Understanding the Adoption of Convergent Services: The Case of IPTV

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Abstract

Today, many of IT innovations that affect people’s daily lives originate from digital convergence. This study examines the factors influencing consumers’ adoption of IPTV, a representative convergent service combining communication and media technologies. Applying innovation diffusion theory, we developed an adoption model reflecting the unique characteristics and usage contexts of IPTV. The results indicate that relative advantage, compatibility, trialability, content diversity, monetary value, personal innovativeness, and social influence have significant direct effects on the consumer’s adoption of IPTV. In addition, the specific attributes of IPTV—interactivity, content diversity, and monetary value—have significant mediating effects on the consumer’s adoption via relative advantage. These results not only provide practical insights into the consumer’s acceptance of new convergent services but also help practitioners to plan their marketing strategies more effectively.

1. Introduction

For the last few decades, we have witnessed the rapid advancement of information technology (IT) and its tremendous impact on every facet of our life. The trajectory of IT evolution has introduced various types of devices, applications, and services to satisfy individual needs for entertainment, fast communication, and easy information access. Many of such IT innovations originate from digital convergence, which refers to the convergence of previously recognized heterogeneous technologies and the creation of new types of digital products and services.

In the context of broadcasting and communications, both Internet-based technologies and digital convergence play an important role in providing innovative solutions to consumers, particularly Internet Protocol Television (IPTV). IPTV is a convergent technology that distributes television contents over the Internet Protocol (IP), enabling a more customized and interactive user experience [16].

Recently, IPTV has attracted a great deal of attention from the private, public and academic sectors, and is now recognized as a viable megatrend affecting the communications and broadcasting industries in near future. In addition, IPTV is capable of becoming a new business model with huge growth potential in the convergent service market. According to the Multimedia Research Group [28], the number of IPTV subscribers worldwide reached 28 million in 2009, and the number is expected increase to 83 million by 2013, a compound annual growth rate of 31%. Further, global IPTV service revenues are projected to be $38 billion in 2013.

Considering IPTV’s technological background, unique characteristics, and market potential, this research is motivated by the fact that IPTV (1) offers a new information service model consisting of diverse digital contents, (2) is a disruptive IT innovation ultimately intended to completely transform the way content services are provided, and (3) is in the initial stage of commercialization. So, we propose the following research questions: (1) What factors influence the consumer’s adoption of IPTV? (2) How do these factors affect the consumer’s decisions regarding IPTV adoption? To answer these questions, we developed an adoption model consisting of nine factors presumed to be the key determinants of IPTV adoption. The model is based on innovation diffusion theory [26, 32] and takes into account IPTV-specific attributes, personal innovativeness, and social influence.

2. Research framework and model development

Some properties associated with IPTV provide useful implications regarding what theoretical perspectives and research framework are related to the adoption of IPTV services across individual customers. First, IPTV is a new information and content service model that transforms the way of designing, delivering, using, and billing digital contents. To conceptualize this new IT service model at a theoretical level, it would be important to view IPTV as an innovation of information and content provisioning driven by technology.

Second, we recognize that the unique characteristics of IPTV can play an important role in formulating the consumer’s expectation of IPTV. As IPTV premis-es a wide range of technology and service innovation, potential users of IPTV would be attracted by the im-
licit or explicit utilities of IPTV, such as content diversity, interactive user interface, and comparative monetary value. Thus, the IPTV-specific attributes that lead to various emotional and economic benefits are good ingredients for identifying the decision factors of IPTV adoption.

Third, the technology and service innovativeness that IPTV promises imply that a customer’s prior exposure to similar technologies [37] and the customer’s propensity (or capability) to absorb new types of technologies and services [8] may play a critical role in IPTV adoption.

### 2.1. Innovation diffusion

The innovation diffusion literature attempts to understand and explain how innovations are spread across a population of potential adopters over time [32] and its application in the individual [26, 27, 36] or organizational [22, 34] context. Classical diffusion theory, developed in the context of individual adopters, considers the diffusion of an innovation as a social process of communication, where potential adopters become aware of the innovation and consider its adoption [32].

A dominant theme in the traditional diffusion of innovation research is to identify and examine the attributes of innovations and their influence on the decision to adopt. Rogers [32] identified five generic innovation characteristics: (1) relative advantage, (2) complexity, (3) compatibility, (4) trialability, and (5) observability. As Rogers’ meta-analysis is based on studies of adoption by individuals, we used the innovation attributes proposed by Rogers as the dominant factors influencing the potential adopter’s decision-making process. Among these characteristics of innovation, we selected four attributes—relative advantage, compatibility, complexity, and trialability—as the focal constructs explaining the rate of IPTV adoption.

Relative advantage is defined as the degree to which an innovation is perceived as being better than the idea it supersedes [32]. Relative advantage encompasses a variety of benefits potential adopters can obtain from a particular innovation, such as economical profitability and desirable social status, among others. IPTV is a new IT platform that facilitates the compelling feature of easy access to various choices of digital contents with eligible price plan. The innovation diffusion literature has found relative advantage to be one of the best predictors of the rate of innovation adoption [19, 27, 36]. Thus, we propose the following hypothesis:

**Hypothesis 1**: The relative advantage of IPTV has a positive effect on the consumer’s intention to adopt IPTV.

Complexity is defined as the degree to which an innovation is perceived as relatively difficult to understand and use [32]. In this study, we translated the concept of complexity into perceived ease of use and applied it to our research model because comparing the saliency of each construct with same effect direction (i.e., to determine whether all of the constructs had a significant positive effect on adoption intention) was more relevant.

Perceived ease of use is defined as the degree to which a technology innovation is perceived as being easy to understand and use. IPTV incorporates GUI that enables users to navigate their needed content and information. The design of user interface usually determines user’s relative perception on the complexity of using IPTV. Perceived ease of use has been shown to affect adoption intention [9]. Following the established findings in prior research, we propose the following hypothesis:

**Hypothesis 2**: The ease of use of IPTV has a positive effect on the consumer’s intention to adopt IPTV.

Compatibility is defined as the degree to which an innovation is perceived as consistent with the existing values, past experience, and needs of potential adopters [32]. The underlying idea behind compatibility is that an innovation that is more compatible is less uncertain to a potential adopter and fits the adopter’s situation more closely [32].

The ultimate nature of IPTV is fundamentally similar to that of conventional broadcasting because IPTV basically provides video and audio contents that gratify the user’s desire to refresh his or her life with entertainment and acquire needed information. In addition to this utility, IPTV offers more innovative features derived from its unique attributes, such as a wide variety of contents, two-way communication enabled by interactivity, and monetary value. In their study of personal workstation adoption, Moore and Benbasat [27] find that compatibility has a significant effect on the potential adopter’s decision process. Thus, we propose the following hypothesis:

**Hypothesis 3**: The compatibility of IPTV has a positive effect on the consumer’s intention to adopt IPTV.

Trialability is defined as the degree to which an innovation may be experienced on a limited basis [32]. New technology innovations that can be tried by potential users are usually adopted more rapidly than those that are not offered on a trial basis. Rogers [32] notes that personal testing of an innovation (a product or a service) is one way for individuals to understand how
the innovation works and dispel uncertainties in the innovation.

Previous studies support the argument that the trialability of an innovation is positively related to its rate of adoption [12]. Thus, trialability is a viable construct that can explain the variance of the IPTV adoption rate for the early stage of its commercialization. So, we propose the following hypothesis:

**Hypothesis 4**: The trialability of IPTV has a positive effect on the consumer’s intention to adopt IPTV.

### 2.2. IPTV-specific characteristics

Unlike the innovation diffusion perspective, which has been extensively studied across a variety of technology contexts, IPTV-specific attributes have been associated with the unique features of IPTV and its distinctive usage contexts. A number of IS researchers have examined the end user’s IT adoption and usage behaviors, but IPTV has some specific characteristics that are different from traditional technologies. In this study, we focus on three factors that influence individual consumers’ intention to adopt: (1) content diversity, (2) interactivity, and (3) monetary value. These three constructs are specific to IPTV’s unique characteristics in terms of service and technology features.

Content diversity in this study refers to the extent to which IPTV is perceived as providing various types of content and information to its users. As IPTV is an innovative content service model enabled by technology convergence, it provides a variety of multimedia contents through the use of communication and media technologies to satisfy different needs of users, such as online games, multi-channel broadcasting, education programs, Internet search, Internet banking, T-commerce, messenger services, video on demand (VoD), and other interactive services. IPTV uses a set-top box (STB) that allows users to watch hundreds of channels and order movies through VoD. IPTV also uses broadband ADSL, the same technology that delivers a high-speed Internet connection to the computer. Thus, there is now potential for thousands of channels.

Prior research has determined that content diversity is a salient factor that influences the user’s intention to adopt IPTV. DeLone and McLean [10] categorize six dimensions of IS success, and they posit that information quality is one of these six dimensions that affect the level of IS success. According to a number of e-commerce studies, diverse contents have been found to be an important factor in the success of Web sites [29]. Thus, content diversity has a positive effect on the user’s decision process regarding IPTV adoption. Content diversity also has an effect on relative advantage. Without the guarantee of diversified contents, the unique usefulness and advantage of IPTV would be seriously undermined [18]. According to Venkatesh et al. [36], facilitating factors such as content diversity may support the use of a system. Considering the above theoretical argument, we hypothesize the following:

**Hypothesis 5A**: The content diversity of IPTV has a positive effect on the consumer’s intention to adopt IPTV.

**Hypothesis 5B**: The content diversity of IPTV has a positive effect on relative advantage.

IPTV also has a distinctive feature, interactivity, which refers to the extent to which users can participate in modifying the format and content of a mediated environment in real time. Different from conventional TV broadcasting services, IPTV exploits a more interactive multimedia system using streaming technologies via the network. IPTV delivers live and on-demand contents over a broadband connection, enabling a more customized and interactive user experience.

The conceptual and empirical findings of previous studies suggest that the interactivity of IPTV may positively influence the user’s intention to adopt IPTV. Rafaeli [31] identifies satisfaction as one of the most obvious outcomes of increased interactivity. Cho and Leckenby [7] also find that higher degrees of interactivity yield more positive advertising effects. Teo et al. [33] find that increased levels of interactivity on Web sites have a positive effect on satisfaction, effectiveness, efficiency, value, and the overall attitude toward Web sites.

The differentiated characteristics of IPTV may also reinforce the relative advantage of using IPTV services and justify consumers’ decision on IPTV adoption. Holak and Lehmann [17] propose that the unique properties of a technology innovation usually strengthen relative advantage to its predecessors. This discussion leads to the following hypotheses:

**Hypothesis 6A**: The interactivity of IPTV has a positive effect on the consumer’s intention to adopt IPTV.

**Hypothesis 6B**: The interactivity of IPTV has a positive effect on relative advantage.

Since IPTV is aimed at personal use, the costs are likely to be assumed by end users. This implies that the price of using IPTV may be an important factor affecting users’ adoption decisions. Whether a particular technology is expensive or not usually depends on consumers’ cognitive evaluation on the value of using the technology. A number of studies in Marketing have found a significant role of the consumer’s perceived monetary value in satisfaction and intention to use a particular service [25]. Several IS studies also have examined the effect of monetary value on technology
adoption and have found it to be an important determining factor. Lim et al. [23] show that economic value increases the level of consumer expectations and satisfaction in the use of mobile Internet services.

In general, IPTV services have been offered by telecommunications and Internet service providers. To compete effectively with their competitors, such as cable and satellite TV operators, telecommunications providers can offer price discounts through bundling, which is defined as the practice of marketing two or more products and/or services in a single package for a special price [14].

Such cost-saving features may reinforce the relative advantage of IPTV over other conventional broadcasting services. As Rogers [32] mentioned, one of the significant factors that justify the relative advantage of a specific technology is economic profitability the technology premises. Along with the above argument, we propose the following hypotheses:

Hypothesis 7A: Monetary value created through IPTV bundling has a positive effect on the consumer’s intention to adopt IPTV.

Hypothesis 7B: Monetary value created through IPTV bundling has a positive effect on relative advantage.

2.3. Personal innovativeness

As previously mentioned, technology and service innovations such as IPTV highlight the importance of personal characteristics such as an individual’s prior exposure to similar technology innovations [37] and the individual’s propensity to absorb new types of technologies and services, which are reflected in the decision process regarding new technology and service adoption [8, 37]. In this sense, personal innovativeness has been known to play an important role in encouraging plausible consumer behavior for the adoption of IT [11]. As each person has his or her own level of personal innovativeness, the impact of this factor basically leads to different degrees of perceived benefits and expectations, finally generating different adoption outcomes [21]. Personal innovativeness can be a viable factor that examines the variance of the individual adoption level of IPTV. Thus, we establish the following hypothesis:

Hypothesis 8: Personal innovativeness has a positive effect on the consumer’s intention to adopt IPTV.

2.4. Social influence

Social influence refers to the degree to which an individual perceives that important peers believe he or she should use the innovation [36]. Information can be transferred from one individual to another, and an individual can be influenced by others easily. Among the informal channels of communication, word-of-mouth referral has been known to strongly influence consumer behavior [5]. Social influence that leads an individual to use a technology has been found to directly affect adoption intention [35].

Another conceptual view applicable to IPTV adoption is “herding behavior” phenomenon, which refers to potential users’ propensity to follow the decision makings of their predecessors. This implies that decision-making with respect to IPTV adoption may depend on the observational learning or social learning phenomenon, in which consumers tend to follow decisions of others rather than using their internal information [2]. Therefore, we hypothesize following:

Hypothesis 9: The social influence of IPTV has a positive effect on the consumer’s intention to adopt IPTV.

To fully account for the differences in users’ perception of IPTV adoption, we included two control variables characterizing the research respondents—gender and age. We selected these variables because of their potential impact on technology innovation adoption [34]. The conceptual model is represented in Figure 1, along with the main constructs of the theoretical framework.

3. Research method and data

We used the survey method to test our model. The survey instrument was developed by identifying appropriate measurements from a comprehensive literature review. Some modifications were made to the existing scale to make those more suitable in the context of IPTV adoption. As the target subjects for the study were potential users of IPTV in Korea, the questionnaire was translated into Korean and reviewed by third-party experts to obtain a good level of translation equivalence. The translated Korean questionnaire was then pre-tested by conducting focus group interviews to examine content validity and face validity. We believe that Korea is a suitable place for the research of IPTV adoption because the country has one of the highest penetration rates around the world in terms of broadband. 

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2 Due to page limit of the paper, detailed survey instruments are available upon readers’ request.
3 South Korea ranked the first in terms of household Internet penetration among member nations of the Organization for Economic Cooperation and Development (OECD). As of the end of 2007, 94 percent of South Korean households had Internet access, taking the first place in the list of 31 OECD member nations, according to the report released at the OECD Ministerial Meeting in June 2008.
The research model was empirically tested by using data from an online survey. The sample data was collected from a dedicated Web site. The online survey consisted of three main sections: inquiries about prior IPTV experience, adoption factors and intention, and respondent demographics. Before starting the survey, all respondents were informed by written explanations on the cover page about the identity and various features of IPTV that are different from conventional broadcasting services. This is because all respondents needed to have minimum knowledge of IPTV to undergo the survey procedure. At the beginning of the questionnaire, the survey participants were asked whether they had prior experience with IPTV services. As the study was restricted to those who had no experience with IPTV services, the respondents who chose “No” were then asked to answer a set of questions associated with the adoption issues of IPTV services by using a seven-point Likert scale. The scale of the questions ranged from “strongly disagree” to “strongly agree.” Finally, some demographic information about the respondents was requested.

In our sample data about the total of 198 respondents, there were more male respondents than female respondents (male: 75.8%, female: 24.2%). The respondents were mostly in their twenties (48%) and thirties (38.4%). 95.5% of respondents watched less than 3 hours. In addition, 76.8% spent an average of 1 to 5 hours per day using the Internet, and 73.2% had downloaded contents such as movies and dramas through the Internet. Approximately 20% downloaded more than 5 items per month. The results indicate that most of the respondents were young male consumers who were familiar with the Internet environment and interested in digital multimedia contents, although they had no prior experience with IPTV services.

We conducted Cohen’s power analysis to calculate both the priori expected sample size and the post hoc power values of our partial least squares (PLS) model. This was because PLS was performed by iterative regression analysis. Hence, power analysis on multiple regression analysis was also applicable to PLS. PLS estimates a structural model block by block. To ensure that every block of our model had adequate power, we calculated the expected sample size and the power values block by block.

Our research model had two dependent variables: behavioral intention to adopt IPTV and relative advantage. Thus, two priori power analyses and all post hoc power analyses were conducted. The expected sample size was 54 (alpha value = 0.05; number of predictors = 1; anticipated effect size = 0.15; desired statistical power 0.8) or 67 (alpha value = 0.05; number of predictors = 2; anticipated effect size = 0.15; desired statistical power 0.8), whereas the power values from post hoc analyses approximated to 1 for the high $R^2$. Thus,
we concluded that our model had adequate power for further analysis.

4. Empirical analysis and results

Before conducting hypothesis test, we assessed common method bias attributed to our self-reported survey data. We adopted both Harman’s single factor analysis and Podsakoff et al. [30]’s approach. In Harman’s approach, all of the construct items were cast into principal component factor analysis. This yielded nine factors with eigenvalues greater than 1.0, which accounted for 78.82% of the total variance. The first factor captured only 39.81% of the variance in the data, indicating the absence of a substantial amount of common method variance in the data.

In Podsakoff et al.’s approach, we included in the PLS model a common method factor whose indicators included all of the principal constructs’ indicators and calculated each indicator’s variance substantively explained by the principal construct and the method. The results demonstrated that the average substantively explained variance was 0.744, whereas the average method-based variance was 0.022. The ratio of the substantive variance to the method variance was approximately 42:1. Given this small magnitude of method variance, we concluded that the method was suitable for this research.

We also performed a number of other analyses to examine instrument validity and reliability. Exploratory factor analysis was conducted to check the validity of the measurement model. The outcomes indicated that the measurements of each construct had similar factor loading values and showed the highest values for the corresponding construct. The results imply that the existing measurement item groups represented the concept (content) of related constructs in a valid manner.

Internal consistency reliability was assessed by examining Cronbach’s alpha. Hair et al. [15] suggest that the minimum acceptance level of Cronbach’s alpha should be 0.70. The alpha values for each construct in this study are presented in Table 1. The values ranged from 0.791 to 0.971, exceeding the recommended lowest limit.

Convergent validity was also assessed by examining the composite reliability and average variance extracted (AVE) [15]. As shown in Table 1, the values of AVE for each construct all surpassed the acceptable threshold value of 0.50, and the composite reliability values ranged from 0.890 to 0.978, exceeding the recommended value of 0.70. We also examined the correlation of each construct (see Table 2). The results indicated that the square root of AVE for each construct was greater than the correlations between itself and all other constructs, implying that there existed discriminant validity for each construct. In addition, the variance of each construct was larger with itself than with other constructs and exceeded the acceptable level of 0.5 [13].

### Table 1. Reliability and Validity Analysis

<table>
<thead>
<tr>
<th>Construct</th>
<th>Cronbach’s $\alpha$</th>
<th>Composite Reliability</th>
<th>AVE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relative advantage</td>
<td>0.914</td>
<td>0.935</td>
<td>0.743</td>
</tr>
<tr>
<td>Ease of use</td>
<td>0.971</td>
<td>0.978</td>
<td>0.918</td>
</tr>
<tr>
<td>Compatibility</td>
<td>0.960</td>
<td>0.969</td>
<td>0.862</td>
</tr>
<tr>
<td>Trialability</td>
<td>0.911</td>
<td>0.957</td>
<td>0.918</td>
</tr>
<tr>
<td>Interactivity</td>
<td>0.896</td>
<td>0.915</td>
<td>0.577</td>
</tr>
<tr>
<td>Content diversity</td>
<td>0.834</td>
<td>0.900</td>
<td>0.751</td>
</tr>
<tr>
<td>Monetary value</td>
<td>0.890</td>
<td>0.935</td>
<td>0.827</td>
</tr>
<tr>
<td>Personal innovativeness</td>
<td>0.827</td>
<td>0.890</td>
<td>0.670</td>
</tr>
<tr>
<td>Social influence</td>
<td>0.791</td>
<td>0.905</td>
<td>0.826</td>
</tr>
</tbody>
</table>

### Table 2. Discriminant Validity and Correlations

<table>
<thead>
<tr>
<th></th>
<th>RA</th>
<th>EOU</th>
<th>COM</th>
<th>TRI</th>
<th>INT</th>
<th>CD</th>
<th>MV</th>
<th>PI</th>
<th>SI</th>
</tr>
</thead>
<tbody>
<tr>
<td>RA</td>
<td>0.86</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EOU</td>
<td>0.19</td>
<td>0.96</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>COM</td>
<td>0.63</td>
<td>0.15</td>
<td>0.93</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TRI</td>
<td>0.40</td>
<td>0.12</td>
<td>0.36</td>
<td>0.96</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>INT</td>
<td>0.44</td>
<td>0.25</td>
<td>0.24</td>
<td>-0.29</td>
<td>0.76</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CD</td>
<td>0.48</td>
<td>0.13</td>
<td>0.40</td>
<td>-0.21</td>
<td>0.58</td>
<td>0.87</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MV</td>
<td>0.37</td>
<td>0.18</td>
<td>0.39</td>
<td>-0.17</td>
<td>0.38</td>
<td>0.38</td>
<td>0.91</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PI</td>
<td>0.31</td>
<td>0.48</td>
<td>0.23</td>
<td>-0.30</td>
<td>0.36</td>
<td>0.25</td>
<td>0.25</td>
<td>0.82</td>
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</tr>
<tr>
<td>SI</td>
<td>0.44</td>
<td>0.09</td>
<td>0.50</td>
<td>-0.25</td>
<td>0.37</td>
<td>0.38</td>
<td>0.41</td>
<td>0.20</td>
<td>0.91</td>
</tr>
</tbody>
</table>

Note: Diagonal shadow is the square root of AVE.
RA (Relative advantage); EOU (Ease of use); COM (Compatibility); TRI (Trialability); INT (Interactivity); CD (Content diversity); MV (Monetary value); PI (Personal innovativeness); SI (Social influence).
Table 3 shows that most of the causal relationships in the research model were supported as hypothesized. From the innovation diffusion perspective, the strong effects of relative advantage (H1), compatibility (H3), and trialability (H4) on adoption intention were noticeable. In terms of the IPTV-specific attributes, the effects of content diversity (H5A) and monetary value (H7A) were found to be significant. The constructs representing personal characteristics such as personal innovativeness (H8) and social influence (H9) impacted adoption intention, although the levels of significance were relatively weak compared with the other constructs.

The two control variables, age and gender, presented contrasting outcomes; the effect of age on adoption intention was found to be significant, whereas in the case of gender, the causal relationship with respect to IPTV adoption was not statistically supported. The impact of ease of use on intention (H2) was not as salient as it was in prior adoption studies. In addition, the empirical validation did not support the direct effect of interactivity (H6A) on adoption intention.

However, the effects of content diversity (H5B), interactivity (H6B), and monetary value (H7B) on relative advantage were found to be strongly significant. Considering the aggregated effects of each construct, IPTV-specific attributes explained 29.9% of the total variance in relative advantage ($R^2 = 0.299$), and 65.1% of the total variance in IPTV adoption was explained by all other constructs ($R^2 = 0.651$).

The strong statistical support for Hypotheses 1 and 6B indicates that there exists the mediating effect of relative advantage between interactivity and IPTV adoption. Following the test procedure that Baron and Kenny [3] proposed, we performed a mediating effect test dedicated to a set of independent variables (IV; interactivity), mediators (M; relative advantage), and dependent variables (DV; adoption intention).

First, we determined whether IV (interactivity) would significantly affect DV (IPTV adoption). We conducted a simple regression analysis with interactivity predicting IPTV adoption to test for the path from IV to DV, and the results showed a significant causal relationship between interactivity and IPTV adoption. The first condition was met. The following step determined whether IV (interactivity) would have a significant effect on M (relative advantage). We again conducted a simple regression analysis with interactivity predicting relative advantage. The analysis results indicated that interactivity positively affected relative advantage with a path coefficient value of 0.463 ($t=3.014$), which was significant at the 0.01 level. Thus, the second condition was also met. The final step determined whether the relationship between IV (interactivity) and DV (IPTV adoption) would be significant when both IV and M were linked to DV. The underlying premise was that M would significantly affect DV despite the insignificant relationship between IV and DV. We conducted a multiple regression analysis with interactivity and relative advantage predicting IPTV adoption to test the significance of the path from IV to DV. The results showed that when both IV and M were linked to DV, the causal relationship between IV (interactivity) and DV (IPTV adoption) was insignificant (the path coefficient value was 0.188 with $t=1.256$).

Taken together, the results suggested that interactivity has a full mediating effect on IPTV adoption via relative advantage.

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Relationship</th>
<th>Coefficient</th>
<th>t-value</th>
<th>Result</th>
<th>$R^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1</td>
<td>RA $\rightarrow$ IPTV adoption intention</td>
<td>0.243**</td>
<td>3.136</td>
<td>Supported</td>
<td></td>
</tr>
<tr>
<td>H2</td>
<td>EOU $\rightarrow$ IPTV adoption intention</td>
<td>-0.063</td>
<td>-1.457</td>
<td>Not supported</td>
<td></td>
</tr>
<tr>
<td>H3</td>
<td>COM $\rightarrow$ IPTV adoption intention</td>
<td>0.178***</td>
<td>2.686</td>
<td>Supported</td>
<td></td>
</tr>
<tr>
<td>H4</td>
<td>TRI $\rightarrow$ IPTV adoption intention</td>
<td>0.173***</td>
<td>3.035</td>
<td>Supported</td>
<td></td>
</tr>
<tr>
<td>H5A</td>
<td>CD $\rightarrow$ IPTV adoption intention</td>
<td>0.130**</td>
<td>2.175</td>
<td>Supported</td>
<td></td>
</tr>
<tr>
<td>H6A</td>
<td>INT $\rightarrow$ IPTV adoption intention</td>
<td>0.006</td>
<td>0.156</td>
<td>Not supported</td>
<td></td>
</tr>
<tr>
<td>H7A</td>
<td>MV $\rightarrow$ IPTV adoption intention</td>
<td>0.208***</td>
<td>3.416</td>
<td>Supported</td>
<td></td>
</tr>
<tr>
<td>H8</td>
<td>PI $\rightarrow$ IPTV adoption intention</td>
<td>0.085*</td>
<td>1.654</td>
<td>Supported</td>
<td></td>
</tr>
<tr>
<td>H9</td>
<td>SI $\rightarrow$ IPTV adoption intention</td>
<td>0.178**</td>
<td>2.454</td>
<td>Supported</td>
<td></td>
</tr>
<tr>
<td>H5B</td>
<td>CD $\rightarrow$ RA</td>
<td>0.296***</td>
<td>3.146</td>
<td>Supported</td>
<td>0.299</td>
</tr>
<tr>
<td>H6B</td>
<td>INT $\rightarrow$ RA</td>
<td>0.203***</td>
<td>2.676</td>
<td>Supported</td>
<td></td>
</tr>
<tr>
<td>H7B</td>
<td>MV $\rightarrow$ RA</td>
<td>0.182**</td>
<td>3.047</td>
<td>Supported</td>
<td></td>
</tr>
</tbody>
</table>

Note: * $p<0.1$, ** $p<0.05$, *** $p<0.01$.

RA (Relative advantage); EOU (Ease of use); COM (Compatibility); TRI (Trialability); INT (Interactivity); CD (Content diversity); MV (Monetary value); PI (Personal innovativeness); SI (Social influence).
5. Discussion

5.1. Implications for research

The results of this study have a number of implications for research. First, among the four constructs related to the innovation diffusion perspective, relative advantage, compatibility, and trialability had strong effects on IPTV adoption. These results suggest that inducing a positive perception of IPTV’s relative advantages may increase the level of consumers’ expectations of IPTV and the likelihood that they would adopt IPTV. Another implication is that the survey respondents perceived a higher level of emotional and economic value from IPTV innovation compared with other technology innovations that they previously experienced. The empirical results also indicate that the trial use of IPTV could lower the adoption barrier perceived by consumers. However, ease of use did not have a significant effect on the adoption of IPTV. As IPTV is currently in the early stage of commercialization and still unfamiliar with most people, potential users may presume that the use of IPTV would impose another technology follow-up burden on their daily lives. As IPTV services advance, such misunderstanding should dissipate.

Second, among the IPTV-specific attributes, both content diversity and monetary value had significant direct effects on IPTV adoption. The results reflected the respondents’ expectation that IPTV should be a prominent alternative complementing conventional TV broadcasting. However, the direct effect of interactivity on adoption intention was found to be insignificant. This might have been because the respondents, who had no prior IPTV experience, did not possess a clear and specific understanding of the advantageous features that IPTV interactivity could provide. Such significant or insignificant role of IPTV-specific attributes re-emphasizes the need to include constructs that reflect the core properties of the IT artifact and its usage context in IS research [4].

Third, personal innovativeness and social influence had a direct impact on IPTV adoption. In particular, personal innovativeness, which reflects individuals’ intrinsic motivation and personal value, was found to exert a direct effect on adoption intention. An individual is usually influenced by others, and word-of-mouth referral has been known to strongly influence consumer behavior. Thus, the level of IPTV adoption may depend on each consumer’s personal characteristics such as prior experience with technologies and absorptive capacity for innovations. Further, in the decision-making process with respect to IPTV adoption, there may exit social network effects that are attributable to peer influence. This study presents empirical evidence that social influence is a direct determinant of behavioral intention to use IPTV services.

Finally, prior IT research has not focused on the impact of monetary value because most studies have examined user behavior in organizational settings where users do not pay for information systems or technologies. However, the results of this study suggest that monetary value is a very important determinant of IPTV adoption. Thus, future research is called for to examine the impact of monetary value in terms of the increasing number of commercially available IT services. In this regard, IS researchers should consult the existing literature on pricing and product bundling in Marketing and Economics to better address IT adoption phenomena beyond the workplace.

5.2 Implications for practice

Our research findings also have implications for managers involved in the development of service offerings and business strategies for IPTV market deployment. First, the salient effect of content diversity on adoption intention implies that the capability of IPTV service providers to supply diverse digital contents including videos, audio clips, Web browsing, interactive games, and T-commerce is critical to the acquisition of a stable customer base and sources of revenues. France provides a good example. The country has the largest IPTV customer base (approximately 6.2 million subscribers in 4Q 2009) in Europe. The market is currently dominated by three major service providers: Orange, Free TV, and Nuef Cegetel. Since the initial launch of IPTV services by Free TV in 2003, all of the three companies have devoted their efforts to establish business relationships with various content developers such as movie distributors and sports broadcasters to diversify their service offerings. As a result of such efforts, Free TV, the leader of the French IPTV market, delivers more than 200 channels [24].

Second, our results indicate that one of the key issues that service providers need to resolve is the delivery of diverse digital content at reasonable (or acceptable) prices. As latecomers in the TV broadcasting market, IPTV service providers would need to secure price competitiveness to fully exploit their growth potential. However, a comparative price advantage does not always refer to low prices or painful price cuts. That is, stratified price plans synchronized with strategically bundled channel packages could stimulate potential users’ specialized interests (i.e., customers with different preferences for movies, educational channels, or sports) and lead to higher subscription rates. For example, Now TV, operated by PCCW in Hong Kong, had 0.7 million subscribers in 2008, accounting for approximately 10% of Hong Kong’s total...
population. The service provider defeated competitors such as Hong Kong cable TV and Galaxy satellite TV with respect to the number of subscribers. The key factor behind its business success has been that Now TV has offered its subscribers more freedom in choosing channels. The subscribers of Now TV can select channels from about 160 available pooled channels according to their preferences and interests. Linked with such diversified channel choices, the subscription fees also vary from HKD 15 to HKD 248 depending on the number and type of channel that customers choose. In addition, the company provides 12 types of pre-defined channel packages. Such user-centric marketing strategies have consequently encouraged potential users’ positive perception of IPTV services and lowered psychological barriers associated with comparative financial value [6].

Third, the strong effect of trialability on IPTV adoption implies that service providers need to offer adequate trial opportunities to make potential users more comfortable with the technology, which would in turn promote their services. From the perspective of customer behavior, users tend to reserve their purchase decisions until they have acquired sufficient information and understand the related features. Such a propensity occasionally mitigates service providers’ sales efforts and results in inefficient marketing ROI. To avoid this problem and improve their returns on marketing activities, IPTV service providers should develop a range of communication channels beyond their own Web site; such channels may facilitate the distribution of information on IPTV service features and encourage potential subscribers’ learning-by-experiencing efforts. For instance, Qook TV, former Mega TV operated by KT in Korea, has established a business relationship with SCEK (Sony Computer Entertainment Korea), which exclusively distributes Playstation 3 in Korea. The main purpose of the partnership between these two companies is installing Qook TV’s IPTV player software inside Playstation 3. Thus, when individuals buy Playstation 3, they can watch some TV program previews with the help of the embedded software and navigate the menu system of KT’s Qook TV. In addition, users can subscribe to Qook TV through the Playstation 3 network. By exploiting such marketing activities beyond its web site, Qook TV expects to communicate with more potential users and generate more opportunities to turn interested customers into actual subscribers [20].

6. Conclusion

In this study, we attempt to understand the individual adoption of IPTV, an innovative convergent service. Our findings suggest that relative advantage, compatibility, trialability, content diversity, monetary value, personal innovativeness, and social influence have significant direct effects on the consumer’s adoption of IPTV and that IPTV-specific attributes have significant mediating effects on consumer adoption via relative advantage.

The study makes three important contributions. First, our study addresses a new trend in the IT industry. IPTV is the latest digital content service comprising several innovative features. We synthesized these distinctive characteristics and incorporated them into our conceptual framework. Second, we study the adoption of IPTV, a disruptive technology innovation, which may completely transform the affected industries. In general, previous studies of IT adoption have focused either on particular applications (e.g., EDI and ATM) or on end-user products (e.g., spreadsheet packages). By developing an adoption framework of IPTV, we expand the technology adoption literature. Finally, as IPTV is not mature in terms of technology and commercialization, our proposed model of IPTV adoption may serve as a practical guide to the subjective evaluation of the value of IPTV and the projection of the technology’ evolutionary path.

As an exploratory study, our research has some limitations. First, IPTV is a relatively new concept to potential users in the real world. As potential users may interpret IPTV differently, our view of IPTV may be different from their perspectives. In this regard, the framework proposed in this study may not fully reflect the real world standpoint because of the gap between the theoretical and real-world levels. Second, although we maintained a structured and systematic view of IPTV adoption, the framework does not embrace other significant theories and perspectives that may be useful for studying IPTV adoption. Finally, because the size of the respondents was relatively small and most of the respondents were men, any generalization of the results should be implemented with caution.

Such weaknesses of our study imply that there remain untapped research areas as IPTV evolves over time. First, for the overall improvement of the framework application, this study’s model should be further refined by developing more concrete measurements and constructs for IPTV adoption. Second, the economic value of IPTV should be examined empirically. There have been concerns about the economic effectiveness of the new digital content service model from both industry and academia. Thus, future research clarifying the economic aspects of IPTV deployment in the real-world context is warranted. Third, an examination of the user characteristics favorable and suitable to IPTV would be beneficial to both researchers and business practitioners.
7. References


