

Understanding IPTV churning behaviors: focus on users in South Korea

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Abstract

Purpose – This study aims to investigate customers' churning out of Internet Protocol Television (IPTV) service, one of the most prevalent forms of IT convergence.

Design/methodology/approach – Based on the review of current literature, a research model is introduced to depict the effects of select independent variables on customer churning behavior. First of all, the two groups are compared in terms of predictor variables, including switching barriers, voice of customer (VOC), membership period and degree of contents usage. Then, a curvilinear regression was applied to understand the association relationship between the level of IPTV contents usage and variables of switching barriers, VOC and membership period. Third, a logit regression was performed to predict customer churning through the variables of switching barriers, VOC, membership period and level of IPTV contents usage.

Findings – Through the empirical analysis, this study analyzed the factors affecting customer churning behavior of IPTV service providers based on switching barriers, VOC and contents usage.

Originality/value – Although several studies on IPTV have been undertaken globally, they have largely depended on self-reporting surveys to examine dynamics between antecedent variables and IPTV performance in terms of customer satisfaction, usage intension and customer retention. This empirical study is performed to understand influential factors of IPTV service defection through the weblog analysis of 3,906 service users, who represented both service defectors and non-defectors during a specific month.

Keywords Switching barriers, IPTV, Churning behaviour, VOC, Contents usage

Paper type Research paper

1. Introduction

Digital convergence is accelerating. It is taking place in many different forms, including voice and data network merger, voice over IP (VoIP) and IP-enabled television (or IPTV).



The internet and its technology are in the epicenter of the accelerating digital convergence. The disappearing boundaries between the traditional mass media and network service industries, especially in the form of IPTV (Internet Protocol Television), are probably one of the most striking examples of the rapid development of digital convergence. Digital convergence in such service brings changes to service providers (e.g. service cost, market competition, customer service strategy), service users (e.g. user behaviors, lifestyle, convenience, utility of service functions), national infrastructure and economy and society (e.g. culture). That is, digital convergence poses challenges and opportunities to businesses, as it disrupts established paradigms. As it sets itself apart from the traditional service paradigm in many different ways, digital convergence warrants dedicated research.

As a reprehensive service riding on the convergence tsunami, IPTV offers service functions that have not been available from the traditional TV service, spawning new and disruptive business models. In Korea, IPTV's popularity has exploded, surpassing 13 million subscribers in April 2016 after its commercialization less than 8 years ago (Korea IPTV Broadcasting Association, 2016) ([Ministry of Science, ICT and Future Planning, Korea Association for ICT Promotion, Korea Electronics Associations, 2016](#)). Now, its adoption is about to enter the maturity stage after going through the rapid growth. Although several studies on IPTV have been undertaken globally, they have largely depended on self-reporting surveys to examine dynamics between antecedent variables and IPTV performance in terms of customer satisfaction, usage intension and customer retention. To the best of our knowledge, none of them has studied customer defection behaviors based on actual usage records of IPTV service, and our research intends to fill the gap.

An empirical study is performed to understand influential factors of IPTV service defection through the weblog analysis of 3,906 service users, who represented both service defectors and non-defectors. First of all, the two groups (i.e. those who defected vs those who stayed) are compared in terms of predictor variables, including switch barriers, voice of customer (VOC), membership period and degree of usage. Then, a curvilinear regression was applied to understand the association relationship between the level of IPTV usage and variables of conversion barriers, VOC and membership period. Third, a logit regression was performed to predict customer churning through the variables of conversion barriers, VOC, membership period and level of IPTV usage. Through the empirical research, we offer strategic insights into the effective management of IPTV customers.

2. Theoretical background and literature review

2.1 IPTV

2.1.1 Definition and characteristics. An IPTV has its own IP address and, through a set top box, a PC or TV receives the content service including real-time broadcasting and VOD (video on demand) over the high-speed internet connection ([Bouwman et al., 2008](#)). The basis of IPTV, thus, is IT convergence on which it performs the traditional TV function – i.e. contents are broadcasted in uni-direction by service providers – and also offers other advanced features such as personal choice of TV programs tailored to customers' needs, internet commerce, web search and email ([Kim and Yoon, 2004](#)). By combining traditional TV provisioning with the rich set of internet-enabled information/commerce functions, IPTV is frequently called "Internet Protocol TV", "Interactive Personal TV" and "Intelligent Program TV". As can be seen, IPTV affords multi-channel interactivity between service providers and consumers, offers personalized services over the point-to-point channel rather than broadcasting and fuses other advanced digital services, including VoIP ([Hong and Lee, 2007](#); [Yu et al., 2011](#)).

2.1.2 Previous studies. Previous studies of IPTV are largely divided into those that investigate technology aspects, including technology trend analysis and proposition of new technology (Vidal *et al.*, 2010; Lopez *et al.*, 2011), policy analysis and development (Ezeh *et al.*, 2012; Lee and Shin, 2009) and service issues (Bouwman *et al.*, 2008; Blasco-Arcas *et al.*, 2012). This study focuses on a service issue that has important strategic implications on IPTV marketing by service providers. Table I summarizes current literature on IPTV research conducted from the perspective of service provision. The literature review reveals that current works examine IPTV service-related issues mainly from four different angles: service adoption intention, service quality and satisfaction, service prediction and contents.

Those of service adoption intention analyze and predict how internal and external service factors affect adoption intention of prospective customers. As IPTV service is still in its early stage of market growth in many parts of the world, understanding what antecedents influence IPTV adoption has been an important research issue to service providers. In that regard, a number of studies attempted to study the association between IPTV adoption intention and explanatory variables through survey research (Shin, 2007; 2009; Blasco-Arcas *et al.*, 2012; Choi *et al.*, 2010; Lee *et al.*, 2012; Pezzi, 2010; Weniger, 2010; Sawng *et al.*, 2014a; Schreider *et al.*, 2010; and Motohashi *et al.*, 2012).

According to them, there are various quality dimensions – e.g. system quality, contents (or information) quality, service quality and degree of customization – that positively affect people's attitude toward IPTV adoption and usage (Blasco-Arcas *et al.*, 2012; Lee *et al.*, 2012; Shin, 2007; Shin, 2009; Sawng *et al.*, 2014a; Weniger, 2010).

Studies of service quality and satisfaction investigate the influence of service quality variables on the satisfaction of IPTV customers. Empirical studies conducted in different contexts confirmed that service quality is an important antecedent of user satisfaction (Oliver, 1993; Cronin and Taylor, 1992; Anderson and Sullivan, 1993; Spreng and Mackoy, 1996). This strong relationship has not been an exception in IPTV research (Jan *et al.*, 2012; Nasir and Khan, 2014; Motohashi *et al.*, 2012). According to the studies, perceived quality of service (QoS) manifested in such dimensions as channel speeds and packet loss recovery significantly affects customer satisfaction (Nasir and Khan, 2014). Also, it was reported that IPTV service providers and subscribers have discrepant perceptions on the quality dimensions of the same service (Jan *et al.*, 2012). Besides, such factors as functional resemblance between services, complementary, substitution effects (Sawng *et al.*, 2013), perceived values (Lin *et al.*, 2012), system and user interactivity and customizability (Blasco-Arcas *et al.*, 2011) have been examined as influencing factors of IPTV service satisfaction.

Studies of service prediction diagnose and characterize current status of IPTV deployment through different research methods such as scenarios, focus group interviews and literature reviews of IPTV technology, market situations and policy in place and apply them to predict its future. Several studies assert that interactivity is a key in furthering future growth of IPTV service (Choi *et al.*, 2010; Zeadally *et al.*, 2011), and that business models evolve around interactivity and customization aspects of service contents (Zeadally *et al.*, 2011).

Research on IPTV contents analyzes characteristics of available information contents and attempts to investigate ways to grow their consumption by subscribers – a key to the success of IPTV business models. Attractive contents are not only a magnet to IPTV adoption but also can fetch additional revenues to service providers through other transactional activities. As related, people may be more active in consuming paid contents when they participate in VOC and watch IPTV for longer hours (Sawng *et al.*, 2014b). It is also pointed out that IPTV contents tend to resort to higher sensationalism in delivering interactivity and individual customization (Lin *et al.*, 2014). Despite this, improvements may

Type	Researcher	Key variables	Research method	Results/Findings
Service adoption intention	Shin (2009)	Usefulness/system quality/content quality/enjoyment/attitude/ intention	Telephone survey of potential IPTV users	System quality and contents quality positively affect service attitude. Also, service attitude is positively associated with usage intention
	Shin (2007)	Intrinsic factors/extrinsic factors/ economic factors/demographics/ adoption intention	Survey of potential IPTV users	Special functions, customized contents, interactivity, value added service, interoperability, service experience are significant indicators of IPTV adoption intention
	Blasco-Arcas <i>et al.</i> (2012)	Interactivity/personalization/user participation/user intentions to continue participating/user involvement in the service purchased	Survey of non-IPTV service users (college students)	It was found that personalization is more effective than interactivity in promoting IPTV service and interactivity improves customer's service engagement
	Choi <i>et al.</i> (2010)	Perceived trialability/perceived usefulness/perceived ease of use/ perceived enjoyment/prior experience/behavioral intention	Survey of two groups – the one group with IPTV experience and the other group with no previous IPTV experience	Perceived trialability is a function of perceived usefulness, which is on the other hand decided much by perceived ease of use. Perceptions of usefulness, ease of use, enjoyment are positively associated with behavioral intentions of IPTV service adoption
	Lee <i>et al.</i> (2012)	IPTV specific features/innovation diffusion/demographic statistics/ social influence/personal innovativeness/adoption intention	Surveyed a group of people with no previous IPTV experience	Relative advantages, compatibility, trialability, content richness, economic value, personal innovation, social influence affect IPTV adoption intention. Also, service reputation, interactivity, content richness and economic value positively affect adoption intention through the relative advantage variable
	Pezzi (2010)	Willingness to pay/service awareness/value adding contents	Survey of satellite broadcasting, digital TV and IPTV user groups	Sports and movies are content types catering to higher willingness to pay for IPTV. Among various quality dimensions, screen quality and sound quality are found to be the most important. It was also learned that the male groups in their 20s and 30s have the highest chance of adopting IPTV service

(continued)

Table I.
Literature review of
IPTV service

Table I.

Type	Researcher	Key variables	Research method	Results/Findings
	Weniger (2010)	Personal innovativeness/computer playfulness/perceived quality/cognitive absorption/perceived usefulness/perceived ease of use/perceived enjoyment/perceived price level/intention to use IPTV	Propose a research model based on literature survey	Perceived enjoyment and other factors included in the model can affect IPTV adoption, and there is a need to examine the correlation between the intention to adopt IPTV and its actual purchase behavior
	Sawng <i>et al.</i> (2014a)	System quality/richness in convergence functions/economic benefit/innovativeness/usefulness perception/reuse intention	Survey of IPTV service users in Korea and Japan	Rich convergence functions, perceived economic benefit and innovativeness affect usefulness perception and reuse intention. The association between system quality and usefulness was significant only in the Japanese group
	Schreiber <i>et al.</i> (2010)	Content recommendations/community awareness/community meta content/end-2-end communication/participatory IPTV/social applications	Designed IPTV contents and service scenarios, and conducted surveys against potential customers and professional groups in their adoption intentions	When there is fusion between social network functions and IPTV, the chance of IPTV adoption may increase considerably
	Motohashi <i>et al.</i> (2012)	Influence factors (adoption diffusion model)/influence factors (use diffusion model)/common factors/perceived ease of use/perceived usefulness/rate of use/variety of use/intention to subscribe/intention to re-use/satisfaction	Surveys were administered to two different groups of IPTV adopters and non-adopters	For IPTV non-adopters, trialability, innovativeness and perceived risks are associated with IPTV satisfaction. To IPTV adopters, complementarity and communication factors were significant in explaining user satisfaction
Service quality/satisfaction	Lin <i>et al.</i> (2012)	Perceived value/perceived advantage/satisfaction	IPTV or MoD service users were surveyed	Customers' perceived net value of IPTV service drives service satisfaction and intention to continue its usage

(continued)

Type	Researcher	Key variables	Research method	Results/Findings
Service prediction	Blasco-Arcas <i>et al.</i> (2011)	Interactivity/personalization/perceived control/satisfaction	Surveyed college students who were competent in IT usage	The results indicate that interactivity and personalization capability of IPTV 'grow customers' perceived control and satisfaction. Also, their synergy effects are stronger than their individual influences combined.
	Jan <i>et al.</i> (2012)	System quality/information quality/service quality/video quality	Surveys were administered on regular TV viewers and IPTV subscribers	Surveys on both service provider and subscriber groups revealed discrepancies in 10 out of 24 service quality dimensions and they agreed on only 4 service quality dimensions, highlighting importance in reducing the perception gap between the two groups.
	Nasir and Khan (2014)	Quality of services/channel zapping time/repair packet loss/IPTV customer satisfaction	IPTV professionals and customers were surveyed	QoS, channel zapping time and ability to repair packets were all significant in IPTV customer satisfaction.
	Sawng <i>et al.</i> (2013)	Product experience/sophistication of technology/household innovativeness/communication/complexity/relative advantage/similarity/complementarity/substitution effect/variety of use/rate of use/satisfaction/intention to re-use	IPTV customers from Korea and Japan are surveyed	Product experience and sophistication of technology are important variables in the diffusion of IPTV innovation. Also, functional similarity, complementarity and substitution effect influence customer satisfaction.
	Zeadally <i>et al.</i> (2011)	Architectural design challenges/market trends	Qualitative study and predictions on IPTV technology standardization, market trends, architectural design and system environment	Predicted rapid progressing user experience including interactivity, customization, recommendation capacity and targeted commercials. This requires standardization of relevant technologies and resolution of security issues.

(continued)

Table I.

Table I.

Type	Researcher	Key variables	Research method	Results/Findings
Contents	Bouwman <i>et al.</i> (2008)	Regulatory environment/industry structure/consumer attitudes	Development of service scenarios and analysis through case studies, literature review and interviews	Design of IPTV-based business models should be based on systematic analysis of external (environmental) factors and uncertainties
	Lin <i>et al.</i> (2014)	Content characteristics/sensationalism/localism/interactivity	Classified IPTV providers in Singapore in terms of their service types and analyzed their characteristics	IPTV resorts to more sensationalism than ordinary TV channels do. Currently limited interactivity is available but this needs to be expanded further in the relationship between customers and contents; customers and the system; and customers and customers
	Sawng <i>et al.</i> (2014b)	Total voice of customer/switching barriers/contents use pattern/paid contents consumption	Web log data of IPTV service customers in Korea are analyzed	VOC is positively associated with the increased sales of fee-based contents. Viewing hours and monthly subscriptions of contents are positively associated with IPTV provider's service sales as well

be necessary to extend the scope of interactivity from the current “customer and contents” to the “customer and customer” level to sustain service growth and maintain healthy revenue streams (Lin *et al.*, 2014; Schreiber *et al.*, 2010).

2.2 Customer defection

Customers voluntarily or involuntarily drop current service usage and/or switch to competitor’s offering. Customer defection behaviors can manifest in different forms: some do not use available service for an extended period, some delay payment of service fees and some choose to drop service subscription altogether. Generally speaking, we can consider that customer churning results when a customer stops subscription and thus has no intention to continue service usage.

A service company has vested interests in learning about customers’ churning behaviors because keeping existing customers is financially and strategically much more beneficial than finding new customers (Hejazinia and Kazemi, 2014). Loyal customers can ensure stable revenue generation and become a source of revenue augmentation through cross-selling and up-selling. Reflecting on their importance, much research has been conducted to determine causes of customer churning behaviors and to improve their predictability from the perspective of customer relationship management grounded on such methodology as data mining and social science (e.g. customer survey) research.

Research on customer defection has been largely on two issues. The first is to understand its triggering forces for which hypothesized influence of antecedents on customer churning is investigated through customer data available from service providers or through self-report surveys (Ahn *et al.*, 2006; Eshghi *et al.*, 2006; Hejazinia and Kazemi, 2014; Kim and Yoon, 2004; Kisioglu and Topcu, 2011; Oghojafor *et al.*, 2012; Portela and Menezes, 2010; Wong, 2011). The second approach is to develop prediction models of customer behaviors (Coussement and De Bock, 2013; Coussement *et al.*, 2010; Glady *et al.*, 2009; Gorgoglione and Panniello, 2011; Gürsoy 2010; Hadden *et al.*, 2005; Hou and Tang, 2010; Huang *et al.*, 2010; Huang *et al.*, 2012; Jahromi *et al.*, 2014; Jamal and Bucklin, 2006; Lariviere and Van den Poel, 2004; Lin *et al.*, 2011; Migueis *et al.*, 2012; Neslin *et al.*, 2006; Owczarczuk, 2010; Qi *et al.*, 2009; Richter *et al.*, 2010; Tsai and Chen, 2010; Tsai and Lu, 2009; Verbeke *et al.*, 2011; 2014; Wang *et al.*, 2009; Xia and Jin, 2008; Xiao *et al.*, 2014; Xie *et al.*, 2009; Yu *et al.*, 2011; Zhang *et al.*, 2012). They use various data mining techniques to compare predictive performance of models derived, to develop new prediction models or to compute the probability of customer defections through simulations.

Our study focuses on unravelling main causes of customer defection for which the impact of studied antecedent variables is analyzed based on real transactional customer data obtained from customers’ web logging and the service provider’s database. For the study, we consider that a customer has defected if he/she canceled IPTV service during a month-long period of monitoring at the time of the study. Current studies of IPTV that investigated customer churning are summarized in Table II.

In previous studies, various antecedents of consumer defections have been studied in the context of different service industries. The antecedents include such clients’ demographic factors as residential areas, income levels and ages (Ahn *et al.*, 2006; Kim and Yoon, 2004; Kisioglu and Topcu, 2011; Oghojafor *et al.*, 2012; Portela and Menezes, 2010; Wong, 2011). It has been frequently shown that higher levels of perceived service quality and satisfaction lead to lower chances of consumer churn (Ahn *et al.*, 2006; Eshghi *et al.*, 2006; Hejazinia and Kazemi, 2014). On the other hand, there has been an argument that, depending on the analytical approach and people sampled for research, consumer satisfaction may not be a reliable indicator of customer churning behaviors (Portela and Menezes, 2010).

Table II.
Antecedents of
customer churning
studies and findings

Studies	Key variables	Research method	Key findings
Ahn <i>et al.</i> (2006)	Customer dissatisfaction/ switching costs/service usage/ customer-related variables/ customer status/customer churn	Logit regression based on service data from 5,789 customers of a telecom service provider	Call dropping, customer complaints, membership points, monthly fees and membership status affect customer churn. Also membership status mediated the influences of call dropping, membership points and monthly fees on customer churn
Eshghi <i>et al.</i> (2006)	Perceived quality/customer expectations/perceived value/ customer satisfaction/ customer complaints/customer loyalty	Survey data gathered from 2,542 telecom service users and use of structural equation modeling	Customer dissatisfaction is a contributor of service switching and efforts are necessary to improve perceived service quality and service values to grow consumer satisfaction. Furthermore, it is important to have a communication strategy that forms more realistic consumer expectations from service providers
Hejazinia and Kazemi (2014)	Switching cost/service price/ quality/satisfaction/security concerns/competitors with superior technology/ advertising/customer churn	Survey data from 415 customers of an Iranian telecom service provider. Data analysis based on such methods as <i>t</i> -test and Friedman test	Service quality, satisfaction, availability of superior competitors, switching cost and marketing exposure had positive influences on consumer defections. Service price and security concerns had little effect on the dependent variable
Kim and Yoon (2004)	Call quality/billing/tariff level/ value-added services/customer services/handset/brand image/ age/sex/income/monthly payment/duration of subscription/duration of handset used/switching experience/loyalty/customer churn	Logit regression based on the survey data from 973 customers of a large mobile telecom service provider in Korea	Customers' defection intention is affected by their service satisfaction. Also significant are variables of call quality, service cost, handset, satisfaction with brand image, income level and duration of service subscription. It revealed that income level and duration of handset use are positively associated with defection intention, but duration of service subscription had a negative relationship with switching intention
Kisioglu and Topcu (2011)	Place of residence/age/average billing amount/trend in billing amount/average frequency of usage/average minutes of usage/churn	Service data of 2000 customers of a Turkish telecom service provider	Such variables as average minutes of usage, average billing amount and average frequency of usage were indicators of customer churn

(continued)

Studies	Key variables	Research method	Key findings
Oghojafor <i>et al.</i> (2012)	Marital status/age/ occupational status/income/ place of residence/educational level/gender/call expenses/ advertising medium/No of mobile connections/type of service plan/service facility/ customer churn	Survey of 800 customers of a Nigerian telecom service provider and data analysis based on multivariate analytical methods	There are higher chances of customers churn when call expenses are high; when service satisfaction is low; when there is lack of optimization in advertising medium; when there are better choices (i.e. service providers); and when the service plan is not adequately matched
Portela and Menezes (2010)	Gender/total dunning/overall revenues/debts/value of off- peak calls/telephone revenues/ internet revenues/customer churn	Survey data gathering on 830 customers of a Portuguese telecom service provider	Study variables except usage, product features and contract types were weak indicators of customer intention to sustain service usage. Customer defection was not a function of satisfaction
Wong (2011)	Rate plan suitability/customer age/customer residing location/consumption of value added services/customer churn	Service data were gathered from 11,525 customers of a Canadian mobile service provider and analyzed with logit regression	55.4% of customers are shown weak in their rate plan suitability and their service defection was higher than those whose rate plan was optimized. The results underscore the importance of identifying suitable rate plan for each customer

Table II.

As a strategic path to curtail customer defections, service providers may resort to communications in order for customers to form realistic service expectations (Eshghi *et al.*, 2006). Also, network service providers need to manage customer satisfaction based on broad service elements, including QoS, terminals and brand images (Kim and Yoon, 2004). Besides, through systematic analysis of client data, optimization may be necessary on service pricing, payment arrangement and the level of commercialization (Wong, 2011; Oghojafor *et al.*, 2012). Despite that many studies have been conducted on customer retention and churn, there is scant research on customer behaviors in the context of IT convergence service such as IPTV and, to the best of our knowledge, few empirical works of this type have been undertaken based on real customer data – rather than perception-driven surveys – gathered by a large telecommunications service company.

2.3 Voice of customer

In its narrow definition, VOC represents customers' feedback about their experiences with and expectations for your products or services, heard through various internal and external communication channels. In a broader definition, VOC embraces a service provider's attitude and volition to actively seek customer-related information in terms of consumer opinions, implicit consumer expectations, innate consumer values, transactional intentions and related behavioral patterns. Regardless of their narrow or broader definition, the objective to gather VOC is to offer improved customer service and satisfaction by curtailing consumer dissatisfaction and ultimately pursuing the state of zero complaint.

At a service firm, VOC should guide customer-oriented system optimization, planning and deployment of communication tools, development of core marketing strategy and management of marketing resources. Berry and Parasuraman (1997) emphasized importance of VOC in understanding consumer discontent and improving service quality. They underscored that current customers, competitors' clients as prospective customers and service-provisioning employees are all VOC sources, and efforts be made to pay attention to VOC from each stakeholder's perspective. That is, VOC may be highly valuable in deriving quality conditions of CRM expected from customers. It is therefore not difficult to expect that more effective service marketing becomes viable when communication strategies are tailored to groups with distinctively different VOC.

2.4 Switch barrier

Switch barriers are services or other factors that discourage customers from dropping current subscriptions to move to a competitor's offer (Jackson, 1985; Jones *et al.*, 2000). For service providers, customer switching has a considerable impact on market share and profitability, and they should find strategic solutions to raise switch barriers (Rust and Zahorik, 1993). When consumers' intentions to sustain current service usage lead to reductions in their defections, this may strengthen their service loyalty in the long run, and subsequently, firms may be able to sell services at regular prices, positively contributing to their bottom line (Reichheld and Sasser, 1990). On the contrary, the attrition of loyal customers forces a firm to invest additionally to find new clients, costing the firm five times more than that of maintaining existing customers (Singh, 1990).

In Fornell's (1992) study, the statistical association between the switch barrier variable and customer satisfaction was particularly strong. Jeong and Moon (2008), in their study of service switching and reuse intentions based on airline industry customers, showed that switching cost and the attractiveness of alternatives are key switch barriers. It was found that procedural, financial and relational aspects of switching costs discourage customers' intention to change service providers, positively affecting continued usage of existing

service. [Byun \(2009\)](#) divided switch barriers into those of positive and negative groups, and found that positive barriers significantly affect customer loyalty and their retention.

It is also known that, when there are intensive market competition and diversification in personal needs, customers still drop existing providers despite the high switching cost. Not surprisingly, we are witnessing that, with growing trends for consumers to pursue richer and unique usage experience, more people are positively responding to services newly introduced to the marketplace rather than maintaining their loyalty to existing membership ([Trijp *et al.*, 1996](#)). This development underscores that firms need to manage service switching barriers tailored to diversified customer needs and different customer characteristics, rather than trying to build and sustain the traditional, one-size-fits-all switch barriers ([Menon and Kahn, 1995](#)).

2.5 Study variables and research model

After reviewing characteristics of IPTV service and relevant existing literature, we examine the effects of IPTV's switch barriers (i.e. service bundling, remaining contract months and membership points), degree of service usage measured through different options of content views, VOC and membership period variables on customer's intention to continued IPTV usage. The study variables and their definitions are summarized in [Table III](#).

Variable Type	Variable categorization	Study variables included	Description
Dependent	Customer behaviors	Customer defection	Defected customer? (defect = 1, stay = 0)
Independent	Switch barriers	Service bundling	Bundled with other service? (bundled = 1, not bundled = 0)
		Remaining contract months	Number of months remaining before the contract expires
		Membership points	Similar to cyber money, offered as an incentive tied to IPTV usage. Could be used just like cash to pay for other fee-based services
	VOC (voice of customer)	Total VOC	Total number of VOC (e.g. complaint) filed with the service center
	Membership period	Membership years	Number of years as an IPTV customer
	Degree of content usage	Channel views	Number of channel views during one month of web logging. Views of traditional regular channels are logged
		VOD views	Number of VOD views during the month of web logging. Includes both free and fee-based contents
		TVOD views	Number of terrestrial broadcasting VOD views during the month of web logging. TVOD provides recorded rerun of popular programs shown in regular channels. This service is fee-based
		PPV	Number of PPV during the month of web logging. This service is fee-based
		Monthly subscriptions	Number of topic channels purchased on monthly basis (e.g. movie, online game, children)

Table III.
Study variables

Incorporating the study variables, the following research model in Figure 1 is proposed based on the previous discussions of relevant theories and findings from existing studies.

3. Research method

3.1 Data gathering and analysis

For empirical analysis, we gathered IPTV service users' web log, VOC records and demographic information from the database of a large IPTV service provider in Korea that had 6.7 million IPTV subscribers as of April 2016 (Korea IPTV Broadcasting Association, 2016). The sampling pool of the study included all customers who maintained their IPTV subscription for four years from July 2010 through July 2014. Out of the sampling pool, a sample of 5,000 was randomly chosen based on the stratified sampling of defector and non-defector groups. More specifically, the sample included 2,500 customers who dropped the IPTV service during the next month period (8.1-8.31, 2014) and 2,500 customers who stayed with the service during the same month period (8.1-8.31, 2014). From the initial sample of 5,000, those with missing data values and having data quality problems are dropped from further consideration. This filtering process left 3,906 people – 2,008 defectors and 1,898 non-defectors – which represented 0.06 per cent of the population. The customer data (e.g. web log) of the two groups gathered by the company during the six-month period from February 2014 through July 2014 are used for this study.

We used Strata v11.2 for statistical analysis of the data. Descriptive statistics of customer demographics are presented first in terms of IPTV bundling, membership join year, gender and age group. Then correlation coefficients between study variables are reviewed to have exploratory understanding of their relationships. Subsequently, the defection and non-defection groups are compared in their statistical differences in the dimensions of switch barriers, VOC, membership period and content usage. Then, using the double-log curvilinear regression, the associations between the content usage variables (e.g. channel views, VOD views) and their antecedents (i.e. switch barriers, VOC and membership years) are examined. Finally, a logit regression was applied to model the effects the independent variables (i.e. switch barriers, VOD, membership period and content usage) have on customer churn.

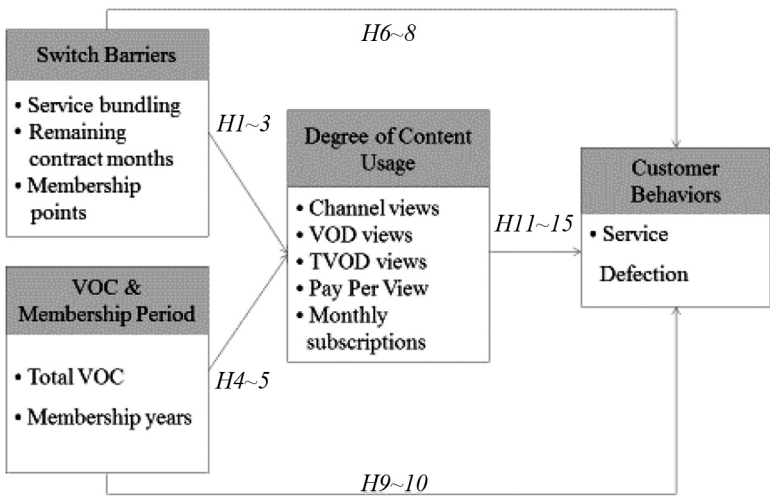


Figure 1.
Research model

3.2 Analytical model and hypotheses

3.2.1 Degree of content usage (first analysis). Generally, higher switch barriers can increase profitability because of the close relationship between customers and service providers (Rust and Zahorik, 1993). However, in the intensifying competition society, it is hard to determine that no churn rate is the higher utilization of services. In recent years, it has been necessary to analyze the content consumption behavior of individual customers in relation to the switch barriers, as customers instantly react to new and unique products and services. Therefore, the following hypotheses are set up between the switch barrier and contents consumption behavior:

- H1. Service bundling is significantly related to a degree of content usage.
- H2. Remaining contract months are significantly related to a degree of content usage.
- H3. Membership points are significantly related to a degree of content usage.

In addition, VOC can also be interpreted as a customer loyalty in that it is a positive sign to service provider (Fornell, 1992). As VOC is an important source of information for improving service quality (Berry and Parasuraman, 1997), analyzing the contents consumption behavior of customers who are actively giving information can provide important implications for future service improvement. Therefore, the following hypotheses are set about the relationship between VOC and subscription period and content consumption behavior:

- H4. Total VOC is significantly related to a degree of content usage.
- H5. Membership years are significantly related to a degree of content usage.

Following statistical model and research hypotheses are proposed with regard to the relationship between the degree of content usage and selected independent variables. For the hypothesis testing, a curvilinear regression model (double-log function) is used:

$\ln(\text{degree of contents usage}) = \beta_0 + \beta_1(\text{service bundling}) + \beta_2 \ln(\text{remaining contract months}) + \beta_3 \ln(\text{membership points}) + \beta_4 \ln(\text{total VOC}) + \beta_5 \ln(\text{membership years}) + \varepsilon$:

- H1 $H_0: \beta_1 = 0, \quad H_1: \beta_1 \neq 0$
- H2 $H_0: \beta_2 = 0, \quad H_1: \beta_2 \neq 0$
- H3 $H_0: \beta_3 = 0, \quad H_1: \beta_3 \neq 0$
- H4 $H_0: \beta_4 = 0, \quad H_1: \beta_4 \neq 0$
- H5 $H_0: \beta_5 = 0, \quad H_1: \beta_5 \neq 0$

3.2.2 Customer churning out (second analysis). Switch barriers, VOCs and subscription terms of IPTV services can affect not only content consumption behavior but also customer churn rate. Customer churn is driven by multidimensional influences such as service utilization levels, transaction duration, service quality and satisfaction. (Ahn *et al.*, 2006; Eshghi *et al.*, 2006; Hejazinia and Kazemi, 2014). Ultimately, it is necessary to analyze the relationship between IPTV service providers' switch barriers and VOCs, as they are aimed at preventing customer churn and establishing long-term relationships. Therefore, the following hypotheses were established with regard to the switch barrier, VOC and subscription period:

- H6.* Service bundling is significantly related to a service defection.
- H7.* Remaining contract months are significantly related to a service defection.
- H8.* Membership points are significantly related to a service defection.
- H9.* Total VOC is significantly related to a service defection.
- H10.* Membership years are significantly related to a service defection.

Contents consumption behavior predicts the possibility of customer churn in that it is an indirect indicator of customer's satisfaction with service and continuous use. In fact, in the previous study, it was confirmed that the frequency of using services was a precursor of customer churn (Kisioglu and Topcu, 2011). Based on this study, the following hypotheses about contents consumption behavior and customer churn were established:

- H11.* Channel views are significantly related to a service defection.
- H12.* VOD views are significantly related to a service defection.
- H13.* TVOD views are significantly related to a service defection.
- H14.* Pay per views (PPV) are significantly related to a service defection.
- H15.* Monthly subscriptions are significantly related to a service defection.

Grounded on Fornell's (1992) prediction model, the following logit model is constructed to explain the relationship between customer defection and antecedent variables, including switching barriers of IPTV service, and hypotheses are proposed in terms of their expected association relationship.

$\text{Log (P/1-P)} = \beta_0 + \beta_1 (\text{service bundling}) + \beta_2 (\text{remaining contract months}) + \beta_3 (\text{membership points}) + \beta_4 (\text{total VOC}) + \beta_5 (\text{membership years}) + \beta_6 (\text{channel views}) + \beta_7 (\text{VOD views}) + \beta_8 (\text{TVOD views}) + \beta_9 (\text{PPV}) + \beta_{10} (\text{monthly prescriptions}) + \varepsilon$
where P = a customer's defection probability:

- H6* $H_0: \beta_1 = 0, \quad H_1: \beta_1 \neq 0$
- H7* $H_0: \beta_2 = 0, \quad H_1: \beta_2 \neq 0$
- H8* $H_0: \beta_3 = 0, \quad H_1: \beta_3 \neq 0$
- H9* $H_0: \beta_4 = 0, \quad H_1: \beta_4 \neq 0$
- H10* $H_0: \beta_5 = 0, \quad H_1: \beta_5 \neq 0$
- H11* $H_0: \beta_6 = 0, \quad H_1: \beta_6 \neq 0$
- H12* $H_0: \beta_7 = 0, \quad H_1: \beta_7 \neq 0$
- H13* $H_0: \beta_8 = 0, \quad H_1: \beta_8 \neq 0$
- H14* $H_0: \beta_9 = 0, \quad H_1: \beta_9 \neq 0$
- H15* $H_0: \beta_{10} = 0, \quad H_1: \beta_{10} \neq 0$

4. Results and interpretations

4.1 Demographics

The demographic information of customers in the sample is summarized in Table IV. Overall, two distinct patterns emerge. First, there is a clear indication that customers who opt for service bundling which combines IPTV with other services (e.g. VoIP and mobile cellular phone communications) had a much lower chance of abandoning it than those who subscribe it on a single-service basis. Another noticeable revelation is related to the distinct behavioral patterns of different age groups in IPTV service use. The comparison of defector versus non-defector groups in terms of their relative percentages indicates that there is a higher chance of dropping IPTV service among older age groups. That is, the percentage of the IPTV defection rate was consistently lower than the non-defection rate among the age groups of 40s or younger, but this reverses in the age group of 50s and 60s.

4.2 Correlation coefficients

To explore association relationships between study variables, their correlations are reviewed as in Table V. Strong positive correlations are observed between *total VOC filing* and *monthly service subscription* (0.74); between *channel views* and the three variables of *VOD* (0.59), *TVOD* (0.52) and *PPV* (0.56) views; and between *VOD* and *TVOD* (0.94).

4.3 Two-sample comparison

The two groups (i.e. defection and non-defection groups) are compared in terms of the study variables and the results are summarized in Table VI. The two-sample *t*-tests reveal that

Variables	Total (<i>n</i> = 3,906)	Defector group (<i>n</i> = 2,008)	Non-defector group (<i>n</i> = 1,898)
<i>Bundling with other services?</i>			
Bundling	1,559 (39.9%)	1 (0.1%)	1,558 (82.1%)
No bundling	2,347 (60.1%)	2,007 (99.9%)	340 (17.9%)
<i>Membership join year</i>			
2010	92 (2.4%)	43 (2.1%)	49 (2.6%)
2011	754 (19.3%)	307 (15.3%)	447 (23.6%)
2012	2,068 (52.9%)	1,153 (57.4%)	915 (48.2%)
2013	688 (17.6%)	359 (17.9%)	329 (17.3%)
2014	304 (7.8%)	146 (7.3%)	158 (8.3%)
<i>Gender</i>			
Male	1,595 (40.8%)	759 (40.0%)	836 (41.6%)
Female	2,311 (59.2%)	1,139 (60.0%)	1,172 (58.4%)
<i>Age group</i>			
< 20	63 (1.6%)	33 (1.7%)	30 (1.5%)
20's	325 (8.3%)	128 (6.7%)	197 (9.8%)
30's	1,130 (28.9%)	513 (27.0%)	617 (30.7%)
40's	1,219 (31.2%)	592 (31.2%)	627 (31.2%)
50's	803 (20.6%)	438 (23.1%)	365 (18.2%)
60<	366 (9.4%)	194 (10.2%)	172 (8.6%)
Total	3,906 (100.0%)	1,559 (100.0%)	2,347 (100.0%)

Table IV.
Summary of sample
data

Table V.
Correlation matrix

Variables of study	①	②	③	④	⑤	⑥	⑦	⑧	⑨
① Remaining contract months	1								
② Membership points	0.01	1							
③ Total VOC	-0.03	0.01	1						
④ Membership years	-0.74	-0.02	-0.02	1					
⑤ Channel views	-0.14	0.07*	0.12*	0.04*	1				
⑥ VOD views	0.04*	0.09*	0.14*	-0.09	0.59*	1			
⑦ TVOD views	0.07*	0.08*	0.13*	-0.12	0.52*	0.94*	1		
⑧ PPV	-0.08	0.14*	0.10*	0.02	0.56*	0.35*	0.31*	1	
⑨ Monthly subscriptions	-0.01	0.02	0.74*	-0.02	0.07*	0.09*	0.09*	0.06*	1

Note: * $p < 0.05$ **Table VI.**
Comparison between
defection and non-
defection groups

Variable category	Variables	Total ($n = 3,906$)	Customers defected ($n = 2,008$)	Customers stayed ($n = 1,898$)	t -value
Switch barriers	Remaining contract months	3.92 (6.72)	4.08 (7.20)	3.76 (6.16)	-1.5
	Membership points	37,285 (121,186)	29,831 (108,667)	45,172 (132,729)	4.0***
VOC	Total VOC	0.75 (1.35)	0.89 (1.44)	0.61 (1.23)	-6.6***
Membership years	Membership years	2.91 (0.88)	2.87 (0.83)	2.95 (0.92)	-
Contents usage	Channel views	520 (1,003)	469 (997)	575 (1,007)	3.3***
	VOD views	2,117 (3,004)	1,762 (2,775)	2,491 (3,187)	7.6***
	TVOD views	626 (888)	517 (812)	740 (948)	7.9***
	PPV views	14 (34)	13 (30)	16 (37)	2.5**
	Monthly service	0.26 (1.26)	0.27 (1.29)	0.25 (1.22)	-0.4

Notes: * $p < 0.10$; ** $p < 0.01$; *** $p < 0.001$

customers of the defection group had lower membership points, higher VOC filing and significantly lower content usage in terms of channel views, VOD views, TVOD views and PPV.

4.4 Double-log and logistic regressions

To test *H1* through *H5*, the double-log regression method was used in which variables of contents usage become the dependent variables (Table VII). Among included independent variables, service bundling and total VOC had a positive association with all variables of contents usage. On the other hand, remaining contract months was negatively associated with channel views, VOD views and PPV. Membership points had a positive association with contents usage variables, except the monthly service variable, and overall, there is a strong negative relationship between membership years and the contents usage level.

To test *H6* through *H15*, a logistic regression was performed in which customer defection becomes the dependent variable. As shown in Table VIII, variables relevant to *service bundling* and frequency of *PPV* are negatively associated with customer defection, whereas *Total VOC* and *monthly subscription* have positive associations with customer defection.

Categories	Independent variables	Dependent variables (category: degree of content usage)				
		Ln (channel views)	Ln (VOD views)	Ln (TVOD views)	Ln (PPV views)	Ln (monthly subscriptions)
Conversion barriers	Service bundling	0.933***	1.157***	1.042***	0.274***	0.015*
	Ln (Remaining contract months)	-0.536***	-0.167*	-0.079	-0.182***	0.001
	Ln (Membership points)	0.036***	0.060***	0.047***	0.047***	0.000
VOC Membership period	Ln (Total VOC)	0.725***	1.165***	0.994***	0.362***	0.502***
	Ln (Membership years)	-0.956***	-1.252***	-1.227***	-0.306**	-0.005
	Constant	5.316	5.677	4.507	1.557	0.003
	R^2	0.08	0.06	0.06	0.05	0.55
	F-ratio	65.28	50.20	52.26	38.28	951.48

Notes: * $p < 0.10$; ** $p < 0.01$; *** $p < 0.001$

Table VII.
Curvilinear regression of contents usage

Defection	Total ($n = 3,906$)	
	Parameter est.	Standard error
Service bundling	-9.52***	1.05
Remaining contract months	-0.00	0.01
Membership credit	-0.00	4.54e-7
Total VOC	0.51***	0.09
Membership years	-0.01	0.09
Channel views	0.00	8.92e-5
VOD views	-0.00	4.97e-5
TVOD views	-0.00	1.65e-4
PPV	-0.01***	1.62e-3
Monthly subscriptions	0.15*	0.07
Constant	1.64	
Log likelihood	-951.39	
χ^2	3508.98	
Pseudo R^2	0.65	

Notes: * $p < 0.10$; ** $p < 0.01$; *** $p < 0.001$

Table VIII.
Logistic regression of customer churning out (1 = defection, 0 = non-defection)

Building on the analysis of the logistic regression, further analysis is performed by constructing prediction models on how the two significant variables – different levels of *Total VOC* (as a positive indicator) and PPV (as a negative indicator) – affect customers' defection behaviors (Figure 2). In the case of VOC, as a customer's VOC increases, the chance of customer churn increases as well regardless of subscribing bundled or unbundled service. However, bundled service subscribers have a lower defection rate than single-service subscribers even with higher VOC. Also, it is noted that single-service subscriber's defection grows fast in the early stage of VOC and then gradually stabilized. Whereas, bundled service subscribers display an opposite behavioral pattern in which the customer defection rate grows faster with higher VOC simulation. It also shows that as PPV purchase increases, customer defection drops. Single-service subscriber's defection dropped a lot faster than that of bundled service subscribers when the former group's PPV is increased (Table IX).

5. Discussions and conclusion

5.1 Discussions

Existing studies of IPTV service investigated varied research topics relevant to prediction of service adoption and adoption intention, repurchase and service continuance, service satisfaction and loyalty. Especially, much attention has been paid to the explanation of customer satisfaction, loyalty, repurchase and service continuance. Despite the research volume, to the best of our knowledge, very few IPTV studies (or even IT convergence research) are based on real customer input (i.e. web log) and transactional data. From that perspective, our work that took advantage of actual service data that provide detailed information of customer behaviors has an important contribution to the research community. Implications of our research findings can be summarized.

First, switching barriers, VOC and subscription period have direct associations with the degree of IPTV usage. Among switching barriers considered, the variable of “bundling with other services” was especially significant in explaining IPTV usage. This becomes a clear indication that when the IPTV service is bundled with other wired and/or wireless services, including high-speed internet access, VoIP and mobile communications, this becomes a more effective and sustainable business model. Also, the analysis indicates that customers with high VOC frequency have higher content usage, confirming that higher engagement of customers

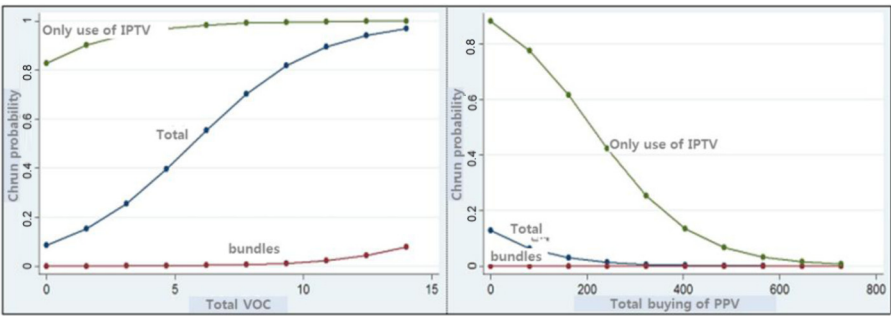


Figure 2.
VOC/PPV and
customer defection

Table IX.
Results of hypothesis
testing

Hypothesis	Path	Statistical results	Test results
H1	Service bundling → Degree of contents usage	$\beta_1 > 0$	Supported
H2	Remaining contract months → Degree of contents usage	$\beta_2 > 0$	Supported
H3	Membership points → Degree of contents usage	$\beta_3 > 0$	Supported
H4	Total VOC → Degree of contents usage	$\beta_4 > 0$	Supported
H5	Membership years → Degree of contents usage	$\beta_5 > 0$	Supported
H6	Service bundling → Customer defection	$\beta_1 < 0$	Supported
H7	Remaining contract months → Customer defection	$\beta_2 = 0$	Not supported
H8	Membership points → Customer defection	$\beta_3 = 0$	Not supported
H9	Total VOC → Customer defection	$\beta_4 < 0$	Supported
H10	Membership years → Customer defection	$\beta_5 = 0$	Not supported
H11	Channel views → Customer defection	$\beta_6 = 0$	Not supported
H12	VOD views → Customer defection	$\beta_7 = 0$	Not supported
H13	TVOD views → Customer defection	$\beta_8 = 0$	Not supported
H14	PPV → Customer defection	$\beta_9 < 0$	Supported
H15	Monthly subscriptions → Customer defection	$\beta_{10} < 0$	Supported

with the service firm leads to higher service usage intention and service purchase – highlighting importance of target marketing in designing marketing strategy. Meanwhile, the number of subscription years had a negative association with IPTV usage, which may imply that with longer service use, customers reach a sort of service plateau. This may indicate importance of introducing periodical promotions to the customer group based on new contents.

Second, it is shown that switch barriers, VOC and subscription period are partly associated with the defection of IPTV customers. Bundling was effective in discouraging service switching. Meanwhile, high VOC frequency was associated with higher chance of customer defection. The patterns in Figure 2 seem to imply that a certain level of VOC is a healthy expression relevant to service usage and purchase intention, but excessive occurrence of VOC may be a precursor of customer discontent and subsequent defection. Additional research is necessary to understand the VOC's threshold value that becomes an infliction point of service dropping.

Third, it was found that PPV and monthly subscriptions showed positive and negative associations, respectively, with customer churning. This seems to imply that customers who prefer certain content genres have a stronger incentive to maintain their consumptions, but those who access many different content types by paying fixed monthly fees may opt to the service that offers more choices and thus could be more easily swayed by alternatives from competitors.

5.2 Limitations and research opportunities

This study has several limitations. First, although our analysis is based on real transactional records (i.e. web log and other customer data) of an IPTV service provider, limited availability of secondary data in terms of customer satisfaction, intention to continue service, customer loyalty and switching intention kept us from pursuing more in-depth study. Second, in analyzing VOC, our variable represented a simple counting of each person's VOC filing. Further analysis can be performed by examining VOC texts and categorizing the patterns to better explain customer churning behaviors. Third, although there has been scant research on customer defections based on real service data, we acknowledge weaknesses in operationalizing study variables and deriving hypotheses grounded on solid theoretical basis. Our research can be expanded into many different research directions. For example, future studies of IT convergence service (not just IPTV) can design assessment methods of customer attitudes based on web logs and databases, develop typology of VOC inputs and apply them to the development of analytical and predictive models relevant to the performance dimensions of customer service, including customer churning, loyalty and service continuation.

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