of their own personal satisfaction, and that their decisions and judgments are based on rational criteria. They also assume that the customer can reflect upon and express these judgments accurately in the form of a scaled questionnaire, which quantifies customer satisfaction based on criteria that can be first discovered by other means, such as a story or incident (Bitner *et al.*, 1990). These models also assume that improvements to a product or service based on customer satisfaction feedback would improve customer satisfaction, which then influences customer loyalty (Gerpott *et al.*, 2001), the most important driver of long-term financial performance (Reichheld and Sasser, 1990). Therefore, it is important to determine the critical factors that relate to customer satisfaction, and how they relate to retention.

Causal models are an excellent source of critical factors. One such satisfaction model is SERVQUAL (Parasuraman *et al.*, 1988), which considers the gaps between the service provider and the customer. The conceptual basis is that a customer's assessment of service quality is the motivator for their behavior (Buttle, 1995), and the gaps between the criteria confirm or disconfirm customer expectations. There have been many iterations and variations of SERVQUAL, and while it is an academic starting point for all service research, criticisms of the model exist (Buttle, 1995). However, it remains a key model for the current research, because it outlines the potential differences between the marketer and customer with regard to how an offering is perceived.

Building on SERVQUAL, customer perceptions then became a focus of research, with the objectives of the provider being entirely neglected, leading to the development

of the construct of customer expectations (CE). Fornell (1992) then created the first national customer satisfaction index (CSI) in Sweden, called the Swedish customer Satisfaction Barometer, while Fornell *et al.* (1996) produced the American Customer Satisfaction Index (ACSI).

In the ACSI model, customer satisfaction is determined by multiple indicators. The antecedents of customer satisfaction are perceived quality (PQ), perceived value (PV), and customer expectations (CE). Customer satisfaction (CS) is a latent variable, and this in turn affects voice (or customer complaints, CC), and loyalty (CL) (Fornell *et al.*, 1996). Overall, customer satisfaction is now accepted as a fundamental indicator of a firm's performance (Anderson *et al.*, 1994).

Based on the ACSI, the European Customer Satisfaction Index (ECSI, 1998) was then developed, with the addition of image (IM) and the removal of CC. More recently, Türkyilmaz and Özkan (2007) in Turkey have further adapted the ECSI model and made it more specific to mobile telecoms services, calling it the CSI-TMPS (Customer Satisfaction Index of Turkish Mobile Phone Sector). Satisfaction is a generalized concept that enables consumers to voice their overall impression of a good or service using a simple scale (Fornell *et al.*, 1996), and the current work focuses more on one of the consequences of satisfaction, retention, and the relationships among its motivators. Customer retention drives customer behavior and loyalty to a significant extent (Gerpott *et al.*, 2001), and this loyalty and behavior often translates into increased profits, with a strong linkage between overall satisfaction and long-term profitability (Reichheld and Sasser, 1990). Maintaining a high level of customer satisfaction is essential in competitive markets, and thus it is an important performance indicator (Turel and Serenko, 2006). Gerpott *et al.* (2001) also stated that mobile network operators should seek to improve their measurements of customer perceptions of core services, because customer satisfaction is closely tied to loyalty in the mobile services market. Based on these cost, quality, and experience factors, the MCDM hierarchy framework in Figure 1 is proposed.

This framework was developed based on a review of the literature, and was assessed and modified after a trial period of data collection. Following this, final revisions were made by discussions with experts from the telecoms industry and academia. The eight criteria shown in Table I were those deemed to be most relevant to customer retention in the mobile telecoms market based on this procedure.

3. A hybrid MCDM model combining DEMATEL and ANP

As any criterion may impact on the others, this study adopted the DEMATEL technique to assess the relationships among the eight criteria. The weights of each criterion from the structure were obtained by utilizing the ANP, and the related methodologies are detailed in the following subsections.

3.1 DEMATEL for constructing an impact relation network

The DEMATEL technique (Fontela and Gabus, 1976; Gabus and Fontela, 1973) is often used to analyze complicated social phenomena, and can be used to examine the relationships among various criteria (Chiu *et al.*, 2006; Huang and Tzeng, 2007). The outputs of DEMATEL in a matrix or diagram show the contextual relations among the criteria in the system, with numerals representing the strength of the influence of each
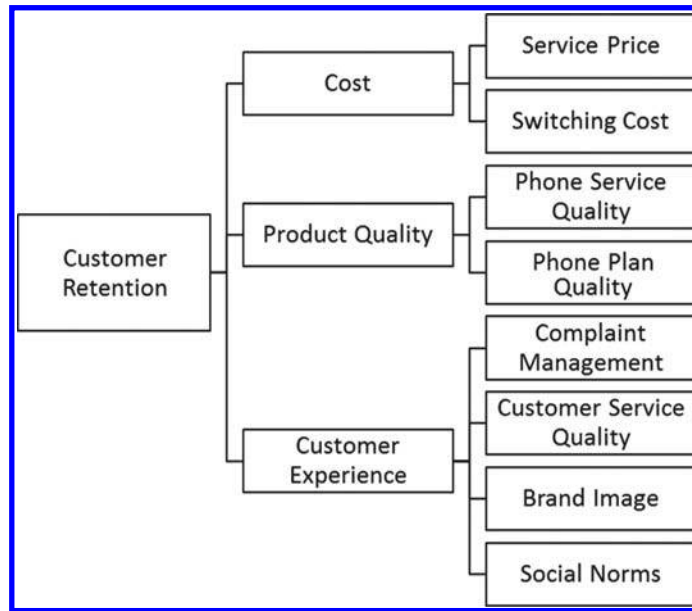
Figure 1.
Multiple criteria hierarchy
framework

Dimension	Criteria	Summary	Relevant literature
Cost	Service price (SP) Switching cost (SC)	The costs associated with entering and maintaining a relationship with a service provider	Fornell *et al.* (1996), Jones *et al.* (2002), Lee *et al.* (2001)
Product quality	Phone service quality (PSQ) Phone plan quality (PPQ)	The quality of the physical product, the associated core services, and the quality of the contract fit	Turel and Serenko (2006), Anderson and Sullivan (1993), Bolton (1998)
Customer experience	Complaint management (CM) Customer service quality (CSQ) Brand image (BI) Social norms (SN)	The interactions between customers and firms in a larger context. The ability to deal with everyday service, exceptions, public responses, and the associated image that is generated	Johnston (2001), Fornell and Wernerfelt (1988), Dasgupta *et al.* (2008), Anderson (1998), Fornell *et al.* (1996)

Table I.
Proposed dimensions and
criteria motivating
customer retention

criterion. Therefore, the DEMATEL technique is able to convert the relationships among the causes and effects of criteria into an intelligible structural model of a system (Wei *et al.*, 2010).

The DEMATEL technique has been widely applied in a number of disciplines, including airline safety (Liou *et al.*, 2008), e-learning (Tzeng *et al.*, 2005), decision-making (Bolaños *et al.*, 2005; Hajime and Kenichi, 2007; Lin and Wu, 2008), knowledge management (Shi *et al.*, 2005; Wu, 2008), operations research (Ou Yang *et al.*, 2008), project management (Jeng, 2012), business policy (Wu and Lee, 2007), selecting systems (Tsai and Chou, 2009), agriculture (Kim, 2006), technology innovation (Huang and Tzeng, 2007; Lee *et al.*, 2010; Yamashina *et al.*, 2005), marketing and consumer behavior (Hsu *et al.*, 2007; Wei *et al.*, 2010), theory validation (Jeng and Tzeng, 2012) and other areas. The DEMATEL procedure is described as follows.

Step 1: Calculate the direct-influence matrix by scores (depending on the views of the experts) and evaluate the relationships among elements (also known as variables/attributes/criteria) of mutual influence, using a scale ranging from 0 to 4 (indicating "no influence (0)," to "very high influence (4)"); Subjects are then asked to indicate the direct effect they believe each element i exerts on every other element j, as indicated by d_{ij}. The matrix D of direct relations is thus obtained, which shows the pair-wise comparison of a causal relationship. Assume there are n variables that impact the system, then the direct-influence matrix D is illustrated in the following matrix:

$$
D = \begin{bmatrix}
0 & d_{12} & \cdots & d_{1n} \\
d_{21} & 0 & \cdots & d_{2n} \\
\vdots & \vdots & \ddots & \vdots \\
d_{n1} & d_{n2} & \cdots & 0
\end{bmatrix}
$$

Step 2: Normalize the direct-influence matrix: On the basis of the direct-influence matrix D, the normalized direct-relation matrix N is acquired using equations (1) and (2):

$$N = D/u. \tag{1}$$

$$u = \max_{i,j} \left\{ \max_i \sum_{j=1}^{n} d_{ij}, \ \max_j \sum_{i=1}^{n} d_{ij} \right\}, i,j \in \{1, 2, \ldots, n\} \tag{2}$$

Step 3: Obtain the total-influence matrix: Once the normalized direct-influence matrix N is obtained by summing i or j, the total-influence matrix T is arrived at using Equation (3), in which the I is the identity matrix:

$$
\begin{aligned}
T &= N + N^2 + N^3 + \ldots + N^q \\
&= N(I + N + N^2 + \cdots + N^{q-1})[(I - N)(I - N)^{-1}] \\
&= N(I - N^q)(I - N)^{-1}
\end{aligned} \tag{3}
$$

Then $T = N(I\text{-}N)^{-1}$, when $q \rightarrow \infty$, $N^q = [0]_{n \times n}$, where:

$$N = \lfloor e_{ij} \rfloor_{n \times n}, \; 0 \leq e_{ij} < 1, 0 < \left(\sum_{j=1}^{n} e_{ij}, \sum_{i=1}^{n} e_{ij} \right) \leq 1.$$

If the summation of either row:

$$\left(\sum_{j=1}^{n} e_{ij} \right)$$

or column:

$$\left(\sum_{i=1}^{n} e_{ij} \right)$$

equals 1 we can guarantee $\lim_{q \to \infty} N^q = [0]_{n \times n}$.

Step 4: Analyze the results: At this stage, the sum of rows (given influence) and the sum of columns (received influence) are separately expressed as influential vector $\boldsymbol{d} = (d_1, \ldots, d_i, \ldots, d_n)$ by factor j ($j = 1,2,...,n$) and influential vector $\boldsymbol{r} = (r_1, \ldots, r_j, \ldots, r_n)$ by factor i ($i = 1,2,...,n$) using Equations (4)-(6). Then, when $i, j \in \{1, 2, \ldots, n\}$ and $i = j$ the horizontal axis vector $(\boldsymbol{d} + \boldsymbol{r})$ is made by adding vector $\boldsymbol{d}$ to vector $\boldsymbol{r}$, which shows the total influence of each criterion. Similarly, the vertical axis vector $(\boldsymbol{d} - \boldsymbol{r})$ is made by deducting vector $\boldsymbol{d}$ from vector $\boldsymbol{r}$, which can separate the criteria into cause and affected groups. In general, when the value of $d_i - r_i$ is higher, the criterion belongs to the cause group. In contrast, if the value of $d_i - r_i$ is lower, the criterion belongs to the affected group. Therefore, the cause-and-effect graph can be achieved by plotting the data set of $\{(d_i + r_i, \; d_i - r_i) \mid i = 1,2,\ldots,n\}$, providing a valuable approach for making decisions:

$$\mathrm{T} = [t_{ij}]_{n \times n}, i, j \in \{1, 2, \ldots, n\} \tag{4}$$

$$\boldsymbol{d} = \left[\sum_{j=1}^{n} t_{ij} \right]_{n \times 1} = [t_i]_{n \times 1} = [d_i]_{n \times 1} \tag{5}$$

$$\boldsymbol{r} = \left[\sum_{i=1}^{n} t_{ij} \right]_{1 \times n}' = [t_j]_{n \times 1} = [r_j]_{n \times 1} \tag{6}$$

where vector $\boldsymbol{d} = (d_1, \ldots, d_i, \ldots, d_n)'$ and vector $\boldsymbol{r} = (r_1, \ldots, r_j, \ldots, r_n)'$ express the sum of rows and the sum of columns based on the total-influence matrix $\boldsymbol{T} = [t_{ij}]_{n \times n}$, respectively.

3.2 ANP for criteria weights and evaluation of strategic alternatives

The ANP (Saaty, 1996) aims to overcome the drawback of analytic hierarchy process (AHP) (Saaty, 1990a; b), which assume the independence among hierarchical criteria. The ANP categorizes complex structures into various dimensions/clusters, where each

dimension consists of multiple criteria. There is outer dependence among clusters and inner dependence within the criteria of dimensions. The AHP/ANP has been applied widely in various contexts (Sipahi and Timor, 2010), and in this work the novel DEMATEL-based ANP is applied, where the process to conduct ANP through the DEMATEL total-influence matrix T is presented follows.

Step 5: Form the unweighted supermatrix by total-influence matrix. The total-influence matrix T obtained from equation (3) shows the relative importance value among all criteria. The unweighted supermatrix W can be formed as shown in Figure 2, where D_n denotes the nth dimension, e_{nm} denotes the mth element in the nth dimension, and W_{ij} is the principal eigenvector of the influence of the elements in the jth dimension compared to the ith dimension. In addition, if the jth dimension has no influence on the ith dimension, then $W_{ij} = [0]$.

Step 6: Determine the threshold value: It is necessary to set a threshold value α to explain the structural relationships among factors while simultaneously keeping the complexity of the whole system to a manageable level. Threshold value α is determined by experts to set up the minimum value of the influence level. An influence relationship between two elements will be excluded from the map if their correlative value in the matrix T is smaller than α. The new matrix with α-cut is called the α-cut total-influence matrix T_α, as follows:

Figure 2.

$$
\boldsymbol{T}_\alpha =
\begin{bmatrix}
t_{11}^\alpha & \cdots & t_{1j}^\alpha & \cdots & t_{1n}^\alpha \\
\vdots & \ddots & \vdots & \ddots & \vdots \\
t_{i1}^\alpha & \cdots & t_{ij}^\alpha & \cdots & t_{in}^\alpha \\
\vdots & \ddots & \vdots & \ddots & \vdots \\
t_{n1}^\alpha & \cdots & t_{nj}^\alpha & \cdots & t_{nn}^\alpha
\end{bmatrix}
$$

where:

$$
t_{ij}^\alpha =
\begin{cases}
t_{ij} : t_{ij} \geq \alpha \\
0 : t_{ij} < \alpha
\end{cases}
$$

Step 7: Obtain the normalized matrix. The normalized α-cut total-influence matrix $\boldsymbol{T}_\alpha$, namely $\boldsymbol{T}_s$, is acquired with equation (7):

$$
d_i = \sum_{j=1}^n t_{ij}^\alpha \tag{7}
$$

$$
\boldsymbol{T}_s =
\begin{bmatrix}
t_{11}^\alpha/d_1 & \cdots & t_{1j}^\alpha/d_1 & \cdots & t_{1n}^\alpha/d_1 \\
\vdots & \ddots & \vdots & \ddots & \vdots \\
t_{i1}^\alpha/d_i & \cdots & t_{ij}^\alpha/d_i & \cdots & t_{in}^\alpha/d_i \\
\vdots & \ddots & \vdots & \ddots & \vdots \\
t_{n1}^\alpha/d_n & \cdots & t_{nj}^\alpha/d_n & \cdots & t_{nn}^\alpha/d_n
\end{bmatrix}
=
\begin{bmatrix}
t_{11}^s & \cdots & t_{1j}^s & \cdots & t_{1n}^s \\
\vdots & \ddots & \vdots & \ddots & \vdots \\
t_{i1}^s & \cdots & t_{ij}^s & \cdots & t_{in}^s \\
\vdots & \ddots & \vdots & \ddots & \vdots \\
t_{n1}^s & \cdots & t_{nj}^s & \cdots & t_{nn}^s
\end{bmatrix}
$$

where $t_{ij}^s = t_{ij}^\alpha/d_i$.

Step 8: Calculate the weighted supermatrix. The weighted supermatrix $\boldsymbol{W}_w$ is calculated by multiplying the $\boldsymbol{T}_s$ and $\boldsymbol{W}$, as follows:

$$
\boldsymbol{W}_w =
\begin{bmatrix}
t_{11}^s \times W_{11} & \cdots & t_{1i}^s \times W_{i1} & \cdots & t_{n1}^s \times W_{1n} \\
\vdots & \ddots & \vdots & \ddots & \vdots \\
t_{1j}^s \times W_{j1} & \cdots & t_{ji}^s \times W_{ij} & \cdots & t_{ni}^s \times W_{in} \\
\vdots & \ddots & \vdots & \ddots & \vdots \\
t_{1n}^s \times W_{n1} & \cdots & t_{ni}^s \times W_{in} & \cdots & t_{nn}^s \times W_{nn}
\end{bmatrix}
$$

Step 9: Retrieve the converged weighted supermatrix by equation (8).

$$\lim_{k \to \infty} W_w^k \qquad (8)$$

A stable converged weighted supermatrix can be derived using these steps, where the overall priorities are also obtained. Combining the DEMATEL and ANP, the relationships among the dimensions/criteria in a complex hierarchical system are obtained using a simplified data collection process. This hybrid MCDM method is more applicable for use in real world practice compared with the conventional ANP approach.

4. Empirical study: case of mobile telecommunication competition in the Canadian context
Empirically, this paper seeks to examine the highly competitive environment of the Canadian mobile telecoms industry due to the recent changes in the market.

4.1 Background
The Canadian mobile telecoms market serves a very large geographic area. Canada is the second largest country in the world with a very low population density, yet 99 percent of the population has access to mobile devices, with this high-coverage nationwide resulting in high deployment costs for network providers. There are 23.8 million subscribers out of a total population of 33.7 million, generating an average of $59 in revenue per month. There are currently 57 licensed operators in Canada, with the "Big 3" carriers of Bell, Telus, and Rogers having nationwide coverage through their own facilities. The remaining operators have smaller coverage and must rent access from the three largest companies, who together have a 95 percent market share. All of these providers are regulated by the Canadian Radio-television and Telecommunications Commission (CRTC) and the Ministry of Industry (CRTC, 2010)

The Canadian telecommunications market is still experiencing growth. Compared to the US and some European countries, which have over 90 percent wireless penetration – Italy has 146 percent - Canada's market is yet to fully mature, with a market penetration of just 70 percent (CRTC, 2010), meaning that firms can still fight over new customers. However, this will not be the case if the current growth trends continue, and this will lead to an inevitably switch in market strategy, as the cost of acquiring customers is very high in saturated countries (Lee *et al.*, 2001). Canadian firms would thus do well to attract as many customers as possible over the next few years, and then change their strategies to focus on retaining and attracting switchers. Canada is in a good position to learn from the examples of other nations, and thus develop a very healthy mobile telecoms industry.

The Canadian context is also significant because of the changing face of competition for new entrants. More lenient regulations on foreign investment, as well as the 2008 spectrum auction, allowed new facility-based entrants to compete in the market. An example of one of the biggest challengers to Bell, Rogers, and Telus is Wind, which offers competitive rates for unlimited minutes and unlimited data access. Number portability, which allows customers to transfer their numbers from one provider to another, also reduces the switching barriers which customers have previously faced, increasing the potential for switching behavior, which can result in lost revenue. Providers must thus become more creative in their attempts to enhance loyalty and retain customers.

Some of these barriers are being removed in order to promote competition, as many of the providers in Canada are subsidiaries of Bell, Telus, and Rogers. In an attempt to overcome this, the CRTC instituted mandatory unbundling in 2008, which allowed smaller companies to rent access to the wireless infrastructure. However, this has been shown to reduce the interest of the companies renting the services to invest in infrastructure and become facilities-based competitors (Crandall *et al.*, 2004). This means that the top three companies in terms of market share are in relatively safe positions, with a very high barrier to facilities-based entry. As a result, most of their competitors have a much smaller market share and focus on a small or single geographical area. Given their collective clout, Bell, Telus, and Rogers also have the ability to purchase more wireless spectrum than their competitors. However, in the last auction, 40 percent of the spectrum was reserved for new entrants, reflecting the changing face of competition in Canada. In addition, more relaxed laws on foreign investment may lead to increased competition and changes in the strategies adopted by the major providers.

The current strategies implemented by the major providers can be divided into two major categories: pre-paid non-contract services, and post-paid contract services, with contracts lasting up to three years. Current acquirement strategies include special offers, free or discounted phones for contract signers, and some exclusive offers. Value-added services include some combination of messaging, data access, next-generation network access, friend-and-family based plans, calling discounts during non-peak hours, and so on. Plans are generally highly customizable, and are offered on a variety of phones. Smaller competitors generally focus on niche markets, while the larger providers have a broader range of strategies. There are a variety of channels, from small private retail partners, to large big-box distributors, as well as online merchants.

The way people view their mobile phones is fundamentally changing, and non-core services, such as data (Light *et al.*, 2010), location-based game layers and social networking services, are becoming more popular. Pairing this with increasing market saturation, changing customer behaviors will have more pronounced effects on firms, which will have to focus more on retaining existing customers through loyalty programs, value-added services, and innovation. One of the best ways to compete in a saturated market is through service innovation (Berry *et al.*, 2006), given the increasingly standardized nature of the products offered by providers in the narrow oligopoly of mobile telecoms. Moreover, in the next few years, as markets continue to saturate, value propositions will become important for providers, as technologies such as m-commerce (Coursaris *et al.*, 2003) and m-health (Istepanian *et al.*, 2004) become more valuable and available. Providers will need to have high levels of customer trust, satisfaction and retention in order to thrive in this evolving market. In their paper on customer satisfaction with mobile services in Canada, Turel and Serenko (2006) found that wireless customers had a lower ACSI score than in the US. While a reevaluation of the data suggested satisfaction parity with the US, it is worth revisiting the sector in Canada to see if this is still true.

The purpose of this empirical study is thus to examine customer retention with regard to Canadian mobile telecoms services. This will be done by reviewing the critical success factors for mobile services, and collecting and analyzing data relevant to the Canadian context. Specifically, this work has the following objectives:

O1. Determine the intertwined relationships among these criteria.

O2. Determine the weight for each criterion and recommend strategic alternatives for companies in the telecoms industry which can increase their customer retention.

Four advertisements from the Big 3 (i.e. Bell, Telus, and Rogers) and a new entrant (i.e. Wind) are used to evaluate their effects on customer retention, and 53 cell phone users with at least eight years of use experience were invited to complete the survey. Table II shows the scores regarding the four companies with respect to the criteria. Based on the weight of the customer retention criteria (see Table III), the customer perceived value (priority) among the four mobile service providers could be obtained.

4.2 DEMATEL analysis

The inter-relationships among the dimensions and criteria are obtained using DEMATEL. The DEMATEL survey took place between May and June 2011. Five experts on the Canadians telecoms industry, as shown in Table IV, were invited to participate in the survey. Following steps 1 to 4 described in section 3.2, the direct-influence matrix D and the total-influence matrix T were obtained, as shown in Table V and Table VI, respectively. The influence of the factors of interest in this study is shown in Table VII. Based on the above analysis, a comprehensive impact relation map can be generated, as illustrated in Figure 3.

The values d_i, r_i, $d_i + r_i$, and $d_i - r_i$ represent the relationships among the criteria. The d_i value reflects the influence on other factors, while the r_i factor reflects the influence from other factors. $d_i + r_i$ represents the degree of the relationship between factors, while $d_i - r_i$ represents the degree of the effect. Essentially, a high $d_i + r_i$ suggests a strong significance, while a high $d_i - r_i$ indicates a strong relationship with other criteria.

The horizontal axis on the DEMATEL impact relation map is $d_i + r_i$, and the vertical axis is $d_i - r_i$. Service Price and Phone Service Quality are the most significant criteria, as they are the outliers on the vertical axis, while Brand Image has the strongest relationship with the other criteria.

4.3 DEMATEL-based ANP and evaluation of the strategic alternatives

Based on the results of the DEMATEL analysis, and based on steps 5 to 9 in section 3.2, the unweighted supermatrix W can be formed, which is the principal eigenvector of the criteria pairwise comparison matrix with respect to the dimension. After obtaining the normalized total-influence matrix T_s, as presented in Table VIII, the weighted supermatrix W_w can be derived, as shown in Table IX. Finally, the converged weighted supermatrix is obtained by raising it to a sufficiently large power, until the weights have converged and it becomes a long-term stable supermatrix. The retrieved weighted dimensions and criteria are presented in Table III. Table II shows the customer perceived value for the four mobile service providers with regard to the related advertisements.

4.4 Other findings

Figure 4 and Figure 5 present an analysis of the open-ended results, and the fishbone diagrams show the five main dimensions of satisfaction that were raised by the

Criteria	Bell		Telus		Wind		Rogers	
	Survey average	Utility	Survey average	Utility	Survey average	Utility	Survey average	Utility
SP	0.8100	0.1438	1.8900	0.3355	2.3800	0.4225	1.5700	0.2787
SC	0.6400	0.0946	1.1300	0.1669	1.5100	0.2231	1.0200	0.1507
PSQ	1.3000	0.2042	1.3200	0.2073	1.0800	0.1696	1.4200	0.2230
PPQ	1.4000	0.2301	1.6400	0.2695	1.7400	0.2859	1.4900	0.2449
CM	0.5800	0.0536	0.9200	0.0850	0.9600	0.0887	0.7700	0.0711
CSQ	0.7400	0.0617	0.9600	0.0800	1.0800	0.0900	0.8100	0.0675
BI	1.1300	0.1123	1.3600	0.1351	1.5700	0.1560	1.3400	0.1331
SN	1.0000	0.0783	1.2600	0.0987	1.3200	0.1034	1.0900	0.0854
Total utility	0.9784		1.3780		1.5392		1.2544	
Rank	4		2		1		3	

Table II.
The customer perceived value (priority) among four mobile service providers

Dimensions	Weight	Ranking	Criteria	Global weight	Global ranking	Local weight	Local ranking
Cost	0.3253	2	Service price	0.1775	1	0.0577	1
			Switching cost	0.1477	4	0.0481	2
Product quality	0.3214	3	Phone service quality	0.1570	3	0.0505	2
			Phone plan quality	0.1643	2	0.0528	1
Customer experience	0.3533	1	Complaint management	0.0924	6	0.0326	2
			Customer service quality	0.0833	7	0.0294	3
			Brand image	0.0993	5	0.0351	1
			Social norms	0.0783	8	0.0277	4

Table III.
The weighted dimensions
and criteria

respondents, and the recommendations for retention, respectively. The number in parentheses represents the number of data points that fell under each node.

Cost and Quality were the most frequently mentioned points with regard to customer satisfaction (see Figure 4), and overall there was a balance between the positive and the negative comments. The recommendations (see Figure 5) focused mainly on contracts, competition, and fees. There was a relatively even distribution amongst the nodes. Respondents felt strongly about better customer treatment through the three nodes:

(1) competition;

(2) contracts; and

(3) fees.

5. Discussion
In this section, the results of the assessment are discussed and some recommendations based on these are provided.

Position	Number of years in telecoms industry
Senior marketing manager at a national carrier	8
Senior vice president of mobile division at a national carrier	12
Senior vice president of sales in the mobile division at a national carrier	17
Telecom research consultant	8
Academic researcher of mobile telecom	8

Table IV.
DEMATEL respondents

D	SP	SC	PSQ	PPQ	CM	CSQ	BI	SN
SP	0.0	0.0	2.0	3.1429	2.0	1.7143	3.1429	2.1429
SC	2.4286	0.0	2.0	2.2857	2.4286	2.2857	2.4286	2.1429
PSQ	3.0	2.1429	0.0	2.5714	3.0	2.8571	3.4286	2.5714
PPQ	3.5714	3.4286	1.8571	0.0	2.8571	2.4286	2.5714	2.2857
CM	2.5714	2.2857	2.4286	1.7143	0.0	2.8571	3.5714	2.1429
CSQ	2.4286	2.4286	3.0	2.4286	3.5714	0.0	3.2857	2.4286
BI	2.7143	2.8571	3.1429	3.1429	2.8571	2.8571	0.0	2.4286
SN	2.1429	2.4286	1.8571	1.7143	2.8571	2.2857	2.5714	0.0

Table V.
The direct-influence matrix D

T	SP	SC	PSQ	PPQ	CM	CSQ	BI	SN
SP	0.5172	0.4434	0.5434	0.6053	0.6187	0.5542	0.6993	0.5406
SC	0.6689	0.4738	0.5874	0.6169	0.6862	0.6222	0.7275	0.5838
PSQ	0.8055	0.6628	0.6033	0.7342	0.8268	0.7511	0.8928	0.7005
PPQ	0.7984	0.6853	0.6577	0.599	0.79	0.7066	0.8281	0.6641
CM	0.7279	0.6173	0.6545	0.6465	0.6395	0.6953	0.8313	0.6316
CSQ	0.7859	0.6769	0.7305	0.7293	0.8505	0.6342	0.8901	0.6968
BI	0.8085	0.702	0.7439	0.7667	0.8348	0.7629	0.7653	0.7062
SN	0.6522	0.5739	0.5785	0.5898	0.698	0.6185	0.7282	0.4871

Table VI.
The total-influence matrix T

Criteria influence	d_i	r_i	$d_i + r_i$	$d_i - r_i$
Cost				
Service price	4.5221	5.7646	10.287	−1.242
Switching cost	4.9667	4.8354	9.8021	0.1313
Product quality				
Phone service quality	5.9771	5.0991	11.076	0.8781
Phone plan quality	5.7291	5.2876	11.017	0.4415
Customer experience				
Complaint management	5.444	5.9445	11.388	−0.501
Customer service quality	5.9942	5.3451	11.339	0.6491
Brand image	6.0905	6.3627	12.453	−0.272
Social norms	4.9261	5.0108	9.9368	−0.085

Table VII.
The influence of the
factors of interest

Figure 3.
The impact relation map
among the criteria of
interest

T_s	SP	SC	PSQ	PPQ	CM	CSQ	BI	SN
SP	0.5385	0.5854	0.5486	0.5381	0.5411	0.5373	0.5353	0.5319
SC	0.4615	0.4146	0.4514	0.4619	0.4589	0.4627	0.4647	0.4681
PSQ	0.4731	0.4877	0.4511	0.5234	0.5031	0.5004	0.4924	0.4952
PPQ	0.5269	0.5123	0.5489	0.4766	0.4969	0.4996	0.5076	0.5048
CM	0.2564	0.2619	0.2607	0.2643	0.2286	0.2769	0.2720	0.2757
CSQ	0.2297	0.2375	0.2369	0.2364	0.2485	0.2065	0.2486	0.2443
BI	0.2898	0.2777	0.2815	0.2771	0.2971	0.2898	0.2494	0.2876
SN	0.2240	0.2229	0.2209	0.2222	0.2258	0.2268	0.2301	0.1924

Table VIII.
The normalized
total-influence matrix T_s

5.1 Results

Interrelationships among the criteria. The motivators of customer retention are
intricately related, as customer retention is not a simple metric, and neither are the
motivators. However, understanding the relationships among these motivators can

enable decision makers to monitor changes in the market over time, and thus adjust their strategies accordingly.

From the initial DEMATEL analysis, the three criteria with the highest $d_i + r_i$ values are:

(1) brand image;

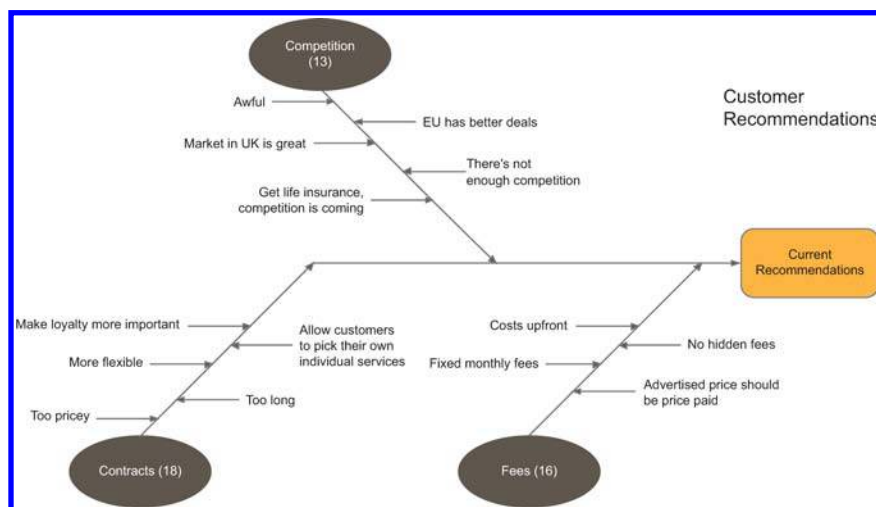(2) customer service quality; and

(3) complaint management.

This suggests that these are highly related to the rest of the criteria, and this is a logical conclusion, since these concepts are all broad, especially brand image, which has the highest $d_i + r_i$ value. Brand image is often an overall perception of the company and its products. The fact that this criterion is the most highly related to the others suggests that the experts involved in the assessment had a good understanding of their field, and that the instrument accurately measured these perceptions. This also confirms that brand image, customer service quality, and complaint management are complex and should not be treated in isolation, but rather as a part of a larger strategy. Brand image should be considered as a barometer of retention, but its relatively low d_i-r_i value suggests that it reflects more than it contributes to strategic value. In terms of strong motivators of retention, the three largest motivators in terms of causality are:

W_w	SP	SC	PSQ	PPQ	CM	CSQ	BI	SN
SP	0.1775	0.1775	0.1775	0.1775	0.1775	0.1775	0.1775	0.1775
SC	0.1477	0.1477	0.1477	0.1477	0.1477	0.1477	0.1477	0.1477
PSQ	0.1570	0.1570	0.1570	0.1570	0.1570	0.1570	0.1570	0.1570
PPQ	0.1643	0.1643	0.1643	0.1643	0.1643	0.1643	0.1643	0.1643
CM	0.0924	0.0924	0.0924	0.0924	0.0924	0.0924	0.0924	0.0924
CSQ	0.0833	0.0833	0.0833	0.0833	0.0833	0.0833	0.0833	0.0833
BI	0.0993	0.0993	0.0993	0.0993	0.0993	0.0993	0.0993	0.0993
SN	0.0783	0.0783	0.0783	0.0783	0.0783	0.0783	0.0783	0.0783

Table IX.
The weighted
supermatrix W_w
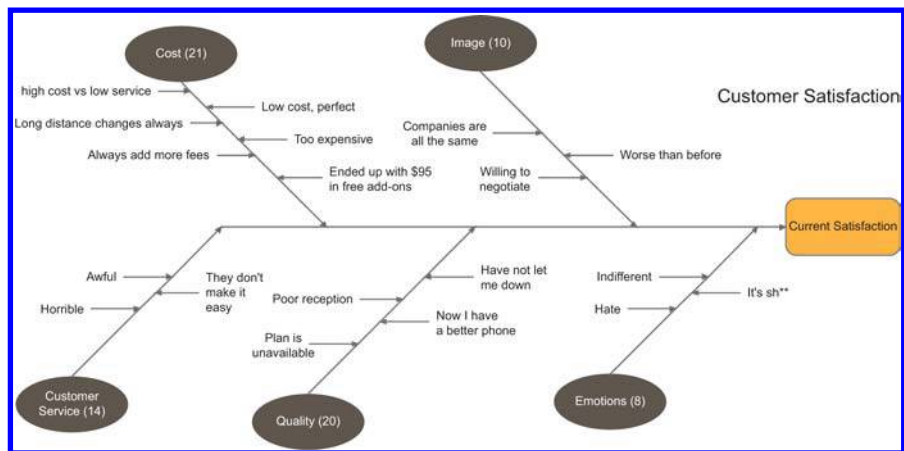
Figure 4.
Open-ended question
analysis on customer
satisfaction

Figure 5.
Open-ended question
analysis on customer
recommendations

(1) phone service quality;

(2) customer service quality; and

(3) phone plan quality.

This may not come as a surprise, as phone service quality is a very strong hygiene factor. If the phone or service simply do not perform up to certain minimum standards, all other motivators become irrelevant. However, the importance of customer service quality and phone plan quality is surprising for two reasons. First, neither of these directly relates to price, and service price is the lowest criteria on the relationship map. Second, in comparison with other research, customer service quality plays a much more significant role in motivating the other criteria of retention in the current work. This could reflect the increasing expertise of the average customer, as consumers are more likely to require more service intensive solutions if they operate at a higher level of knowledge. Consumers in countries with developed mobile markets will thus have greater needs and higher expectations, both of which require greater provider support.

Phone plan quality also reflects the increasing needs of consumers. Data and text are becoming the commodities which voice was five years ago. Data especially requires more rapid advances in technology, and these are no longer the money-making value-added services they once were. Phone plans, especially for smartphone users, have more components, and assembling these in an optimal way will affect customer retention. If a company can provide a complicated plan in a simple way then it will reap the benefits of this strong competitive advantage.

Switching costs have a lower effect on retention than expected. This could be a result of the regulations put in place by the CRTC, which govern the nature of contracts and switching barriers. While this may be considered a boon for consumers, this is not necessarily the case, as if it is easier to switch providers, then the benefits to be gained by either switching or staying loyal may be diminished. If loyalty with a provider offers little value, then competitors may not need to make as valuable an offer to induce switching.

Ultimately, after the ANP analysis, service price has the highest global weight of any criteria, and then asked what the most important criterion was to them, 71 percent of respondents chose this one. Price thus remains the ultimate construct in any strategy, with phone plan quality, phone service quality, and switching costs filling out the top four criteria in terms of influence. The customer experience criterion fell much farther below in its global weighting, suggesting that core services are still critical.

In contrast, customer experience had the highest global weight on the dimension level. While each component had a lower global weight, the sum of the totals had a weight greater than either cost or product quality. This shows that customer experience is important, with each element contributing a small portion of the overall effect. Strategies that leverage complete customer experience may thus have greater success than one that focuses on an individual element. However, given that this is the most relationship-based criterion, the return on investment is likely to be higher with a service price strategy.

Promotional strategic alternatives. Three of the plans examined in the survey were in the similar low-medium price range of $35-$45 per month, while the Bell plan was much more expensive, at $100 per month. Accordingly, the perception of service price and the utility garnered from it was the lowest of any of the strategies. Overall, this plan also had the lowest utility, at 0.974, compared to Wind, which had the highest at 1.5392. This plan offered the most minutes, the most data, and a 4G handset, as well as a set of bonuses and fewer caveats and technical details, than the other plans. Essentially, this was the most expensive but thorough plan. The fact that a "pay and forget" plan had the lowest overall utility suggests that consumers are not necessarily willing to pay more money for greater peace of mind, and a savvier customer set considers this plan inferior to more basic plans with additional options. The highest contributors to utility were phone service quality, phone plan quality, and service price, in this order. Bell is the owner of the largest telecoms infrastructure in Canada, and the wide-scope of the plan that it offered is in line with these results.

Rogers had the third ranked strategy, with the highest utility coming from service price and phone plan quality, and phone service quality. The Rogers plan offered a unique handset-protection guarantee, which, while ambiguous, had almost no effect on the perceived value of the plan. This suggests that this is not a valuable value-added service, or that there are other moderating factors that negate the strategic benefit this service may provide.

The Telus strategy was ranked second. The greatest utility for this plan came from service price, phone plan quality, and phone service quality. This was the least expensive plan, at $35 per month. This plan had no mention of a data plan, and only unlimited access to certain applications and social networks. The handset was a new series Blackberry, a phone that has a solid position in the Canadian smartphone market.

The Wind strategy was the highest ranked, with the highest service price utility of any of the plans. The other major two contributors were phone plan quality and switching costs. Note that this is the only plan to have a high utility contribution from the switching costs. This is an interesting finding, given that the service price for the Wind plan was the second highest per month, after Bell. This plan also provided a less well-known brand of phone with a much simpler feature set. Switching barriers were not mentioned explicitly in the plan, which also had the fewest caveats in terms of

usage, but probably the largest set of limitations. The unlimited features (which include voice, data, texts, and Canada-wide long-distance calls) are only available within certain geographical areas, called Wind Zones. The fact that only one of the respondents was a Wind customer suggests that expert consumers may be motivated to switch to new providers, and that the Big 3 need to consider new entrants a serious threat.

Other findings. In addition to the questions related to marketing strategies, there were also a number of open-ended questions. When asking switchers the reasons they switched, the most common answer was "Better offer" from another provider, at 53 percent, followed by "Customer service issues." This suggests that these customers felt that their previous provider could meet their needs, and did not have an adequate level of customer service. This again confirms that customer service may be a hygiene factor, and is noticed only when it is causing problems. Also, some users had switched several times, suggesting that some individuals are more prone to repeated switching, and may have a lower long-term value for providers. Questions about current levels of satisfaction were answered in a similar fashion. Some of the satisfied respondents were simply indifferent: "All cell phone companies are pretty much the same." In addition, another respondent mentioned that benefits like customer service are non-existent, so price is their only concern.

Respondents were also asked to make one recommendation to telecommunication executives. The most common response was to look to other nations for examples on pricing and customer service. This recommendation is sound, as Canada is following a similar regulatory and competitive model as other countries, and would benefit from the learning from the experiences of other countries and foreign companies.

5.2 Discussion

The relative importance of the motivators of satisfaction and retention were investigated in this work. The results show that value in the form of cost was still the most important motivator (Fornell *et al.*, 1996), and that price was the most identifiable and measurable component of this, and is thus a critical success factor in mobile telecoms (Fraunholz and Unnithan, 2004). Switching costs were found to be of moderate importance, both to the experts and to the survey respondents, and while this finding is supported by Kim *et al.* (2009), these costs may not be as important as they once were. Although quality remains important, phone service quality was of less importance than in previous studies (Gerpott *et al.*, 2001), which could suggest that it is becoming a hygiene factor, and that value-added services are becoming of equal importance to core services. Phone plan quality and complexity were considered important by both sets of respondents, confirming the relationship between customer retention and plan complexity (Seo *et al.*, 2008). Overall, customer experience elements were judged as important, as suggested by Kim *et al.* (2004), but individual elements did not have any special significance, similar to the results in Gerpott *et al.* (2001). Social norms were found to be of limited importance, although this measure is complex (Dasgupta *et al.*, 2008) and worthy of further study.

5.3 Recommendations

The major Canadian carriers' marketing strategies are moderately well-aligned with the desires of customers, and this suggests that providers are responding to the

expectations of the market (Turel and Serenko, 2006). Most plans leverage the important motivators of retention, and 53 percent of the respondents polled, despite their long histories of mobile usage, had never switched carriers. Given the decrease in switching costs over the past decade, this suggests that providers are offering a good mix of plans for the variety of customers in Canada. The high customer retention rate with a low barrier to switching suggests that loyalty advantages are strong, or that the perceived switching costs are greater than they actually are. Since the ultimate goal of this research is to make strategic recommendations to increase customer retention, Table X presents a summary of these.

6. Concluding remarks
This work adopted a hybrid MCDM approach to a major strategic issue in mobile telecoms: customer retention. Retained customers are of increasing value to providers, and that there will be fewer new customers for Canadian companies to share in the future. The focus on customer retention is thus of value to strategic planners in markets which are approaching or have reached saturation. Strategies that leverage the weightings of the motivators of customer retention, as revealed in this paper, may have a greater effect on customer retention that other approaches.

Academically, this article demonstrates the strengths of using a hybrid MCDM method in rapidly changing markets. Given that one of the major advantages of combining the DEMATEL and ANP methodologies is the increased speed and greater

Recommendations	Details
Focus on service price	Given the repeated prevalence of this construct, service price will continue to be a major motivator of retention. However, the lowest price does not always win. Price is a balance; a value proposition. From the qualitative analysis, billing consistency was one of the major causes of dissatisfaction. The ability to provide and justify a consistent price will improve retention
Focus on the customer experience	Complaints range from inaccessible customer service representatives, to billing problems, to the complexity of plans. A competitor that can develop an advantage through creative service design will have definite gains. While each individual customer experience criteria has low significance, the total influence of customer experience is higher than previously suggested. Keep track of Canadian customer satisfaction and retention
Switching costs are changing	Given that the ability to lock-in customers is being reduced through competitive and regulatory practices, retention will have to be through promotion and pull factors. Loyalty programs and long-term benefits which balance the long-term revenues gained from customers may be effective
Competition	The face of competition in Canada is changing. New entrants are increasingly backed by foreign investors and thus making the Canadian mobile an international market. Current incumbent providers have a home-field advantage, but this may not always be the case. Lobbying will provide temporary gains, but agility will be a more valuable asset

Table X.
Recommendations to telecom providers

ability to collect data for both components simultaneously, this paper demonstrates that the DEMATEL-based ANP method can offer concrete, valid, and practical results in contexts with high complexity and tight time constraints. From a managerial standpoint, best practices involving customer retention should be appropriate to the relevant field, and should be based on frequent customer feedback. Managers should also actively pursue and evaluate customer retention strategies, and using an MCDM approach could be particularly useful to achieving this in a systematic manner.

The initial conclusions of this research are significant, and comparing these results with similar studies over time could provide insights into the changing nature of customer retention in mobile services given technological, regulatory, and market changes. Additional confirmation through other methodologies, such as SEM, could provide further insights into customer retention, and similar studies could be performed, leading to the creation of a customer retention index. Given the inherently practical nature of this research, two promising directions for future work present themselves. First, the success or failure of the strategies proposed in this work could be assessed in a practical context to see if their effects on customer retention are as predicted. Alternatively, a case study could be undertaken of a telecoms company that develops a strategy based on the findings of this work, and the results could then be measured and discussed.

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