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Abstract

Korean Telecommunications Industry has a large scale market and boasts on high service quality and high technologies enough to provide the Video Telephony Service (VTS) satisfactorily. For many years, Korean telephone companies have been investing enormous sums to advertise their services widely and to allow their customers to change their cell phones for the third-generation (3G) devices indispensable for the service. However, despite their efforts, the VTS adoption rate in Korea is very low and it seems that customers seldom feel the necessity to use. From this viewpoint, it becomes necessary to find the antecedents influencing the intention to use for the VTS empirically. For this purpose, we proposed several hypotheses from the perspective of the Value-based Adoption Model (VAM). VAM is a conceptual model suggested to overcome some limitations of the Technology Acceptance Model (TAM) in explaining the adoption of new Information and Communication Technology (ICT) such as Mobile Internet where customers play the role of service consumer rather than simply technology users. We conducted a survey on 125 samples and found that customers perceive the value of VTS when they can recognize the service is functionally useful (Perceived Usefulness) and when they feel they can put themselves forward by using it (Self-Expression). On the other hand, the other factors including Technical Complexity, Privacy Concern and Perceived Price (Fee) don't have statistically significant influences on the Perceived Value of VTS.

Keywords: Video Telephony Service, Technology Acceptance Model, Value-based Adoption Model, Perceived Value, Self-expression

1. Introduction

Since CDMA was commercialized 10 years ago, the Korean telecommunication market has significantly matured with skyrocketing numbers of subscribers exceeding 41.1 Million (almost 80% of the total population) as of March. 2007 [22].

Given this, telecommunication service providers in Korea have started seeking new profit sources, focusing on the highly advanced, WCDMA-based Video Telephony Service (VTS).

To win the full-blown VTS battle starting from March of 2007, the service providers have significantly invested in distributing WCDMA-based terminals widely, as a sound platform for VTS expansion.

As a result, the number of VTS-enabled handset holders among total mobile subscribers has reached 16 Million as of October. 2008.

However, despite such efforts, VTS usage rate has remained remarkably low.

For instance, the statistics of the providers indicates that the number of users utilizing VTS more than once, via free promotion, has been on the rise, but this growth has not been translated into actual sales [26] [40].

Additionally, a public survey on VTS showed that the majority of 51.1% responded expressing that they had "Feeling no need for VTS" [29].

In short, the role of VTS in daily life has not yet materialized in Korea [30].

There were similar attempts to expand VTS usage in Japan and America, but this effort mostly failed.

Many researchers concluded that VTS technical issues such as 'Image quality' or 'system quality' did not fully satisfy customer expectation, but at the same time, the overstretched attempt to create a new market based on the perspective of supplier/technology capability, without sufficient analysis on customer needs, also largely contributed to the failure [36] [45].

Therefore, Korean telecommunication providers should not pursue the same strategy, but rather create a service extension strategy based on a full understanding of customer needs.

A starting point of understanding customer needs in this area begins with an understanding of the critical elements that create user appreciation arising from the VTS service value proposition.

However, most VTS studies have focused on technological aspects of VTS.

Typically that is the direct motivation behind this VTS study, aiming to answering the following two questions.

I. What elements do have impact on VTS adoption?

II. Among them, what is the most decisive element in evaluating VTS value?

In the following Chapter, the definition and implication of a Value-based Adoption Model, the key Model of this research, will be discussed.

Then, it establishes a major research hypothesis based on the theory, in order to develop a quantifiable model through regression analysis, highlighting its implications.

This study will help observe when and in which case users appreciate the value of VTS, bringing practical benefits in creating a new marketing strategy to the telecommunication service providers.

2. Background and Hypotheses Building

2.1. Value-based Adoption Model (VAM)

Discovering the full value of an equipment or device requires users to have the ability to sufficiently use it. And its sufficient usage requires users to adopt it as his or her personal device, both physically and psychologically.

Many IT researchers have recognized the importance of User Acceptance and consistently studied what is the pre-requisite in making a new technology valuable to users.

In regard to this, well-known theories are including 'Theory of Planned Behavior [54]', 'Social Cognitive Theory [3] [4]', 'Unified Theory of Acceptance and User of Technology (UTAUT: [60])', 'Theory of Diffusion of Innovations [35]', and 'Technology Acceptance Model (TAM: [9])'.

Among them, the Technology Acceptance Model (TAM) is simple to understand and highly reasonable, and well-explained, thereby it is widely accepted by researchers. Davis(1989) insisted that elements directly affecting the level of User Acceptance are Usefulness and Ease of Use [9].

However, TAM was designed based on the scenario where a user must use IT Artifact, including a mandatory system or process and the supporting technology, to carry on his or her job as a member of a specific organization [27].

Given that characteristics, TAM has its own limitation in observing User Acceptance when a user is both a technology user and service consumer such as for mobile internet usage [27].

Before moving on to more details, it is worth considering the meaning of 'Perceived Value'.

Perceived Value is the value that users appreciate, following product or service consumption, and is calculated by subtracting total costs(sacrifice) required up to the final purchase decision as well as its usage costs from benefits gained during the course of its consumption [63].

Also it was confirmed that Perceived Value positively influences purchase (adoption) intention [33] [53].

In a company introducing TAM, the company itself, instead of a user, takes business cost required for utilizing IT Artifact (IT functionality). (In fact, TAM does not cover the sacrifice specifically, but only focuses on the benefits resulting from new IT functionality usage, including Usefulness and Ease of Use)

Particularly, in most cases, the purpose of a new IT functionality is decided by the organization itself as a company policy, instead of by users directly. Furthermore, the authority to determine the value of its consistent use is unlikely to be granted to users [27].

As for mobile-Internet, however, its consistent use is dependent on intended requirements of individual users and its future usage is also largely determined by user's appreciation of the value following their service consumption [27].

Kim et al.(2007) understood the area that cannot be explained by TAM, then suggested Value-based Adoption Model(VAM) to complement TAM [27].

The following Figure 1 is a conceptual model of VAM.

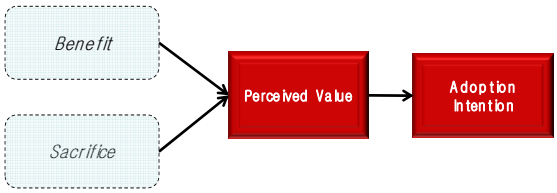

Figure 1. Conceptual Model of VAM

As Figure 1 shows, VAM is designed based on Perceived Value of Zeithaml(1988) [63]. In other words, Perceived Value of products or services is produced through a total sum of benefits and costs following consumption.

Just like the mobile internet, VTS users can be both new technology adopters and service users.

Having said that, establishing a VAM-based research model helps analyze which elements impact VTS Adoption Intention by users.

2.2. Perceived Benefit

When do consumers start to recognize value?

Sheth(1983) suggested a Integrative theory of exploring consumer repurchase motivation, asserting that there are two motivations at play in buying products or services [48]. The first is 'functional need', indicating an easy access to and availability of products that consumers want to purchase and the second is emotional and subjective values that consumers expect after

consumption [48].

Since then, many researchers have further developed this theory into a specific concept. Particularly, Rintamaki et al.(2006) categorized values following consumption into Utilitarian value, Hedonic value, and Social value and corroboratively proved that they are mutually exclusive [42].

Utilitarian value is appreciated by removing the functional needs that Sheth(1983) conceptually distinguished [48]. For instance, when consumers save costs during service consumption (monetary savings) or feel convenience (convenience) as a result of using this service, they are thought to be appreciating Utilitarian value [42].

Hedonic value defines the sense of pleasure being enjoyed during the course of consumption itself [6] [21].

Social value originates from consumer belief that they are distinguished among the public by consuming specific products or services [7] [49] [51].

Given the study history above, this document covers the values sensed by VTS users, from the three aspects of Perceived Usefulness, Enjoyment, and Self-Expression.

2.2.1. Perceived Usefulness (PU)

Many IS researchers have studied diverse variables affecting new technology adoption and stressed the significance of user's conviction or attitude [12] [17] [18] [24].

Especially, the concept of Perceived Usefulness has been recognized as a critical determinant of user behavior [9] [43] [46].

Here, Perceived Usefulness is defined as 'the confidence in specific systems improving personal work performance [9].

The result of different IS studies confirms that Perceived Usefulness is significant for technology adoption [27].

Considering such study results above, following hypothesis can be established for this VTS study.

H1. The stronger conviction that VTS is useful, the higher Perceived Value that users appreciate.

2.2.2. Enjoyment (EN)

Consumers are pursuing fantasies, feeling, and fun in their consumption. Holbrook & Hirschman(1982) define this phenomenon as 'Hedonic Consumption' and explain that it significantly defines consumer behavior [21].

Many marketing studies prove that a consumer's emotion and feeling, following their consumption, serve as critical variables in their appreciation of the value of a service (e.g., [32]).

If the previously mentioned 'Perceived Usefulness' is related to Utilitarian value, product or service functional value, the Hedonic value is more subjective and emotional.

Turel et al.(2007) coined the expression of Emotional Value, indicating the comprehensive feeling of Enjoyment, Pleasure or/and Anxiety following the usage of product or service [58].

Among those feelings, this study particularly focuses on Enjoyment coupled with 'VTS' usage.

Davis et al.(1992) confirmed that Enjoyment affects Intention to use by extensively applying existing TAM. However, he added that its impact is smaller than the one expected from Perceived Usefulness and Ease of Use [10].

However, Heijden(2004) argued that such analysis results from insufficient categorization, by purpose, of Information system in relation to this study. He insists that we need to separately observe the system designed to provide effective function and the system that delivers pleasure to users. He names the first as the Utilitarian system while the second as the Hedonic system [59].

According to his corroborative study on film information websites, the impact of Enjoyment on Intention to use in the Hedonic system is much larger than that witnessed in Perceived Usefulness (Heijden, 2004).

Given all of the above, VTS becomes one of the Hedonic system examples, thereby new assumptions are established as follows:

H2. The more users enjoy VTS, the higher their Perceived Value would be.

2.2.3. Self-Expression (SE)

According to existing studies, consumption itself can be described as 'social activity of expressing the individual to others' [49].

Consumers strongly confirm or strengthen their social identity during product or service consumption [16]. At the same time, they express their social status [42] and further consolidate personal relationships thanks to unlimited time and space in displaying their own interests in others [31].

Leung & Wei (2000) argued that mobile service usage would be one of the greatest ways to display strong personality and social status [31]. And Pihlstrom & Brush (2008) confirmed that the social value delivered by the mobile service largely determines the service value [41].

This study focuses on Self-Expression, the level of confidence in the strong power of expressing a user social status and individuality following VTS consumption.'

H3. The stronger that the VTS user feeling is that

their social status and personality can be displayed following VTS usage, the higher Perceived Value they can appreciate.

2.3. Perceived Sacrifice

Perceived Sacrifice means the portion that users have to give up or sacrifice for acquiring a product or service. It consists of monetary and non-monetary aspects.

Product price and service fees are a great example of monetary sacrifice while personal effort, time, and complaints about lower-than-expected service quality are examples of non-monetary sacrifice [27].

This study considers monetary and nonmonetary sacrifice, expected to be experienced following VTS consumption, from four perspectives of Technical Complexity, Quality Uncertainty, Privacy Concern, and Perceived Price.

2.3.1. Technical Complexity (TC)

Complexity coupled with new innovation, impacting potential users, serves as an obstacle to its extension and application for business tasks [57].

Here, complexity is defined as the difficulty in understanding and using the innovation content and value [44].

Many MIS studies on IT adoption confirmed that such complexity affects Adoption Intention, but the negative impact gradually declines following user's adaptation to the new technology [27] [56] [60].

Following the launch of the VTS service 2 years ago, its market penetration is still low.

Having said that, most users are still unfamiliar with VTS and for them, it is still difficult to operate VTS terminals and its features.

And ultimately it is reasonable to infer, such a position is likely to undermine the service usage value.

H4. Complexity following VTS usage affects Perceived Value on VTS.

2.3.2. Privacy Concern (PC)

VTS was once thought to offer more natural and better communication than voice phone, becoming the choice of communication in the market [38].

However, against this expectation, VTS failed to deliver business success [36], because the attitude of the majority VTS users, during a call was more likely to be formal, exaggerated, and unnatural, compared to the voice call [47].

Especially, the users had privacy concern due to VTS power of revealing the details of the backgrounds during calls [38].

Against this backdrop, a hypothesis can be established as follows.

H5. The bigger privacy concern following VTS consumption, the lower Perceived value it has.

2.3.3. Perceived Price (PP)

Helson (1964) developed a 'Adaptation-Level theory', explaining how consumers build their attitude toward product price.

According to this theory, consumers consider objective price, actual price, as well as their own internal reference price to evaluate the appropriateness of the price [19] [20].

As a psychological price in consumer cognition system, the internal reference price serves as a standard to decide whether the actual price is high or low [15] [19] [34] [62].

The internal reference price is decided or adjusted by consumer's purchasing experience and expectation derived from similar products [19].

Another study based on a similar logic, where consumer attitude toward mobile-internet service is affected by consumer's long-term experience of a free wired internet service [2], supports that previous consumption experience influences a customer attitude toward further purchases.

The Adaptation-Level theory implies that there is no appropriate price that all consumers can generally accept. In other words, the objective price cannot be a valid concept when evaluating the co-relationships between price and quality or between price and value, like in this study.

Against this backdrop, Perceived Price (PP) appears to supplement the objective price. In short, PP indicates consumer's subjective evaluation of the price, decided via the mechanism between the objective price and the internal reference price [25].

Chang & Wildt(1994) confirmed that the objective price and the internal reference price forge a positive and negative relationship with Perceived Price, respectively [8].

And Perceived Price undermines Perceived Value, according to various studies (e.g., [8] [13] [55] [27]).

VTS charges a higher objective price than a voice call. Furthermore, the fee of the voice call (serving as the internal reference price to VTS users), which is the long-term user choice and VTS-similar service, is relatively more affordable.

Given that, VTS Perceived Price is likely to be decided at a higher level. Such a higher Perceived Price is expected to reduce VTS's Perceived Value.

Therefore, another hypothesis can be established as follows.

H6. The higher VTS Perceived Price, the lower VTS Perceived Value.

2.4. Adoption Intention (AI)

Intention is the anticipated or planned future behavior of individuals, meaning the subjective probability of user conviction and attitude being translated into actual behavior [14].

A "Behavioral intention in decision-making" model directly defines a specific behavior [23] and Ajzen & Fishbein(1980) insisted that such a behavioral intention is highly likely to be translated into actual behavior [1].

Intention behavior in marketing indicates the user's psychological state created right before actual product purchase. Many studies prove that the behavioral intention is highly correlated with the actual purchase [28].

Diverse marketing studies confirm that Perceived Value does decisively influence the consumer purchase intention and purchase decision-making [33] [39] [63].

Therefore, it is reasonable to infer that high VTS Perceived Value can be translated into a high adoption intention.

H7. The higher VTS Perceived Value, the higher adoption intention.

3. Research Methodology

3.1. Data Collection

To statistically verify the hypotheses, a survey was conducted, targeting people in their 20s to 50s who once used or are using VTS.

As a result, 125 samples were verified by sorting out meaningless answers from a total of 176 samples.

The demographical distribution of respondents is as follows.

The following Table 1 shows that people in their 20s and 30s account for almost 84% of total respondents.

Table 1. Age distribution

Age interval	Percentage
20 ~ 25	16%
26 ~ 30	40%
31 ~ 35	28%
36 ~ 40	12%
41 ~ 45	2%
46 ~ 50	1%
51 ~ 60	1%
Total	**100%**

Job distribution shows that respondents with jobs represent majority, followed by students of 31% and professionals of 17%.

Table 2. Job distribution

Job	Percentage
Expert/Specialist	17%
Office worker	50%
Student	31%
Self-employed	1%
Etc.	1%
Total	**100%**

3.2. Operationalization of Constructs

The operational definitions on construct and measure items employed in this study are stated in Appendix A.

4. Data Analysis and Results

4.1. Reliability and Validity of Measure Items

Factor analysis was conducted to confirm the construct validity of measure index and Cronbach's alpha value was checked to ensure internal consistency among relevant measure index.

Analysis results confirmed that in most cases, the factor loading of the measure index recorded higher than the general standard of 0.7 and Cronbach' alpha value was also above the standard of 0.7 [37], indicating the validity and reliability of the measure index.

However, Perceived Usefulness and Enjoyment appear to be combined as one factor. That will be covered in detail in the Discussion section below.

4.2. Hypotheses Test

Multiple regression analysis was conducted with SPSS 12 in order to statistically verify the cause and effect among constructs and the following is a review summary of the resulting hypothesis.

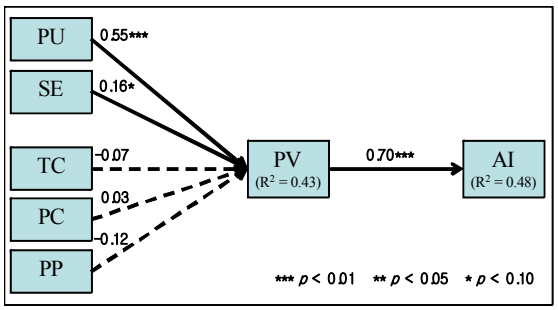

Figure 2. Summary of Hypotheses Tests

Analysis results show that Perceived Value (PV, $\beta = 0.70$, $p < 0.01$) has a meaningful impact on Adoption Intention($R^2 = 0.48$).

Also Perceived Usefulness ($\beta = 0.55$, $p < 0.01$) and Self-Expression ($\beta = 0.16$, $p < 0.10$) among 6 independent variables meaningfully

influences Perceived Value ($R^2 = 0.43$).

Checking the Variance Inflation Factor (VIF) was required to verify Multicollearity among constructs, and its value was somewhere between 1.05 and 1.53, much lower than a generally accepted standard of 10, proving there is no multicollearity issue.

Meanwhile, according to the methodology of Baron & Kenny (1986) [5], the mediating effect of Perceived Value was reviewed to see which mediating effect is working between independent and dependent variables, or in other words, whether it is a partial or perfect mediating effect. However, the analysis scope was only limited to Perceived Usefulness and Self-Expression which have statistically significant effect-and-cause relationship with Perceived Value.

The following table displays the test result of mediating effects.

Table 3. Testing the mediating effect of Perceived Value

Step	DV	IV		R^2
		Variable	Beta	
1.1	PV	PU	0.648***	0.415
1.2	AI	PU	0.702***	0.488
1.3	AI	PU	0.429***	0.588
		PV	0.420***	
2.1	PV	SE	0.450***	0.196
2.2	AI	SE	0.366***	0.113
2.3	AI	SE	0.028	0.480
		PV	0.686***	

*** $p < 0.01$ ** $p < 0.05$ * $p < 0.1$

The test result proves that Perceived Usefulness has a partial mediating effect between its perceived value and adoption intention while confirming a perfect mediating effect between Self-Expression and Adoption Intention.

5. Discussion and Conclusion

5.1. Discussion and Conclusion

As we confirmed above, when users feel that the VTS service is useful (Perceived Usefulness) and that they can better express themselves (Self-Expression), they will appreciate the VTS value proposition.

However, as the analysis demonstrates, the construct of Perceived Usefulness is combined with the construct of Enjoyment.

The reason behind this can be explored from different perspectives. Among them, the most compelling logic is that the process of experiencing Usefulness itself can also be a sense of Enjoyment to users.

In short, the mobile phone is a personalized device and people enjoy its contents including VTS, to satisfy personal needs, thereby a user judgment that the service is useful itself cannot be separated from the personal joy of using the device.

Of course, such a finding might result from an imperfect construct and measurement design, but the measurement system used was not entirely new, it was built with borrowed concepts proved via several tests and studies on measurement validity and reliability. Therefore, it is unlikely that the design of the measurement system caused the coupling of user Perceived Usefulness and Enjoyment.

The hypotheses on Technical Complexity, Privacy Concern, and Perceived Price that were supposed to be discussed in Cost were not developed. The reason why they do not have any meaningful influence on Value appreciation will be covered later, but before its discussion, it is worth noting the demographical characteristics of participants in this research.

As mentioned above, by age distribution, the proportion of respondents in their 20s and 30s accounts for 84% of the total, while students and professionals represent 31% and 17%, respectively by job distribution.

By considering that point, we can see why Technical Complexity does not have any significant impact. According to the age distribution, most respondents are in the age range where a flexible and active response to new changes is expected.

Particularly, respondents in their 20s to early 30s have been directly and indirectly influenced by IT innovation from their childhood, so VTS's functional complexity and sophisticated features are not necessarily a material challenge to them.

Meanwhile, they pursue lifestyle following consumption, more than any generation, and make more phone calls than the average. So the current VTS fee is less likely to undermine their appreciation of service value.

The fact that Self-Expression has a meaningful impact on VTS value appreciation can be a good starting point in discussing Quality Uncertainty and Privacy Concern issues.

Amongst users who significantly value the fact that they can express themselves via VTS, the privacy concern is less likely to serve as a big variable.

This studies results imply that telecommunication service providers should leverage the aspects of Usefulness (and Enjoyment) and Self-Expression in order to promote VTS to their customers in the 20s and 30s age range.

At the same time, the widely employed

marketing methods such as 'Easy Use' and 'Low Price' are unlikely to be effective in positioning VTS or in promoting its consumption, at least in the VTS target market of consumers in their 20s to 30s.

5.2. Limitations and Future Research

This study has several limitations as follows.

First, the majority of survey respondents were in their 20s and early 30s, thereby it is somewhat unreasonable to generalize the results obtained. Particularly, 4 constructs (e.g., Technical Complexity and Sacrifice) were shown not to have any significant impact on Perceived Value, largely attributable to the concentrated demographic distribution as above. Therefore, any future study should include respondents in their late thirties and above in order to allow a wider generalization of the result. Alternatively it might be useful to survey diverse age layers, across demographic boundaries, to compare the result by age distribution thereby enabling conclusions to be drawn in this key aspect.

Second, Perceived Usefulness and Enjoyment were coupled as one construct in the process of cause analysis, but the root cause of this is not fully explained. Any future study needs to confirm that the relationship between Perceived Usefulness and Enjoyment is truly equal, as inferred in the Discussion part.

Appendix

Appendix A. Operationalization of Constructs and Measure Items

Construct	Operational definition	Measure item	Reference
Perceived Value	Consumer's overall assessment of the utility of a product/service based on perceptions of what is received and what is given	Evaluation whether it is worth paying the cost for VTS use	[50]
		Recognition the need for investing time and effort for more comfortable VTS usage	
		Appreciation of comprehensive VTS value	
Adoption Intention	VTS usage intention	Plan or determination to use VTS at present or in the future	[9]
Perceived Usefulness	Perception of the usefulness of VTS functions	The sense of usefulness that VTS contributes to business tasks	[9]
		Confidence that VTS improves working performance	
		Confidence that VTS saves time and effort supposed to be invested in works	
Enjoyment	The sense of joy following VTS use	Appreciation of convenience following VTS usage	[52] [59]
		The sense of joy VTS would bring	
Self-Expression	Conviction that VTS utilization expresses their own social status and personality to others	Feeling that VTS usage makes themselves early adopters, moving ahead of others.	[42] [52]
		Confidence that using VTS displays their own personality	
Technical Complexity	The level of difficulty in utilizing VTS terminal and specific features	The level of difficulty in using VTS functions	[9] [11]
Perceived Price	User's psychological perception on VTS fee	Perception that VTS fee is expensive	[61]
		Perception that VTS fee is reasonable	
Privacy Concern	Privacy concern following VTS usage	Concern of both a caller and receiver about privacy exposure	[38]

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