

# A New Model for the Calculation of Customer Life-time Value in Iranian Telecommunication Companies

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## Abstract

In this paper, we proposed a new model to evaluate a customer's lifetime value, considering non-financial elements such as the customer's churn probability, cooperation capability, willingness to refer, willingness to recommend, and innovation. We tested our proposed model on customer data from a mobile phone operator to evaluate the effect of each element on the customer's lifetime value. Four hundred and twenty questionnaires were distributed and 400 questionnaires were determined to be suitable for our study. We employed structural equation modeling using Smart-PLS software and we have found that the innovation, customer's churn, willingness to refer, and cooperation elements have the strongest effect on the customer's lifetime value.

**Keywords:** Customer life time value, customer innovation, cooperation potential, willingness to recommend, willingness to refer, churn

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## Introduction

With the advent of a more competitive economic environment, concepts such as customer orientation and customer satisfaction are considered a basis for business, and organizations that do not pay attention to them will be eliminated from the market. Nowadays, organizations do not rely on their products selling, but rather prefer to attract, and subsequently retain, profitable customers. Research demonstrates that some of the most successful organizations have a customer retention rate of more than 90% (Haenlein et al. 2007). The most important challenges in customer-oriented organizations can be expressed as identifying customers, understanding the differences between them and classifying them (Liang 2011). We cannot say that all customers will make a similar contribution to an organization's success, so increasing the satisfaction of key customers is vital (Glifford 2005). In addition, organizations that claim it is not necessary to spend money to gain customers are, inattentive to customer profitability levels (Blattberg et al. 2001; Blattberg et al 1996) To determine which class of customers is more valuable than others, and which customers (assets) to target, while operating with a restricted budget, we must provide a plan to maximize the investment profit (choosing the best customers). A concept such as customer lifetime value (CLV), which focuses on customer behaviour, makes this possible. The main idea of CLV, first defined 30 years ago by Kotler, is to evaluate customers based on their profitability for the organization, determining the current value of the expected future income stream during a specific period of time, while communicating with customers (Han et al. 2012). The main purpose of calculating CLV is to estimate customer weighting and, based on this, assign them the relevant level of resources. Evaluating CLV provides a method for customer comparison and, in industry for example, makes it possible to provide distinct products and better serve customers with higher CLV. A great deal of research has been devoted to calculating CLV, with most based on the equation proposed by Berger and Nasr (Berger & Nasr 1996) which can be considered as follows.

$$CLV = \sum_{i=1}^n \frac{(R_i - C_i)}{(1 + d)^i} \quad (1)$$

In equation (1),  $i$  corresponds to the time horizon,  $R_i$  is the acquired income from the customer over a period  $i$ ,  $C_i$  is the total customer costs over a period  $i$  and  $n$  is the number of periods. There exist other models to calculate customer lifetime value. Hwang et al (2004) were the first authors to use customer churn probability in their model. Cheng and Chen (2009) and Liang (2010) used the RFM model to evaluate customer lifetime value. In this model, R derives from the word 'recency' that refers to the interval between the customer's last purchase and now, F derives from the word 'frequency' that refers to the number of customer purchases over a certain period of time and M derives from the word 'monetary' that refers to the value of customer purchases over the same period of time in real. In the RFM method, we first calculate the parameters M, F and R for each customer. Chan et al (2010) and Donkers et al (2007) used a Markov Chain model to calculate CLV. Glady et al (2009) used a Pareto/NBD model. Han et al (2012) used non-quantitative elements and truth to calculate CLV and have proposed a new method to quantify these elements. Cheng et al

(2012) introduced a new model based on a Markov Chain model to calculate CLV. Chen and Fan (2013) considered customer dynamic purchase behavior in their proposed model.

After reviewing the literature, we found that most of the studies considered only financial elements that affect CLV but didn't pay attention to nonfinancial elements. In the current paper, we consider financial and nonfinancial elements simultaneously and quantify CLV based on these elements. Figure 1 shows the conceptual model of the relationship between defined elements of the research. This conceptual model demonstrates the relationships between variables in which accuracy is not examined using experimental data.

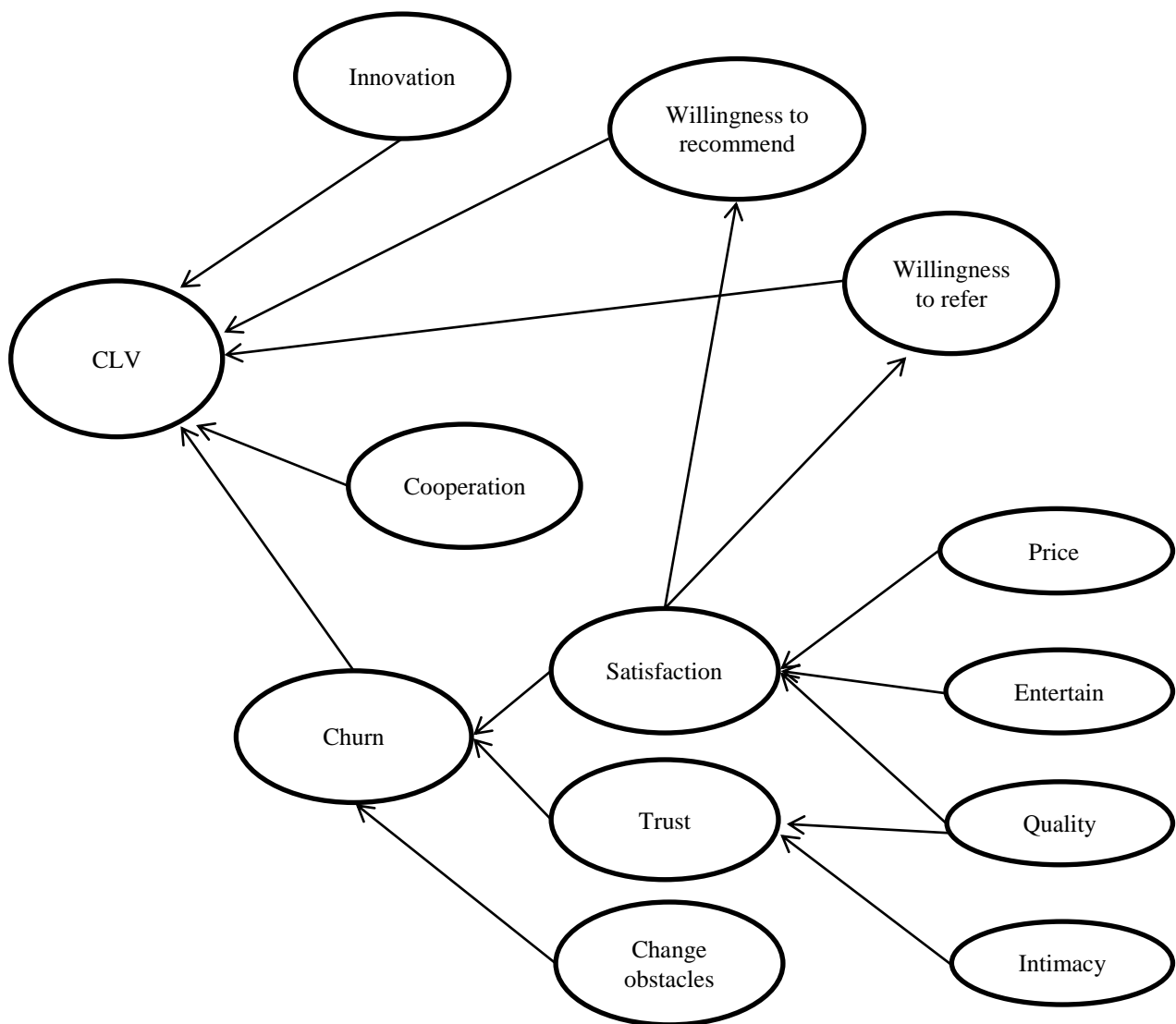


Figure 1 Research Conceptual model

## Materials and methods

### *Investigation methodology*

The present research according to its goal can be classified to applied researches category and according to its method is categorized as a survey research, because we use questionnaires to aggregate data. Based on our studies, researches, scientific papers and studies in similar context provided by reliable international Professors, researchers and scientists, to evaluate and measure each desired criterion and parameter, we need 2 to 6 questions to acquire scientific and documentary results. So in our research, we have used 2 to 6 questions for each variable to aggregate necessary data. The research questionnaire has included 36 questions, evaluating 3 questions about customer churn, 3 questions about customer satisfaction, 6 questions about change obstacles, 3 questions about service quality, 2 questions about service cost, 2 questions about trustworthiness, 2 questions about intimacy, 3 questions about entertainment, 2 questions about referring willingness, 2 questions about recommendation, 3 questions about cooperation, 4 questions about innovation and finally 1 question about customer life time value (according to late acquired profit from customer). These variables are expressed in Table-1. The questions are graded by 5 points Likert Scale (in this scale, point 1 means very low, point 2 means low, point 3 means moderate, point 4 means high and point 5 means very high). The research statistical population is the entire set of customers corresponding to one of Iranian mobile-phone operators. 420 questionnaires have provided to sample peoples and 400 of these questionnaires determined as suitable to be the base of Statistical calculations. Figure 1 shows the conceptual model of the relationship between the various defined elements of the research. The conceptual model demonstrates the relationships between variables, although their accuracy is not examined experimentally.

The main assumption of our research can be considered as follows: Nonfinancial elements affecting customer life time values consist of innovation, cooperation capability, willingness to refer, willingness to recommend and churn. We also have two secondary assumptions:

- The churn element has a negative effect on a customer's life time value.
- The elements of innovation, cooperation, willingness to refer, and willingness to recommend have positive effects on a customer's life time value.

Table 1 Visible variables of the customer life-time value model

Variable	Symbol	Indicators	Source
Churn	$y_{11}$	Unwillingness to use services	Kim and Shin (2008)
	$y_{12}$	Not recommending services to others	Kim and Shin (2008)
	$y_{13}$	Need to other organizations services	Kim and Shin (2008)
Satisfaction	$y_{21}$	Being satisfied from organization services	Kim and Shin

Variable	Symbol	Indicators	Source
			(2008) Liu et al (2011)
	$y_{22}$	Meeting needs	Kim and Shin (2008) Liu et al (2011)
	$y_{23}$	Total satisfaction of Organization	Liu et al (2011)
Trust	$y_{31}$	Reliability of Organization	Liu et al (2011)
	$y_{32}$	Keeping promises	Liu et al (2011)
Change obstacles	$y_{41}$	Time consuming of changes	Kim and Shin (2008)
	$y_{42}$	Changes cost	Kim and Shin (2008)
	$y_{43}$	Difficulties of changes in organization	Kim and Shin (2008) Liu et al (2011)
	$y_{44}$	Difficulties in use of other organizations services	Kim and Shin (2008)
	$y_{45}$	Uninterestingly of other organizations	Liu et al (2011)
	$y_{46}$	Difficulties of information gaining about other organizations	Kim and Shin (2008)
Price	$y_{51}$	Organization main service costs suitability	Kim and Shin (2008)
	$y_{52}$	Sidelong service costs suitability	Kim and Shin (2008)
Quality	$y_{61}$	Satisfaction of organization personnel behavior	Kim and Shin (2008)
	$y_{62}$	Good sense about organization services	Kim and Shin (2008)
	$y_{63}$	Better service quality compared to other organizations	Kim and Shin (2008)
Entertainment	$y_{71}$	Delightfully degree	Liu et al (2011)
	$y_{72}$	Happiness degree	Liu et al (2011)
	$y_{73}$	Fun degree	Liu et al (2011)
Intimacy	$y_{81}$	Friendly relationship with personnel	Liu et al (2011)
	$y_{82}$	Willingness to friendly relationship	Liu et al

Variable	Symbol	Indicators	Source
			(2011)
Willingness to recommend	$y_{91}$	Recommending organization as a good one to others	Boles et al (1997)
	$y_{92}$	Organization request acceptance to recommend it to others	Boles et al (1997)
Willingness to refer	$y_{101}$	Organization request acceptance to refer others to it	Boles et al (1997)
	$y_{102}$	Presenting of familiar who are not organization customers if the organization want	Boles et al (1997)
cooperation	$y_{111}$	Cooperation intent with organization	Tang et al (2013) Rudolf-Sipötz (2001)
	$y_{112}$	Having technology, product, software and ... which are profitable for organization	Rudolf-Sipötz (2001)
	$y_{113}$	Having organization required specialty	Tang et al (2013)
Innovation	$y_{121}$	Interfering with evaluation and idea purge	Ballantine (2003)
	$y_{122}$	Being full of idea	Ballantine (2003)
	$y_{123}$	Testing prototype by customer	Ballantine (2003)
	$y_{124}$	Interfering with design and extension of products	Ballantine (2003)
CLV	$y_{13}$	Obtained profit from customer in the past years of his lifetime	Blattberg et al (2009)

## Data analysis and research assumptions test

### *Evaluating the suitability of the questionnaire*

Our intention from suitability is to ensure that the content of the tools or the questions provided in these tools must evaluate the variables and the issue under study in an accurate manner. Using unsuitable tools will result in aggregating unrelated information and destroying the discipline of the investigation stages and data analysis. In this research, in order to determine suitability, the questionnaires were examined by experts so that they could determine the accuracy level and relevance of the questions. Consequently, some of these questionnaires were presented to the participants and finally some of the questions have corrected.

### *Evaluating the reliability of the questionnaire*

In order to evaluate the reliability of the questionnaire, we used the Cronbach's alpha method. This method calculates the internal consistency of measurement tools that

measure different features. We used SPSS software to calculate Cronbach's alpha. Considering that the Cronbach's alpha value for elements and the questionnaire is higher than 0.7, the reliability of the questionnaire and elements is confirmed.

## Discussion

The resulting data from the questionnaires have been processed using suitable software. The results obtained from executing the model via the software, are expressed in Table 3. If the statistic value is more than 1.96, with more than %95 confidence interval, then the acquired relation is meaningful. According to the table, the effects of trust on churn and of intimacy on trust have been rejected. In Figure 2, acceptable and meaningful paths are represented. R<sup>2</sup> Values of models element are represented in Table 2. Based on our calculated R<sup>2</sup> value of 60% for customer life-time value, we propose that the model includes 60% of elements that can affect customer life-time value.

Table 2 R<sup>2</sup> values for models element

R <sup>2</sup>	Dependent variable
0.60	CLV
0.782	Churn
0.914	Satisfaction
0.57	Willingness to refer
0.51	Willingness to recommend

Table 2 Result obtained from executing the model via Smart PLS

Path	Standardized coefficient	t-value	Result
Cooperation-CLV	0.143	3.101	Accepted
Innovation-CLV	0.285	2.97	Accepted
willingness to refer- CLV	0.208	2.346	Accepted
willingness to recommend- CLV	0.215	2.526	Accepted
churn-CLV	-0.249	2.99	Accepted
satisfaction-churn	-0.554	6.243	Accepted
trust-churn	-0.143	1.11	Rejected
Churn obstacles-churn	-0.301	4.28	Accepted
Price-satisfaction	0.382	3.346	Accepted
Entertainment-satisfaction	0.299	2.03	Accepted
Quality-satisfaction	0.399	4.626	Accepted
Quality-trust	0.802	7.23	Accepted
Intimacy-trust	0.109	1.36	Rejected
Satisfaction-willingness to recommend	0.241	3.230	Accepted
Satisfaction-willingness to refer	0.251	3.520	Accepted



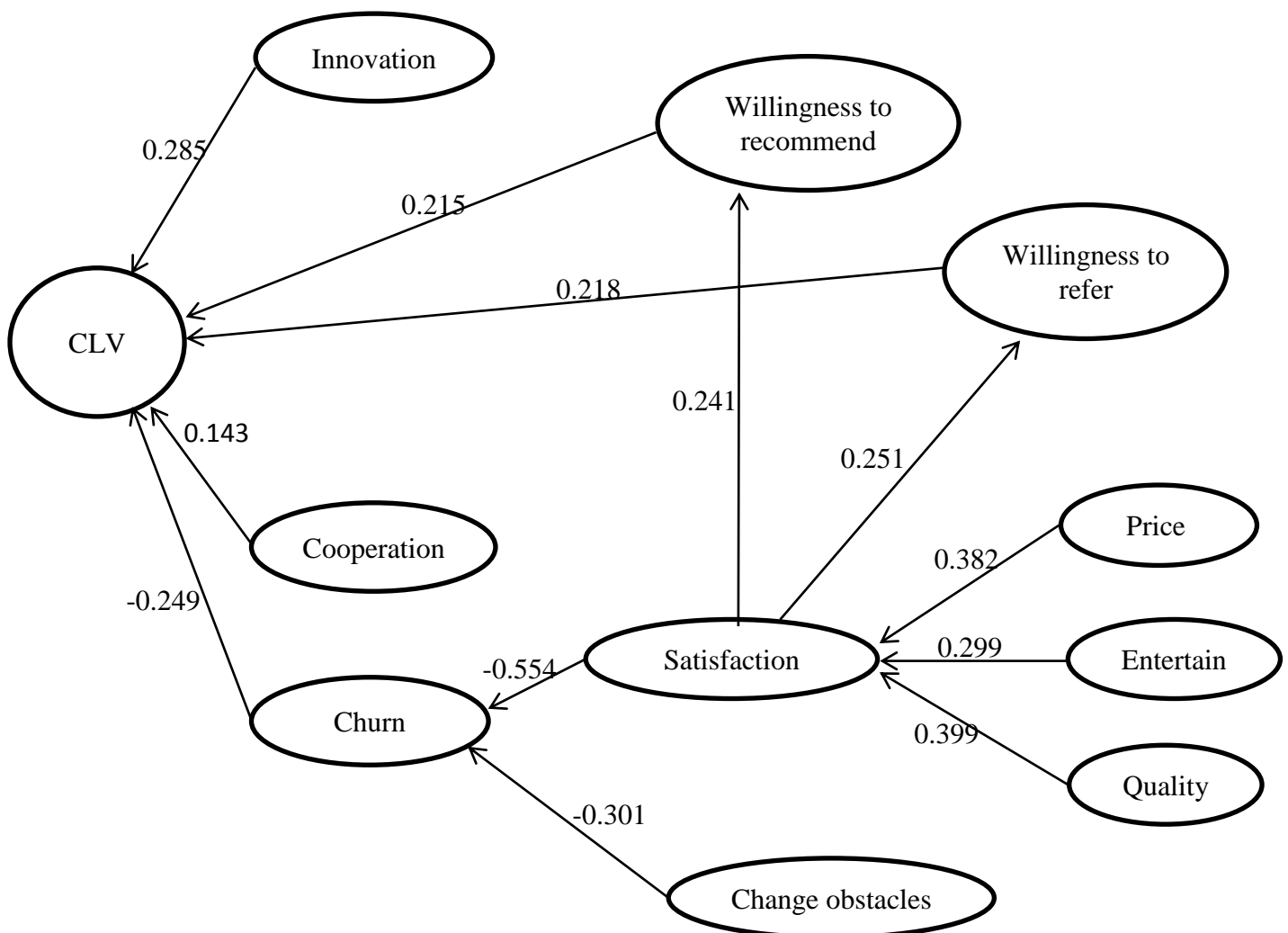


Figure 2 Acceptable and meaningful paths

## Discussion

In this research, we proposed a new model to evaluate customer's lifetime value. Our model is different from the other models as it considers non-financial elements that affect customer lifetime value. These elements include: Customer churn probability, cooperation capability, willingness to refer, willingness to recommend and customer innovation. We tested our proposed model on a set of data aggregated from a mobile-phone operator and determined the coefficient of each element in the customer lifetime value. For this purpose, the structural equation modeling was used via the Smart-PLS software. However the most important restriction in this research was the inaccessibility to the company's database, which has concluded incorrect calculation of customer lifetime value. Future research can focus of the following points:



- Measuring the effects of demographic variables on the customer's life time value, as this study disregards the effect of these variables.

- Using a more precise method to calculate the structure of customer life time value: in the current research, the structure is calculated approximately and is based on distributed questionnaires. It should be calculated according to the customer's database.

This model should be implemented in other service organizations and firms.

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