IPTV in Korea: The effect of perceived interactivity on trust, emotion, and continuous use intention

Geena Shin
Korea Telecom, Seoul, Korea
geen@kt.com

Joongho Ahn
Seoul National University, Seoul, Korea
jahn@snu.ac.kr

Taeha Kim
Chung-Ang University, Seoul, Korea
tkim@cau.ac.kr

IPTV, which has already secured a subscriber base of 1.5 million individuals in South Korea, is evidencing rapid growth in the global market. The development of IPTV is also increasing the interactivity between users and the IT media. The existing interactivity between users and IT from the cognitive perspective is insufficient to describe the usage behavior and continuous use intentions of consumers, who evidence a broad diversity of sentiment. This paper addresses the effects of IPTV users' trust and emotions on the basis of the perception of interactivity. According to the results of empirical research into the users of IPTV services, the perception of interactivity was directly related with trust. Users' trust bolsters users' emotion in a positive/negative aspect, and such emotion was verified to affect the intention continuously use IPTV.

The results of the work indicate that the trust and emotion of users should be considered from the MIS perspective in an attempt to build the intention to use IPTV. Additionally, from the executive perspective, cost-effectiveness should be considered to enhance positive emotions for user retention and eventually bolster intentions to continue to use IPTV.

Keywords: IPTV, perceived interactivity, web experience, trust, emotion, usage intention.

1. Introduction

1.1 Research Background

Television is evolving. We are recently experiencing a paradigm shift in the TV

industry. If TV was originally to be perceived as a medium of 'seeing', we are currently facing a new generation of 'doing' over IPTV (Internet Protocol Television). IPTV is a new concept in television, which employs Internet protocols to provide real-time broadcasting, multi-media contents and two-way services. There are more than 1.5 million subscribers in three firms that provide IPTV in Korea only; and the scale of this service is increasing considerably. This implies that IPTV is now past the experimental stage of its services and is presently repositioning itself as a practical medium for the next generation.

Unlike television in previous years, IPTV is capable of two-way services including VOD (Video on Demand), games, finance, and shopping. Moreover, IPTV is branching out toward internet-only services such as widget services[1]. Such capabilities permit IPTV to be used as a medium that enables interactivity via CMC (Computer Mediated Communications), which is the combination of network devices and TV including commerce, SMS (Short Message Service), chatting, and e-mailing (Quico, 2003).

The new IPTV media features superior functions relative to the former media. However, such functions require user participation, and are also useless if the usage intentions are unclear.

Therefore, it is important to conduct research into the manner in which interactivity enhanced by IPTV protocols influences usage intentions and related variables.

2. Objective and Tasks

In regard to its functional aspects, IPTV provides a more diverse menu of features than TV previously. Additionally, Shin (2007) stated in a prior study that: 'If former TV used a Push-mechanism, IPTV is based on a Pull-mechanism due to the fact that IPTV induces user participation". Recently, a series of research studies into interactivity as the principal influence on IT media were conducted (Rafaeli, 1988; Steuer 1992; Zack, 1993; Ha and James, 1998; Liu and Shrum, 2002; Stromer-Galley, 2004; Johnson *et al.*, 2006). The results of current research indicate that the interactivity users perceive when using the information system positively influences usage intentions (Wu, 1999; Liu and Shrum, 2002; McMillan and Hwang, 2002; Fiore and Jin, 2003; Johnson *et al*, 2006). Former research into interactivity has focused on the cognitive area, and individual features such as trust and emotion were not considered prominently. The cause of such a cognitive perspective was the predominant TAM (Technology Acceptance Model) approach (Davis *et al*. 1989), which holds that the use of IT devices

---

[1] Widgets are small applications that hold specific content, and are widely regarded as a service that enables users to readily access and use information.

is dependent on cognitive factors. In particular, unlike former offline services in which direct communication is possible, an online medium requires an extraordinary function that attracts consumers, thus allowing them to communicate continuously with the medium. However, such requirements have been considered only glancingly, if at all. The principal task begins in focusing on the internal features of the IT medium--for instance, trust and emotion--as opposed to functional features. Similar acts may appear in IPTV however, in order to attract continuous usage intention; fundamentally building trust and understanding the mechanisms of emotion are critically important.

Based on the results of various studies concerning the rapid development of interactivity, this work confirms the perceived interactivity in IPTV and attempts to assess the influence of perceived interactivity on trust and emotion, which eventually confirms the cause-and-effect relationship previously elucidated.
The primary questions this study sought to answer are as follows:

A. Via what mechanisms, specifically, does perceived interactivity affect usage intention?
B. How does the perceived interactivity affect the individual features of trust and emotion?
C. What influences might perceived interactivity have on trust according to the level of web experience?

2. Theory

2.1. IPTV

IPTV is a term encompassing multimedia services such as TV, video, audio, text, graphic, and data that employ an IP network-based program (Atlas Research, 2009). The ITU-T focus group, which functions as an impetus for the standardization of IPTV, has defined IPTV as a medium that significantly exceeds the capabilities of one-way TV, providing a choice of desired programs, interactivity, the required amount of QoS (Quality of Service), information safety, interactivity, and trust, all via a broadband infrastructure.

Additionally, IPTV employs an internet protocol to compress the respective functions of former digital devices into one form, allowing for video, home shopping, internet banking, weather, news, traffic status and other contents to be materialized on the TV screen. In other words, IPTV can be described as a "Fusion-service providing a broad field of multimedia contents, including broadcasts, radio, and lifestyle contents, via an IP network"(Lee Jeong Keun, 2008, p. 100). Conceptually, IPTV can be regarded as the addition of PC and internet functions to a standard TV. TV viewers are passive,

with no choice but to watch the programs being broadcast at any given time; PC users, however, are able to search actively for specific information--moreover, they are open to active movements where such information can be shared.

IPTV research, which has grown in popularity in recent years, has made great progress in terms of communication: most recent studies in the field have focused on the difference between traditional face-to-face communication styles and the newer computer-based two-way communication style (He *et al*, 2004, Quico, 2003). Weisz (2007) performed an experiment using the Movielens (www.movielens.org) service, by simultaneously providing live cartoon programs and chatting services. According to the results of that study, the satisfaction level of viewers who simultaneously chatted and watched the cartoon program tended to be higher than the satisfaction levels of those who only watched the cartoon program, without chatting. Additionally, even uninteresting cartoon programs were reported as being more fun when the chatting function was active.

Until now, studies of IPTV have progressed largely via the functional perspective, and involved assessments of individual's satisfaction levels with communication. Further research is clearly required regarding the influence on usage intentions, as IPTV is being diffused broadly among a large number of users. More specifically, research into the variety of individual features that affect usage intentions is imperative, as opposed to measurements of functional satisfaction levels.

2.2. Interactivity

The definition of interactivity may differ according to the situation (Johnson, 2006) and academic field of inquiry (Liu and Shrum, 2002). The primitive standard of the definition of interactivity from the IT area has been *user-device interactivity;* however, owing to the development of IT—most notably the Internet--the concept has expanded to encompass user-user interactivity. Therefore, the former concept of interactivity can be regarded as insufficient (Liu and Shrum, 2002). Many researchers (Cho and Leckenby, 1997; Hoffman and Novak, 1996; Stromer-Galley, 2004) define interactivity via three distinct paradigms: user-media interactivity, user-information interactivity, and user-user interactivity.
In an effort to integrate these disparate but related definitions of interactivity, Liu and Shrum (2002) have suggested a three-dimensional interactivity concept, with the following dimensions: Active control, Two-way communication, and Synchronicity.

Previous research into interactivity has been largely concentrated on the process of information exchange (Rafaeli 1988, 1990; Rafaeli and LaRose 1993; Zack 1993), as

well as on specific chat rooms or search engine response features that serve to enhance interactivity (Ha and James, 1998). However, Newhagen *et al.* (1995) has elevated the research concept to a combinational perspective that includes perceptions. From this perspective, interactivity can be classified into process, feature, perception, and combination (McMillan and Hwang, 2002).

Wu (2005) distinguished interactivity into two distinct categories: actual interactivity (based on objective perception) and perceived interactivity (which is perceived from a subjective perspective). Practically speaking, the level of interactivity can be determined in accordance with the users' perceptions (Williams *et al.*, 1988). Therefore, perceived interactivity plays a crucial role in specifying the effects of actual interactivity to participants (Wu, 2005). Reeves and Nass (1996) argued that 'perception is more effective than objective facts', arguing for the relevance of perception. Lee (2005), who activated research into perceived interactivity, claimed that 'interactivity is not measured by the features or process analysis, but rather by the perception or experience of users.' Schumann (2001) emphasized the perception of users by stating that perception is the user's choice to interact, which is a user feature rather than a media feature.

According to research conducted thus far into perceptions of interactivity, whether or not the media is interactive may be a matter for users to decide. For this reason, interactivity is predicated on users' subjective perceptions. Some researchers have uncovered clues to this by developing ways to explore interactivity through user perception (Moon, 2009). From this perspective, Steuer (1992) defined interactivity as "the level of participation to modify the contents and form of real time media." Such statements underline the important role of users in defining interactivity.

2.3. Trust

The definition of trust varies according to the relevant discipline: philosophy, psychology, and business marketing all have different views on trust, and the concept continues to be relevant in all these disciplines. However, Wang and Emurian (2005) have stated that the abstract concept is associated with credibility, assurance, certainty and multifarious concepts associated with cognitive, emotional, and behavioral areas. To sum up the common view of researchers, trust can be defined as the absence of doubt in a partner's words, and a construct built through a continuous relationship between parties (Ellen and Johnson, 1999).

Table 2-1 Affective sources to trust

Name	Year	Precedence to trust-building

Koh Il Sang, Choi Soo Jeong	2005	Trust value of internet shopping malls (ability, hospitality, faultlessness); trust in system (structural stability, situational stability)
Gefen	2002	honesty, ability, hospitality
McKnight *et al.*	2002	Perceived reputation of provider, perceived quality of website, structural stability
Jarvenpaa *et al*	2000	Perceived size, Perceived reputation
Cheskin Research	1999	Safety guarantee, brand, easy-searching, request fulfillment, presentation, technical skills

(Source: Jeong Cheol Ho, Jeong Young Soo 2006, modified)

Hoffman (1999), in his studies of trust, asserted that public disclosures of financial and personal information in e-commerce constitute the most daunting obstacles to trust. Adopting a similar perspective, Wang and Emurian (2005) argued that the formation of trust is a difficult proposition in the online context: however, they determined, once trust has been built online, sensitive information can often be exchanged. In the field of e-commerce research, Mohr and Sohi (1995) showed that two-way communication increases users' satisfaction, hence resulting not only in re-visits but also in an expansion of trust between the online shopping mall and users.

Additionally, as the importance of trust is increasingly recognized, the number of studies addressing the effective factors in trust building also has increased. Chreskin Research (1999), showed that the important factors in preserving the professional impression created by a website include the following: safety guarantee, brand, easy-searching, request fulfillment, presentation, advanced technology, *etc.* According to that study, trust is formed over time and repeated experience. Put another way, trust is formed when users become familiar with a specific website and gain experience within a given amount of time. Such experience is required to become a form of trust. Additionally, users with experience in logging onto a specific website must decide whether or not they will visit the website again in the future; therefore, trust is built through the accumulation of knowledge (Flavian *et al.*, 2006).

Urban (2000) states that in order to form trust online, there must be trust in the website, trust in the information provided on the website, and trust in the services provided; additionally, trust in the website was identified as a prerequisite for other forms of trust.

Owing to the absence of control of online personal information, an organization that assures users about the safety of their personal information is vital in building trust (Hoffman *et al.*, 1999; C. Park, 2002). Considering the threats of anonymity, uncertainty and complicated online networks, organizations should inevitably guarantee the safety of e-commerce and increasing interactivity on the Internet. Under such circumstances,

trust enables parties to build mutual trust.

2.4. Emotion

Emotions are incisive and strong-short psychological/biological changes, which have immense power to stimulate or inhibit a variety of situations (Rosenberg, 1998). Emotions can involve decisions regarding a particular issue, or can be immediate feelings derived from a person's instantaneous thought processes (Bagozzi *et al*., 1999). Emotions are not always simple constructs leading from superficial decisions, but rather often are complicated perceptions derived from secondary decisions; therefore, emotions can be just as strongly associated with caution, effort, and control of external factors as with the reverse (Dunn and Shchweitzer, 2005).

Most studies of emotions based on the stimuli that elicit a given emotion, or on the manner in which a given emotion affects the individual: this model is referred to as the Stimulus-Organism-Response model. Hwang (2007) discovered previously that emotions are 'pleased/depressed, joyful/unfortunate, satisfied/unsatisfied' feelings, thus placing them firmly into a three-dimensional Pleasure-Arousal-Dominance paradigm (Mehrabian and Russell, 1994). This paradigm was previously employed to explain interest, time-spent and tendency to revisit a particular online shopping mall. According to Anderson and Kumar (2006), users experienced a positive emotion when they found what they were seeking, and experienced a negative emotion when they did not.

Emotion is a crucial motive in selecting a product; thus, research on emotions is drawing an increasing amount of attention from researchers in the field of information technology (Hirchman and Holbrook 1982), and IT products are not likely to be an exception to this tendency. Under similar conditions, Conger (1998) previously claimed that users believed themselves to be rational with regard to their decision-making processes, but research demonstrated that emotional motives were actually the relevant variables. Robinette and Lenz (2003) previously stated that emotions are active along with reasoning when selecting a product, and that emotions could often overpower reason in this process. These results decouple long-term Human Computer Interaction research from the Taylorist notions of interactivity previously posited (Picard and Klein 2002). In other words, in interactions between users and devices, where the user is the principal point of concern rather than the interaction between devices, emotions should not be regarded as any less important than any other consideration.

2.5. Usage Intention and Experience

1. **Continuous intention to use**

As Davis (1989) stated in the TAM (Technology Acceptance Model), the results of several lines of inquiry have shown that "intention is the psychological state before using a particular mechanism and has direct influence on the actual usage of the information technology" (Cha 2007; Davis *et al.*, 1989). Research results on the TAM Ⅱ demonstrated that perceived usefulness and perceived intention without variables directly affect intentions to use (Davis *et al.*, 1992). To date, most previous research has revealed that perceived interactivity exerts a positive effect on the intention to use and on users' attitudes; this effect is both direct and indirect (Wu, 2005).

Kim (2007) presented research results involving the expectancy theory, social cognitive theory, and habits; those results implicated satisfaction as an emotional state and showed that, in the context of IT usage intention research, intentions were influenced by habits, cognitive factors, emotional attitudes and self-efficacy. Furthermore, cognitive attitudes are affected by expectancy and self-efficacy as well.

2. Experience

There are two theories associated with the formation of subjective perceptions through repeated experience. The first of these is the Social Cognitive Theory which involves the interactivity of environmental, personal, and behavioral factors (Bandura, 1977). This theory holds that personal, environmental, and individual behavioral factors are influenced by interactivity. It has been shown that previous successful experiences tend to increase self-efficacy and previous unsuccessful experiences diminish self-efficacy (Kim 2008). LaRose and Eastin (2004) describe the experiential relation between the usage and satisfaction of the media on the basis of Bandura's Social Cognitive Theory.

The second of these is the Expectation-Disconfirmation Theory, which holds that as the divergence of evaluation between the experience prior to or following the purchase of a product grows larger, the Expectation-Disconfirmation of a product or service also increases. The term Expectation-Disconfirmation is formed when users obtain experience from actual usage, and is affective of the final decision-making process when using a product. Bhattacherjee (2001) claimed that Expectation-Disconfirmation is the core element in the continuous usage of a product, in the context of e-commerce research.

3. Research Model

3.1. Research Model

The principal objective of this study was to measure the effects of perceived interactivity in order to examine the impact of perceived interactivity on usage intentions. Only a minimal amount of research has been conducted thus far on the effects of trust in non-face-to-face services, such as IPTV which is run off the web. Some previous studies have provided us with important insights into trust in the online context; however, further research is clearly warranted into the function and role of trust in the new media, including IPTV with its panoply of interactive features.

Emotion is a crucial factor that cannot be ignored in the process of decision making. Finding the reason for users selecting a particular IT has its limits only through cognitive factors, including ease of use. This is because similar IT products with basically the same cognitive factors, which include ease of use, are clearly being discriminated by users. This research model assumes that users familiar with interactive environments would experience different results, depending on the level of experience.
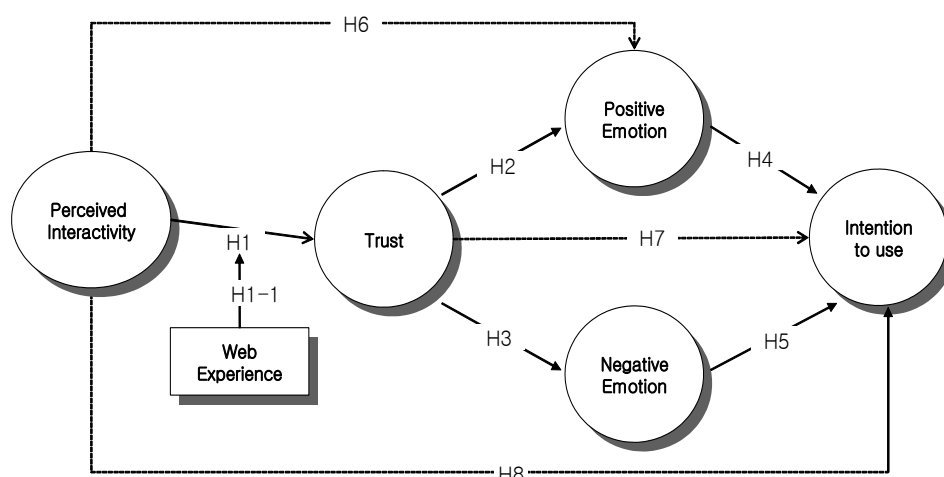

Figure 3-1 Research Model

3.2. Hypothesis

1. Perceived Interactivity and Trust

With regard to the relationship between perceived interactivity and trust, Park (2002) previously stated that trust can be formed among internet shopping mall consumers by providing more accurate information on a product and enabling consumers to share information amongst themselves through active communities. According to Woszczynski (2002), there were PC users who operated in a voluntary and innovative manner when interacting with computers, and this interaction allowed to

individuals to enjoy a high level of trust and satisfaction. Using reinforced Information systems with more online interactivity, such as IPTV, would be expected to be affected by former experience with an interactive medium. Venkatesh and Davis (2000) proved that usage experience increases continuous usage intentions, thereby proving that usage experience is an appropriate control variable. Using the former research results as evidence, the relationship between perceived interactivity and trust are expected to be as follows:

1: In IPTV, perceived interactivity should result in a positive effect on trust.

1-1: In IPTV, users with extended web experience would have a greater level of perceived interactivity and trust than those with inferior web experience.

2. Trust and Emotion

Wang and Huff (2007) pointed out that trust involves both cognitive and emotional aspects. Additionally, they emphasized that emotions may trigger a cognitive re-evaluation of trust and experience from the perspective of trust and emotion. Wang and Huff (2007) asserted that the objective of trust is to allow the relationship to mature, such that the provider will represent the consumers. Moreover, consumers respond in a manner that is simultaneously emotional and reasonable.

Young (2006) claimed previously that emotion is the principal factor affecting behavior, and is an indispensable aspect of business relations. Young (2006) proposed that positive emotions are the principal component, prerequisite, and final outcome of trust; in fact, the terms are frequently employed synonymously. However, this study will attempt to clarify the complex relationship between trust and emotions, focusing on the manner via which trust affects emotions. In particular, this study hopes to approach the concept of trust in a way that resolves the inconsistencies of previous research results. Additionally, our work includes the hypothesis that positive emotions would strengthen as trust is built, whereas negative emotions would grow as trust is reduced.

2: In IPTV, positive emotions would strengthen as trust is built.

3: In IPTV, negative emotions would increase as trust is reduced.

3. Emotions and Usage Intentions

In a previous study of consumer intentions, emotions such as happiness or disappointment from perceived performance were shown to evidence a direct and positive relationship with intentions in the future (Swan and Trawick, 1981; Patterson and Spreng, 1997). Additionally, satisfaction in portal websites was shown to exert a

profound impact on intentions (Van Riel *et al*., 2001). In relation to Information Technology, it is expected that users will use a particular information technology continuously, so long as the users evaluate the technology positively. Additionally, Kim Yong Young (2007) previously demonstrated that habits may affect emotional attitudes, and that expectancy and self-efficacy have profound effects on cognitive/emotional attitudes, stating that emotional factors are strongly related to intentions. The term 'positive emotions' is related to the individual's decision to maintain such feelings, but the term 'negative emotions' is oppositely related to decision-making. Bagozzi (1999) stated that positive emotions lead to sharing of emotions with others; however, negative emotions lead to negative behavior.

Hypotheses 4 and 5 can be proposed as a background for related research results:

4: In IPTV, positive emotions would have a positive effect on continuous usage intention.

5: In IPTV, negative emotions would have a negative effect on continuous usage intention.

4. Mediating effect of Trust and Emotions

In regard to trust, greater usage of IT services results in an effect on trust in a particular aspect of IT, which can be either positive or negative in its direction. For example, the results of Chaudhuri and Holbrook's (2001) study revealed a relationship between brand trust and emotions with brand likeliness. Additionally, brand trust and emotions are important sources of brand likeliness or concentration. In other words, as trust accumulates, it generates a positive impact on emotion, and thus user concentration.

Positive emotions such as favorability influence others's behaviors, and a variety of studies are currently underway to determine how emotions influence the perception of trust (Kumar, 1997). Positive outcomes, such as interactivity, tend to strengthen trust, whereas negative outcomes tend to damage it (Anderson and Kumar, 2006).

Until now, studies into this topic have primarily focused on negative emotions; however, DeWitt (2008) previously addressed both positive and negative emotions. Dewitt's study also revealed the huge role played by trust and mediation of emotions, by empirically researching the effects of trust and emotions on the recovery process.

Considering hypotheses 1, 2, 3, 4, and 5, hypotheses 6, 7 and 8, which are related to

trust and emotion, may also be possible:

6: In IPTV, the relation between perceived interactivity and emotions could be mediated by trust.

7: In IPTV, the relation between trust and intention could be mediated by emotions.

8: In IPTV, the relation between perceived interactivity and continuous usage intention could be mediated by trust and emotions.

4. Empirical Research

4.1. Definition and Measurement of Construct

The survey regarding interactivity research involves two factors: response and reaction time, both of which measure the perceived interactivity on the basis of the former interactivity research (Johnson, 2006; McMillan and Hwang, 2002; Davis, 1992). Additionally, validity and reliability are appropriately modified and selected as measured variables via trust (Gefen, 2002), emotion (Davis, 1992), and intention (Venkatesh and Davis, 2000). Prior to conducting the survey, the collected articles were confirmed twice to ensure the accuracy and specificity of the data.

Table 4-1 Operant Definition of Construct

Construct	Definition	Related Research
Perceived Interactivity	The level of perception related to communication such as suitable response and fast reaction in a particular situation.	Alba *et al*.(1997), Burgoon *et al*. (2002), Johnson *et al*.(2006), Rafaeli(1998)
Trust	The level of reliance the other party: expectancy satisfaction through promised performance and consumption.	Gefen(2000), Park Chul(2002)
Positive Emotions	The level of positive emotion, self-reinforcement, on the basis of joyful emotions through accomplishment.	Hoffman and Novak (1996), Anderson and Kumar(2006)
Negative Emotions	The level of negative emotions, self-reinforcement, on the basis of depressing experience when failed to accomplish goals.	
Intention	The level of tendency using IPTV continuously.	Venkatesh and Davis (2000)
Web	The level of web experience which can be	Kim Sung Byuk

experience	divided into two: high and low	(2005)

The verified measured variables of reliability and validity identified in previous research were collected to enhance the tool of measurement. The perceived interactivity was employed as a measured variable, and then supplemented and modified to the following research from Wu's (2000) 9 indices.

Table 4-2 Measurement factors of Variables

Observed Variable	Measurement factor	No.	Related Research
Perceived Interactivity	▪ All time reaction, suitable response, interactive communication	3	Jonhson *et al*. (2006), Wu (2003), McMillan and Hwang (2002)
Trust	▪ Accuracy, convenience, stability	4	Park Soo Young (2003)
Positive Emotions	▪ Happy, warm, admiration, fun feelings	5	Heijden (2003), Davis *et al*. (1992)
Negative Emotions	▪ confusion, anger, boring, worried feelings	4	
Intention	▪ Will use continuously ▪ Tendency to recommend	3	Venkatesh and Davis(2000)
Web experience	▪ Familiarity	1	Kim Sung Byuk (2005)

4.2. Research Method and Data Collection

The targets of the study were experienced consumers above the age of 20 who are capable of continuous IPTV use, as well as subscribers who are provided with similar levels of the IPTV service in the capital area.

Data Collection was assessed for 3 months, from 1st July to 30th September 2009, with the target population consisting of the IPTV users surveyed by the interviewers. A total of 480, excluding 22 with response errors among 502, were used as the dataset for analysis. 221 (46%) were women and 259 (54%) were men; the age distribution was categorized into three groups: 20~29 (28%), 30~39 (41%) and above 40 (30%).

5. Data Analysis

5.1 Reliability and Validity analysis

Prior to verifying reliability and validity, we employed SPSS 15.0 software for the statistical analysis of the research data. For the reliability analysis, we employed the Cronbach's Alpha to verify the research model's reliability. The research results were regarded as suitable when the Cronbach's Alpha value was 0.7 and the composed credibility was over 0.7 (Fornell and Lacker, 1981).

Table 5-1 Reliability Verification results

Construct	Credibility	AVE	Cronbach Alpha
Interactivity	0.904	0.758	0.833
Trust	0.905	0.705	0.859
Positive emotions	0.892	0.625	0.849
Negative emotions	0.928	0.764	0.897
Intention	0.944	0.848	0.908
Standard value	over 0.7	over 0.5	over 0.7

PLS confirmative analysis was employed to confirm the discriminant validity and convergent validity. AVE (Average Variance Extraction) was employed to verify the discriminant validity, which is an easier and more accurate method than comparing the Chi-square Distribution values among each construct. The verification of the confirmative analysis was compared with the AVE value and relativity value of the construct. The AVE value (grey area) was over 0.6, which indicates that it was relatively greater than the cross-loading value of the construct.

Table 5-2 Validity Verification results

Construct	Interactivity	Trust	Emotion(+)	Emotion(-)	Intention
Interactivity	**0.871**				
Trust	0.340	**0.840**			
Emotion(+)	0.382	0.639	**0.791**		
Emotion(-)	-0.198	-0.409	-0.526	**0.874**	
Intention	0.403	0.671	0.700	-0.626	**0.921**

Additionally, the loading value of the distributed measured variable from the confirmative analysis was substantially greater than the other loading values (Gefen 2002). As a result, the individual loading value of the measurement factors was 0.7 at a minimum, thereby indicating that the measurement factors were appropriately converged to each construct, because the loading value was substantially in excess of that of the same columns.

Table 5-3 Loading value and Cross-Loading value

Construct	Q.	Interactivity	Trust	Emotion(+)	Emotion(-)	Intention
Interactivity	PI-1	**0.870**	0.209	0.244	-0.110	0.268
	PI-2	**0.919**	0.356	0.389	-0.210	0.402
	PI-3	**0.827**	0.290	0.333	-0.173	0.355
Trust	Tr-1	0.265	**0.849**	0.532	-0.296	0.536
	Tr-2	0.293	**0.824**	0.447	-0.259	0.468
	Tr-3	0.288	**0.803**	0.573	-0.453	0.682
	Tr-4	0.298	**0.888**	0.577	-0.338	0.544
Positive emotion	PE-1	0.273	0.433	**0.724**	-0.300	0.415
	PE-2	0.360	0.584	**0.833**	-0.399	0.564
	PE-3	0.249	0.467	**0.780**	-0.377	0.532
	PE-4	0.264	0.466	**0.728**	-0.407	0.452
	PE-5	0.351	0.562	**0.885**	-0.560	0.746
Negative emotion	NE-1	-0.099	-0.279	-0.360	**0.854**	-0.463
	NE-2	-0.219	-0.425	-0.491	**0.892**	-0.615
	NE-3	-0.186	-0.264	-0.495	**0.884**	-0.562
	NE-4	-0.171	-0.433	-0.479	**0.874**	-0.532
Intention	ITU-1	0.360	0.628	0.698	-0.633	**0.947**
	ITU-2	0.356	0.647	0.607	-0.588	**0.932**
	ITU-3	0.404	0.584	0.630	-0.505	**0.889**

These results lead us to conclude that a suitable level of reliability and validity were procured from the measurement tools of the research model.

5.2 Hypothesis Verification

1. Measurement model analysis

Prior to verification of our hypothesis of the relativity between the constructs, the work verified the measurement model via the PLS. Measurement model verification involves the confirmation of the significance between the potential variables and the observed variables. If the significance between the potential variables and observed variables is positive, we can conclude that one construct was measured as MIMIC (Bagozzi and Yi, 1988). Generally, significance is positive when the loading value of the distributed measured-variable is in excess of 0.7. The loading value for each construct in the work is over 0.7; this result indicates significance. As a result of the verification of the relativity of the measured variable and potential variable via the Bootstrap method, all t-values in the observed variables were in excess of 2.58 (p<0.01) which describes the potential variables well.

Table 5-4 Measurement model analysis

Construct	Q.	Estimate value	Standard Error	t
Interactivity	PI-1	**0.868**	0.024	35.940

	PI-2	**0.917**	0.011	80.597
	PI-3	**0.825**	0.023	35.824
Trust	Tr-1	**0.848**	0.012	70.039
	Tr-2	**0.822**	0.017	49.046
	Tr-3	**0.801**	0.020	40.092
	Tr-4	**0.886**	0.010	89.511
Positive emotion	PE-1	**0.723**	0.031	23.467
	PE-2	**0.831**	0.015	55.434
	PE-3	**0.778**	0.018	43.594
	PE-4	**0.727**	0.030	24.578
	PE-5	**0.883**	0.009	102.119
Negative emotion	NE-1	**0.853**	0.017	49.667
	NE-2	**0.890**	0.010	91.700
	NE-3	**0.882**	0.014	61.799
	NE-4	**0.872**	0.011	83.226
Intention	ITU-1	**0.945**	0.006	172.490
	ITU-2	**0.930**	0.007	140.103
	ITU-3	**0.887**	0.013	68.654

2. Structure model analysis

1) Direct cause-and-effects

Along with the confirmation of the measurement model, we verified the validity of the proposed hypotheses, via structure model analysis. With regard to the relationship between the variables, first, the perceived interactivity appeared to exert a positive effect on trust (path coefficient=0.340, t-value=8.948, p<0.001). Second, trust had a positive impact on positive emotions (path coefficient=0.639, t-value=22.149, p<0.001). Third, trust appeared to exert a positive effect on negative emotions as well (path coefficient=-0.409, t-value=-9.795, p<0.001). Fourth, positive emotions exert positive effects on intention (path coefficient=0.513, t-value=13,130, p<0.001). In short, positive emotions play a positive role in decision-making. Fifthly, our results demonstrated that negative emotions exert a negative effect on intention (path coefficient=-0.356, t-value=-8.196, p<0.001).

Table 5-5 Direct effects on Construct Hypothesis

Hypothesis (Path)	Estimate value	T-value	Significance	Result
Interactivity→Trust	0.340	**8.948**	**P<0.01**	**SIG**
Trust→Positive emotion	0.639	**22.149**	**P<0.01**	**SIG**
Trust→Negative emotion	-0.409	**-9.795**	**P<0.01**	**SIG**
Positive emotion →Intention	0.513	**13.130**	**P<0.01**	**SIG**
Negative emotion →Intention	-0.356	**-8.196**	**P<0.01**	**SIG**

2) Moderating effect of media interactivity experience

The formula proposed by Chin (2003) was employed to confirm the differences between groups with advanced web experience and little web experience.

Table 5-6 Comparison based on experience

Path	Experience (people)	path coefficient	Standard Error	T	Result
Interactivity → Trust	High(349)	0.386	0.0456	1.583	Non-significant
	Low(131)	0.256	0.0571		

The two groups were found not to be significant, as the t-value of 1.58 was smaller than 1.96, in accordance with the formula. As the result of our comparison of the high-experience and low experience groups' trust, the degree of significance at $p<0.05$ (t-value>1.96) showed no detectable differences. Hypothesis 1-1, that the interactivity with perceived experience can control the effects on trust, was not supported by our results.

3) Mediating effect of trust and emotion

The three stages of mediating effects proposed by Baron and Kenny (1986) to measure the mediating effects of trust and emotion are as follows:

3-1) Mediating effect of Trust

The effect of perceived interactivity on trust, trust on positive emotions and trust on negative emotions were all significant. In particular, the relationship between perceived interactivity and positive emotions was indicated by the t-value of 5.8410, at $p<0.01$. In this case, trust was shown to exert a proportional mediating effect on perceived interactivity and positive emotions.

However, our results demonstrated that the effect of perceived interactivity on negative emotions was not significant, as shown by the t-value of 1.703 ($p<0.05$). This implies that trust exerts a fully mediating effect on the effects of perceived interactivity on negative emotions.
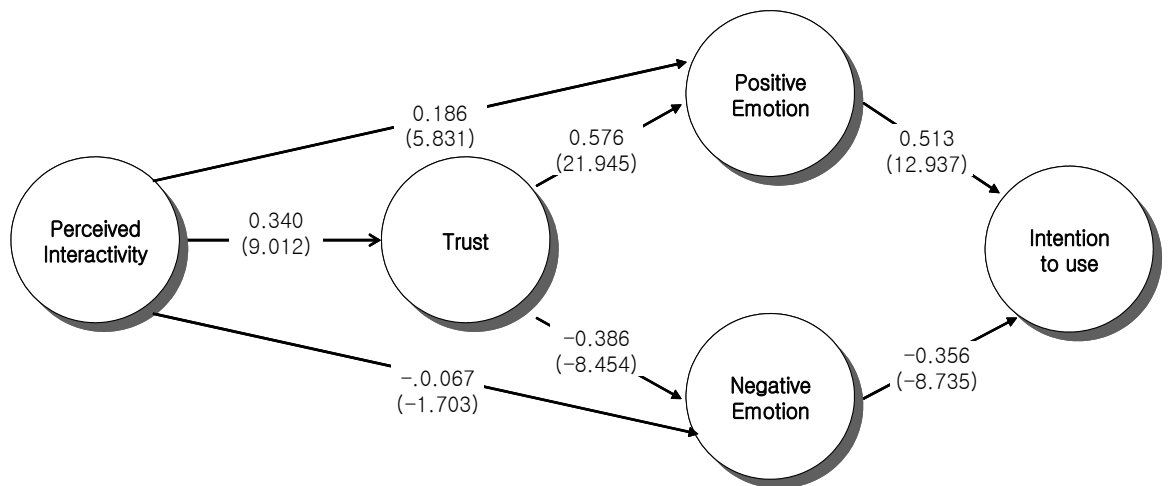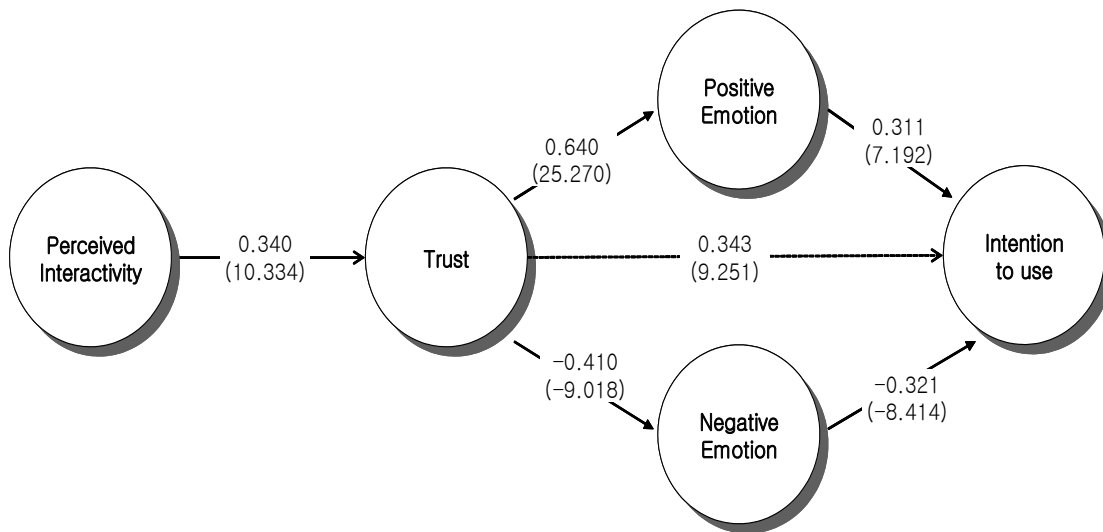
Figure 5-1 Mediating factor-trust: 3-stage analysis

3-2) Mediating effect of positive and negative emotions

Trust was shown to exert a significant effect on positive emotions, and positive emotions appeared to have a significant effect on intentions. The relation between trust and positive emotions was significant: the t-value was 25.270 at $p<0.01$ and the relation between positive emotions and usage intentions was verified by the t-value of 7.192 at $p<0.01$. In this case, the relationship between trust and usage intention was positive, as demonstrated by the t-value of 9.251 at $p<0.01$; therefore, positive emotions exert a proportional mediating effect between trust and usage intention.

Additionally, the effect of trust on negative emotions and that of negative emotions on the intention to use was shown to exert a positive influence. The relation between trust and negative emotions was significant, as demonstrated by the t-value of -9.018 at $p<0.01$ and the t-value was 9.251 at $p<0.01$ in the relation between negative emotions and usage intention. As previously stated, the relation between trust and intention to use was positive, as shown by the t-value of 9.251 at $p<0.01$; therefore, negative emotions can also exert a proportional mediating effect between trust and intention to use.

F

igure 5-2 Mediating factor-emotion: 3-stage analysis

3-3) The dual mediation effect of trust and emotion

According to the results of the final stage of analysis conducted to confirm the dual mediation effect of trust and emotion, perceived interactivity was shown to influence trust, positive emotions, and negative emotions. Trust, positive emotions, and negative emotions appeared to exert a positive influence on usage intentions. In this case, as a result of the analysis of the perceived interactivity's effect on usage intentions, the t-value of 4.356 at $p<0.01$ was positive; therefore, trust and positive/negative emotions exert a proportional mediating influence.
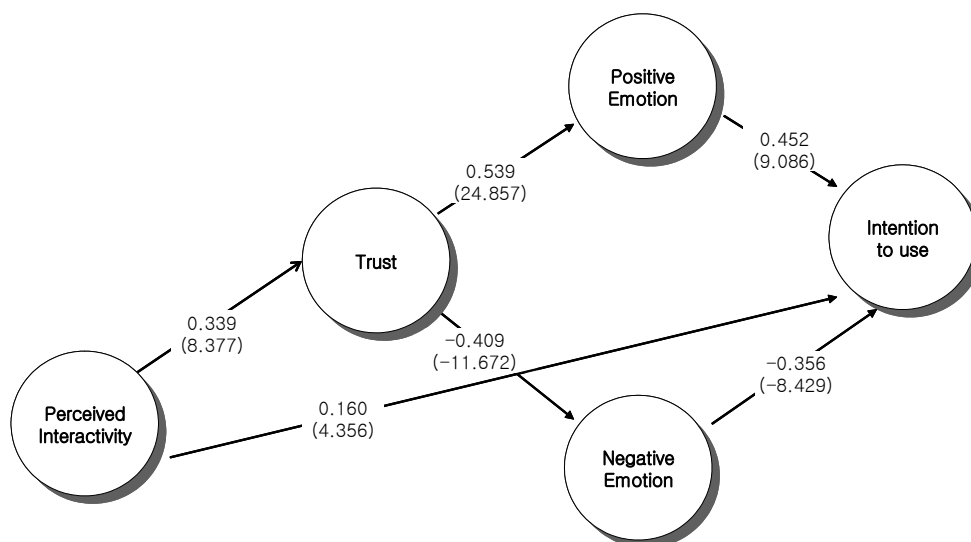

Figure 5-3 Dual mediation effect: 3 stage analysis

Trust exerts a mediating effect between perceived interactivity/positive emotions and perceived interactivity/negative emotions. Trust was shown to exert a proportional mediating effect between perceived interactivity and positive emotions, whereas it appeared to exert a fully mediating effect between perceived interactivity and negative emotions.

Positive emotions exerted a proportional mediating effect between trust and the intention to use, whereas negative emotions also exerted a proportional mediating effect between trust and the intention to use. Trust and emotions exerted a dual mediating effect between perceived interactivity and the intention to use; therefore, the results of research analysis demonstrated that they exert a proportional mediating effect.
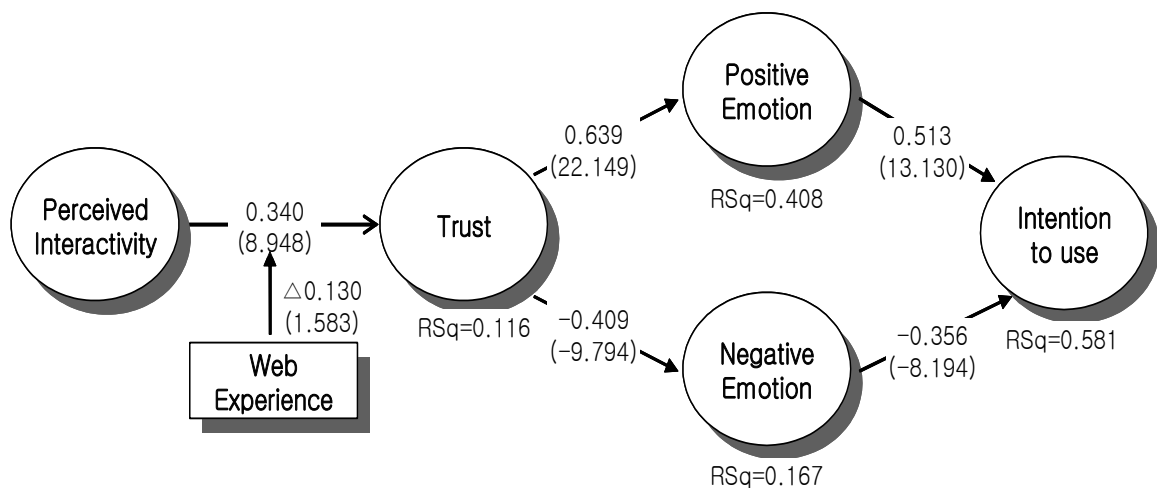
4) Hypothesis results

Figure 5-1 Research model verification

8 of the hypotheses were supported by the results of our investigation. However, as web experience was anticipated to have an effect between perceived interactivity and trust, it showed no signs of significance. This may be attributable to the fact that it proved impossible to consistently translate the web experience to IPTV usage. As a consequence, web experience may not directly accelerate IPTV use, owing to differences between web-based user interfaces and IPTV.

6. Conclusions and Implications

6.1 Conclusions and Significance

The principal objective of the work was to confirm the effects of perceived interactivity, trust, and emotion on intentions to use IPTV service. In service of this objective, we empirically researched the effects of individual features such as trust and emotions in perceived interactivity on users' intentions. As a consequence, the relationships between perceived interactivity and trust, trust and emotions, and trust and user intentions were all as anticipated; therefore, the stated hypotheses were supported. Trust was affected as perceived interactivity was high and a positive relation appeared when trust was high; however, a negative relation was observed in terms of emotions as trust was low. The results of our empirical research demonstrated that positive and negative emotions influenced user intentions positively and negatively. Moreover, the relation between perceived interactivity and emotions was mediated by trust, and the relationship between trust and perceived interactivity was mediated by emotions.

The results of our research clearly show that the trust and emotion of users should be considered from the MIS perspective in order to build consumer intentions to use the product. Additionally, viewed from the executive perspective, cost-effectiveness should be regarded as a factor to enhance positive emotions, thus improving user's intentions to retain and continue to use IPTV.

6.2 Implications

Several academic implications may derive from the research presented herein. First, a combined model of perceived interactivity, trust, emotion, and user intention in IPTV was put forth. The connection between interactivity, trust, emotion, and user intentions has been deemed insufficient in previous studies, but a theoretical outline of the effect of interactivity on user intentions was provided by the results of this research. Second, the research area of interactivity was expanded by our finding. Our research indicates the effect of relieved interactivity on trust and emotions, which leads to an effect on user intentions. The mediating role played by trust and emotions in user intentions was substantially supported by our results. Third, the research may be viewed as the starting point of the primitive IPTV research model. Many of the studies conducted thus far have provided evidence to confirm the relationship between interactivity and user intentions. Our research provides empirical research results demonstrating that the relationships between interactivity, trust, emotion, and intention in current IPTV technology, which can be seen as the vanguard of a new generation of IT-based communications.

The next implication of this research involves the executive aspect. First, one of the results of our study of the factors affecting the continuous usage of IPTV was that it provided some practical implications regarding IPTV's design and technology development. The work not only implies some possibilities for technical improvements in interactivity, but also design, in that an effective design would focus on increasing trust and boosting the effects of positive emotions. Second, according to the empirical information regarding user intention standards and the cause of continuous usage in IPTV, the results outline some service improvements, technology, and marketing improvements of providers. The practical task in the subscriber retention is provided in the work. In other words, subscriber retention can minimize the cost associated with subscribing new costumers by earning trust and fostering positive emotions. Research into users is conducted in order to prevent early leavings and maintain long-term users, which is the primary goal of Korean companies where IPTV is not currently in broad use. Our results provide correspondence and verification of the practical needs of consumers for marketing managers and IPTV design.

REFERENCES

[1] Andersen, P. H and R. Kumar, "Emotions, Trust and relationship development in business relationships", *Industrial Marketing Management* (35), 2006, pp.522-535.

[2] Bagozzi, Richard P. and Yi, Y., "On the Evaluation of Structure Equation Models", *Academic of Marketing Science*(16), 1988, pp. 76-94.

[3] Bagozzi, Richard P., Mahesh Gopinath and Prashanth U. Nyer, "The Role of Emotional in Marketing", *Journal of the Academy of Marketing Science*(27: 2), 1999, pp.184-206.

[4] Bandura, A., *Self-Efficacy: The Exercise of Control*, Freeman, 1977.

[5] Bhattacherjee, A., "Understanding Information Systems Continuance: An Expectation Confirmation Model", *MIS Quarterly*(25:3), 2001, pp.351-370.

[6] Chaudhuri, A. and M. B. Holbrook, "The Chain of Effects from Brand Trust and Brand Affect to Brand Performance : The Role of Brand Loyalty", *Journal of Marketing*(65:2), 2001, pp.81-93.

[7] Chin, W. W., B. L. Marcolin, and P. R. Newsted, "A Partial Least Squares Latent Variable Modeling Approach For Measuring Interaction Effects: Results From A Monte Carlo Simulation Study And Electronic Mail Emotion/Adoption Study", *Information Systems Research*(14:2), 2003, pp.189-217.

[8] Conger, J. A., "Qualitative Research as the Cornerstone Methodology for Understanding Leadership", *Leadership Quarterly*(9), 1998, pp.107-121.

[9] Davis, F. D., R. P. Bagozzi, and P. R. Warshaw, "Extrinsic and Intrinsic Motivation to Use Computers in The Workplace", *Journal of Applied Social Psychology*(22:14), 1992, pp.1111-1132.

[10] Davis, F. D., R. P. Bagozzi, and P. R. Warshaw, "User acceptance of computer technology: a comparison of two theoretical models", Management Science(35:8),

1989, pp.982–1003.

[11] Dunn, J. R. and Maurice E. Schweitzer, "Feeling and Believing: The Influence of Emotion on Trust", *Journal of Personality and Social Psychology*(88:6), 2005, pp.736-748.

[12] Ellen, G., and M.S. Johnson, "The Different Roles of Satisfaction, Trust, and Commitment in Customer Relationships", *Journal of Marketing*(632), 1999, pp.70-87.

[13] Fiore, A.M. and H. Jin, "Influence of Image Interactivity on Approach Responses toward an Online Retailer", Internet Research: *Electronic Networking Applications and Policy*(13:1), 2003, pp.38-48.

[14] Flavian, C., M. Guinalieu and R. Gurrea, "The Role Played by Perceived Usability, Satisfaction and Customer Trust on Website Loyalty", *Information and Management*(43:1), 2006, pp.1-14.

[15] Fornell, C., & Larcker, D. F.. Evaluating structural equation models with unobservable, variables and measurement error. *Journal of Marketing Research*, 48, 1981, pp. 39–50.

[16] Gefen, D., "Reflections on the Dimensions of Trust and Trustworthiness among Online Consumers", *ACM SIGMIS Database*(33:3), 2002, pp.33-53.

[17] Ha, Louisa and E. Lincoln James, "Interactivity Reexamined: A Baseline Analysis of Early Business Web Sites", *Journal of Broadcasting and Electronic Media*(42:4), 1998, pp.457-474.

[18] Hirschman, Elizabeth C. and Morris B. Holbrook, "Hedonic Consumption: Emerging Concepts, Methods and Propositions," *Journal of Marketing*(46:3), 1982, pp.92-101.

[19] Hoffman, Donna L. and Thomas P. Novak, "Marketing in Hypermedia Computer-Mediated Environments: Conceptual Foundations", *Journal of Marketing*(60: 7), 1996, pp.50–68.

[20] Hoffman, Donna L., Thomas P. Novak and M. Peralta, "Building Consumer Trust Online", *Communications of the ACM*(42:4), 1999, pp.80–85.

[21] Hu, Y., J. F. Wood, V. Smith and N. Westbrook, "Friendships through IM: Examining the Relationship between Instant Messaging and Intimacy", *Journal of Computer-Mediated Communication*(10:1), 2004, pp.10-25.

[22] Hwang Duk Raan, "The effect of motives and emotions in shopping: Difference between consumers and potential consumers", *Management Research* (22:2), 2007, pp.347-375.

[23] Johnson, Grace J., Gordon C. Bruner II and Anand Kumar, "Interactivity and its Facets Revised", *Journal of Advertising*(35:4), 2006, pp.35-52.

[24] Kumar, R., "The Role of Affect Negotiations: An Integrative Overview", *Journal of Applied Behavioral Science*(33), 1997, pp.84-100.

[25] LaRose, Robert and Matthew S. Eastin, "A Social Cognitive Theory of Internet Uses and Gratifications: Toward a New Model of Media Attendance", *Journal of Broadcasting and Electronic Media*(48:3), 2004, pp.358-377.

[26] Liu, Yuping, and L. J. Shrum, "What Is Interactivity and Is It Always Such a Good Thing? Implications of Definition, Person, and Situation for the Influence of Interactivity on Advertising Effectiveness", *Journal of Advertising*(31:4), 2002, pp.53–64.

[27] McMillan, Sally J. and Jang-Sun Hwang, "Measures of Perceived Interactivity: An

Exploration of the Role of Direction of Communication, User Control, and Time in Shaping Perceptions of Interactivity", *Journal of Advertising*(31:3), 2002, pp. 29–42.

[28] Mohr, J.J. and R.S. Sohi, "Communication Flow Distribution Channels: Impact on Assessment of Communication Quality and Satisfaction", *Journal of Retailing*(71:4), 1995, pp.393-416.

[29] Newhagen, J. E., J. W. Cordes and M. R. Levy, "Audience Scope and the Perception of Interactivity in Viewer Mail on the Internet", *Journal of Communication*(45:3), 1995, pp.164-175.

[30] Patterson P. G. and R. A. Spreng, "Modeling the Relationship between Perceived Value, Satisfaction and Repurchase Intentions in a Business to Business, Services Context: an Empirical Examination", *International Journal of Service Industry Management*(8), 1997, pp.414-434.

[31] Picard, R. and J. Klein, "Computers that Recognize and Respond to User Emotion: Theoretical and Practical Implications", *Interacting with Computers*(14), 2002, pp.141-169.

[32] Quico.C., "Are Communication Services the Killer Application for Interactive TV? Or Left My Life because I am in Love with the TV set?", Proceedings of the 1st European Conference on Interactive Television: from Viewers to Actors, p.100, Chorianipoulos, K. and G. Lekakos, 2007, "Learn and Play with Interactive TV", *Computers in Entertainment*(5:2), 2003, p.2.

[33] Rafaeli, Sheifaz, "Interactivity: From New Media to Communication", in Advancing Communication Science: Merging Mass and Interpersonal Processes, R. P. Hawkins, J. M. Wiemann, and S. Pingree, eds., Newbury Park, CA: Sage, 1988.

[34] Rafaeli, Sheizaf, and Robert J. LaRose, "Electronic Bulletin Boards and "Public Goods" Explanations of Collaborative Mass Media," *Communication Research*(20:2), 1993, pp.277-297.

[35] Robinette, S. and Lenz, V., *Emotion Marketing*, New York: McGraw-Hill, 2003.

[36] Rosenberg, E.L., "Levels of Analysis and The Organization of Affect", *Review of General Psychology*(2), 1998, pp.247-270.

[37] Schumann, David W., Andrew Artis and Rachel Rivera, "The Future of Interactive Advertising Viewed Through an IMC Lens," *Journal of Interactive Advertising*(1:2), 2001, http://www.jiad.org/article12.

[38] Shin, Dong Hee, "Potential User Factors Driving Adoption of IPTV. What are Customers Expecting from IPTV?", *Technological Forecasting and Social Change*(74), 2007, pp.1446-1464

[39] Steuer, Jonathan, "Defining Virtual Reality: Dimensions Determining Telepresence", *Journal of Communication*(42:4), 1992, pp.79-90.

[40] Stromer-Galley, J., "Interactivity as Process and Interactivity as Product", *The Information Society*(20:5), 2004, pp. 391-394.

[41] Swan, J.E and I.F. Trawick, "Disconfirmation of Expectation and Satisfaction with a Retail Service", *Journal of Marketing* (57:3), 1981, pp.49-67.

[42] Urban, G.L., F. Sultan and W. Qualls, "Making Trust the Center of your Internet Strategy", *Sloan Management Review*(Fall 1), 2000, pp. 39-48.

[43] Van der Heijden, H., "Factors influencing the usage of websites: the case of a generic portal in The Netherlands", Information and Management(40:6), 2003, pp.541-549

[44] Van Riel, A. C. R., V. Liljander, and P. Jurriens, "Exploring Consumer Evaluations of E-services; A Portal Site", *International Journal of Service Industry Management*(12:3-4), 2001, pp.695-704

[45] Venkatesh, V.and F. Davis, "A Theoretical Extension of the Technology Acceptance Model: Four Longitudinal Field Studies", *Management Science*(46:2), 2000, pp.186-204.

[46] Wang, Sijun and Lenard C. Huff, "Explaining Buyers' Responses to Sellers' Violation of Trust", *European Journal of Marketing*(41:9/10), 2007, pp.1033-1052.

[47] Wang, Ye Diana and Henry H. Emurian, "An Overview of Online Trust: Concepts, Elements, and Implications", *Computer in Human Behavior*(21), 2005, pp.105-125.

[48] Williams F., R.E. Rice and E.M. Rogers, *Research Methods in the New Media*, NY: The Free Press, 1988.

[49] Wong Amy, "The Role of Emotional Satisfaction in Service Encounters", *Managing Service Quality*(14:5), 2004, pp.365-378.

[50] Woszczynski, A., P. Roth and A. Segars, "Exploring the Theoretical Foundations of Playfulness in Computer Interaction", *Computers in Human Behavior*(18), 2002, pp.369–388.

[51] Wu, Guohua, "How Interactive Advertising Works: The mediating Role of Perceived Interactivity in the Effect of Actual Interactivity on Attitude toward the Website", *Journal of Interactive Advertising*(5:2), 2005, http://jiad.org/article61.

[52] Young Louise, "Trust: Looking Forward and Back", *Journal of Business and Industrial Marketing*(21:7), 2006, pp.439-445.

[53] Zack, Michael H., "Interactivity and Communication Mode Choice in Ongoing Management Groups," *Information Systems Research*(4:3), 1993, pp.207-239.