

Effects of Key Drivers on Continuing to Use Digital Convergence Services: Hierarchical Component Approach

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Technological advances made with the development of digital technology and the Internet have led to the emergence and evolution of digital convergence — the integration of media and communications. This, in turn, has led to the creation of the representative broadcast and communication convergence business model (IPTV service). This study examines the consumption patterns and behaviors of IPTV service customers and explores the process of their continuous use of the IPTV service, thereby endeavoring to contribute to the diffusion of digital convergence services. To survey customers' continuous use of the IPTV service, this study first designs a research framework based on an examination of the existing literature on satisfaction, loyalty, and so on. In addition, research is conducted on the switching barrier of the method of consolidating customers' adherence to a given IPTV service by increasing the burden on them, thereby developing a final research model with which to attempt yet another heterogeneous approach. This enables not only an analysis of the causal relationship with antecedent variables but also a measurement of the explanatory contribution of the antecedent variables' sub-variables.

Keywords: Digital convergence, IPTV, switching barrier.

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I. Introduction

So far, digital convergence has led to improvements in diverse areas including technological innovation, economic growth, social welfare, and product productivity; thus, it has triggered stimuli and creativity in the ecosystem of today's information society. Digital convergence, which provides new convergence services based on digital technologies, shows great potential for diverse applications and offers considerable opportunities for industrial growth, making it one of the most remarkable technological innovations of recent times. Over the past ten years, with the increasing ability to bridge communication devices with networks and computing, digital convergence has focused on the development of new functions (in terms of combination and connection) in the information and communication technology (ICT) field. Furthermore, advances in the development of digital technology and the Internet have led to the development of digital convergence, which involves the integration of media and communications. The world market of IT convergence will grow to over \$3.6 trillion in 2020 [1]. As such, the issue of broadcast/communication convergence has long been sufficiently discussed by academia and various industrial sectors.

In the meantime, new technologies based on ICT have been developing rapidly, pointing to the recent technological innovation direction of diverse convergence patterns between industries and technologies. Broadcast/communication convergence, prompted by technological innovation, can be explained in terms of four categories; namely, services, communication networks, devices, and providers (business

operators). When examining the recent patterns of change in media and communication markets (gigantic market growth) and the perceived new value-creation opportunities through the development of convergence service applications, new services involving broadcast/communication convergence are one of the key digital convergence models [2].

The Internet Protocol television (IPTV) service is defined as a digital TV service, like the fiber-to-the-home (FTTH) transmission media, which uses the IP-based broadband Internet. Moreover, the IPTV service includes not only the existing TV service, but also most of the hitherto developed media-communication combined services, such as video on demand, personal video recording, a network, an electronic program guide, information services, interactive TV, interactive applications, and broadband applications. In other words, the IPTV service is a key business model of broadcast/communication convergence, and as such, the fundamental convergence value of the IPTV service lies in providing broadcast contents via broadband Internet-based communication networks such as FTTH. IPTV technology has combined the basic communication characteristics of interaction and personalization functions with the viewing of broadcast contents to complement the one-way passive TV function, thereby providing new service patterns such as in the provision of the Internet with regards to convenience.

Wirtz [2] proposed three dimensions as the drivers of industry convergence trends; namely, market regulation, technological innovation, and changes in users' preferences. Jang and Noh [3], using a technical acceptance model (TAM), surveyed variables that have an impact upon the will of adoption. Shin then verified them empirically and subsequently derived several crucial antecedent factors that have an impact on IPTV acceptance. Bouwman and others [4] classified their IPTV business model in terms of four aspects; namely, service, technology, organization, and finance. However, there was little available literature proposing the introduction of a comprehensive framework designed for the successful establishment of new media-communication-combined service markets. Research on digital convergence models is a somewhat complicated and multifaceted task; therefore, it is very difficult to develop a theoretical model of users' preferences. Nonetheless, this study attempts to make use of diverse approaches to overcome such research limitations. Notably, this study focuses on users' preference for the IPTV service in relation to the three aspects of the media-communication-combined services proposed by Wirtz in 2001. As research on digital convergence or media-communication-combined service fields is limited, this study proposes a comprehensive model from the perspective of user preference.

For instance, Gerpott and others [5] surveyed the antecedent

factors that impacted customer loyalty toward the current mobile communication service. Similarly, Kim and others [6] and Aydin and Ozer [7] conducted studies on the antecedent factors that determine a user's loyalty toward the providers of mobile communication services. While, in the initial stage, it is an essential option to allure customers, loyalty is a crucial key factor in the drive to continuously increase earnings. If a customer is loyal to a particular service provider, then they are less likely to cancel any existing contract for existing services or be tempted away by other service providers; thus, loyalty plays a crucial role in consumer consumption. For this reason, this study focuses on the process of the formation of IPTV customer loyalty.

Most behavioral studies that survey user preferences in ICT-related fields such as mobile communications, propose experience-based models and then attempt to verify them empirically. Total customer experience (TCE) theory offers an explanation, based on the gathered data of customer experiences, of the decision processes and the factors that influence whether customers will continue to use a given product or service. As such, this theory serves as a very effective tool for surveying the process of the formation of customer loyalty in this study.

Thus far, research on innovation diffusion has been conducted from the perspectives of Roger's [8] innovation adoption/diffusion theory and TAM. As research focused on usage aspects has increasingly become the focus of discussion recently, a new change in research on innovation diffusion is being developed. This study, focusing on customer usage of the innovative service IPTV and their preference for the service, applies the theory of TCE to customer experiences and to the research conducted on customer loyalty, thereby comprehensively modeling the process of the formation of IPTV customer loyalty.

The rest of the paper is organized as follows. Section II presents the theoretical background and developed research models; Section III describes the data and explains the method; Section IV presents the empirical results and the implications derived from them; and Section V presents the conclusion and possible directions for future research.

II. Theoretical Development

TCE theory stresses that the competitiveness of a product or service is determined by customers' satisfactory experiences, and that, to that end, a corporation should provide effective clues to customers, from both a functional and human perspective, so as to enhance such experiences. Such clues influence the purchase-decision process and the "moment of truth" that determines satisfaction and continuance of use, and

this in turn determines TCE levels [9]. Mascarenhas and others [10] proposed managerial factors for maintaining customer loyalty from the perspective of TCE. Meyer and Schwager [11] proposed customer experience management factors in contrast to customer relationship management, and to monitor customer experiences, proposed gathering experience data directly from users, including target research, listening to customer voices, observation, and surveys.

As such, the process by which, for each potential variable, service users' experiences were evaluated to explore variables strongly influencing satisfaction and determination to continue was based on the theory of TCE [12]. Individuals who have adopted IPTV services will determine in the process of using them whether or not to continue their use of the service. To explore which attributes of IPTV services will influence this decision, and through what process the decision making will occur, and finally to develop a research model capable of explaining how loyalty to IPTV is formed, we adopt the theory of innovation diffusion as a theoretical basis.

The decision-making process surrounding whether to purchase an innovation forms an attitude in an individual; one that is based upon the recognition of an innovation's characteristics. Such an attitude will strongly influence the decision to adopt an innovation. Upon adoption of an innovation, there comes the process of its implementation and then the decision as to whether to continue with its adoption. The IPTV loyalty of its adopters is determined by "diffusion," which by definition, implies "the acceptance into use and continued use of an IPTV service" [13].

IPTV services are a new type of communication and broadcast convergence service, and as such, they are generally new to the general public compared with cable TV or the Internet. As a result, an innovation decision-making process model is deemed to be a suitable framework to explain the adoption of IPTV services and the continuity thereof. The universality of the innovation decision-making process model concerning new IT and services was already proposed by Jeyaraj and others [14], among others. Indeed, Chen and others [15] addressed the fact that the innovation attributes used in Roger's Innovation Acceptance Theory explain 49%–87% of the variance in the rate of adoption.

Based on customer experiences and TCE theory, the whole framework of this paper's research model was designed from the perspective of Rogers' innovation diffusion decision process [8]. In addition, by referring to SERVQUAL theory and to research on the switching cost (or switching barrier), a final research model of the process of the formation of IPTV customer loyalty was completed. It has been widely noted that the single most important variable affecting consumers' intentions to continue using a product or service is quality. In

the service industries, the quality of a service or product has been proven to have a strong correlation with users' levels of trust in a service provider by numerous empirical studies [16]–[17]. Although, under SERVQUAL theory, service quality was initially defined as the gap between customers' perceptions of a service upon using it and their initial expectations [18], most literatures measured service quality in terms of the absolute extent of perceived service quality. For instance, Aydin and Ozer [7] and Kim and others [6] verified that the absolute level of perceived service quality was, indeed, the significant antecedent of customer loyalty toward mobile communication providers for users in Turkey and Korea.

The reason why service quality must be considered as a crucial factor of IPTV users' intentions to continue using the service is that it is a medium that substitutes existing, similar media such as terrestrial TV and cable TV. As both terrestrial TV and cable TV have already reached a phase of stability, little in the way of customer service is currently required or provided. IPTV, on the other hand, is an Internet-based, interactive, two-way service that, by its very nature, necessitates exchange and communication with the provider.

Parasuraman and others [19] measured service quality through five parameters; namely, reliability, responsiveness, assurance, tangibility, and empathy, which they considered absolute measures of perceived service quality. In this study, we considered only four of the five service quality constructs; that is, reliability, responsiveness, assurance, and empathy. We exclude tangibility on the grounds that it is barely relevant to online services [20]–[21]. Here, reliability means that a service is delivered accurately, as promised, and according to schedule. Responsiveness, meanwhile, refers to instant or speedy interaction, while assurance signifies a service provider's capacity to respond to users' requests for support and to its ability to resolve any problems faced by users [3]. Finally, empathy signifies the considerateness of a service provider vis-à-vis its customers and personalized interest in its customers.

• **Hypothesis 1 (H1).** IPTV service quality — consisting of reliability, responsiveness, assurance, and empathy — positively influences customer satisfaction for IPTV services.

Customer satisfaction is defined as a customer's affective response to the entirety of a product or service—a response that is formed based on a pre-purchase expectation and a post-purchase evaluation, or on initial customer experience [22]. Customer satisfaction is a key factor that helps form a positive long-term relationship with customers and that increases the likelihood of continuing profits for an enterprise [23].

IPTV satisfaction formed through the accumulated experience of contents and other distinctive functionalities compared to CATV or simple public broadcasting will affect both a user's trust and attitude towards continuing their

subscription in a service provider. User satisfaction, determined after a sufficient period of usage, definitely affects post-purchase behavioral intentions and behaviors such as complaints, trust, re-purchasing intentions, and so on. Under various contexts, customer satisfaction is known to be the basic determinant that influences a consumer's intention to re-purchase [24].

Trust focuses on the relationship between an organization and an individual (that is, it is a business to consumer relationship), and Internet technology may be regarded as a target of trust [25]. According to the existing literature, trust influences not only customers' intentions to buy a company's product, but also their intentions to repeat purchases [26]–[27].

So, trust serves as a major factor influencing customers' loyalty toward a business. With regard to e-commerce, trust includes a consumer's belief in, and expectation of, an online seller [28]. While both satisfaction and trust represent similar states of attitude toward a subject, trust represents a higher level of influence than satisfaction, in the sense that the aggregated evaluation of satisfaction will have an impact on the formation of trust [29]. Numerous literatures on e-commerce [30] have suggested that the extent of a customer's satisfaction is accrued from the service provider's capability as offered through a website, and the extent of trust in the service provider is directly related to the extent of the customer's satisfaction. Indeed, trust in the service provider accelerates the continuing purchase by removing uncertainty and encouraging a long-term-oriented customer's attitude [7]. In view of the above, the following hypotheses are proposed:

- **Hypothesis 2 (H2).** IPTV satisfaction positively influences trust in the IPTV service provider.
- **Hypothesis 3 (H3).** IPTV satisfaction positively influences a customer's loyalty for the IPTV service.
- **Hypothesis 4 (H4).** Trust in the IPTV service provider influences a customer's loyalty for the IPTV service.

In general, the two methods considered to be the most effective in increasing customer loyalty toward a business consist, on the one hand, of enhancing customer satisfaction with products and services, and on the other hand, of preventing their desertion by magnifying the economic and emotional costs of switching to another business [27]. Switching barriers are important variables with measurable effects on a consumer's decision as to whether to continue using a product or service. Jones and others [31], in their discussion of customer loyalty to banks, barbershops, and hair salons, stressed the crucial role of switching barriers — equally important, according to them, as “the attractiveness of the alternative.” Balabanis and others [32], meanwhile, proved through empirical analysis the existence of switching barriers, which contribute to the continuous use of, and the making of

repeat purchases at, online stores.

The effect of switching barriers on the prevention of customer desertion is particularly great in the Internet and telecommunications markets. For instance, Kim and others [6] and Shin and Kim [33] analyzed the effect of customer satisfaction and switching barriers on the decision to switch providers, using number portability in both the Korean and the US wireless markets, and found that their effect was statistically significant. The providers of IPTV services also made a great deal of effort to lower existing switching barriers or create new ones, by offering discounts among others, as a way of encouraging current users to continue using the service and potential users to substitute similar services with IPTV.

When switching to a new service or service provider, customers perceive several types of cost and risk, including exploration costs; transaction costs; learning costs; loss of benefits offered to long-term customers; cost of severing habits; emotional costs; costs in terms of time and effort already invested; and social and psychological risks [34]. These various switching costs present obstacles to switching and serve as the so-called switching barriers. Hence, we considered a total of five switching barriers as variables that affect the adoption of IPTV; namely, the benefit–loss barrier, learning barrier, convenience barrier, uncertainty barrier, and emotional barrier. These five categories of switching barriers were formulated by merging and redefining the switching barriers discussed by Balabanis and others [32] (economic barrier, emotional barrier, convenience barrier, speed barrier, and familiarity barrier) and the switching costs proposed by Jones [31] (economic costs, contract-stipulated costs (ex. cancellation fees), psychological costs, exploration costs, set-up costs, learning costs, and continuity costs).

Here, “benefit–loss barrier” refers to the economic benefits renounced by switching from IPTV to another service or the increase in costs that result from switching. “Learning barrier” refers to the burden felt by a user from having to invest time and effort in learning to use the IPTV applications provided by another service provider and in understanding the related practices and the service agreement. “Convenience barrier,” meanwhile, refers to the burden experienced from the prospect of losing the comfort and convenience of using a familiar service. “Uncertainty barrier” represents the burden of misgivings and uncertainty felt about a new service or service provider. Finally, “emotional barrier” refers to the burden resulting from the positive emotional ties felt about the current service or service provider. Thus, with the three theoretical dimensions (innovation adoption, expectation-confirmation, and service quality) established as the precedents of IPTV satisfaction, switching barriers will influence IPTV loyalty directly along with IPTV satisfaction.

- **Hypothesis 5 (H5).** IPTV switching barriers — consisting of benefit–loss, learning, convenience, uncertainty, and emotion — positively influence a customer’s loyalty for the IPTV service.

III. Methodology

1. Sample and Data Collection

The present study surveyed IPTV service users. Prior to the survey, the questionnaire was examined and improved through a pre-test by surveying scholars and researchers engaging in IPTV research, obtaining feedback, and revising measurement variables and questions. In addition, 250 users of three IPTV providers were randomly selected and asked by phone whether they were prepared to respond to a survey in cooperation with an external research agency. Next, the selected users were surveyed offline and presented with token gifts (the number of distribution: 250 surveys, response rate: 100%), as shown in Table 1.

2. Measuring Instruments

The aim of the survey was to identify the main determinants of IPTV users’ satisfaction and of their intention to use the service continually. Questions relating to the variables were either chosen from items used in previous studies or else derived by converting statements defining variables into questions. Applied to each item was a 7-point Likert-type multiple-item scale, where 1 point meant “not very much so,” and 7 points meant “very much so.”

As for the reliability of service, responsiveness, assurance, and empathy, a total of thirteen measurement instruments were selected, drawing on SERVQUAL theory and studies on service quality in the context of e-commerce [35]. Concerning the “switching barriers” variable, sixteen items were defined with regard to the five first-order factors; namely, benefit–loss barrier, uncertainty barrier, convenience barrier, learning barrier, and emotional barrier, drawing on Jones and others [31] and Bumham and others [36]. Finally, for the selection of measurement instruments related to trust, we consulted works by Jarvenpa and others [26], Chiou and Droge [37], and Floh and Treiblmaier [38]. Also, the constructs of “satisfaction” and “loyalty” were defined by consulting the related items used by Bhattacharjee [39]–[40]; Lin and others [41]; and Srinivasan and others [42]. All of the variables and measurement items used in this study are listed in Table 2.

3. Analytical Instruments

The purpose of this study is to explore the process by which

Table 1. Profile of sample projects.

Demographic characteristics	Number of respondents (%)	
Gender	Male	148 (59.2)
	Female	102 (40.8)
	Total	250 (100)
Age group	20–29	67 (26.8)
	30–39	135 (54.0)
	40–49	36 (14.4)
	Over 50	12 (4.8)
	Total	250 (100)
Occupation	Students	9 (3.6)
	Stay-at-home wives	10 (4.0)
	Working adults	223 (89.2)
	Other	8 (3.2)
	Total	250 (100)
Education	High school graduates	27 (10.8)
	College students	21 (8.4)
	College graduates	173 (69.2)
	Master’s degree or higher	29 (11.6)
	Total	250 (100)
Income (monthly)	Less than \$2,500	38 (15.2)
	More than \$2,500 less than \$5,000	126 (50.4)
	More than \$5,000 less than \$7,500	56 (22.4)
	Over \$7,500	30 (12.0)
	Total	250 (100)

users of IPTV come to develop loyalty toward the service or service provider they are currently using to such an extent that they decide to continue using the same service or service provider, and to create an explanatory model for this process via a structural analysis of empirical data. The data analysis in the present study uses the partial least squares (PLS) estimation statistical technique.

The reason for adopting the PLS method instead of LISREL, despite the sufficient sample size, is as follows: first, one of the main purposes of this study is to explore the significant factors among the IPTV functional attributes — service quality (assurance, empathy, reliability, responsiveness) and switching barriers (benefit-loss, learning, convenience, uncertainty, emotional). The PLS method is generally used in the early stages of theory development, or to estimate possible causal relationships, rather than to measure the goodness-of-fit of an entire model [43]. For this reason, it has often been used in IT-

Table 2. Measurement variables and items.

Variables		Items	References
Service quality (4)	Assurance	Seriousness of response, response capacity, friendly response	Devaraj and others (2002) [35]
	Empathy	Personalized interest in customers, genuine understanding of problems faced by customers, understanding of specific requests from customers	
	Reliability	Compliance with promised service schedules, sincere response to customer service requests	
	Responsiveness	Speedy service, instant feedback, around-the-clock response to customer inquiries	
Switching barriers (5)	Benefit-loss barrier	Loss of economic and other benefits	Jones and others (2000) [31], Burnham and others (2003) [36]
	Learning barrier	Burden of undergoing a new learning curve and following new guidelines, burden of familiarizing oneself with a new service	
	Convenience barrier	Wasted time and effort, inconvenience of having to search for new alternatives and go through subscription procedures, procedural complexity	
	Uncertainty barrier	Uncertainty of service level, negative opinions	
	Emotional barrier	Emotional attachments, emotional comfort	
IPTV vendor trust		Trust in the service and service provider, reliability of service provider, considerateness of service provider	Jarvenpa and others (2000) [26], Chiou and Droge (2006) [37], Floh and Treiblmaier (2006) [38]
IPTV satisfaction		Positive assessment of a purchase choice, satisfaction upon experiencing a new service	Bhattacharjee (2001) [39], Lin and others (2005) [41]
IPTV loyalty		Intention to continue using the same service, unlimited trust in, and satisfaction with, the service provider	Bhattacharjee (2001) [40], Srinivasan and others (2002) [42]

related studies to estimate the explanatory power of component concepts, and this is also a reason as to why we have used it here. Second, while the LISREL method provides various fit indexes to validate a structural model supported by a strong theoretical background, the method does not provide the functionality of a formative first-order structure in a hierarchical model. While LISREL supports only the reflective indicator model in support of a second-order factor, the PLS method supports the high-order models having second-order factors including both the reflective indicator and the formative indicator [43]–[45]. As such, unlike LISREL, which is based on covariance and allows the application of only reflective indicators, the component-based PLS enables the design of models with formative and reflective indicators. With these reasons in mind, this study adopts the PLS method for data analysis and uses the SmartPLS Version 2.0 M3 as the PLS statistical program. SmartPLS provides similar functions to PLS-Graph but offers a superior graphic interface and more stable platform.

IV. Analysis and Results

1. Reliability and Validity

The reliability of an instrument means the likelihood of obtaining the same, or similar, value of a construct with

Table 3. Reliability and convergent validity analysis.

Measures		Standard loading	CR*	AVE**
Service quality	AS	0.929, 0.922, 0.936	0.950	0.863
	EM	0.929, 0.944, 0.942, 0.910	0.963	0.867
	RE	0.859, 0.883, 0.872, 0.906	0.932	0.775
	RS	0.908, 0.937, 0.935, 0.916	0.959	0.854
IPTV switching barriers	BB	0.835, 0.879, 0.891	0.902	0.755
	LB	0.880, 0.915, 0.934	0.935	0.828
	CB	0.878, 0.839, 0.764, 0.660	0.868	0.624
	UB	0.792, 0.864, 0.881	0.883	0.717
	EB	0.883, 0.904, 0.680	0.866	0.686
TR		0.889, 0.879, 0.909, 0.865, 0.881	0.947	0.783
SA		0.921, 0.918, 0.935, 0.944	0.962	0.865
LY		0.858, 0.883, 0.914	0.916	0.784

Note 1. Assurance (AS), Empathy (EM), Reliability (RE), Responsiveness (RS), Benefit-Loss Barrier (BB), Learning Barrier (LB), Convenience Barrier (CB), Uncertainty Barrier (UB), Emotional Barrier (EB), IPTV Vendor Trust (TR), IPTV Satisfaction (SA), IPTV Loyalty (LY).

Note 2. *Composite Reliability, **Average Variance Extracted.

repeated measurement using that instrument. It generally measures the internal consistency of items, both indicators and constructs [46]. Reliability of an indicator is measured in terms of the loading of the construct that they measure, and an item is considered reliable when this figure achieves the confidence level of 99% or else has a composite reliability of 0.6 or more

Table 4. Discriminant validity analysis.

	1	2	3	4	5	6	7	8	9	10	11	12
AS	0.929											
EM	0.732	0.931										
RE	0.863	0.706	0.880									
RS	0.906	0.753	0.849	0.924								
BB	0.397	0.461	0.425	0.435	0.869							
LB	0.244	0.325	0.338	0.257	0.618	0.910						
CB	0.128	0.075	0.184	0.158	0.435	0.410	0.790					
UB	0.327	0.315	0.386	0.306	0.629	0.549	0.514	0.847				
EB	0.445	0.524	0.477	0.447	0.684	0.619	0.418	0.616	0.828			
TR	0.806	0.875	0.823	0.825	0.490	0.336	0.174	0.383	0.576	0.930		
SA	0.482	0.421	0.525	0.453	0.545	0.395	0.407	0.496	0.675	0.518	0.885	
LY	0.623	0.595	0.633	0.603	0.540	0.402	0.289	0.483	0.640	0.686	0.710	0.885

[43]. For a construct to be taken as reliable, it has to have a composite reliability of 0.7 or more [43]. The loading of indicators in this study ranged from 0.660 to 0.944, and the measured value of the composite reliability from 0.866 to 0.963 (see Table 3). These figures exceed the respective threshold values of 0.6 and 0.7, indicating the reliability of the IPTV model as a measurement of customer loyalty.

Validity refers to whether a measurement instrument properly measures the construct it is designed to measure. Validity evaluation is classified into content, convergent, and discriminant validity. Content validity here was evaluated on the basis of criteria used in previous studies, by checking consistency among indicators and through consultations with research specialists in the field. Convergent validity was evaluated by the average variance extracted (AVE) method, and the measured AVE here was found to range from 0.624 to 0.867, figures that well exceed the convergent validity threshold value of 0.5 [47] in Table 3. Discriminant validity of a construct is said to be attained when the square root value of its AVE is greater than the square root of its correlation coefficient with other constructs [48]. The figures shown in Table 4 confirm a satisfactory level of discriminant validity for the IPTV model.

2. Hypothesis Testing

In this study, the constructs of “service quality” and “switching barriers” were designed according to the concept of a two-dimensional hierarchical structure (with the second-order factor reflecting multiple first-order factors). The construct of “service quality” was composed of four first-order factors taken from SERVQUAL and studies of service quality, while the construct of “switching barriers” was composed of five first-order factors taken from literature on switching costs and switching barriers. To measure the latent variable (LV) scores of “service quality” and “switching barriers,” the first-order

Table 5. Second-order factor verification results.

2nd-order construct	1st-order construct	Relative indicator contributions		Absolute indicator contributions	
		Weight	<i>t</i> -stat	Loading	<i>t</i> -stat
Service quality	AS	0.277	0.961	0.904***	19.258
	EM	0.196	0.960	0.789***	9.367
	RE	0.802***	3.787	0.984***	37.248
	RS	-0.229	0.843	0.851***	12.923
Switching barriers	BB	0.304**	2.556	0.824***	15.010
	LB	-0.104	0.680	0.612***	6.209
	CB	-0.103	1.051	0.389***	3.467
	UB	0.171	1.226	0.725***	9.720
	EB	0.755***	6.439	0.965***	39.302

Note. **t* > 1.645, ***t* > 1.965, ****t* > 2.576

factors were converted to a single measure, by calculating the relative and absolute level contributions of each first-order factor. The method of using formative indicators is effective in inhibiting co-linearity among the detail attributes consisting of second-order factors, and the revealed statistics were used as the criterion for distinguishing only statistically valid first-order factors [49]. “Service quality” was examined in terms of four first-order factors: assurance, empathy, reliability, and responsiveness. With reference to Table 5, among the four first-order factors, assurance, empathy, and responsiveness are not shown to be valid (*t* = 0.961, *t* = 0.960, and *t* = 0.843, respectively).

Statistically significant effects are revealed only for the first-order factor of “reliability” consisting of “service quality.” As such, Hypothesis 1 is partially supported, the result of which is pictorially illustrated in Fig. 1. The results of the statistical analysis indicate that “service quality” significantly influences IPTV customer satisfaction ($\beta = 0.590^{***}$), with the

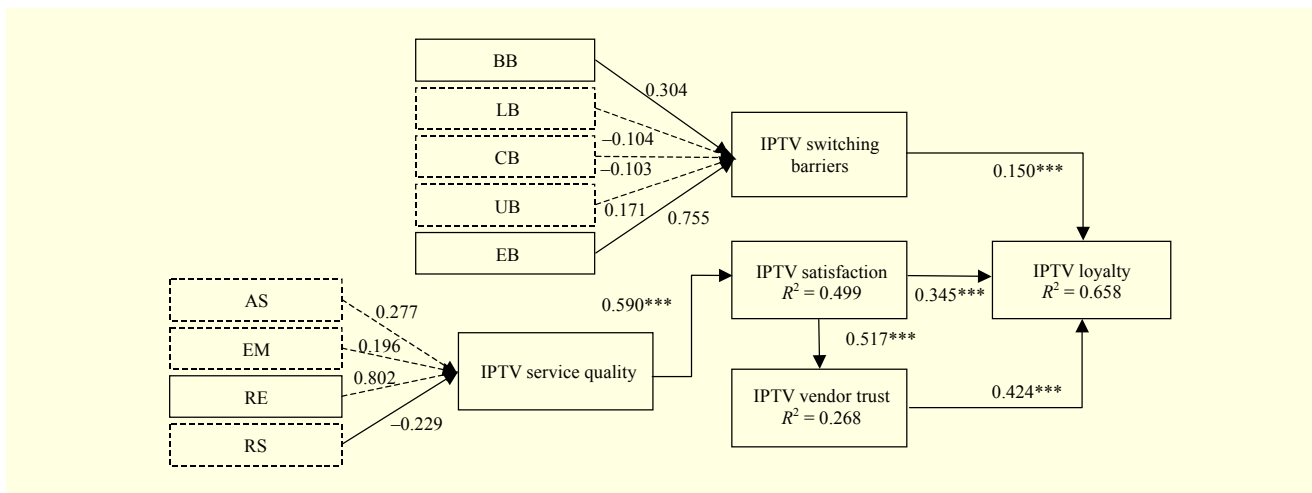


Fig. 1. Results of structural model analysis.

Table 6. Hypothesis testing results.

Path analysis	R ²	Estimate	t-statistic	Result
H1. Service quality → IPTV satisfaction	0.499	0.590***	7.913	Partially support
H2. IPTV satisfaction → IPTV vendor trust	0.268	0.517***	9.757	Support
H3. IPTV satisfaction → IPTV loyalty		0.345***	5.676	Support
H4. IPTV vendor Trust → IPTV loyalty	0.658	0.424***	5.687	Support
H5. IPTV switching barriers → IPTV loyalty		0.150***	2.591	Partially support

Note. * $t > 1.645$, ** $t > 1.965$, *** $t > 2.576$

explanatory power of 0.499 (R^2). Of course, the importance of service quality applies to any service for any person. We, however, found this to be particularly remarkable for especially a new product or service because initial adopters want to eliminate uncertainty when purchasing a new one.

A statistically significant effect is detected for the impact of IPTV satisfaction on vendor trust ($\beta = 0.517***$, $R^2 = 0.268$), which supports Hypothesis 2. And, IPTV satisfaction, vendor trust, and switching barrier are all shown to affect loyalty at a statistically significant level ($\beta = 0.345***$, $\beta = 0.424***$, $\beta = 0.150***$, each respectively) with the explanatory power R^2 of 0.658. The results support Hypotheses 3, 4, and 5.

The construct “switching barriers” consists of five first-order factors including benefit–loss barrier, learning barrier, convenience barrier, uncertainty barrier, and emotional barrier. As shown in Table 5, of the five first-order factors, learning barrier, convenience barrier, and uncertainty barrier are not shown to be valid ($t = 0.680$, $t = 1.051$, $t = 1.226$, each respectively). Statistically significant effects are revealed only for the following two attributes: benefit–loss barrier and emotional barrier. The hierarchical component approach was applied to Hypothesis 5, and as such, it is partially supported,

the result of which is pictorially illustrated in Fig. 1 and Table 1. We found that not only the advantages provided from the economic and emotional perspective, but also the burdens felt in the same perspective, stimulated IPTV users into making a decision to continue using IPTV.

V. Discussion and Conclusion

This study aims to explore the process whereby IPTV users form an intention to continue to use the service, with a view to helping the development of the IPTV market in South Korea, and to discover the aspects of customer behavior that will facilitate such development. To that end, several theories and models widely used in marketing and e-commerce, such as innovation diffusion, switching barriers, quality of service, and total consumer experience, were applied. The data was examined to test to what extent all these influenced customer loyalty, utilizing a structural equation model.

The structural model used confirms that customer satisfaction with the IPTV service is significantly influenced by quality of service, and this satisfaction leads in turn to stronger loyalty. However, when it comes to generating loyalty among

IPTV customers, satisfaction is a less important contributing factor than trust in the service provider once they are satisfied with service reliability. The analysis of the structural model of switching barriers found that two of the five switching barriers considered; (namely, benefit–loss barrier and emotional barrier), had a direct positive influence on customer loyalty toward IPTV. Along with satisfaction, switching barriers proved to have an important influence on customer loyalty toward IPTV, with economic and emotional-level barriers having a particularly dissuasive effect on their switching to another service.

An increase in satisfaction with and trust in service providers, achieved through these efforts, ensures that more customers will opt to maintain their subscription to IPTV. Switching barriers such as economic and emotional costs also appear to have a positive effect on a user's decision to continue subscribing to a given IPTV service.

The findings of this study revealed that reliability, one of the four service quality characteristics, is the key to bolstering customer loyalty. This suggests that as the IPTV service is a broadcasting/communication converged innovative digital service, it is expected to give rise to a degree of quality totally different from that of existing broadcast services, implying that customers expect to see the strengths of the IPTV service only, which differ from those of existing TV services and are special. In other words, it is only by stably delivering a unique and high quality IPTV service to customers that customer satisfaction with the IPTV service will be enhanced and customer loyalty toward the IPTV service will ultimately be formed. In addition, the positive prospects for the technology, market size, and business models of IPTV service will impose a big economic and psychological burden on IPTV customers if they try to transfer to other services. Notably, the differentiated strengths of the IPTV service (usefulness, convenience, and originality) will further bolster switching barriers, eventually forming customer loyalty toward the IPTV service. The resulting framework is useful in providing a better understanding of how to ensure successful loyalty formation among existing innovative convergent service users from a managerial perspective.

The greatest contribution of this study lies in its analysis of consumer perceptions about innovative convergence services such as IPTV and in its modeling and empirical verification of the process of customer loyalty formation. Notably, the adoption of a two-dimensional hierarchical structural equation model using formative indicators is very effective in exploring the impact of the detailed characteristics of the “service quality” and “switching barriers” components. This provides implications for service providers and is something that cannot be found in existing studies, which only seek to verify the

effectiveness and significance of constructs; and it is these implications in particular which constitute the greatest differentiating characteristic of this study. This study surveys the detailed characteristics that make up each of the two key components (that is, service quality and switching barrier) that are influential in ensuring a customer's continuous use of the IPTV service, thereby giving working staffs and researchers a greater understanding of and insights into innovative convergence services.

In addition, this study examined customer loyalty formation toward IPTV services from two heterogeneous perspectives. The first covers the formation of customer loyalty through customer satisfaction by enhancing service quality, and the second by means of building switching barriers. This process starts with the premise of stimulating a customer's positive perception of the IPTV service through the enhancement of service quality, and then progresses to the building of switching barriers to other services, thus increasing a customer's economic and psychological burden and consolidating their adherence to a given IPTV service. This process was previously discussed mainly in the remaining literature researches related to customer loyalty in marketing and e-business, so this is the first time that this process has been applied to research on IPTV services.

Although this study offers various meaningful implications and working and academic contributions, it has several limitations and insufficiencies. First, our study provides only a snapshot without considering the dynamic nature of the process of customer loyalty formation. Ideally, a longitudinal study that tracks customers' attitudes over time is needed. Second, the results may have to be carefully interpreted since the sample population was restricted to only those who reside in South Korea. We truly hope that, under the impetus of this study, diverse further studies on the IPTV service will be conducted, thereby effectively and greatly contributing to the popular development of innovative convergence services.

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