

## Exploring Attributes for Selecting VoIP Service in Korea

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**Abstract.** In Korea, the number of VoIP users is expected to rapidly increase after introducing VoIP number portability on October 31, 2008. The total number already gone beyond 2 million, and the number of customer churn has exceeded 0.35 million. Considering the high penetration rate of broadband Internet in households is exceeding 80 percent, it can be said that Korea is an environment which could provide a good quality of VoIP. Therefore, for the success of VoIP, it is critical to work out effective market strategies and design a service reflecting consumers' preferences. In this context, we propose a research design using conjoint analysis with four attributes: a consumer device cost, monthly call charges saved, number portability, and value-added service. With these attributes, a test was performed, and the strategic implications were found for VoIP service providers in Korea.

**Keywords:** VoIP, Number Portability, Conjoint Analysis, Relative Importance.

### 1. Introduction

With the implementation of VoIP number portability on October 31 in 2008, it is now possible to move from public switched telephone network (PSTN) to Voice over IP (VoIP) without changing the current phone number. The number portability can affect the VoIP service market in several ways. Firstly, the portability of a telephone number decreases switching costs [3]. It lessens the troublesome of informing a new number. Also, the policy promotes competitions between service providers by decreasing a switching barrier [4][5]. The positive effects of number portability have been practically proven with the case of Mobile Number Portability (MNP) that number portability increases customer churn and activates competitions [6].

Therefore, it is expected that VoIP number portability would provide strong incentives for customer churn to PSTN users; there is no burden of changing numbers which was one of the critical barrier of using VoIP [7]. Many PSTN users already have started to close PSTN and move to VoIP. According to the data of Korea Telecommunications Operators Association (KTOA), there were already about 120,000 applications of churn in November 2008, the first month, and 250,000 applications in December 2008; more than 100% increase in the second month. About customer churn, Kim(2006) referred that more than 70% of consumers replied that they will use VoIP after they close PSTN [2].

In terms of the VoIP service demand, Kim(2006) estimated the demand using the Bass diffusion model that the number of users will reach 4.8 to 5.2 million after the regular diffusion of VoIP service [2]. In terms of market size, it was increased from \$36 million in 2003 to \$255.2 million in 2007 [9], and IDC Korea expects that the market size will expand remarkably to \$1.4 billion in 2011. Considering the Internet infrastructures which are enough to provide good quality of VoIP service, it can be said that the success of VoIP depends on developing well designed service and effective marketing strategies. Therefore, understanding consumers' intention and preference to VoIP should be proceeded. As a result, the purpose of

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this study is to explore important attributes for consumers to select VoIP service in Korea. We will use conjoint analysis to estimate the structure of consumer's preferences.

## **2. Literature Review**

### **2.1. VoIP**

Simply, VoIP means doing voice communications over the Internet, which we rely on for data communications [1]. Unlike PSTN, voice transmissions are sent as data packets using the Internet Protocol (IP), whereby the user's voice is converted into digital signal, compressed, and broken down into a series of packets [11]. In terms of history, the VoIP concept was developed in the 1970s [13], and the commercial development started since the mid-1990s [11].

VoIP service is available with multiple combinations of terminals like phone to phone, computer to phone, and computer to computer, etc. [13]. Usually, a computer to computer combination is used at the initial stage of VoIP like Dial-pad. In case of a computer to phone type, it is called 'soft phone', and, software and headset are used for voice communications. In terms of phone to phone, which is called 'hard phone', this type of service uses exclusive consumer devices to connect to the Internet for voice communication.

Technically, VoIP has several advantages over PSTN. The most representative ones are lower call charges and many value-added services beyond the voice communications [2][7][8][11][13]. From the fact that the cost of a packet switched network for VoIP could be as much as half that of PSTN, VoIP has a great advantage in terms of the cost. Also, because VoIP allows data and voice transmissions simultaneously over a single network, Internet, various kinds of value-added services can be provided. For example, services like SMS, video telephony, caller ID, call forwarding, information service, etc. are now being provided to VoIP users [8][10]. In spite of these advantages, many people have been worried about a QoS. However, there have been continuous efforts toward the solving of this problem with the progress of network technologies and the upgrade of broadband network [1].

### **2.2. VoIP service in Korea**

In Korea, after Saerom C&T launched PC to PC type of VoIP called Dial-Pad for free in 2000, the market rapidly grew with 0.2 million of users at the end of 2003 due to the competitiveness in the VoIP's call charge system. At the beginning, because anyone could provide VoIP service with a little amount of money, many small-scale companies entered into the market and started the service. However, there was a limitation of broad diffusion of the service. One of reasons was related to QoS. It was very difficult to solve the problems like jitter, latency, and packet loss. Furthermore, there was no structured number system. Therefore, it was difficult to provide reliable service.

To solve such problems, and activate VoIP service, the Government enacted the notice of Internet phone service in 2004 and established the market entry system. Through the notice, VoIP was classified as a common carrier service, and the details related to QoS, interconnection and access, etc. were decided [12]. Also, the Government put a restriction on service providers so that only qualified providers could launch VoIP. Consequently, it was changed so that service providers who satisfied a certain level of QoS could provide service with using 070 prefix [2].

Since the notice of Internet phone service in 2004, it became difficult for small-scale companies to continue to provide VoIP service, but large enterprises have begun to start offering VoIP service. Samsung Networks firstly launched 'SamsungWise070' service in 2005, and then, Korea Telecom, LG Dacom, SK Broadband and cable operators entered into the market. Moreover, after LG Dacom launched 'myLG070' service, the target customers of VoIP have expanded from companies to households. Households were interested in VoIP's characteristics such as lower call charges, simultaneous use of Internet and VoIP, and value-added services [2]. Also, demographically, highly educated men living in apartments and spending more than \$70 for a month in mobile phone charges and \$30 for PSTN charges have higher intention of using VoIP [15].

VoIP service in Korea is now expected to grow by introducing number portability on October 2008. Number portability was one of the biggest requests of service providers to increase the competitions in fixed phone service markets. Therefore, VoIP number portability will be able to give incentives of customer churn from PSTN by decreasing switching costs, and to activate VoIP service market [12].

### 2.3. Conjoint Analysis

Conjoint analysis is a set of techniques for predicting consumer preferences among alternatives of multiple attribute options [13]. Also, conjoint analysis makes it possible to estimate the structure of a consumer's preferences (i.e., estimates preference parameters such as part-worths, importance weights, ideal points), given his or her overall evaluations of a set of alternatives that are pre-specified by levels. The set of techniques has received considerable academic and industry attention for measuring buyers' tradeoffs among multi-attributed products and services. Specifically, conjoint analysis has been accepted and popular for marketing purposes like new product evaluation, repositioning, market segmentation, etc.

There are several researches of VoIP using conjoint analysis. Zubey et al. (2002) tried to measure the preference structures between VoIP and PSTN service using conjoint analysis, and suggested the attributes of VoIP technology that best meet users' needs. The attributes of price, reliability, accessibility, voice quality, and services were used, and it was found that voice quality and reliability are the critical attributes for consumers [13]. Ida et al. (2005) used conjoint analysis to investigate the demand for VoIP of Japan. To examine demand substitutability between VoIP and PSTN, alternatives are divided into three, only fixed phone, parallel usage, only VoIP with the attributes of basic monthly charge, voice quality, number portability, emergency access, fax usage, and call charges. And it was found that 44% replied that they would use only fixed phone, 36% for parallel usage, and 20% for only VoIP. Also, Ida et al. (2005) referred that key condition for the proliferation of VoIP is a complete guarantee of QoS, number portability, fax usage, and emergency access [14].

## 3. Research Design

The first step of conjoint analysis is to define attributes and levels. To select attributes, we referred to the results of a survey about consumers' requirement conditions [7], and researches of Zubey et al.(2002) and Ida et al. (2005) [13][14]. Also, the present conditions of VoIP service were considered. After that, four attributes were selected: a VoIP consumer device cost, Monthly call charges saved, number portability, and value-added service. Because more than six attributes can be too complex for human beings to simultaneously process [14], the number of attributes is limited to four. The details are shown in Table 1.

**Table 1. Attributes and Levels**

Attributes	Description	Level		
A consumer device cost	Cost of an exclusive consumer device	Free (3-year- contract)	\$60	\$90
Monthly call charges saved	Monthly call charges saved compared to PSTN	\$6	\$8	\$10
Number portability	Introducing number portability	Introduced	Not introduced	
Value-added service	Value-added services which VoIP can provide	Provided	Not provided	

### 3.1. Consumer Device Cost

To use VoIP, a user should purchase an exclusive consumer device, or a modem. In the initial VoIP penetration stage, a consumer device price was for free since service providers utilized 'free consumer device' to attract consumers; however, in return, users are required to pay for at the time of the purchase or use the phone for a long term. Therefore, a consumer device cost is currently regarded as one of switching and fixed costs like a signup fee. Consequently, a consumer device cost can be one of the attributes that

consumers consider when they decide to use VoIP. The levels are divided into three; free with a 3-year-contract, \$60, and \$90.

### 3.2. Monthly Call charges Saved

We can say that lower call charge compared to PSTN is the most representative advantage of VoIP; consumers are mostly interested in the call charge of VoIP [7]. By comparing the call charge systems of PSTN and VoIP, it was found that VoIP's charge system is more attractive in initial set up cost, basic monthly charges, long distance charges, international call charges, and mobile call charges. Also, in case of VoIP, it is free to call by phone between users of same service providers. Therefore, it is possible to save \$6 to \$10 monthly under the assumption that a consumer pays \$20 for PSTN call charges, and the amount saved can be increased if a consumer heavily makes long distance calls and international call frequently. The levels are divided into three, \$6, \$8, and \$10. Table 2 explains the details of call charge systems of PSTN and VoIP.

**Table 2. The Call Charge Systems of PSTN and VoIP**

Category	PSTN	VoIP
Initial Set up Costs	\$60	\$10 or Free
Basic Monthly Charge	\$5.2	\$2
Local call (3Min)	¢ 3.9	¢ 3.8
Long distance call (3Min)	¢ 3.9(within 30KM) / ¢ 26(over 30KM)	¢ 3.8
Internet telephony (3Min)	¢ 4.9	¢ 3.8 or Free
Mobile phone call (10Sec)	¢ 1.5	¢ 1.1
International call (1Min)	Different (e.g. ¢ 28 for U.S)	¢ 5

### 3.3. Number Portability

Introducing VoIP makes it possible to move from PSTN without changing a current fixed telephone numbers. When consumers could keep their numbers, the incentives to use VoIP increased. By including number portability as an attribute, the impact of number portability to VoIP service can be estimated.

### 3.4. Value-added Service

Another advantage of VoIP is the various kinds of value-added services provided simultaneously with voice communication. Because VoIP uses the Internet, not only voice but also video and data are transmissible. As Korea Telecom is now providing, video phone service is available, and other services like SMS, caller ID, call forwarding, and information services (weather, finance, traffic, etc.) can be provided. Value-added services are able to provide benefits to users, and this is one of reasons why consumers choose VoIP [2].

## 4. Results and Implications

In the research design, we gathered 500 samples through online and offline survey, and performed conjoint analysis using SPSS 10.0. Respondents listed their preference among 9 subsets which were created by using SPSS's 'orthogonal array' procedure. As explained in Table 3, it is found that 'A consumer device cost' is the most important factor for consumers with the average importance of 57.60. Also, we can find the significant impact of 'Monthly call charges saved' with the importance of 20.37. 'Number portability' is also important to consumers, the average importance is 14.43. Finally, in case of 'Value-added service', the importance is 7.60, respectively.

With the results of the test, we might find some strategic implications. First, in terms of consumer device cost, the most important attribute, service providers might be required to map out a strategy to decrease consumer's device switching costs. Service providers need to keep the price of the consumer device at a satisfied level or for free under a certain condition such as providing a subsidy with some conditions can be a good strategy. As for call charges, it is necessary for service providers to maintain their competitive strengths in call charges. For instance, considering the fast growing of VoIP, continuing to provide a VoIP call for free among users of the same service provider is very important to stay ahead of the competition. In terms of value-added service, it appears that consumers are not really interested in this attribute compared to others. This finding might be interpreted that consumers place a much higher priority on the function of basic voice phone call service instead of additional services. Therefore, excessive investments or efforts to develop

distinctive value-added services which cause a raise of the call charges would better be avoided; rather, making efforts to provide better call quality at lower call charges seem to be more important.

**Table 3. Conjoint Analysis Results**

Attributes	Level	Utility Estimates	Importance
A consumer device cost	Free (3-years contract)	2.0922	57.60
	\$60	0.0708	
	\$90	-2.6130	
Monthly call charges saved	\$6	-0.7007	20.37
	\$8	-0.1035	
	\$10	0.8043	
Number portability	Introduced	0.5331	14.43
	Not introduced	-0.5331	
Value-added service	Provided	0.2806	7.60
	Not provided	-0.2806	

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