

学位論文

Doctoral Dissertation

Essays for Innovative Converged Services'

Adoption and Diffusion

(イノベーティブ融合サービスの導入と普及に関する研究)

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Contents

Chapter 1 Introduction.....	1
1.1 Background and purpose	1
1.2 Methodology and composition	8
Chapter 2 Research rationale	16
2.1 Theoretical background	16
2.1.1 Diffusion of innovations theory: classical approach.....	16
2.1.1.1 Technology acceptance model.....	22
2.1.1.2 Task technology fit model	24
2.1.1.3 Theory of perceived risk.....	26
2.1.1.4 Concept of mobile service and related literatures.....	29
2.1.2 Innovation adoption-diffusion model and innovation use-diffusion model.....	32
2.1.3 Hofstede model of national culture	38
2.2 Digital convergence and IPTV service	44
2.2.1 Digital convergence.....	44
2.2.2 IPTV service.....	50

Chapter 3 Innovative converged service and its adoption, use and diffusion: a holistic approach to diffusion of innovations, combining adoption diffusion and use-diffusion paradigms..... 55

3.1 Empirical research design58

 3.1.1 Research model58

 3.1.2 Research hypotheses.....61

 3.1.2.1 Hypotheses on the adoption-diffusion of IPTV services61

 3.1.2.2 Hypotheses on the use-diffusion of IPTV services.....66

 3.1.3 Measurement70

 3.1.4 Gathering and sampling of data.....75

3.2 Results78

 3.2.1 Result of adoption-diffusion model79

 3.2.2. Result of use-diffusion model81

3.3 Recapitulation85

3.4 Implications88

Chapter 4 Comparative analysis of innovative diffusion in the high-tech markets of Japan and South Korea..... 92

4.1 Comparison of adoption-diffusion and use-diffusion frameworks95

4.2 Hypothesis development	99
4.2.1 Common constructs between adoption and use-diffusion models	100
4.2.2 Unique Constructs of use-diffusion	102
4.2.3 Supportable constructs of use-diffusion	104
4.3 Research model and methodology	106
4.3.1 Research model	106
4.3.2 The Population, sample, and instrumentation.....	108
4.3.3 Measuring instruments	113
4.4 Analysis and results	118
4.4.1 Analytical instruments	118
4.4.2 Reliability and validity tests	118
4.4.3 Hypotheses testing.....	122
4.4.4 Comparison between Japan and Korea.....	130
4.5 Discussion	131
4.6 Summary and implications	134

Chapter 5 People stick to current IT convergence service? cultural comparative view of service provider and service user 139

5.1 Research model	142
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5.1.1 Research model development	142
5.1.2 Hypotheses development	144
5.2 Research methodology	151
5.2.1 Survey development and measures.....	151
5.2.2 Sample and data gathering.....	156
5.3 Analysis and results	159
5.3.1 Analytical instruments, reliability and validity tests.....	159
5.3.2 Hypotheses testing.....	164
5.3.3 Cultural comparative analysis between Japan and Korea.....	168
5.4 Summary and implications	172
Chapter 6 Conclusion	176
6.1 Summary	176
6.2 Implications	179
6.3 Limitations and future study	182
References	185

List of Table

Table 1 Comparison of major digital converged services	4
Table 2 Main content of the dissertation (research theme, theoretical background, subject, and characteristic of study).....	15
Table 3 Adoption-diffusion model vs. use-diffusion model.....	37
Table 4 Digital convergence between broadcasting and telecommunications	46
Table 5 Standards and types of digital convergence services by each country	48
Table 6 Consumer-perceived performance characteristics of IPTV	53
Table 7 Surveyed household locations	76
Table 8 Respondent characteristics	77
Table 9 Results of structural analysis of adoption-diffusion model on IPTV	79
Table 10 Results of structural analysis of the use-diffusion model on IPTV	83
Table 11 Summary of results	86
Table 12 Comparison of adoption-diffusion and use-diffusion frameworks	96
Table 13 Sample profile	111
Table 14 Research measurement	114

Table 15 Reliability and convergent validity analysis.....	119
Table 16 Discriminant validity analysis.....	121
Table 17 Results of hypothesis testing	123
Table 18 Summary of hypotheses testing	127
Table 19 Results of comparison between Japan and Korea	129
Table 20 Survey measures.....	154
Table 21 Profile of sample projects (Japanese vs. Korean).....	157
Table 22 Results of reliability and validity (Japanese Data).....	162
Table 23 Results of reliability and validity (Korean Data)	163
Table 24 Results of hypotheses testing (Japanese vs. Korean)	166
Table 25 Results of Hofstede's five cultural differences (Japanese vs. Korean)	168

List of Figure

Figure 1 Research development of the dissertation	7
Figure 2 Composition of the dissertation	14
Figure 3 Innovation decision process	19
Figure 4 Technology acceptance model	22
Figure 5 Factors influencing perceived risk	29
Figure 6 Research model.....	60
Figure 7 Research model.....	107
Figure 8 Research model.....	144
Figure 9 Results of hypotheses testing for Japanese and Korean in IPTV service	167

論文の内容の要旨

Essays for Innovative Converged Services' Adoption and Diffusion

(イノベティブ融合サービスの導入と普及に関する研究)

宋泳和

近年のIT技術をベースにした新技術の発展速度の急速な向上に伴い、多様な形態での技術革新が活発化している。21世紀の代表的な技術革新として、デジタル融合革新を挙げることができる。代表的なデジタル融合革新の一つのタイプと言える放送通信融合サービスは、今日では一般の人々にもよく知られており、すでに直接的な消費者市場への参入が成立している技術革新分野である。このようなデジタル融合現象の中で、技術革新をベースに提供されるサービスのユーザー選択に対する概念が新たに確立されている。ユーザーは、単に一つの独立した機能と端末機に依存してニューメディアを選択するというよりも、互いに異なるそれぞれの機能を比較し、その機能間の関連性の中で、融合されたサービスを選択する“賢い消費者”になった。

ところが、このような放送通信融合サービスは、概念的には同じように

呼ばれているが、技術革新、市場の主導的勢力、そしてユーザーの属性別の受容と革新、さらには拡散の形態が異なる形で現われている。その一方、産業の側面でも、デジタル融合革新の拡散が急速に進み、これらを基盤とする技術とサービスを対象に、導入および革新拡散に関する多くの研究がこれまでに実施されてきた。このような研究は、ほとんどがRogers (1995)の革新拡散理論とTAM(Technology acceptance model、Davis、1989)およびTPB(Theory of Planned Behavior、Akzen、1991など)をはじめとする革新受容者のモデルなど、新技術受容理論を根幹としている。しかし、これらの研究の限界についての意見も絶えず提示されてきたが、これらの研究は、研究の対象が違うだけで、同じような変数と脈絡で研究が繰り返された傾向がある。また、最近では、数々の新技術/サービスが出現しているにもかかわらず、関連研究では新しい理論的発見や可視的な研究モデルが現われておらず、根本的な限界点を克服できない傾向を見せているというのが、その主な理由である。

したがって、本研究では、デジタル融合サービスの導入と革新拡散において、体系的かつ統合的な研究を行った。

そのため、本研究では、受容と革新拡散に関連する既存の多様な研究を体系的に学び、解析して、それぞれの長所は受容し、限界点は理論的論拠に基づいて克服するよう努め、これらの過程を通じて新しい研究モデルを提示した。

既存の研究に対する学習と解析の過程は、いわゆる関連研究の古典とされるTAMの研究から出発し、これを根拠にさらに発展したETAM(Extended

Technology Acceptance Model)の研究だけではなく、消費者観点の受容-拡散研究、そして最近の革新拡散研究において代案として提示されている消費者観点の使用-拡散研究に至るまで、デジタル融合サービスの受容と革新拡散の関係を究明しようとする多次元的な試みを本研究に盛り込んだ。

例えば、本研究では、デジタル融合サービスの採択と革新拡散において、新しい試み、すなわち使用-拡散の研究を、受容-拡散と共に考慮し、研究の主な軸として選択してより深い研究を行った。Shih & Venkatesh (2004)は、TAMなど消費者の受容に焦点を当てている導入と革新拡散の研究に対して、受容-拡散モデルと定義し、このモデルの限界点を克服するための代案的採択と革新拡散の研究モデルとして、使用に焦点を当てた使用-拡散モデルを提示した。これらは、現在ユーザーが使用している製品やサービスの使用量と使用の多様性が、新製品やサービスの導入と普及をもたらすと考えた。これらの主張は、伝統的な受容-拡散モデルで強調している革新受容者集団よりも、ユーザー集団に焦点を置いている。本研究では、放送通信融合サービスの代表的なタイプの一つであるIPTVを中心に、既存の個人単位の研究よりも、世帯単位での導入と革新拡散に関して、使用-拡散モデルを受容-拡散モデルと共に考慮した研究を行った。また、単一製品を中心に、アプローチする該当分野の新技术の拡散形態や採択要因を扱うよりも、融合技術の属性によってどのように変わるかを究明した。言い換えると、IPTVなどのデジタル融合革新サービスの属性上、その消費者が家族世帯の研究にも関わらず、資料収集上の問題などの理由で、国の内外を問わず、個人レベルで扱われて来た限界を克服し、融合技

術の属性にしたがって受容と革新拡散において、影響要因と構造的関係を使用-拡散モデルと受容-拡散モデルを共に考慮した研究を実施した。また、本研究では、特に日本と韓国という国家間の比較を本研究で試みることで、研究の結果が提示する理論的、実務的、技術的な側面だけではなく、国家的側面から付与する意味も導き出した。また、本研究は、デジタル融合サービスの受容と革新拡散を新たな観点からアプローチする統合的な観点、すなわちサービス供給者とサービス利用者の観点から、デジタル融合サービスの受容と革新拡散をアプローチする新しい研究モデルを代案として提示した。

したがって、本研究は、デジタル融合サービスを重点研究対象として受容と革新拡散に関する研究を進めるにあたり、既存の研究に対するより深い考察と共に、実証研究を併行して進めることで、それぞれの理論が持つ長所と限界点を体系的に証明し、これを基盤に新しい代案を提示する全周期的観点で研究を進めることで、アカデミックな側面だけではなく、実務的側面からも非常に意味のある結果を導き出そうとした。特に本研究では、代表的なデジタル融合サービスであるIPTVを対象に、日本と韓国という国家間/文化的比較を本研究で試みることで、本研究の結果が提示する汎用性、つまり理論的、実務的、技術的、国際的、文化的側面での一般化も追求しようと努力した。

結論として、本研究は、最近話題になっているデジタル融合サービスを消費者が受け入れ、時間の経過と共に徐々に拡散する過程を、対象となるサービス/技術の視点、主体である消費者の視点、そして現象学的な連続/

非連続革新の視点、さらに新たな発展的代案であるサービス供給者とサービスユーザーの統合的観点において、学問的/実務的側面から全周期的に研究を行い、さらには人文学的観点から国家間/文化的な比較も試みたデジタル融合サービスの受容と革新拡散の研究において、体系的かつ総体的な研究に該当すると言することができる。また、本研究は、重点的な研究対象がデジタル融合サービスであるだけに、研究の方法論においても技術-消費者-国際/文化の学際的観点から研究を進め、その意味を一般化および汎用化しようと努力した。

Chapter 1 Introduction

1.1 Background and purpose

With the new technologies rapidly developing due to IT, diverse technical innovations are emerging, especially as the forms of services. Digital innovative service can be cited as a characteristically 21st century technical innovation. Representative digital convergence innovative services that have been developed through IT, include smartphones, IPTV (Internet Protocol Television), DMB (Digital Multimedia Broadcasting), HSDPA (High Speed Downlink Packet Access), WiMAX (World Interoperability for Microwave Access), and 4th generation mobile communications LTE (Long Term Evolution)-Advanced.

Broadcasting and telecommunications convergence services, which are new services in representative innovative digital convergence, are well known to the general public nowadays, and are already entering the consumer markets. Meanwhile, diverse existing media and telecommunications technologies are increasingly being combined with each other and thus the past individually independent technologies, such as telephony, data networks, broadcasting, and

computer technologies, are now converging on a new integrated point through broadband networks (Baldwin et al., 1996). Amidst this digital convergence, media users are establishing new concepts of choosing convergence innovative technology-based services, such as new media. Users, instead of choosing new media that simply depends on one independent function and a terminal, have now become wise consumers that compare different functions, and choose terminals and services that provide convergence services that connect these types of functions.

However, although such broadcasting and telecommunications convergence services as one of digital convergence services are conceptually named identically, the acceptance, innovation, and diffusion of converged services vary according to technical innovation, market leaders, or user attributes. For example, even in the same broadcasting convergence service category, the IPTV (Internet Protocol Television) service market is generally controlled by telecommunications service providers that provide broadband internet services. On the other hand, for the DMB (Digital Multimedia Broadcasting) service market, mobile service providers control the satellite DMB service, while the terrestrial DMB service is controlled by broadcasting service providers. Additionally, from the perspective of user attributes, the satellite/terrestrial DMB services treat individuals as the main consumers, while the IPTV service targets households as the main consumers. Thus, for the

acceptance of broadcasting and telecommunications convergence services, individual and household attitudes or behaviors may have different characteristics.

Meanwhile, as the innovation and diffusion of innovative digital convergence services are rapidly being unfolded in the industries, many studies on the adoption, innovation, and diffusion of these services have been conducted. These studies are primarily based on new theories for technology acceptance such as Rogers' innovation theory on diffusion (1995), TAM (technology acceptance model, Davis, 1989), TPB (the theory of planned behavior, Akzen, 1991), and other innovation adoption models. However, critical opinions on these studies have been presented. This is because these studies have been repeated in the context of similar variables only with a change in research targets, and despite research efforts on the innovation and diffusion of the recent myriad of new services and products, no new theoretical findings or research models have been produced, thus failing to overcome fundamental limitations of the these studies.

Table 1 Comparison of major digital converged services

	WiMAX	W-CDMA (HSDPA)	Satellite DMB	Terrestrial DMB	IPTV
Type of service	Internet access under a mobile environment	Wireless internet access	Mobile reception of broadcast content (TV, video, audio, etc.)	Mobile reception of broadcast content (TV, video, audio, etc.)	Internet access under a fixed environment (mobile environment possible)
Service coverage	Indoors & outdoors, and hot zones	Nationwide	Nationwide	Geographic coverage, initially limited; to be progressively extended	Nationwide
Customer	Individual	Individual	Individual	Individual	Household
Transmission speed	High speed (1-2Mbps)	Moderately high speed (384-512kbps)	High speed (1.7Mbps)	High speed (1.1Mbps)	Broadband (average 50Mbps)
Mobility	High	Extremely high	High	High	Medium (will be changed in the mobile IPTV environment)
Price	Medium to low-rate flat fee pricing or partial flat fee pricing	High-rate usage pricing	Low-rate flat fee pricing	Free	Low-rate flat fee pricing (content using pricing)
Content type	Wireless internet content	Wireless internet content	Multimedia service	Multimedia service	The highest amount of bundled services
Reception devices	Tablet PC, smartphone	Tablet PC, smartphone	Tablet PC, smartphone	Tablet PC, smartphone	TV set, (Tablet PC, Smartphone)

Therefore, the purpose of this is to elaborate a comprehensive research model of innovative converged services' adoption and diffusion. To do this, the researcher in this paper conducted an academic and practical exploration of the acceptance of digital convergence services and the diffusion of innovations. This was done from a theoretically holistic perspective by combining Adoption-Diffusion and Use-Diffusion paradigms, from the consumers' perspective by applying Use-Diffusion paradigm for Japanese and Korean, as well as from the integrated perspective of service providers and service users, a new developmental alternative. Additionally, it attempted to make national and cultural comparisons between Japan and Korea from the perspective of the humanities.

Hence, the purpose of this study included the following four goals: first, this study comprehensively and theoretically examined the existing studies related to the acceptance and diffusion of innovation, and established the logics concerning the acceptance of digital convergence services and the diffusion of innovations.

Second, this study thoroughly compared and analyzed diverse theoretical models, namely, the developed models such as the ETAM (Extended Technology Acceptance Model), the Adoption-Diffusion Model, the Use-Diffusion Model, and the Chasm Model, and thus defined the influencing factors and structural relations in the acceptance of digital convergence service and the diffusion of innovations.

Third, by applying IPTV, which is the representative digital convergence service, this study examined the acceptance and the diffusion of innovations from the service/technological perspective, from the continuous/discontinuous perspective, and from the perspective of a new integrated research model, thus offering academic and practical implications from the total-periodic and evolutionary perspectives.

Fourth, this study examined the process of acceptance and the diffusion of innovations by making national and cultural comparisons from the perspective of the humanities in an effort to conduct research from a multidisciplinary perspective involving technology, consumer, and international/cultural aspects and to generalize and universalize the results.

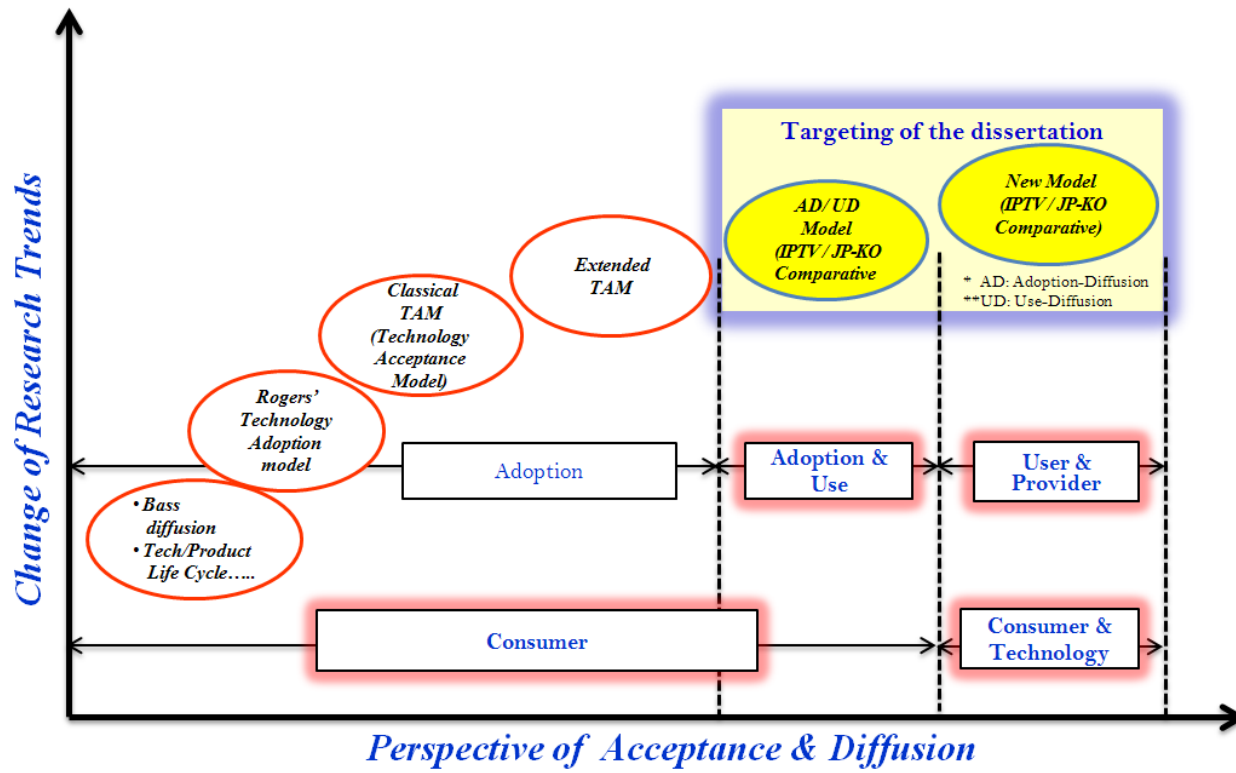


Figure 1 Research development of the dissertation

1.2 Methodology and composition

This study conducted systematic and holistic research on the acceptance of digital convergence and on the diffusion of innovations.

Towards this end, this study systematically learned about and analyzed the diverse existing studies on the acceptance and the diffusion of innovations, thus accepting their diverse advantages and logically overcoming their limitations, and accordingly sought to offer a new research model.

In this study, the process of learning about and analyzing the existing studies involves not only the so-called classic TAM (technology Acceptance model) research, the subsequent further-developed ETAM (Extended Technology Acceptance Model) research, and the consumer-perspective Adoption-Diffusion Model research, but also the consumer-perspective Use-Diffusion Model research has been recently recognized as an alternative to on the diffusion of innovations' studies.

As such, this study had made multi-dimensional attempts to define the relationship between the acceptance of digital convergence service and the diffusion of innovations. For example, this study conducted an in-depth examination of a new attempt in the acceptance of digital convergence service and

the diffusion of innovations, namely, the use-diffusion model together with the adoption-diffusion model. For studies such as TAM that look at the acceptance and diffusion of innovations with a focus on consumers' adoption of digital convergence service, Shih and Venkatesh (2004) defined this study as the adoption-diffusion model. To overcome the limitations of this model, Shih and Venkatesh (2004) also offered the use-diffusion model, which focuses on use, as an alternative research model on the acceptance and diffusion of innovative convergence services. They saw that the volume and diversity of the products and services that users are currently using can bring about the acceptance and diffusion of new products or services. Their argument focused on the users' groups rather than on adopters' groups, which are emphasized in the conventional acceptance-diffusion model. By focusing on IPTV, which is a representative type of broadcasting and telecommunications convergence service, this study examined the use-diffusion model together with the adoption-diffusion model with regard to the acceptance and diffusion of innovations at the level of households, rather than at the individual level. This study also defines how the adoption and diffusion of related new technologies will differ according to the attributes of convergence technologies, rather than according to the attributes of products. In other words, innovative digital convergence services, such as IPTV, have been dealt with at

home and abroad at the level of individuals due to the limitations of gathering data, even though the consumer unit is a household given the attribute of the innovative service. Therefore, to overcome such limitations, this study defines the influencing factors and structural relations in the acceptance of digital convergence service and the diffusion of innovations according to the attributes of convergence technology. It does so by considering both the use-diffusion model and the acceptance-diffusion model. In addition, by comparing Japan and Korea, this study not only presents the theoretical, practical, and technical aspects of research results, but also derives aspects of nation-related significance.

Furthermore, this study offers as a new research model the acceptance of digital convergence service and the diffusion of innovations from the new, integrated perspective of the service providers (technology) and the service users (consumers) with a cultural comparative analysis by Greet Hofstede, who is a cultural and human psychologist and conducted his research on the interaction of national and organizational cultures.

Thus, in mainly targeting the digital convergence service and examining the acceptance and diffusion of innovations, this study deeply explored the existing studies on adoption and diffusion of services and simultaneously explored the subject empirically, thereby systematically proving the strengths and limitations of

the related theories. Based on these results, this study explored the subject from the total periodic and evolutionary perspective with the aim of offering a new alternative, thus deriving considerably significant results not only from the academic perspective but also from practical perspectives. In particular, by focusing on IPTV, which is the representative digital convergence service, this study offered a national and cultural comparison between Japan and Korea and did so in a bid to generalize the results of the research in terms of the universality of theoretical, practical, international, and cultural perspectives.

In conclusion, with regard to the recently much talked-about digital convergence service, this study conducted a holistic academic and practical exploration of the process of user acceptance and gradual diffusion over time, from the target service and technological perspective, from the consumers' perspective, and from the integrated perspective of service providers and service users, which is a new developmental alternative. Additionally, this study is a systematic and holistic attempt to examine the acceptance of digital convergence service and the diffusion of innovations by making a national and cultural comparison from the perspective of the humanities by applying a cultural comparative analysis of Greet Hofstede. Given that the digital convergence service is the target of research on international/cultural aspects, the research methodology of this study was also

conducted from the multi-discipline perspective and involved technology, consumer, and international/cultural aspects. It also attempted to generalize and universalize the results.

This study consists of six chapters, each of which is outlined as listed below.

Chapter 1 gives the introduction and describes the research background, purpose, methodology, and composition system.

Chapter 2 gives the research rationale and examines the theoretical background based on the examination of existing research literature of adoption and diffusion of services. This chapter also discusses digital convergence and IPTV services.

Chapter 3, Chapter 4, and Chapter 5 are the main discussion of this research. These three chapters consist of one particular study per chapter. In particular, on this research I conducted an academic and practical exploration of the acceptance of digital convergence service and the diffusion of innovations from a theoretically holistic perspective by combining Adoption Diffusion and Use-Diffusion paradigms in Chapter 3; from the consumers' perspective, by applying the Use-Diffusion paradigm for Japanese and Korean in Chapter 4; as well as from the integrated perspective of service providers and service users, a new developmental alternative. in Chapter 5. Additionally, on this research I attempted to make national and cultural comparisons between Japan and Korea from the perspective

of the humanities in Chapter 4 and Chapter 5. Lastly, in Chapter 6, which is the conclusion of this study, offers a summary and the implications of this study.

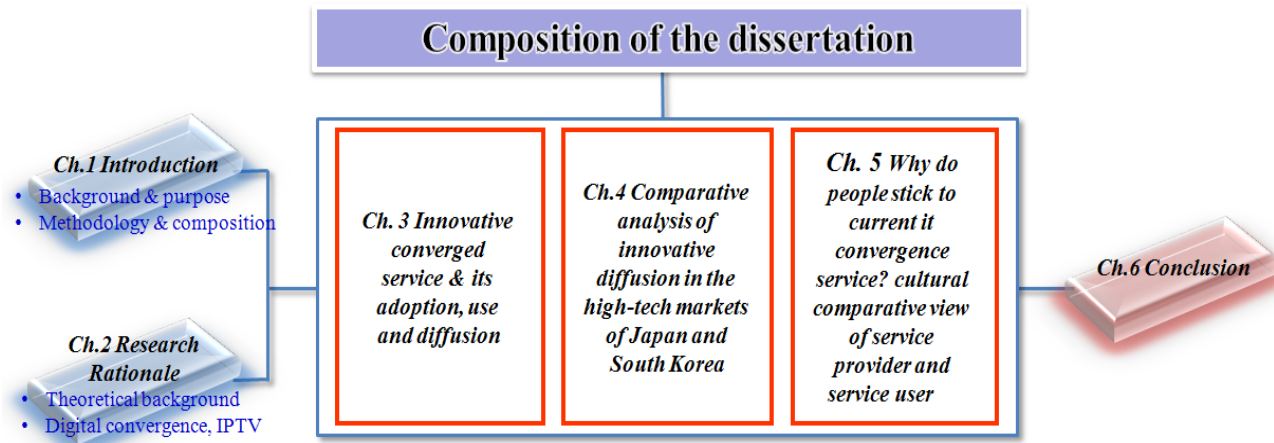


Figure 2 Composition of the dissertation

Table 2 Main content of the dissertation (research theme, theoretical background, subject, and characteristic of study)

	Research Theme	Theoretical Background	Subject	Objective Service	Target country	Characteristic of Study
Ch. 3	Holistic Approach to Diffusion of Innovations combining AD and UD Paradigms	Adoption-diffusion & use-diffusion of technology	User focused	IPTV	Korea	Empirical research
Ch. 4	Innovative diffusion in the high-tech markets of Japan and Korea	Use-diffusion of technology	User focused		Japan & Korea	
Ch. 5	New theoretical approach	New approach	Technology & user Focused		Japan & Korea	Theoretical research

Chapter 2 Research rationale

2.1 Theoretical background

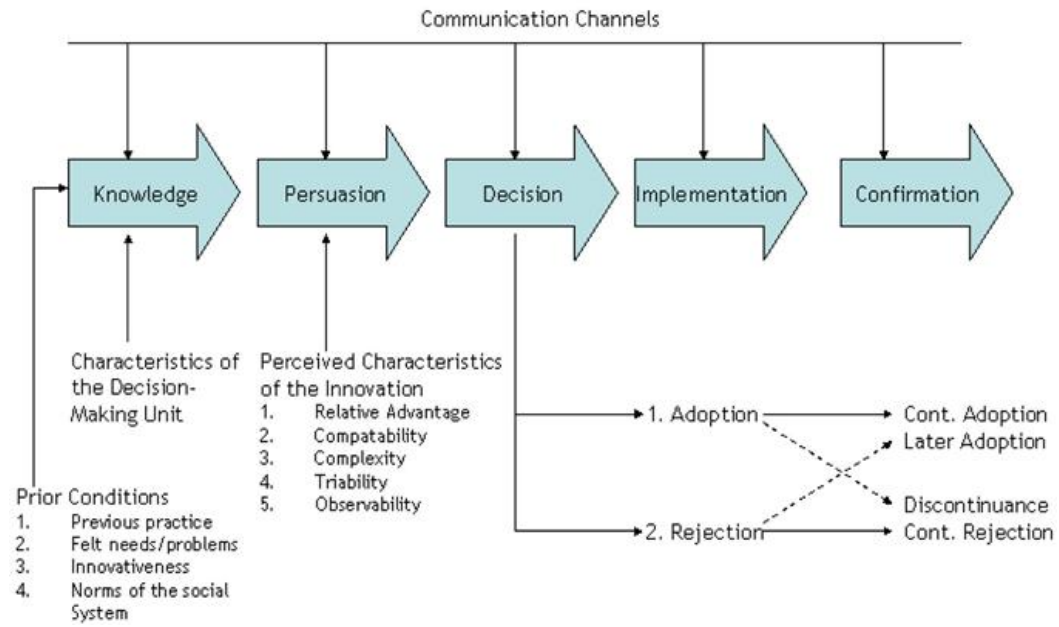
2.1.1 Diffusion of innovations theory: classical approach

Rogers (1995) distinguishes five stages in the process by which an individual comes to adopt an innovation: knowledge, persuasion, decision, implementation, and confirmation (See **Source:** Rogers (1995)

Figure 3). The stage of knowledge corresponds to the initial phase in which an individual is first exposed to an innovation and develops an understanding about how this innovation works. The process by which an individual develops knowledge related to an innovation is largely influenced by his/her personal taste, needs and desires, and past experiences, as well as the values and norms of the social systems (Weiber, 1992, 1994). The knowledge developed during this stage serves the potential adopter of the innovation as the basis to form his/her opinion about the innovation in question. In other words, during the stage of persuasion, the potential adopter forms either a favorable or unfavorable attitude toward the innovation, based on the knowledge he/she has gained

from the initial knowledge stage. While the individual's mental activity during the knowledge stage is mostly cognitive in nature, during the persuasion stage, it is predominantly affective. As a general rule, the easier it is to observe the results of an innovation and to communicate them to others, the higher the probability that the potential adopter will actually choose this innovation (Rogers, 1995). This decision whether to adopt or reject the innovation is made during the third stage, and the attitude developed during the persuasion stage provides the basis for decision-making. According to Rogers (1995), most individuals are willing to try out an innovation before forming an opinion. The intention to adopt an innovation is usually dependent on whether or not the potential adopter sees relative benefits or advantages associated with the adoption of the innovation. It is during the fourth stage, in other words, the stage of implementation that the final decision is made on whether to adopt or reject the innovation. The implementation, therefore, occurs when an individual reaches the final decision to use the innovation. During the implementation stage, most individuals keep searching information about the innovation, as some degree of uncertainty on the potential consequences of using this innovation still lingers. Finally, during the stage of confirmation, an individual, based on the level of satisfaction he/she experiences with regard to the results of using the innovation, considers whether or not to continue to use the innovation. A satisfied innovation adopter would typically choose the same product at

the next purchase occasion (Borchert, et al., 2004).



Source: Rogers (1995)

Figure 3 Innovation decision process

The first three of the five stages in the innovation decision process are each related to ‘belief,’ ‘attitude’ and ‘intention’ in the technology acceptance model (TAM), and provide the basis for combining the diffusion of innovations theory with TAM. Benbasat and Dexter (1992) developed a method for measuring constructs believed to influence the adoption and acceptance of innovations, based on the diffusion of innovations theory and related literature. Using this method, he measured the extent to which these factors actually influence individuals’ use of information technology. Meanwhile, ‘perceived risk’, a concept proposed by Rogers in the context of potential innovation adopters’ assessment of the relative quality of a product, has been reported to be one of the important reasons why customers are reticent about e-commerce (Schmalen, 1996). Borchert, et al., (2004) elaborated a new model to measure the effects of various factors deemed to influence buyer behavior on the frequency and value of purchase, drawing on the diffusion of innovations theory and marketing literature on related topics. His analysis found that four factors, including internet usage, search capacity, confidence in the seller and confidence in the security of transactions over the internet had a positive influence on the frequency and value of purchase. Regarding mobile services specifically, consumers’ knowledge and experience of the internet are believed to influence their perceived ease of use (Hoffman, et al., 1995). Prior

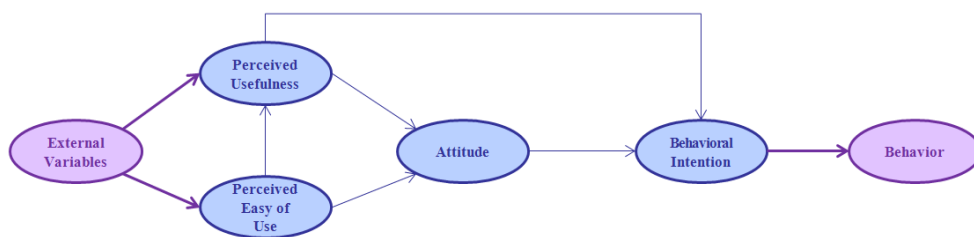
experience proves to be crucial in the acceptance of innovations, insofar as an innovation which appears too new or unfamiliar or whose use requires extensive changes in consumers' past habits tends to increase the barrier to acceptance. The level of acceptance is generally lower with innovations based on an entirely new body of knowledge, in other words, innovations with which consumers have little prior experience. This is also the reason why with innovative products or services new to the market, those consumers who are able to understand their innovative characteristics and assess them appropriately, tend to accept them earlier than others (Gerpott, 1999). In addition to consumers' knowledge of computer and the internet, the perceived ease of use with regard to a mobile service is often influenced also by the familiarity of the software and ease of its installation (Doring, 2002). Perceived familiarity, therefore, is an essential requirement for the market success of a new technology or service (Hoffman, et al., 1995). In other words, the mode of network access should be familiar to mobile service consumers, the interface, easy and convenient to use and search functions more powerful (Harms, 2002).

In this study, to determine innovation acceptance characteristics of mobile service consumers, I begin by examining possible reasons why a consumer accepts or rejects a new information technology. This choice is based on the likelihood that

the benefits consumers expect from an innovation play a determining role in their acceptance of it (Reichwald, 1982). The knowledge of why consumers accept or reject a mobile service, furthermore, can assist service providers in designing marketing strategies which closely takes into consideration innovation acceptance characteristics of consumers. Needless to say, achieving rapid acceptance by consumers is vital for the market prospects of a new mobile commerce service (Kollman, 1998, 2004).

2.1.1.1 Technology acceptance model

The TAM (Technology Acceptance Model), developed by Davis, Bagozzi and Warshaw (1989) (see **Figure 4**), is a model widely used to explain and predict consumer behavior with regard to the acceptance of information technology.



Source: Davis, Bagozzi and Warshaw (1989)

Figure 4 Technology acceptance model

An extension of Fishbein and Ajzen's (1975) theory of reasoned action (TRA), the TAM explains how consumers come to accept and use a technology. In his original study, Davis (1989) sketched out basic relationships between cognitive and affective variables influencing the acceptance behavior of a technology consumer, using the conceptual tools provided by the theory of reasoned action. In the TAM, acceptance behavior is determined by two belief-related factors, 'perceived usefulness' and 'perceived ease of use,' and whether an information technology would be ultimately accepted by its potential consumers is predicted using the belief – attitude- intention – behavior sequence proposed in the theory of reasoned action. Perceived usefulness and perceived ease of use, as the two key belief factors shaping the attitude, intention and behavior of a technology consumer, are believed to lead to the acceptance of a new information technology (Lederer et al., 2000). Notwithstanding, in some cases, the influence of perceived ease of use on the acceptance of a technology can be negligible or difficult to prove, and this phenomenon is explained by the fact that the relative importance of influence factors for technology acceptance varies depending on the type and characteristics of the task for which a new technology is used (Neudorfer, 2004). Previous studies found that perceived ease of use had a greater influence on the acceptance behavior of technology consumers, than usage characteristics related to using or purchasing

high-quality information services or products, if and when a technology is employed for its originally-intended purposes, in other words, to use an information system (ex. searching educational materials, etc.) (Gefen, 2000). Accordingly, in this attempt to measure the impacts of various factors influencing the acceptance behavior of mobile service consumers, the primary focus is placed on the consumer perception of security and reliability.

2.1.1.2 Task technology fit model

The task technology fit model (TTFM) is a tool to assess the extent to which an information system supports the tasks carried out by potential consumers. This model, developed by Goodhue (1995), has been popularly employed in the context of research to gauge the satisfaction and attitude of consumers with regard to information systems. The task technology fit model is considered a pertinent tool for evaluating the quality of an information system and predicting how much an information system would be actually used by potential consumers. Although this model has been thus far used mostly as a secondary tool, at least within the context of acceptance research, given its effectiveness in evaluating service providers' capability to address consumers' needs at the level of information systems, it could very well be used as an alternative explanatory model for acceptance behavior.

This is because the acceptance of a technology is susceptible to general factors such as the fit between information systems, tasks, technologies and individual consumers (Goodhue, 1995). Dishaw and Strong (1998), in their investigation of the TTFM, stated that one of the model's postulates is that software will be used if, and only if, the functions provided by it support the tasks performed by the consumer. In other words, a consumer with the habit of rational thinking and prior experience using information systems is bound to choose a tool that enables him/her to successfully perform a task, delivering maximum effectiveness at a minimal cost. The influence variables in the TTFM, including technology, task and fit, are defined as follows (Amberg, et al., 2003):

First, technology is regarded in the TTFM as a tool supporting individual consumers' activities (Goodhue and Thompson, 1995). Technology, in other words, is a support service assisting both the computer system and the consumer with the performance of his/her primary tasks. The term 'technology,' as used in the TTFM, has a broad and rather general meaning. This is because technology not only designates concrete systems, but also refers to all influences that information systems may have on potential consumers and their activities. Second, tasks are understood as all activities through which an input is converted into an output. One thing to be noted in regards to tasks in the context of TTF is that with an interesting

task, the consumer relies more extensively on information technology. Individuals are agents who use technologies that can assist them with the performance of their respective tasks, and individual characteristics (amount of training and experience with using computer and motivation, etc.) influence how easily a consumer learns to use a new technology. Third, 'fit,' the pivotal concept in the TTFM, is a variable closely related to the consumer's experience of satisfaction.

To enable quantitative measurement, Goodhue and Thompson distinguished twelve dimensions of task-technology fit: accessibility, assistance, ease of use, system reliability, data accuracy, compatibility, currency, presentation, confusion, the level of detail, meaning and locatability. A higher level of task-technology fit increases the consumers' expectations on the results and allows him/her to perform a higher-level task as well (Goodhue and Thompson, 1995). In this study, we assume that the three influencing factors in the TTFM are at work also in the process of acceptance of mobile services, and will use this model to evaluate the fit between a mobile service and its potential consumers (Amberg, et al., 2003).

2.1.1.3 Theory of perceived risk

The concept of perceived risk was first proposed by Bauer (1960). Bauer stated that the consequences of a choice made by a consumer can be unpredictable and

some of these unforeseen consequences can be undesirable. Perceived risks refer to the potential risks of a purchase decision as perceived by consumers. Perceived risks, meanwhile, should be distinguished from objective or statistical risks, insofar as consumers only respond to subjectively-perceived risks, and such subjective risks perceived by a consumer may or may not prove real. Cox (1967) explained perceived risk by two factors: the perceived extent of loss that may be incurred from an unwanted outcome of a purchase decision and the perceived amount of security that the purchase would not lead to an unexpected outcome. These two concepts provide a basis for risk reduction strategies to decrease the possible loss and increase the level of security to avoid undesirable consequences (Neudorfer, 2004). As for Bettman (1973), he further elaborated the concept of perceived risk by distinguishing two types: inherent risk and handled risk. Inherent risk is the latent risk a product class holds for a consumer, in other words, the innate degree of conflict a product class can arouse in a consumer. Handled risk, on the other hand, represents the conflict potential which still exists when choosing a brand from a product class at the moment of the purchase decision, and may, therefore, be described as the 'perceived residual risk.' Using the distinction between these two components, Bettman measures the risk-reduction behavior of consumers (Neudorfer, 2004). Meanwhile, Cox (1967) states that the realization that the goals

of purchase may not be reached arouses anxiety in consumers, and the perception of risk stems from the consumer's uncertainty about his/her own goals of purchase, whether a product corresponds to the goals of purchase (if the goals are known), or whether he/she will be satisfied with the consequences of the purchase. In other words, perceived risks are negative consequences perceived by a consumer in relation to a purchase decision, when he or she is unsure about the goals of his/her own purchase, which product or model corresponds best to the goals of purchase or whether he/she will be satisfied with a product, after the product is bought. Cunningham (1967) classified perceived risks in a purchase decision into six types: financial loss, physical loss, psychological loss, time loss, social risk and performance risk. Perceived risk in a purchase decision is determined by negative purchase consequences and insecurity (see **Figure 5**). Insecurity is closely related to the possibility envisioned by a consumer that the goals of his/her purchase may not be achieved, and the consequences of a purchase include the consequences of a purchase decision. The theory of perceived risk, therefore, maintains that a behavioral pattern can be extrapolated from how a consumer handles the risk they perceive in a purchase decision. According to their attitude toward risk taking, in other words, their level of willingness to accept a risk, consumers can be classified into three groups: risk-friendly, risk-averse and risk-neutral consumers (Neudorfer,

2004). In order to measure perceived risk with a reasonable degree of accuracy, using constructs such as negative purchase consequences and insecurity, these constructs must be appropriately adjusted. For these constructs to be used in the analysis of consumer behavior in advanced and complicated technology products such as mobile services, these perceived risk factors need to be clearly defined (Weiber, 1994).

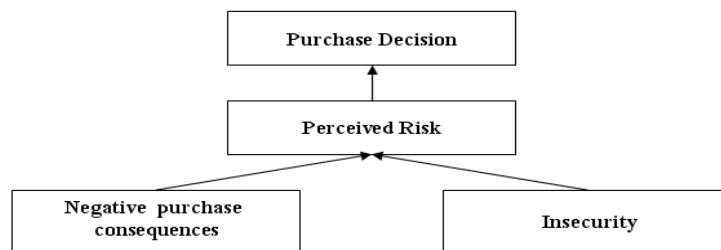


Figure 5 Factors influencing perceived risk

2.1.1.4 Concept of mobile service and related literatures

Mobile commerce services allow their consumers to exchange values and conduct business transactions over wireless networks using portable devices. It is a superior alternative to e-commerce, in that transactions can be conducted at any time and from anywhere (Villanen et al., 2004). Although similar to e-commerce insofar that it uses the internet, mobile commerce is distinct from e-commerce in

terms of enabling technologies and business models. As devices used for accessing the wireless internet are portable devices that are limited in data storage capacity and interface functionality, this medium emphasizes network-centered mobility and is evolving into a platform that is more personalized than the mobile internet with service providers taking up an active role in resolving the temporal and spatial constraints experienced by consumers (Turowski and Pousttch, 2004). On the consumer side, the mobile internet is also distinct from fixed internet access, as it does not offer extended hours of search and free access to information. The duration of connection is shorter with the mobile internet, and access to information and services is on a pay-for-use basis (Buse, 2002). Neudorfer (2004), in his investigation of factors that influence the acceptance of mobile services, found that the expected benefits had a positive influence on the probability of the adoption of mobile services. Meanwhile, his investigation found that perceived risk (service risk and cost risk) had no significant influence on consumers' acceptance of mobile services. Amberg et al. (2003) measured customers' satisfaction with mobile services, before and after the actual experience of the services, and found that usefulness, ease-of-use, cost, and mobility were factors that effectively influenced consumers' attitude toward a mobile service both during and after the use. The pleasure experienced using texting services and their perceived usefulness

and usability has been also reported to have an influence on the level of consumer satisfaction with mobile services (Doring, 2002). Lehner (2003), in his study on the characteristics of mobile content interfaces, content services, and mobile internet usage, found that convenience and efficiency were the two most important factors influencing the acceptance of mobile services. According to his results, at the level of content interface, structural simplicity and the ease of being able to effectively search for the acceptance behavior of mobile service consumers. Meanwhile, he measured different variables including accuracy, timeliness, personalization, specialization, locatability, and simplicity to characterize mobile service providers. Bullinger (2003) investigated mobile internet users' behavioral intention by using TAM and found that the quality of the system and information influenced perceived pleasure, ease of use, and usefulness. Meanwhile, Sawng et al. (2011) conducted research on the usage behavior for the 3-generation mobile service. The main purpose of this study was to investigate consumers' usage behavior in mobile services to provide pointers for the future development of this field. Specifically, this study empirically attempted to estimate the relationship among characteristics related to the acceptance of mobile services, factors that influence consumers' satisfaction, and on the perceived benefits and risks. Four constructs related to acceptance characteristics were selected as measured variables; namely, perceived

usefulness, perceived ease of use, perceived cost, and perceived network effects.

2.1.2 Innovation adoption-diffusion model and innovation use-diffusion model

Research investigating the market acceptance of innovations has long focused on consumers' choice behavior, namely, their resistance to innovation and how continuously they use innovative new products or services once they overcome their initial resistance and adopt them. The central postulate of the adoption-centered approach to the diffusion of innovations is that of the consumers' psychology and their choice behavior in-play in their decision-making purchases that have a determining influence on their final acceptance of a new product or service (Hyori Jeon *et al.* 2011). For this reason, the object of the inquiry in acceptance-centered studies is to determine what factors influence the choice of information on which individual consumers base their decision to adopt or reject an innovative product or service, and the extent of that influence.

Studies espousing the technology acceptance perspective, further, rest on the following four basic assumptions (Rogers 1983): First, the level of recognition of innovativeness, when an innovative product is released, varies among sellers as

well as the marketing scheme they use to distribute the product. Second, early adopters are individuals with definable characteristics and are distinct from late adopters. Third, there exist effective telecommunications channels allowing the interaction between innovation adopters of different categories (Park G-s 2004). Fourth, early adopters tend to be opinion leaders and have an influence on the adoption of innovative products or services by others belonging to their social group.

Studies adhering to an adoption-centered approach to diffusion also view the process of adoption as a decision-making process toward adopting or rejecting an innovation, and it consists of a series of psychological phases, including the initial awareness of a new product or service, development of an attitude toward it and the final stage of acceptance/rejection decision-making. The process of acceptance of innovations, insofar as it is the process through which a consumer decides to adopt or reject a new product or service, constitutes the centerpiece of the diffusion of innovations theory. One of the theoretical and methodological consequences of this focus on adoption in diffusion research has largely neglected information processing and behavioral determinants in favor of hierarchy of effects models.

The main limitation of the adoption-centered approach to diffusion, according to Shih and Venkatesh (2004), is the failure to concretely explain the process of

diffusion of an innovation as a whole, and in particular, why the speed of diffusion varies and how the personal characteristics of consumers influence this process. As an alternative to the adoption-centered approach, providing a more in-depth understanding of the process of diffusion of innovations, they proposed a new model baptized “use-diffusion model”.

One of the key assumptions underlying this model is that consumers’ adoption of a digital convergence product, at a time when the progress in information technology is rapidly shortening the lifecycle of technologies, can be explained to a great extent by their experience with products they are currently using. **Table 3** below provides a summary comparison of the use-diffusion model of Shih and Venkatesh (2004) and the adoption-diffusion model:

The first and foremost difference that sets the use-diffusion model apart from the adoption-diffusion model is the usage paradigm. In this model, the consumers’ usage pattern with products they currently use, measured in two dimensions, ‘rate of use’ and ‘variety of use’, is ascribed predictive capabilities for the diffusion of future technology products and services.

Secondly, in an adoption-diffusion model, the process of diffusion is viewed as a two-stage process, consisting of a phase of innovation and a phase of imitation, and this same two-stage conception of diffusion underlies other measures and

constructs used in this model, such as the S-shaped diffusion curve, penetration rate and adopter categories. In the use-diffusion model, on the other hand, the focus is on the continuous use of a technology, as well as the degree of technological convergence of a product or service, as perceived with the need for a technology and its influence, and users' adoption behavior vis-a-vis new technologies in general (Kim, Yi 2007).

Thirdly, in adoption-diffusion models, the market is segmented into five categories of innovation adopters, proposed by Rogers (1995), according to the timing of adoption; namely, innovators, early adopters, early majority, late majority and laggards. In the use-diffusion model, meanwhile, the market is segmented according to the type of users and use capabilities, into four user categories: intense users, specialized users, non-specialized users and limited users.

These two models, although they differ in their focus and way of segmenting the market as well as the criteria they use for the segmentation, they also overlap concerning their basic conception of the process of diffusion of innovations (Park J-m 2005). Concretely, the two models use the same basic variables of influence, such as individual innovativeness, social communication, complexity, media influence and relative advantage. These common variables, however, are not always defined or understood exactly the same way in the two models (Kim, Lee

2005). For example, the innovativeness of a user is a concept distinct from the innovativeness of an adopter. Further, unlike in the adoption-diffusion model, in which observability, compatibility and trialability constitute the key characteristics of the diffusion process of innovations (Rogers 1995), in the use-diffusion model the same process is explained through product experience, competition for use, sophistication of technology and satisfaction (Shih, Venkatesh 2004).

Table 3 Adoption-diffusion model vs. use-diffusion model

	Differences					Elements common to both models
	Key difference	Market segments	Segmentation criteria	Model-specific factors	Theoretical consideration	
Adoption-diffusion model (ADM)	Adoption	<ul style="list-style-type: none"> Innovators Early adopters Early majority Late majority Laggards 	<ul style="list-style-type: none"> Timing or rate of adoption 	<ul style="list-style-type: none"> Observability Compatibility Trialability 	<ul style="list-style-type: none"> S-shaped curve of diffusion Speed of penetration and critical mass Two-step model of diffusion 	<ul style="list-style-type: none"> Innovativeness Social communication Complexity Influence of media Relative advantage
Use-diffusion model (UDM)	Use	<ul style="list-style-type: none"> Intense users Specialized users Non-specialized users Limited users 	<ul style="list-style-type: none"> Rate of use Variety of use 	<ul style="list-style-type: none"> Product experience Competition for use Sophistication of technology Satisfaction 	<ul style="list-style-type: none"> Evolving nature of use Technology integration Sustained / continuous use Dis-adoption Essentialness of technology Impact of technology 	

2.1.3 Hofstede model of national culture

Culture has been defined in many ways; the most typical definition is: "Culture is the collective programming of the mind that distinguishes the members of one group or category of people from others." It is always a collective phenomenon, but it can be connected to different collectives. Within each collective there is a variety of individuals. Most commonly the term culture is used for tribes or ethnic groups (in anthropology), for nations (in political science, sociology and management), and for organizations (in sociology and management). A relatively unexplored field is the culture of occupations (for instance, engineers versus accountants, or academics from different disciplines). The term can also be applied to genders, generations, or social classes. However, changing the level of studied aggregation changes the nature of the concept of 'culture.' Societal, national and gender cultures, which children acquire from their earliest years onward, are much more deeply rooted in the human mind than occupational cultures acquired at school, or than organizational cultures acquired on the job.

The most common dimension used for ordering societies is their degree of economic evolution or modernity. U.S. anthropologist Edward T. Hall (1976) divided cultures according to their ways of communicating, into high-context

(much of the information is implicit) and low-context cultures (nearly everything is explicit). In practice, this distinction overlaps largely with the traditional versus modern distinction. Parsons and Shils (1951) claimed that these choices are present at the individual (personality) level, at the social system (group or organization) level, and at the cultural (normative) level. They did not take into account that different variables could operate at different aggregation levels. Others have extrapolated Kluckhohn and Strodtbeck's (1961) classification to all kinds of social comparisons, without concern for their geographic limitations, without considering the effect of levels of aggregation, and without empirical support. Many authors in the second half of the twentieth century have speculated about the nature of the basic problems of societies that would present distinct dimensions of culture (for a review see Hofstede, 2001, pp. 29-31).

The Hofstede model (Hofstede, 2010; 2011) distinguishes cultures according to five dimensions: power distance, individualism/collectivism, masculinity/femininity, uncertainty avoidance, and long-/short-term orientation. The model provides scales from 0 to 100 for 76 countries for each dimension, and each country has a position on each scale or index, relative to other countries. Although the country scores were originally produced in the early 1970s, many replications of Hofstede's study on different samples have proved that the country ranking in

his data is still valid. In the second edition of his book *Culture's Consequences* (2001), Hofstede describes over 200 external comparative studies and replications that have supported his indexes. Much data on product ownership and related behavior (Hofstede, 2001; De Mooij, 2004; 2010) appears to correlate with Hofstede's dimensions. Sometimes a configuration of two dimensions explains differences in product usage or other consumption-related phenomena even better.

The power distance dimension can be defined as 'the extent to which less powerful members of a society accept and expect that power is distributed unequally.' In large power distance cultures, everyone has his or her rightful place in a social hierarchy. The rightful place concept is important for understanding the role of global brands. In large power distance cultures, one's social status must be clear so that others can show proper respect. Global brands serve that purpose. Luxury articles, some alcoholic beverages and fashion items typically appeal to social status needs. In Hofstede et al. (2010), Power Distance Index scores are listed for 76 countries; they tend to be higher for East European, Latin, Asian and African countries and lower for Germanic and English-speaking Western countries.

The contrast of individualism/collectivism can be defined as 'people looking after themselves and their immediate family only, versus people belonging to in-groups that look after them in exchange for loyalty.' In individualistic cultures,

one's identity is in the person. People are 'I'-conscious and self-actualization is important. Individualistic cultures are universalistic, assuming their values are valid for the whole world. They also are low-context communication cultures with explicit verbal communication. In collectivistic cultures, people are 'we'-conscious. Their identity is based on the social system to which they belong, and avoiding loss of face is important. Collectivistic cultures are high-context communication cultures, with an indirect style of communication. In the sales process in individualistic cultures, parties want to get to the point quickly, whereas in collectivistic cultures it is necessary to first build relationships and trust between parties. This difference is reflected in the different roles of advertising: persuasion versus creating trust. In Hofstede et al. (2010), Individualism Index scores are listed for 76 countries; Individualism tends to prevail in developed and Western countries, while collectivism prevails in less developed and Eastern countries; Japan takes a middle position on this dimension.

The masculinity/femininity dimension can be defined as follows: 'The dominant values in a masculine society are achievement and success; the dominant values in a feminine society are caring for others and quality of life.' In masculine societies, performance and achievement are important; achievement must be demonstrated, so status brands or products such as jewelry are important to show

one's success (De Mooij and Hofstede, 2002; De Mooij, 2010). An important aspect of this dimension is role differentiation: small in feminine societies, large in masculine societies. In masculine cultures, household work is less shared between husband and wife than in feminine cultures. Men also do more household shopping in the feminine cultures. Data from Eurostat (2002) show that low masculinity explains 52% of variance of the proportion of men who spend time on shopping activities. In Hofstede et al. (2010), Masculinity versus Femininity Index scores are presented for 76 countries; Masculinity is high in Japan, in German speaking countries, and in some Latin countries like Italy and Mexico; it is moderately high in English-speaking Western countries; it is low in Nordic countries and in the Netherlands and moderately low in some Latin and Asian countries like France, Spain, Portugal, Chile, Korea and Thailand.

Uncertainty avoidance can be defined as 'the extent to which people feel threatened by uncertainty and ambiguity and try to avoid these situations.' In cultures of strong uncertainty avoidance, there is a need for rules and formality to structure life. This translates into the search for truth and a belief in experts. People of high uncertainty avoidance are less open to change and innovation than people of low uncertainty avoidance cultures. This explains differences in the adoption of innovations (Yaveroglu and Donthu, 2002; Yeniurt and Townsend, 2003; Tellis et

al., 2003). Whereas high uncertainty avoidance cultures have a passive attitude to health by focusing on purity in food and drink and using more medication, low uncertainty avoidance cultures have a more active attitude to health by focusing on fitness and sports (De Mooij and Hofstede, 2002; De Mooij, 2010). In Hofstede et al. (2010), Uncertainty Avoidance Index scores are listed for 76 countries; they tend to be higher in East and Central European countries, in Latin countries, in Japan and in German-speaking countries, lower in English-speaking, Nordic and Chinese culture countries.

Long- versus short-term orientation is ‘the extent to which a society exhibits a pragmatic future-orientated perspective rather than a conventional historic or short-term point of view.’ Values included in long-term orientation are perseverance, ordering relationships by status, thrift, and having a sense of shame. The opposite is short-term orientation, which includes personal steadiness and stability, and respect for tradition. Focus is on pursuit of happiness rather than on pursuit of peace of mind. Long-term orientation implies investment in the future. An example is the relationship between LTO and broadband penetration (De Mooij, 2010). Broadband asks for large investments by business or governments. In Hofstede et al. (2010), dimension scores have been re-calculated including Minkov’s analysis of recent World Values Survey data. Long-term oriented are East Asian countries,

followed by Eastern- and Central Europe. A medium term orientation is found in South- and North-European and South Asian countries. Short-term oriented are the U.S.A. and Australia, Latin American, African and Muslim countries.

2.2 Digital convergence and IPTV service

2.2.1 Digital convergence

The term “convergence” was first introduced by U.S. MIT Professor Negroponte (1978) when, in his book titled *Being Digital*, he presented on the convergence of diverse media such as broadcasting, computer, and publications, and the future of the subsequent digital era.

With digital convergence emerging as a new economic paradigm, a significant demand for convergence is being created not only in the technology/service and industry/business area, but also in political, social and cultural areas.

The concept of convergence was initially focused on the integration of technologies and networks, but recently, attention is being paid to services that stretch the boundaries of technologies and industries or that cross all platforms. This suggests that the ultimate goal and value of convergence target not

technologies or industries (businesses), but the final beneficiaries, users.

In actuality, in the IP-based digital convergence environment, the internet repositioned passive users in the existing IT/media services as active users that embrace the open and participatory position in the interactive telecommunications system (Future Exploration Network, 2007). Digital convergence is evolving from the combination of computers and telecommunications to the convergence of broadcasting and telecommunications combined with the media digital contents, and its representative services include their business models.

The emergence of digital convergence services also made it necessary to come up with a new classification system to include these new services and to review and modify the existing regulatory regimes so that they can be applied to the latter. Although the need for new classification and regulatory bodies to regulate converged services is widely acknowledged and understood, the appropriate definition of convergence remains to be clarified. This is because the phenomenon of digital convergence is mainly the result of practical requirements and environmental changes in both telecommunications and broadcasting. In other words, while digital convergence services are a natural result brought about by customer demand coupled with technological development, defining their types and characteristics is much less straightforward. Generally, digital convergence is

defined as the provision of both telecommunication services and broadcasting services through converged networks of telecommunications and broadcasting. This makes digital convergence services fall into an ambiguous territory, belonging to neither one technological domain nor another completely, and subject to neither one regulatory regime nor another. In other words, network convergence not only enables converged services, but also ultimately leads to convergence of regulations.

Table 4 Digital convergence between broadcasting and telecommunications

	Sub-type	Characteristics
Technology convergence	Convergence between networks	Physical convergence between networks as a consequence of technological progress
	Convergence between devices	Multimedia
	Convergence technologies	Digital technology
Service convergence	Inter-industry convergence between services	Borderline services between broadcasting and telecommunications
	Intra-industry convergence between services	Marketing strategies of service providers
Market convergence	Convergence between carriers and broadcasters	Consolidation between broadcasters and telecommunications service providers
	Functional convergence between service providers	Strategic partnership
Policy and regulation convergence	Regulatory convergence	Consolidation of regulations and regulatory bodies
	Convergence between regulatory bodies	

In many countries around the world, some classification standards for digital convergence service, especially broadcasting and telecommunications convergence services are already in place. In the US and Japan, converged services are regarded as either telecommunication services or broadcasting services. In Germany and France, convergence services are considered as the third service that belongs to neither telecommunications nor broadcasting service.

In the US, digital convergence service is considered as 'data service'. The scope of data service includes both processed and unprocessed information. In Germany, 'Media service' and 'Tele-service' are regarded as digital convergence services, for which two determining criteria is the ability to make public opinion and whether the transmitter intentionally organizes their programs. In Japan, digital convergence services are divided into telecom service destined to the general public and broadcasting to specific audiences, according to the criterion whether those services intentionally reach specific receivers or the general public. In France, 'double function telecommunications service' is classified as the third service that is neither a telecommunications service nor a broadcasting service. The definition implies the service provided through private connections, while assuming the form of a public delivery.

The question whether telecom-broadcasting convergence services should be

regulated by telecommunications or broadcasting authorities depends on which of the two regulatory regimes is more stringent. Broadcasting regulations are generally stricter than rules governing the telecommunications industry. Therefore, if telecom-broadcasting convergence services were regulated by broadcasting regulatory bodies, they would be subject to much tighter entrance and content regulations. Stiff regulations can stifle these budding service products, ultimately hurting customers' welfare. On the other hand, if converged telecom-broadcasting services were too loosely regulated, this could cause the collapse of markets and overflow of flawed information.

Table 5 Standards and types of digital convergence services by each country

Category	Classification standards	Classification types
US	Both the processed and unprocessed information	Data service
Germany	Public opinion making, intentional organization of programs	Media service, Tele-service
Japan	Specific receivers (specific persons and/or general public)	Telecom service destined to the general public and broadcasting to specific audiences
France	Private connection and public delivery	Double function telecommunications service

A trend of vertical and horizontal integration and M&A has been seen in digital

convergence service, especially in the telecommunications and broadcasting industries following the introduction of market and regulatory liberalizations. For example, the US approved telecommunications and broadcasting operators to mutually enter and invest in both markets through the 1996 Telecommunication Act Amendment. This legislation sparked off a wave of mergers and acquisitions among telecommunications operators, cable TV operators, and computer operators. In the telecommunications industry, AT&T merged with Media One Group in April 1999 and CBS with Viacom in September 1999. In the media industry, there have been big merger and acquisition attempts such as the takeover of Sprint by MCI World in October 1999, and that of Time Warner by AOL (American Online) in January 2000. The convergence of the media industry, thanks to the economy of scale and economy of scope, enables suppliers to provide complex multimedia services. This will be accompanied by stepped-up customized services and optimized content portfolios such as telephone services through cable TV, and VOD (Video on Demand) through telecommunication networks. Such convergence may eventually lead to the reorganization of related industries into content provider, service provider, media operator, and platform provider industries. Traditionally these industries have been classified into publishing, telecommunications, broadcasting, and movie businesses.

2.2.2 IPTV service

The concept of IPTV is far from static and is still evolving. Best known as “IPTV”, a name coined in the United States, this application is known in Europe as “ADSL TV” and in Japan as “broadband broadcasting”. According to the ITU-T Focus Group, IPTV is a two-way, interactive multimedia data service, coming with a degree of QoS and QoE (Quality of Experience) guarantees, provided through IP-based networks. OVUM, meanwhile, defined IPTV as a service delivering broadcast content and TV programs and videos in the form of VoD, over IP networks. Finally, according to FCC (2005), IPTV is a kind of internet video service for direct downloads of films or TV shows using broadband internet (VoD over the Internet) and advanced TV functions such as DVR (Digital Video Recorder) or PVR (Personal Video Recorder).

When describing IPTV, consumer-perceived characteristics are criteria that are as important as technical characteristics. In technical aspects, one can discern the following four characteristics for IPTV: First, IPTV uses IP (Internet Protocol)-based broadband internet networks as the transmission medium. It is thanks to the use of internet protocol, crucial to enabling broad-ranging telecommunications services, that IPTV can combine voice, data and video services. This is also the key

feature that distinguishes IPTV from traditional non-IP network-based TV services such as cable TV and satellite TV, which are limited in the variety of services they can offer due to this very reason. Second, TV is the user interface of IPTV (Kerschbaumer 2000).

In Korea, a prototype of IPTV has existed since 1997. This video service, known as “webcasting,” is also provided via broadband internet. One crucial difference between webcasting and IPTV, however, is that in the case of the former, the service platform is the computer and not the TV. Third, IPTV provides multi-channel services, enabled by multicasting streaming technology. Webcasting, although it uses broadband internet as transmission means, as does IPTV, is distinct from the latter in that webcasting videos are streamed through unicasting technology and not multicasting technology. Fourth, IPTV enables a wide variety of interactive services such as VoD, TV banking, information search, e-mail and PVR (or DVR). Many next-generation features, such as VoD, T-commerce or Telecommunications, that set IPTV apart from traditional TV services, are made possible thanks to the two-way communication capability of this IP-based medium (Kim 2004; Kim C-h 2005).

Meanwhile, there are four main consumer-perceived characteristics of IPTV: multi-channel broadcasting, high-definition video, two-way data transfers, and

convergence, as shown in **Table 6** below. Of these four, two-way data transfers may be considered the foremost characteristic of IPTV, insofar as it is a feature offered exclusively by digital media such as digital satellite TV or digital CATV, and not by analog satellite or CATV. Further, not all digital satellite TV services enable two-way data transfers, as this requires broadband return channels as well as real-time interactivity, which can be provided only through bundling with telephone or internet services. Convergence is another characteristic absent in analog CATV services, which, however, is an option available for digital CATV. On the other hand, once fully digitalized Terrestrial TV can provide multi-channel broadcasts and two-way data transfer services. But, for terrestrial TV to enable two-way data transfer, it must also resort to bundling with telecom services, as is the case with digital satellite TV, to gain access to broadband return channels and achieve real-time interactivity. Consumer-perceived performance characteristics of terrestrial TV, upon full digitalization, are, therefore, quite similar to those of digital satellite (Ju, Han 2001; Kim, D-y 2005).

Table 6 Consumer-perceived performance characteristics of IPTV

Characteristics	Description
Multi-channel broadcasting	Dozens of broadcasting channels
High-definition video	High-definition video, HiFi sound, 5.1 or better
Two-way data transfer	Broadband, real-time return channels, for data transfer from users to the broadcaster.
Convergence	Bundled services, other than TV, provided through the set-top box, home gateway or the platform (TV set), which may vary depending on the service mix (i.e., double play, triple play or quadruple play).

The characteristics of IPTV help develop new businesses that the existing TV service cannot implement, as well as create unlimited values through inter-industry convergence. For example, the interactive TV service, using the IP backbone, provides audience-participatory TV programs such as quiz shows, viewer feedback, voting and e-commerce, as well as indirect advertising and services of purchasing TV host-clad clothes and other items. Additionally, combining with diverse services and businesses such as education, games, gambling, auction, shopping, and banking, the interactive TV service can maximize industrial ripple effects. This differentiation can start with the combination of services and businesses that overcome the existing TV technology limitations using the IP-based broadband (FTTH) and that stretch the borders between broadcasting and telecommunications.

IPTV markets have grown significantly on a global level, and IPTV services

are recently being popularized and universalized in Japan and Korea. This is regarded as a representative success case of IT convergence service.

In Japan, the market environment has changed progressively since 2007, with service providers other than telecom operators joining the IPTV market, which is currently expanding in size at a steady rate. IPTV services currently available in Japan include BBTB by Softbank Group, Hikari One by KDDI, 4th MEDIA and on-demand services by NTT Group. The growth of Japan's IPTV market accelerated in 2012, hitting 3.57 million in the number of subscribers and JPY 108.5 billion in revenue.

As for Korea's IPTV market, as of July 2009, the number of real-time broadcast subscribers was estimated at 600,000 and the number of VOD subscribers 1.2 million. IPTV services are currently provided in Korea by three companies—KT, SK Broadband and LGU+. As for the size of the Korean IPTV market, the number of households subscribed to an IPTV service grew at an average annual rate of 51% to hit 6.0 million in 2012, with the revenue rising to an estimated 966.4 billion won.

**Chapter 3 Innovative converged service and its
adoption, use and diffusion: a holistic approach to
diffusion of innovations, combining adoption
diffusion and use-diffusion paradigms¹**

The accelerating pace of progress in digital convergence is resulting in an increasing intersection between voice and data communications, and broadcasting and computer technologies, with the broadband network as their point of convergence (Baldwin *et al.* 1996). One of the consequences of this rapidly-expanding phenomenon of convergence for users is the changing spectrum of choice in new media. With converged services and devices, offering more than one function, becoming the market norm, the choice for today's consumers is about which product combines features that best suit their various needs and addresses the most complete array of those needs.

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IPTV (Internet Protocol TV) is a leading example of this new generation of converged media. IPTV, a superior, interactive alternative to one-way media, like traditional TV services, allows viewers to send and receive voice and data traffic via the television set, connected to the internet. The introduction of IPTV, as a full-triple play solution, pushing the horizon of digital convergence further out, has also had the effect of taking the already intense competition in the TV broadcasting market, pitting digital CATV and digital satellite TV against traditional terrestrial TV, to a new level of complexity.

Meanwhile, the accelerating innovation in the field of convergence technology is triggering active research on the process of diffusion of innovative converged media and devices. As a general rule, the speed of diffusion of an innovative product is influenced both by the characteristics of the new product and the characteristics of consumers (Shih, Venkatesh 2004). Attempts to understand the process of diffusion of new products or new technologies among consumers have been so far made principally in the field of innovation diffusion. Traditional theories on innovation diffusion were focused mainly on adoption. In recent years, however, the focus has been gradually shifting toward the use aspect of innovations.

Existing studies in innovation diffusion draw mostly upon Rogers' (1995) innovation-adoption theory and acceptance diffusion models such as the

technology acceptance model (TAM). The framework of adoption diffusion, proposed by Rogers, in which the focus is placed on the process of consumers' adoption of new products or services has later become the root of newer theories such as the theory of reasoned action (TRA), the theory of planned behavior (TPB) – a theory expanding on TRA – and the technology acceptance model (TAM) – a modified TRA. Meanwhile, limitations inherent in this adoption-centered approach to the diffusion of innovations have been pointed out by several researchers (Gatignon, Robertson 1985).

Shih and Venkatesh (2004) recently proposed a new innovation diffusion model they baptized “use-diffusion model”, as opposed to “adoption-diffusion models”. Shih and Venkatesh (2004) argued for the need to shift the focus of diffusion research from ‘adoption’ to ‘use’ as a solution to overcome the limitations of traditional approaches in diffusion research while having TAM or other adoption-centered theoretical frameworks. In this alternative approach aimed at moving beyond the adoption-centered paradigm of diffusion, consumers' usage patterns with products or services they are currently using are important predictors for the diffusion process of new products or services. More specifically, how frequently a consumer uses a technology product or service and how varied his/her use of the same product or service may be can explain and determine his/her

behavior adopted toward new products or services, and thereby, also the process of their diffusion, according to Shih and Venkatesh (2004).

Also of note is that in this new model, user categories, segmented by usage patterns, plays a similarly prominent role as the innovation adopter groups in traditional adoption-diffusion models.

In this study, a use-diffusion model was combined with a traditional adoption-diffusion model for a more holistic approach to the diffusion of IPTV services, a representative converged media service. Based on the results of analysis, I derived implications for the marketing of IPTV services that have practical importance for both market entry strategy and the acceleration of diffusion.

3.1 Empirical research design

3.1.1 Research model

The objective of this study is to empirically investigate the process of diffusion of converged media services by looking at the case of IPTV. By combining the use-diffusion model proposed by Shih and Venkatesh (2004) with a traditional TAM-based adoption-diffusion model, I designed a conceptual research model, as

shown in **Figure 6** below.

The research model consists in applying a TAM-based, adoption-diffusion model and the use-diffusion model to IPTV services so as to identify a comprehensive range of factors influencing their diffusion process. The variables selected for the research model are wide-ranging and include major Tam variables, and some of the key variables used in the use-diffusion model by Shih and Venkatesh (2004), the media substitution theory and the total consumer experience (TCE) approach.

The adoption-diffusion model used in this study is a structural model having perceived ease-of-use and perceived usefulness as mediating variables. For the use-diffusion model, I chose the rate of use and variety of use as mediating variables, following Shih and Venkatesh (2004). The variables used in the latter model include substitution effect and complementarity, constructs in the media substitution theory proposed by Li (2004). Meanwhile, drawing on Sandström *et al.* (2008)'s TCE model, I also included product experience among the variables. Satisfaction, intention to re-use, and intention to subscribe were selected as outcome variables for both the acceptance-diffusion and use-diffusion models.

Common factors applicable to both the adoption-diffusion model and the use-diffusion model include household innovativeness, communication, complexity,

relative advantage, perceived risk, and service quality. In addition, key TAM factors such as perceived ease-of-use and perceived usefulness, and compatibility, observability and trialability were classified as factors uniquely applying to the adoption-diffusion model. Factors specific to the use-diffusion model include three constructs proposed by Shih and Venkatesh (2004), namely the rate of use, variety of use and sophistication of technology, as well as product experience from the TCE framework, and substitution effect, complementarity and similarity from the media substitution theory as the variable of competition for use.

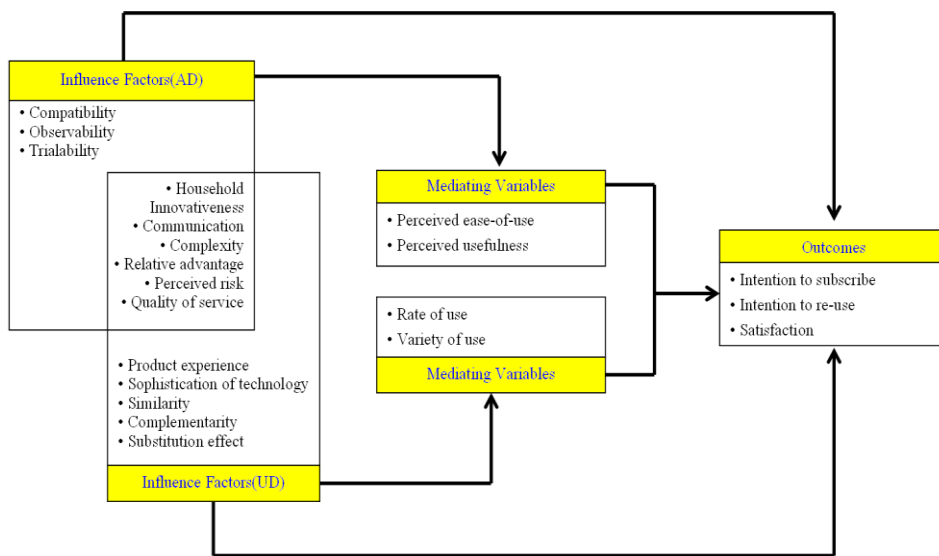


Figure 6 Research model

3.1.2 Research hypotheses

3.1.2.1 Hypotheses on the adoption-diffusion of IPTV services

TAM (Technology Acceptance Model) and other adoption-centered theories argue that the diffusion of an innovation within a social network begins when an individual member comes into the awareness of it and communicates his/her knowledge to others within the network (Chatman 1986).

According to this postulate, for an effective diffusion of a new product, a marketer must promote the product in such a way so as to create as many early adopters as possible, who would, in turn, convert more consumers into adopters through inter-consumer communication. Factors believed to influence consumers' adoption of innovations vary depending on the researcher, even though many share basic premises on the diffusion process, which have been formulated by influential adoption-diffusion theories such as the theory of diffusion of innovations of Rogers (1995), TRA (Theory of Reasoned Action) by Fishbein and Ajzen (1975), TPB (Theory of Planned Behavior) by Ajzen (1991) and TAM (Technology Acceptance Model) by Davis (1989).

Rogers (1995) saw the diffusion of innovations as a progressive process in which the adoption of an innovation, initially only by a small number of people,

gradually increases to eventually lead to a mass-market take-up. In other words, Rogers believed that the early phase of innovation adoption was closely linked to the personal innovative tendencies of early users. Cai (2001), drawing on TRA, argued that consumers' attitudes toward innovations and social norms were important determinants of purchase behavior. A consumer's behavioral intention with regard to the adoption of innovative technology, he argues, is directly influenced by his/her personal conviction and evaluation of this technology, and social norm-related factors such as trust and conformity. Meanwhile, according to Malhotra *et al.* (1999), in their study conducted from a TAM perspective, a consumer's attitude toward a new technology product is formed by a combination of social influence factors and perceived technical characteristics of the product, such as its perceived ease-of-use and usefulness.

Among early adoption-diffusion studies, Rogers and Shoemaker (1971) proposed five factors that influence the rate of adoption and diffusion of a new technology product: relative advantage, compatibility, simplicity, observability and trialability. According to Rogers and Sheomaker (1971), the driving factor of the diffusion process is the relative advantage presented by a new technology product over the existing product and the more the innovative product corresponds to consumers' desires, beliefs, values and personal experience, the greater the extent

and speed of its diffusion. They further claimed that as the ease-of-use of a new technology facilitates its broad take-up and, in some cases, even trumps price considerations the simpler and more innovative a product, the faster the rate of diffusion. An eye-catching new product, they also maintained, has a better chance of being quickly adopted by the mass-market and odds for market success are greater for products that can be tried in advance of purchase without financial risk to consumers (Kim *et al.* 2003; Rim *et al.* 2005).

Robertson and Gatignon (1986), in a study on the adoption of innovative cutting-edge products among industrial buyers, advanced the view that a competitive supplier-side environment influenced the demand-side competition environment thereby also influencing the diffusion of new technology products. Here, the competitive environment has as its key components: industrial competitiveness, company reputation, technology standardization and vertical inter-firm cooperation.

Ram, Jung (1990) stated that the main barrier and resistance factor in consumers' adoption of an innovative product was perceived risk. They argued that when a consumer feels that purchasing a new product carries risk, this perceived risk plays the role of a functional or psychological barrier, producing the effect of delaying the adoption or causing a downright rejection of the same product. In the

case of an innovative technology product, the role of perceived risk is mostly that of a functional barrier, they further claimed. In TAM, a dominant paradigm in today's adoption-diffusion research, attitude and behavioral intention-related variables are believed to influence individuals' actual adoption of innovations, through the intermediary of perceived ease-of-use and perceived usefulness (Davis 1989).

Lee *et al.* (2002) report, in their study on the banking industry's adoption of new technology products, that communication was an important predictor of the actual acceptance of new products. In other words, perceived ease-of-use and perceived usefulness are determinants of consumers' behavioral intentions concerning technology acceptance, and the influence of external variables on technology acceptance is mediated by perceived ease-of-use and usefulness (Agarwal, Karahanna 2000). Lee *et al.* (2003) validate TAM through their meta-analysis of 101 empirical studies. Joo and Kim (2004), meanwhile, found, in an investigation of technology acceptance in the internet market, that innovativeness, external environment and organizational characteristics were the three most important determinants of acceptance.

In this study, I draw on the adoption-diffusion model and related theoretical research, as well as the use-diffusion model by Shih and Venkatesh's (2004),

which expands on the latter, and TAM. Factors considered include those unique to the adoption-diffusion model, such as perceived ease-of-use, perceived usefulness, compatibility and accessibility, and those common to both models such as household innovativeness, communication, complexity, relative advantage, perceived risk and service quality. In the adoption-diffusion model, I set the two key influence factors for technology acceptance in TAM, namely, perceived ease-of-use and perceived usefulness, as mediating variables, and other variables, including compatibility, observability, trialability, household innovativeness, communication, complexity, relative advantage, perceived risk and service quality, as influence factors. Intention to re-use and intention to subscribe and use were considered the adoption outcomes for IPTV, as the former is an existing service and the latter, a service new to the market. Using these variables, I formulated the following hypotheses on the adoption-diffusion of IPTV.

Hypothesis 1. Factors such as compatibility, observability, trialability, household innovativeness, communication, complexity, relative advantage and service quality have a positive influence on the perceived ease-of-use and perceived usefulness of IPTV and the intention to subscribe to IPTV while the perceived risk of IPTV

has a negative influence on its perceived ease-of-use, perceived usefulness, and the intention to subscribe to this service.

Hypothesis 2. The perceived ease-of-use and perceived usefulness of IPTV will have positive effects on IPTV subscribers. In other words, if users perceive IPTV to be easy, their purchase potential of IPTV will increase because of the conviction through in advance IPTV service experience.

3.1.2.2 Hypotheses on the use-diffusion of IPTV services

Shih and Venkatesh (2004) argued that for a more complete understanding of the process of consumers' acceptance of new products, one needs to move beyond adoption factors and also examine use-diffusion patterns. They developed an alternative model which takes into consideration use-related aspects of innovation diffusion, baptizing it the "use-diffusion model", and successfully tested the model's validity by applying it to the diffusion process of home electronics and technology products. Park j-m (2005), in a study on the diffusion process of cutting-edge technology products, found that product experience was a valid influence factor for the use-diffusion of new technology products and that variety of use effectively influenced the use-diffusion of innovative technologies.

Experiential marketing and TCE (Total Customer Experience) have stressed that product experience influences the use and diffusion of new products. Hahn *et al.* (1994), for instance, reported that product experience had a direct and determining influence on the conversion of an adopter into a repeater. The basic idea is that as a consumers' experience of a new technology increases, they develop a better understanding of its benefits and come to perceive it as an indispensable part of their everyday life. In other words, the more experienced and familiar a consumer is with a technology, the more varied and frequent his/her use of this technology becomes. There have been also studies in technology fields reporting the positive effect of product experience on the use-diffusion of information systems and services.

Cognitivate (1999), for example, reported that users' experiences on the website of an online company not only shapes the users' image of this company, but it also has a decisive influence on their intention to revisit the same website in the future. Huberman *et al.* (1998) noted that the amount of time spent by users on a website is directly correlated with the value they perceive in the same website. Gillespie *et al.* (1999) found evidence confirming that users' experience of a website is a major determinant of their loyalty toward the same website. The view that these studies share is that the more relevant a website is to a user, the greater

the amount of time he or she spends browsing it. The relevance of a website, in other words, incites users to more thoroughly explore its pages as well as make repeat visits. Bucklin and Sismeiro (2000) reported similar findings indicating that the amount of time spent on a website and number of page views are largely determined by its perceived relevance to users.

As for usage behavior patterns, they are considered important influence factor for product acceptance and diffusion not just within the use-diffusion model by Shih and Venkatesh (2004), but also in many other studies. Kahneman and Lovallo (1988) argued that the greater the capabilities of the individual user to successfully use a new technology product, the stronger the satisfaction they experience with the same product.

In sum, individual users' technology proficiency, as it leads to a higher rate of use as well as a more varied use of a new product, ultimately results in greater satisfaction with the product. Huberman *et al.* (1998), meanwhile, claimed that the amount of time users spend at a website is directly linked to its value as well as the revenue generated by it. Shih and Venkatesh (2004), pointing out the importance of a household's usage pattern with regard to general technology products as a predictor of their adoption behavior vis-à-vis new technology products, stated that the adoption of an innovative product is largely determined by the extent to which

it improves existing products in terms of technological sophistication. Technological sophistication, here, refers to the versatility and capabilities of a technology. The current state of information technology makes it possible for a technology to be sophisticated without being difficult to use. New products with a higher level of technological sophistication, according to Shih and Venkatesh (2004), lead to a higher rate of use and broader, more varied use.

In this study, using the theoretical framework of Shih and Venkatesh (2004) and taking inspirations from the media substitution and TCE theories, I selected the following influence factors for hypotheses related to the use-diffusion of IPTV: product experience, sophistication of technology, similarity, complementarity, substitution effect, household innovativeness, communication, complexity, relative advantage, perceived risk and service quality. Rate of use and variety of use, the two main constructs, related to the usage pattern proposed by Shih and Venkatesh (2004), were used as mediating variables. Three outcome variables were selected, namely, satisfaction with IPTV, intention to re-use it and attitude towards subscribing to an IPTV service. Two hypotheses were formulated, as follows, on the relationship between these use-diffusion variables:

Hypothesis 3. Factors, such as the product experience, sophistication of technology, similarity, complementarity, substitution, household innovativeness, communication, complexity, relative advantage, and service quality will have positive effects on the rate of use and the variety of use of IPTV, the satisfaction felt about and intention to re-use IPTV while perceived risk will have negative effects on the rate of use and the variety of use of the IPTV product as well as the satisfaction felt about and intention to re-use IPTV.

Hypothesis 4. The rate of use and diversity of the IPTV product will have positive effects on the satisfaction felt about and intention to re-use IPTV.

3.1.3 Measurement

This study considers variables that are common to the adoption-diffusion model and the use-diffusion model and those that are specific to each of them. Variables specific to the adoption-diffusion model considered in this study include compatibility, trialability, observability, perceived ease-of-use and perceived

usefulness.

Compatibility refers to the extent to which a new product corresponds to the desire, trust, values and the past experience of a consumer (Rogers 1995). In this study, I measured compatibility through the compatibility of a product to the current purchase behavior, cultural background and the lifestyle of a consumer (Jang, Cho 2000). As for observability, this variable was measured through the observability of benefits resulting from the use of a product, overall usefulness of the product and information communication (Jang, Cho 2000). Trialability was measured through the limited period of use, capabilities to use the functions of a product, ability to use the product when needed and performance enhancement resulting from the use of the product (Alexandra 2007). Perceived usefulness was measured through the ability to quickly access information useful to a user, usefulness of a product for conducting purchases and the variety of information made accessible through the product (Davis 1989). Perceived ease-of-use was measured through the ease of using desired functions and convenient methods for accessing the internet and other manipulations (Davis 1989; Venkatesh 2000).

Variables specific to the use-diffusion model that are included in this study are product experience, technological sophistication, similarity, complementarity, substitution effect, and the rate and variety of use.

I measured product experience through the length of use of a product, from the initial purchase of the product to the current point in time (Noyes, Garland 2006). In this study, adopting the perspective of TCE, I measured emotional experience-related factors, such as pleasures derived from IPTV, the experience of smooth integration of functionalities and overall usefulness (Sandström 2008). Specifically, I measured the experience of using the five main functions of IPTV (VoD, personalized features, two-way communication, value-added services, entertainment and media content), which may be translated into pleasure, smooth functional integration, temporal flexibility, increased convenience for everyday activities and general usefulness. Technological sophistication, meanwhile, was measured through the versatility and capabilities of the product/service (Shih, Venkatesh 2004). As for functional similarity, I took into account the extent to which a consumer, based on his/her personal experience, perceives a product/service as functionally similar to existing ones (Martin, Stewart 2001). Complementarity, which describes the relationship between two products/services that simultaneously benefit by helping the other maximize its usefulness, was measured with regard to the ability to increase the existing media's entertainment potential and usefulness for information access and as a communication tool (Jeffres, Atkin 1996). Substitution effect, corresponding to the relationship between

two products/services in which the use of one dispenses the use of the other – in other words, one replaces the other – was measured with regard to TV, internet, mobile phone, DMB (Digital Multimedia Broadcasting) and other existing media in terms of IPTV's potential to substitute their functionalities, the content they provide and the time spent using this media (Li 2004). Variety of use was measured by the variety of content types for which a product/service is used as the means of access (Ram, Jung 1990). The uses considered in this study range from communication with family members, family entertainment, care and support of family members, home shopping, education and information (Tinnell 1985). Rate or frequency of use was measured by number of hours spent using a product/service (Shin, Venkatesh 2004).

Variables common to the adoption-diffusion model and use-diffusion model included in this study are household innovativeness, communication, complexity, relative advantage, perceived risk and service quality.

Household innovativeness refers to how willing a household is to adopt an innovation (Gatignon, Robertson 1985) or, in other words, how rapid a household adopts an innovation and this was measured by curiosity/creativity, risk preference, voluntary simplicity, creative re-use, and multiple use potential (Price, Ridgway 1983). Communication was measured by whether there are helpers to provide

assistance with regard to the use of a product/service, the possibility to acquire knowledge needed for its use, and how large or complete the related information source is (Venkatesh 2000). Items used to measure complexity were difficulty of use, complexity of manipulation, understanding of advanced functions, and the need for explanations on advanced functions (Rogers 1983). Relative advantage was measured by the comparative price advantage of a product/service, the ease and speed of manipulation, and portability (Moore, Benbasat 1991). Perceived risk was measured through performance risk, financial risk, social risk, and psychological risk (Hirunyawipada, Paswan 2006). Quality of service was measured by the accuracy, relevance, completeness and comprehensiveness of information provided through a product/service, and the variety of information made accessible by it (Parasuraman *et al.* 1985).

The outcome variables chosen for this study were satisfaction, intention to re-use, and intention to subscribe. Items used to measure satisfaction were positive feelings and overall satisfaction with a product/service, and favorable quality assessment (Shih, Venkatesh 2004; Kim Y-j 2005). Intention to re-use was measured by the intention to continue to use the current product/service and the intention to recommend it to others (Hellier *et al.* 2003). Finally, the intention to subscribe/use by applying to IPTV was measured by the intention to subscribe to

an IPTV service, as indicated by households. Households were provided with a basic description of IPTV and were asked to decide whether they would subscribe to the service, within a short period of time (Eastlick 1993).

3.1.4 Gathering and sampling of data

The data were gathered from both users and non-users of IPTV, in accordance with the objectives of the study. The data from non-user households were used in the analysis of the IPTV adoption-diffusion model while the data from user households were used in the analysis of the IPTV use-diffusion model.

The data were collected through a face-to-face interview conducted at the homes or workplaces of the respondents, using two different questionnaires for households currently using an IPTV service and those that were not. The respondents were selected among households residing in four major Korean cities, namely, Seoul, Incheon, Busan and Daegu. 500 total copies of the adoption-diffusion analysis survey questionnaire were distributed to households that are not currently using IPTV, which broke down by region to 200 copies to Seoul-based households and 100 copies each in Incheon, Busan and Daegu-based households; 414 valid responses were returned. As for the use-diffusion analysis questionnaire

designed for households that are currently using IPTV, 250 copies were distributed – 100 copies in Seoul and 50 copies each in Busan, Incheon and Daegu – and 160 valid responses were returned. The survey was conducted over a period of one month, between October 15, 2008 and November 14, 2008.

As for the geographical distribution of respondents who returned valid responses, Seoul accounted for 44.2% of the total households that are currently not using IPTV (183 out of 414 total households that returned a valid response) followed by Busan (85 households), Daegu and Incheon (73 households for both cities). As for households that are currently using IPTV, 90 of them resided in Seoul, corresponding to 56.3% of total households that returned a valid response, while 29 others resided in Busan, 23 in Daegu and 18 in Incheon.

Table 7 Surveyed household locations

Region	IPTV non-user		IPTV user	
	Frequency	Ratio (%)	Frequency	Ratio (%)
Seoul	183	44.2%	90	56.3%
Inchoen	85	20.5%	29	18.1%
Busan	73	17.6%	23	14.4%
Daegu	73	17.6%	18	11.3%
Total	414	100%	160	100%

Table 8 Respondent characteristics

Variables	Category	Adoption-diffusion (IPTV non-user)		Use-diffusion (IPTV user)	
		Frequency(persons)	Ratio (%)	Frequency(persons)	Ratio (%)
Sex	Male	187	45.2	90	56.3
	Female	227	54.8	70	43.8
Age	Age 20–29	62	15.0	42	26.3
	Age 30–39	126	30.4	83	51.9
	Age 40–49	157	37.9	27	16.9
	Age over 50	69	16.7	8	5.0
Marital status	Married	352	85.0	87	54.4
	Single	62	15.0	73	45.6
Education	Under middle school graduate	3	0.7	0	0
	High school graduate	214	51.7	19	11.9
	In college	10	2.4	11	6.9
	College graduate	183	44.2	113	70.6
	Master’s degree or higher	4	1.0	17	10.6
Job	Self-employed	92	22.2	23	14.4
	Sales	61	14.7	6	3.8
	Production	16	3.9	2	1.3
	Office Worker	109	26.3	76	47.5
	Technician	44	10.6	13	8.1
	Management	15	3.6	3	1.9
	Specialized Job	15	3.6	17	10.6
	House maker	55	13.3	8	5.0
Student	6	1.4	6	3.8	

	Unemployed	1	0.2	5	3.1
	Other	0	0	1	0.6
Average income	Under KRW 2.5 million	70	16.9	28	17.5
	KRW 2.5-5 million	277	66.9	76	47.5
	KWR 5-7.5million	54	13.0	37	23.1
	Above KRW 7.5 million	13	3.1	19	11.9
Total		414	100.0	160	100.0

3.2 Results

To test the reliability and validity of the variables used in the two diffusion models, I calculated Cronbach's α and performed a factor analysis. The results suggest that all variables had a sufficient level of reliability and validity. Those of the constructs used in the adoption-diffusion model that proved to have an acceptable level of validity through the factor analysis were, then, tested for internal consistency reliability. Cronbach's α was 0.660 or greater for all factors tested. The internal consistency reliability analysis, performed on the constructs used in the use-diffusion model, resulted in a Cronbach's α of 0.8 or greater for all of the factors.

3.2.1 Result of adoption-diffusion model

I performed a structural analysis of the adoption-diffusion models predicting the diffusion of IPTV, using AMOS v.70. The resulting goodness-of-fit measures are provided in **Table 9** below, listing the values separately for IPTV:

The goodness of fit of the overall model proved to be highly adequate.

The structural analysis of the adoption-diffusion model on IPTV was based on TAM. The results of the structural analysis of the adoption-diffusion models on IPTV are listed in **Table 9** below.

Table 9 Results of structural analysis of adoption-diffusion model on IPTV

Chi Square Indices		GFI		AGFI		RMR		NFI	
χ^2	df	$\chi^2/df(p)$	GFI	AGFI	RMR	NFI			
5.865	1	5.865(.015)	0.998	0.917	0.004	0.997			

Exogenous variable	Path	Endogenous variable	Estimate
Compatibility	→	Perceived ease-of-use	0.053
Observability			0.108+
Trialability			0.178**
Communication			0.097*
Complexity			-0.080*
Relative advantage			0.266**
Perceived risk			0.075+
Quality of service			0.183**
Household innovativeness			0.073*
Compatibility	→	Perceived usefulness	0.108*

Observability			0.381**
Trialability			0.082*
Communication			0.121**
Complexity			0.037
Relative advantage			-0.037
Perceived risk			0.096**
Quality of service			0.085+
Household innovativeness			-0.037
Compatibility			-0.078
Observability	→	Intention to subscribe to IPTV	0.059
Trialability			0.252**
Communication			0.013
Complexity			0.046
Relative advantage			0.138
Perceived risk			-0.144*
Quality of service			0.219*
Household innovativeness			0.233**
Perceived ease-of-use	→	Intention to subscribe to IPTV	0.301**
Perceived usefulness			0.116

+p < . 1; *p < . 05; **p < . 01

The results reveal that, trialability, perceived risk, quality of service, household innovativeness and perceived ease-of-use had a direct influence on potential users' intention to subscribe to IPTV. Also, these variables had indirect mediation effects through its perceived ease-of-use. What this implies in practical terms is that in order to promote the adoption-diffusion of IPTV, marketers must try to enhance consumer-perceived ease-of-use of this application. Thus, hypotheses 1 and 2 on the adoption-diffusion model on IPTV are generally well supported.

3.2.2. Result of use-diffusion model

To test hypotheses 3 and 4 on the use-adoption of IPTV, I performed a structural analysis of the use-adoption model using the survey response data collected from IPTV users. The goodness-of-fit measures obtained from the analysis are provided in **Table 10** below:

Goodness-of-fit values from all indices, from χ^2 to GFI, AGFI, RMR and NFI, were within a very satisfactory range. The goodness-of-fit of the use-adoption model on IPTV was, notably, superior to that of the two adoption-diffusion models on IPTV, respectively, analyzed earlier. Based strictly on the goodness-of-fit values, the use-diffusion model on IPTV may be considered to possess more explanatory power than the two other models for the diffusion process in real-world settings.

The results of structural analysis revealed that complementarity, a construct specific to the use-diffusion model, and communication, a construct common to the adoption-diffusion and use-diffusion models, had a direct influence on the rate of use of IPTV and the satisfaction felt by users. The intention to re-use IPTV, meanwhile, was influenced by perceived risk and relative advantage. This is an indication that in order to enhance consumers' satisfaction with IPTV, in the

context of promoting the use and diffusion of this service, providers must look to increase its complementarity vis-à-vis existing media and strengthen its communication-related functions. Meanwhile, to incite current users to re-subscribe to IPTV, providers need to adopt a strategy which reduces perceived risk associated with this service while simultaneously increasing its relative advantage.

Specifically, the rate of use of IPTV was directly influenced by variables from the media substitution theory, such as complementarity and the substitution effect, and communication. The variety of use was likewise positively influenced by the media substitution variables such as similarity and complementarity, and the sophistication of technology. These results imply that media substitution variables constitute important determinants for the rate of use and the variety of use of innovative products like converged media services. Also, satisfaction with IPTV was positively influenced by complementarity, the substitution effect and communication – variables which proved to also influence the rate of use. In the meantime, the intention to re-use IPTV was positively influenced by complexity and relative advantage, but negatively influenced by perceived risk. However, the study found that the rate of use and the variety of use of IPTV did not significantly influence consumers' intentions to re-use this service. Hypotheses 3 and 4 on use-diffusion of IPTV were, therefore, partially supported.

Table 10 Results of structural analysis of the use-diffusion model on IPTV

χ^2	Df	χ^2/df	GFI	AGFI	RMR	NFI
1.822	1	1.822	0.998	0.918	0.0008	0.998

Exogenous variable	Path	Endogenous variable	Estimate	Exogenous variables	Path	Endogenous variable	Estimate
Product experience	→	Rate of use	0.088	Product experience	→	Satisfaction	0.005
Sophistication of technology			0.060	Sophistication of technology			0.060
Similarity			-0.020	Similarity			-0.020
Complementarity			0.362**	Complementarity			0.362**
Substitution effect			0.191*	Substitution effect			0.191*
Household innovativeness			-0.125	Household innovativeness			-0.125
Communication			0.260**	Communication			0.260**
Complexity			0.051	Complexity			0.051
Relative advantage			0.197+	Relative advantage			0.197+
Perceived risk			0.015	Perceived risk			-0.135
Service quality			0.104	Service quality			0.144
				Rate of use	→	Satisfaction	0.045
				Variety of use			0.301**
Product experience	→	Variety of use	0.107	Product experience	→	Intention to re-use	0.133
Sophistication of technology			0.169*	Sophistication of technology			0.169

Similarity			0.451**	Similarity			-0.059
Complementarity			-0.008	Complementarity			0.084
Substitution effect			0.329**	Substitution effect			0.098
Household innovativeness			-0.100	Household innovativeness			-0.081
Communication			-0.116	Communication			0.035
Complexity			0.135	Complexity			0.178*
Relative advantage			0.144	Relative advantage			0.288**
Perceived risk			0.007	Perceived risk			-0.300**
Service quality			-0.069	Service quality			-0.050
				Rate of use	→	Intention to re-use	0.102
				Variety of use			0.122

+p < .1; *p < .05; **p < .01

3.3 Recapitulation

The results of the analysis of factors influencing the diffusion of IPTV services, using the adoption-diffusion model and the use-diffusion model, are summarized in **Table 11**.

First, in the case of the adoption-diffusion model, measuring non-users' intentions to adopt IPTV, the trialability and perceived ease-of-use proved to be determinants effectively influencing the adoption behavior of potential subscribers, among endogenous factors, specific to this approach. Among common factors, I found that household innovativeness, perceived risk, and service quality were determinants of adoption of IPTV. The results also indicate that for innovative, converged media services like IPTV, perceived ease-of-use is an important mediator of the relationship between factors influencing adoption-use behavior and actual adoption-use. What this finding suggests in practical terms is that enhancing ease-of-use is crucial to promote the adoption-diffusion of IPTV. The results also show that in order to enhance the perceived ease-of-use of IPTV, service providers must emphasize observability, trialability, communication, relative advantage, and service quality, at the level of the product and technology, and try to capitalize on household innovativeness at the level of consumers.

Table 11 Summary of results

Variables		Adoption-diffusion (non-users)	Use-diffusion(users)	
		Intention to subscribe	Satisfaction	Intention to re-use
Model-specific factors	Compatibility			
	Observability			
	Trialability	**		
	Perceived ease-of-use	**		
	Perceived usefulness			
	Product experience			
	Sophistication of technology			
	Similarity			
	Complementarity		**	
	Substitution effect		*	
	Rate of use			
Variety of use		**		
Common factors	Household Innovativeness	**		
	Communication		**	
	Complexity			*
	Relative advantage		+	**
	Perceived risk	*		**
Service quality	*			

+Moderate influence; *Strong influence; **Very strong influence

Second, the use-diffusion model on IPTV proved to have high explanatory power for the diffusion process of converged media services. The analysis, based on the results of a survey of consumers currently subscribed to an IPTV service, found that the use-diffusion model far exceeded the adoption-diffusion model in terms of explanatory power with regard to satisfaction felt with the service and the intention to re-use the service. The use-diffusion model also received very high goodness-of-fit scores from all indices. The satisfaction that consumers experience with IPTV was influenced by complementarity, the substitution effect and the variety of use, among endogenous factors specific to the use-diffusion model, and communication and relative advantage, among common factors.

The intention to re-use IPTV was significantly influenced by factors common to the two diffusion models, such as complexity, relative advantage and perceived risk, rather than factors uniquely associated with the use-diffusion model. These results indicate that in order to enhance users' satisfaction with IPTV and, thereby, incite them to continuously use the service, service providers must increase both its complementarity and substitution effect vis-à-vis existing media and induce more varied use of it. Consumers' intention to re-use IPTV, as I have said earlier, is more greatly influenced by factors common to the two diffusion models, namely, relative advantage and perceived risk, rather than those that are specific to the use-diffusion

model.

3.4 Implications

As a holistic approach to understanding the diffusion process of IPTV, a converged media service that is rapidly rising as an alternative to CATV, the traditional TV service with the highest household penetration, this study empirically analyzed both an adoption-diffusion model of innovation and a use-diffusion model. The main theoretical and practical implications of this study are as follows:

At a theoretical level, this study is significant in four ways: First, it is an empirical evaluation of the use-diffusion model proposed by Shih and Venkatesh (2004) that compares it to a traditional adoption-diffusion model. Although there have been some attempts, in recent years, to explain the use-diffusion model, as an alternative to the adoption-diffusion model, these attempts fall short of establishing whether and to what degree the former exceeds the latter in terms of explanatory power. The findings of this study provide concrete evidence that the use-diffusion model surpasses the adoption-diffusion model in its ability to explain the diffusion of innovations in real-world situations.

Second, this study proposed a set of adoption factors and use factors to consider from the adoption-diffusion perspective and use-diffusion perspective, which influence the prospect and process of diffusion for IPTV. In identifying adoption factors for IPTV, this study distinguished common factors from model-specific factors, thereby providing a theoretical basis for designing a strategic marketing framework.

Third, this study found evidence that the rate and variety of use, the two key mediators in the use-diffusion model by Shih and Venkatesh (2004), do not have as determining or conclusive an influence on the diffusion outcome as perceived ease-of-use or perceived usefulness with constructs used in TAM, a model based on the traditional adoption-diffusion paradigm. Shih and Venkatesh (2004), who focused on different use patterns displayed by users of innovative technology products or services, divided the market into user segments, derived factors influencing the use-diffusion of new products and services from the use patterns of these user segments, and accordingly predicted the outcome of diffusion. The results, however, revealed that usage patterns based on rate of use and variety of use, alone, cannot adequately explain the use-diffusion of innovations.

Fourth, this study found that product experience and technological sophistication, two constructs proposed by Shih and Venkatesh (2004) as important

influence factors for the diffusion of a new product, had no significant influence or predictive power on the diffusion outcome. Product experience, being a central concept in experiential marketing and the TCE paradigm, provides an ample, theoretical basis justifying its importance as a variable in the diffusion process of new products or services. I found, however, that concerning IPTV and, by extension, converged digital media in general, product experience and technological sophistication determine less satisfaction felt by consumers and their intention to re-use the service than what is contributed to the process in which traditional influence factors such as relative advantage or perceived risk influence the intention to newly subscribe to the service or continuously use it. In sum, the experience of an innovative product or its technological sophistication alone proved to be insufficient to explain its diffusion process or outcome. The results, therefore, suggest that product experience and technological sophistication, rather than being independent predictors of the use-diffusion process of innovations, are links mediating the influence of other factors.

This study offer a number of practical implications for the marketing of IPTV, now set to begin commercial service in Korea, concerning both market entry and market penetration strategies. When designing a market entry and marketing strategy for IPTV, service providers must try to create a positive perception among

its potential users, especially with regard to its trialability and ease-of-use. Customer relationship management is to be perceived as significant approach impacting the success of business company in the long run (Korsakiene 2009). The results, furthermore, suggest that service providers need a strategy to reduce the opportunity costs arising from the adoption of IPTV as well as the learning curve required before consumers become proficient with its use. Meanwhile, to solidify the grip on the early adopter market, the marketing strategy must stress IPTV's complementarity vis-à-vis other media and its substitution effect, so as to enhance satisfaction among this adopter segment and, thereby, magnify the word- of- mouth, marketing effect.

The two-way, interactive data transfer capability of IPTV must be also emphasized so as to increase consumers' awareness of this medium as a communications solution and not just as a media delivery service. Underlining the fact that IPTV provides customized content is also a valid market entry strategy. Finally, in order to prevent the desertion of IPTV by early adopters, for instance, at the end of a promotional, free trial period, providers must emphasize the relative advantage of this service to incite them to continue to use it. The findings also point to the need to reduce perceived risk associated with subscribing to an IPTV service.

Chapter 4 Comparative analysis of innovative diffusion in the high-tech markets of Japan and South Korea²

Recently, some doubt has been raised by many scholars and practitioners concerning whether or not conventional research approach to the diffusion of innovation can explain and predict the needs and behavioral patterns of consumers (Hoffmann and Soyez 2010; Kivi et al. 2008; Shih and Venkatesh 2004). The conventional research on the diffusion of technology has relied mainly on Rogers' (1995) Innovation and Diffusion Theory and the Technology Acceptance Model (TAM) (Davis, 1989) that was rooted in Theory of Reasoned Action (TRA) (Fishbein and Ajzen, 1975) and the Theory of Planned Behavior (TPB) (Ajzen, 1991). Because conventional research had only focused on the process of diffusion by simply looking at the adoption behavior of consumers, it is difficult to clearly account for the needs and behavioral patterns of consumers in the rapidly changing market environment. For instance, since one of the dominant trends and

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phenomena in innovation environments is convergence, product lifecycles are becoming short in a number of industries especially in high-tech markets (Hoffmann and Soyez 2010). In such market environments, many firms have attempted to satisfy the demand of their customers so as to be competitive. To effectively and successfully launch new products, firms should know not only about the needs and behavioral patterns of consumers, but also be aware of antecedents of consumer innovativeness.

Considering the limitations of previous research and the rapidly changing market environment, some scholars have introduced a new model, the Use-Diffusion Model, as an alternative approach by shifting the focus from adoption of innovation to usage of innovation (Shih and Venkatesh 2004). According to them, the Use-Diffusion Model (UDM) can explain and predict the diffusion process of innovative technologies by examining consumers' usage patterns in the post-adoption stage and to determine further diffusion. For example, UDM can consider diverse characteristics of diffusion such as different dimensions of Technology Usage, Rate of Use, and Variety of Use to determine how an innovation would fare in the market over a long term. Thus, UDM is widely applicable as an explanatory model further diffusion of technically-complex products such as converged digital products, which offers multiple functions (Kim and Yi 2007).

The main purpose of this study is to explore whether UDM is more effective for a more complete investigation of innovation diffusion than the Adoption-Diffusion Model in an environment where the product lifecycle is becoming increasingly short and consumers' insatiable demand for digital convergence services. In this study, I compare innovative patterns between Japanese and Korean customers because these two countries have some similarities such as the world-leading level of technology, consumers' usage patterns, and innovative attributes and cultures (Ha and Hong 2008). Additionally, I will select Internet Protocol Television (IPTV) market services in Japan and Korea as is IPTV is typical converged digital media service (Motohashi et al. 2012; Nishi 2008). Currently, the number of subscribers of IPTV service in Japan is 3.13 million and Korea is 3.7 million as of 2010 (Motohashi et al. 2012).

This paper is organized into six parts. In the first part, I discuss the Adoption-Diffusion Model and the Use-Diffusion Model in order to examine different characteristics of innovation. In the second part, I develop hypotheses focusing on factors affecting consumers' innovative patterns. In the third part, I present the research model and measurement items. In the fourth part, I will empirically test the research model with a real data set. In the last parts of the fifth and sixth parts, I provide discussion of the results and elaborate implications, limitations, and future

research needs.

4.1 Comparison of adoption-diffusion and use-diffusion frameworks

Mick and Fournier (1998) argued that adoption of a new technology is influenced by consumers' viewpoints, opinions, and experience through a discussion of the paradox of technology that explains why a technology is perceived in a certain way and why its diffusion becomes delayed. Shih and Venkatesh (2004) proposed the Use-Diffusion Model (UDM) as an alternative to the traditional Adoption-Diffusion Model for a more complete understanding of the process of consumers' acceptance of new technological products. UDM by Shih and Venkatesh (2004) consists of theoretical frameworks that are focused on the three constructs of use-diffusion, pattern of use-diffusion, and the result of use-diffusion. Additionally, UDM is conceptually divided into two groups – Variety of Use and Rate of Use – in order to explain the pattern of use-diffusion. The variety of Use means the extent to which content provided by IPTV is varied. The Rate of Use refers to the amount of time spent on IPTV. **Table 12** shows a comparison of the Adoption-Diffusion and Use-Diffusion frameworks to theoretically and

practically understand which factors are different and whether or not the new model overcomes some of the limitations of the conventional model in explaining a pattern of consumers' acceptance of new products.

Table 12 Comparison of adoption-diffusion and use-diffusion frameworks

	Differentiation				Elements common to both models
	Variable of interest	Typology of population	Relevant criteria	Elements unique to each model	
AD	Adoption	<ul style="list-style-type: none"> · Innovators · Early adopters · Early majority · Late majority · Conservatives 	<ul style="list-style-type: none"> · Timing or rate of adoption 	<ul style="list-style-type: none"> · Observability · Compatibility · Trialability 	<ul style="list-style-type: none"> · Innovativeness · Social communication · Complexity · Influence of media · Relative advantage
UD	Use	<ul style="list-style-type: none"> · Intense users · Specialized users · Non-specialized users · Limited users 	<ul style="list-style-type: none"> · Rate of use · Variety of use 	<ul style="list-style-type: none"> · Product experience · Competition for use · Sophistication of technology · Satisfaction 	

Source: Shih, C. and Venkatesh, A (2004)

First, there is a significant difference in the framework between the Adoption-Diffusion Model and the Use-Diffusion Model in terms of the usage paradigm. The Adoption-Diffusion Model emphasizes the rate and time frame of adoption. In

contrast, because UDM focuses on the Rate of Use and the Variety of Use, it has predictive capabilities for the diffusion of technology products and services.

Second, at a theoretical level, the Adoption-Diffusion Model presents an S-shaped diffusion curve, penetration rate, adopter categories, and a two-stage process: the phase of innovation and the phase of imitation. On the other hand, UDM is more focused on the continuous use of a technology, the degree of technological convergence of a certain product or service, the perceived need and influence of a technology, and users' adoption behavior vis-à-vis new technologies.

Third, the Adoption-Diffusion Model stresses market segmentation proposed by Rogers' diffusion curve. This diffusion curve can be divided into five categories with regard to the degree of innovation, communication channels, length of time, and social system, namely: innovators, early adopters, early majority, late majority, and laggards (Rogers 2003). Meanwhile, the market in UDM is segmented according to the type of users and user capabilities into four categories: intense users, specialized users, non-specialized users, and limited users (Motohashi et al. 2012).

As shown in **Table 12**, these two models have differences in terms of what the core approach is in explaining diffusion patterns, how to segment the market and measure segmentation criteria, what main factors are important for determining

different types of consumers, and theoretical considerations. Although these two models have different perspectives and approaches, they still share some common elements in regard to diffusion patterns in an innovative environment: individual innovativeness, social communication, complexity, media influence and relative advantage. However, Kim (2005) argued that these common variables are not always defined or understood in the same way between the two models. For instance, the innovativeness of a user is a fundamental concept distinct from the innovativeness of an adopter (Motohashi et al. 2012). Furthermore, while the process of diffusion in the Adoption-Diffusion Model is examined for characteristics such as observability, compatibility, and trialability (Rogers 2003), the process of diffusion in UDM is explained through product experience, competition for use, sophistication of technology, and satisfaction (Motohashi et al. 2012; Shih and Venkatesh 2004). Thus, it can be argued that UDM has superior theoretical and practical capabilities relative to the Adoption-Diffusion Model in dealing with and explaining the needs and behavioral patterns of consumers who demand for more sophisticated and converged items in the high-tech market.

4.2 Hypothesis development

The Use-Diffusion Model (UDM) has several common constructs (household innovativeness, social communication, complexity, media influence and relative advantage) as the Adoption-Diffusion Model in investigating innovative patterns of users (Shih and Venkatesh 2004). In this study, I excluded media influence from the common constructs because it is similar to substitution effect discussed by Media Substitution Theory. Nevertheless, UDM is structurally different from the Adoption-Diffusion Model as it specifically emphasizes certain variables (product experience and sophistication of technology) related to the Rate of Use and Variety of Use that ultimately influence satisfaction and intention to re-use (Shih and Venkatesh 2004). Additionally, other variables (similarity, complementarity, and substitution effect) discussed by Media Substitution Theory and Total Customer Experience Theory may positively or negatively be related to the Rate of Use and Variety of Use if these are theoretically and practically supportable in the converged high-tech market (Barbara and Thomas 2003; Berry et al. 2002; Cai 2001; Li 2004; Sandström et al. 2008). Unfortunately, there has been insufficient evidence to support these issues. Therefore, an empirical study of causal relationships among the variables that affect or influence each other is significant.

In this part, I develop hypotheses to test these concerns based upon the two models and other theoretical approaches.

4.2.1 Common constructs between adoption and use-diffusion models

Rogers (2003) and Shih and Venkatesh (2004) emphasized technological density of the home that influences the rate of adoption of new innovations. Innovativeness with regard to high-tech items, such as HDTV, is a household matter instead of merely an individual preference (Baaren et al. 2008). They empirically argued that a change of television sets and subscriptions affects all members of a household, and thus innovativeness of the household can influence personal perceptions on HDTV (Baaren et al. 2008).

Shih and Venkatesh (2004) stated that higher exposure to media may stimulate involvement with the technology. Thus, it may account for higher levels of usage pattern. Some scholars have argued that consumers' use of new technologies is directly related to the degree of social communication (Lee et al. 2002). In particular, someone who is used to media for fun or work is more inclined to experiment with high technology such as Internet, social network service (SNS)

than are others. Lee and her colleagues (2002) found that social communication was an important predictor of the actual acceptance of new items, in a study of the banking industry's adoption of new technology products.

Complexity refers to the degree to which an innovation is perceived as difficult to understand and use (Mahler and Rogers 1997). Ram and Jung (1990) believe that the main obstacle and resistance factor for consumers to adopt or use an innovative product is perceived risk. For instance, when a consumer perceives that purchasing a new product bears risk, this perception may play a crucial role as a functional or psychological barrier. Thus, perceived risk could affect the consumer to delay adopting as cause a downright rejection of the product.

According to Mahler and Rogers (1997), relative advantage means the degree to which an innovation is perceived to produce significant benefits for the user. For instance, Rogers (2003) and Shih and Venkatesh (2004) insisted that technological (e.g., convenience) benefit as well as demographic (e.g., income and education level) and socioeconomic (e.g., social prestige) benefits are critical determinants affecting innovative behavioral patterns associated with relative advantage. Additionally, Shih and Venkatesh (2004) empirically supported that variety of use and rate of use play significant roles in identifying satisfaction and intention to re-use.

If the Adoption- and Use-Diffusion approaches help explain consumers' innovative patterns in Japan and South Korea, the following hypotheses can be proposed.

H1a. The Variety of Use and Rate of Use of IPTV in Japan and South Korea are affected by household innovativeness, communication, complexity, and relative advantage.

H2a. Consumers' satisfaction with and intention to re-use of IPTV in Japan and South Korea are affected by household innovativeness, communication, complexity, and relative advantage.

H3a. Consumers' satisfaction with and intention to re-use of IPTV in Japan and South Korea are affected by the Rate of Use and Variety of Use.

4.2.2 Unique Constructs of use-diffusion

To understand the process of consumers' acceptance of new products, one of the priorities of this study is to not only move beyond examining adoption factors, but also use-diffusion patterns (Shih and Venkatesh 2004). Regarding these concerns, Shih and Venkatesh (2004) argued that product experience and sophistication of technology are indispensable factors in explaining and examining

innovative behavior in the converged high-tech market.

Many scholars in the study field of experiential marketing and Total Customer Experience (TCE) have stressed that product experience influences the use and diffusion of new products (Cognitavive 1999; Hahn et al. 1994; Huberman et al. 1998; Motohashi et al. 2012sa). Hahn and his colleagues (1994) asserted that product experience had a direct influence on the users' innovative patterns. In particular, as consumers' experience of a new innovative item increases, they develop a better understanding of its benefits and come to perceive it as a valuable and indispensable part of their everyday life. Cognitavive (1999) empirically supported this argument by testing users' experiences on the website of an online company. Cognitavive (1999) argued that users' experience not only shapes their image of the online company, but also has a decisive influence on their intention to re-visit the same website in the future.

An additional determinant leading to innovative usage patterns is sophistication of technology (Shih and Venkatesh 2004). The sophistication of technology means versatility and capability of a certain technology with consideration of ease of use. They argued that users' innovative patterns depended on the degree of sophistication of the innovative product under question. Their evidence showed that if a new product is technologically sophisticated and easy to use, consumers

are more willing to use it than other existing similar products.

If unique constructs proposed by UDM can explain consumers' innovative patterns in Japan and South Korea, the following hypotheses can be proposed.

H1b. The Variety of Use and Rate of Use of IPTV in Japan and South Korea are affected by consumers' product experience and sophistication of the product's technology.

H2b. Consumers' satisfaction with and intention to re-use of IPTV in Japan and South Korea are affected by product experience and sophistication of technology.

H3b. Consumers' satisfaction with and intention to re-use of IPTV in Japan and South Korea are affected by the Rate of the Use and Variety of Use.

4.2.3 Supportable constructs of use-diffusion

According to Media Substitution Theory and Total Customer Experience (TCE) Theory, functional similarity, substitution effect, and complementarity are related to consumers' usage patterns (Atkin 1995; Barbara and Thomas 2003; Berry et al. 2002; Cai 2001; Fidler 1997; Li 2004; Sandström et al. 2008). Since high technology products and services often provide a variety of functions with regard

to convenient and comfortable services, customers especially having innovative tendencies are more inclined to substitute a new product or a service by comparing either previous or existing other products or services (Barbara and Thomas 2003). After testing consumers' preference to a two-way CATV service, Li (2004) proposed that the functional similarity is a key factor influencing consumers' usage pattern toward innovative technology products or services. Berry and his colleagues (2002) argued that the competitiveness of a product or a service is determined by customers' satisfactory experience, given that an innovative product is complementary in many ways.

Relating Media Substitution Theory and TCE theory to UDM to explain consumers' innovative patterns of Japan and South Korea, the following hypotheses can be proposed.

H1c. The Variety of Use and the Rate of Use of IPTV in Japan and South Korea are affected by functional similarity, substitution effect, and complementarity.

H2c. Consumers' satisfaction with and intention to re-use of IPTV in Japan and South Korea are affected by functional similarity, substitution effect, and complementarity.

H3c. Consumers' satisfaction with and intention to re-use of IPTV in Japan and South Korea are affected by the Rate of Use and Variety of Use.

4.3 Research model and methodology

4.3.1 Research model

The main purpose of this study is to empirically test whether the Use-Diffusion Model (UDM) proposed by Shih and Venkatesh (2004) is not only applicable to observe the diffusion process of converged media services, especially in the IPTV market, but can also predict the consumers' behavior patterns.

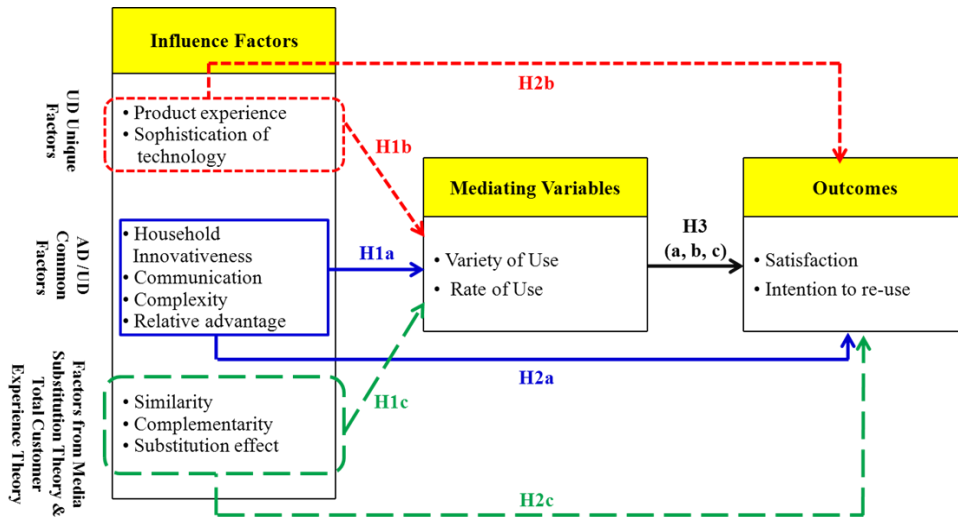


Figure 7 Research model

Therefore, I proposed the research model shown in **Figure 7** for testing these two issues. The research model was derived from UDM, the Adoption-Diffusion Model, and other theories (i.e., Media Substitution Theory and Total Customer Experience Theory).

As **Figure 7** shows, there is a process linking influence factors to mediating variables and outcome variables. Thus, the model contributes not only to a better understanding of the processes through which influence factors operate by highlighting their influence on the mediating variables (Rate of Use and Variety of Use), but also how outcomes (satisfaction and intention to use) can be enhanced.

This process is important, both theoretically and practically, as it provides a potential foundation and the point of departure for understanding the patterns of consumer behavior and the degree of innovative diffusion in a high-tech market.

4.3.2 The Population, sample, and instrumentation

To test the research hypotheses, the following process is undertaken. First, given that the main purpose of this study is to investigate the use of IPTV and the process of its diffusion in Japan and Korea, a survey design is an appropriate way to collect data on trends, attitudes, and opinions of a population. Before conducting the main survey, I conducted a pilot study to ensure the questions would be properly understood by asking university faculty and researchers interested in IPTV-related topics. Based on their comments and concerns, the questionnaire items and measurement variables were appropriately revised and supplemented.

Second, the target population in this study is both Japanese and Koreans who are currently using an IPTV service. In the first survey, the total number of participants was 1,000 in Japan using both Internet survey and 500 in Korea by

face-to-face interview survey.³ Additionally, in Japan I randomly excluded 500 respondents out of 1,000 respondents to have the equal sample size between Japanese and Korean IPTV users. The survey was conducted over a period of twenty days (Sep. 1-Sep. 20, 2009) in Japan. The survey in Korea was conducted over a period of one month (Sep 10, 2009 - Oct. 10, 2009).

Table 13 shows the sample profile in Japan and Korea. In Japan, 71.5 percent of the respondents were male and 28.5 percent female. In the classification, age 28.5 percent of the respondents were in their 20s, and 31.7 percent in their 30s. In the occupation group, 12.7 percent of the respondents were self-employed and 20.9 percent technical employees. In the level of education, 30.9 percent of the respondents were senior high school graduates and 58.8 percent college graduates. In annual income, 42 percent of the respondents earn about US \$50,000 to US \$100,000.

In Korea, 50.5 percent of the respondents were male and 49.5 percent female.

³ In order to find respondents, there are several sampling methods: 1) Non-Probability Sampling Methods (e.g., purposive sample, volunteer subjects, haphazard sample), and 2) Probability Sampling Methods (e.g., simple random sample, stratified sample, cluster sample). However, each sampling methods has advantages and disadvantages. Therefore, I had to carefully draw two different samples with regard to both accuracy and research expense. In Japan I found respondents through an Internet survey because it is becoming increasingly popular with many researchers in diverse fields such as marketing. On the other hand, in Korea I drew a simple random sample (i.e., face-to-face survey) for accuracy, although it is too expensive.

In the age group, 38.3 percent of the respondents were in their 30s and 28.3 percent in their 40s. In the occupation group, 19.1 percent of the respondents were self-employed and 33.6 percent clerical employees. In the level of education, 34.7 percent of the respondents were senior high school graduates and 54.3 percent college graduates. In annual income, 20.1 percent of the respondents earn up to about US \$25,000, and 58.1 percent of the respondents earn about US \$25,000 to US \$50,000.

Table 13 Sample profile

		Japan		Korea	
		N	%	N	%
Total		500	100	500	100
Gender	Male	357	71.5	252	50.5
	Female	143	28.5	248	49.5
Age	20s	68	13.5	97	19.5
	30s	158	31.7	192	38.3
	40s	160	32	141	28.3
	50s	83	16.7	70	13.9
	60s	27	5.3		
	Over 70s and Older	4	0.8		
Occupation	Self-employed	63	12.7	95	19.1
	Sales	53	10.5	54	10.7
	Production	16	3.2	15	3.1
	Clerical employee	95	19	168	33.6
	Technical employee	104	20.9	48	9.6
	Administration	41	8.2	16	3.2
	Professionals	37	7.4	38	7.6
	Agriculture, fisheries, and stockbreeder	3	0.5	3	0.5
	Housewives	28	5.7	46	9.2
	Students	9	1.8	10	2.0
	Inoccupation	38	7.6	6	1.3
	Others	13	2.5	1	0.1
Level of education	Junior high school	6	1.1	5	1.1
	Senior high school	154	30.9	174	34.7
	Some college	8	1.7	20	4.0

	College graduates	294	58.8	271	54.3
	Postgraduate degree holders	38	7.5	30	5.9
Annual income	US \$0~\$50,000	99	19.8	391	78.2
	US \$50,000~\$100,000	210	42	78	15.6
	US \$100,000~\$150,000	98	19.6	23	4.6
	Over US \$150,000	44	8.9	8	1.6
	NA	49	9.7	0	0

4.3.3 Measuring instruments

This research included variables in three groups: independent variables, mediating variables, and dependent variables. Dependent variables were re-organized by the Adoption-Diffusion Model and the Use-Diffusion Model, including factors (i.e., Similarity, Complementarity, and Substitution Effect) from media substitution theory and total customer experience theory. In particular, household innovativeness, communication, complexity, and relative advantage are common factors discussed by the Adoption-Diffusion Model and the Use-Diffusion Model. Product experience and sophistication of technology are unique factors of Use-Diffusion Model. Mediating variables chosen for this study were the Rate of Use and Variety of Use. The dependent variables included Satisfaction and Intention to Re-use. **Table 14** shows a brief measurement of each variable.

Table 14 Research measurement

Variables	Measurement	No. of Questions
Product experience	<ul style="list-style-type: none"> • The length of use of a product (Noyes and Garland, 2006). • The experience of using the five main functions of IPTV (i.e., VoD, personalized features, two-way communication, value-added services, entertainment and media content) (Sandström <i>et al</i>, 2008). 	4
Sophistication of technology	<ul style="list-style-type: none"> • The versatility and capabilities of the product/service (Shih and Venkatesh, 2004). 	7
Similarity	<ul style="list-style-type: none"> • Personal experience (Martin and Stewart, 2001). 	6
Complementarity	<ul style="list-style-type: none"> • The relationship between products and services. • The ability to increase IPTV's entertainment and usefulness as an information access and communication tool (Jeffers and Atkin, 1996). 	3
Household innovativeness	<ul style="list-style-type: none"> • Six innovative indicators; namely, curiosity, risk preferences, voluntary simplicity, creative re-use and multiple use potential (Price and Ridway, 1983). 	4
Communication	<ul style="list-style-type: none"> • The availability of assistance for use, access to use knowledge and wealth of information sources (Venkatesh, 2000). 	6
Complexity	<ul style="list-style-type: none"> • Four indicators: difficulty of use, complexity of method of use, understanding of detailed functions and need of explanation of detailed functions (Rogers, 2003). 	3
Relative advantage	<ul style="list-style-type: none"> • Price advantage, speed and convenience of operation and easy portability (Moore and Benbasat, 1991). 	5
Substitution effect	<ul style="list-style-type: none"> • TV, internet, mobile phone, DMB and other existing media, in terms of IPTV's potential to substitute their functionalities, the content they provide and the time spent using these media (Li, 2004). 	6
Rate of use	<ul style="list-style-type: none"> • Number of hours spent using a product/service (Shin and Venkatesh, 2004). 	4
Variety of use	<ul style="list-style-type: none"> • Variety of content types (i.e., communication with family members, family entertainment, care and support of family members, home shopping, education and information) (Ram and Jung, 1990). 	10

Satisfaction	• Positive feelings, overall satisfaction with a product/service and favorable quality assessment (Shih and Venkatesh, 2004).	4
Intention to re-use	• Intention to continue to use the current product/service and intention to recommend it to others (Hellier et al., 2003).	4

Product Experience was measured by the length of use of a product, from the initial purchase of the product to the current point in time (Noyes and Garland 2006). In particular, I measured emotional experience-related factors such as pleasures derived from IPTV, the experience of smooth integration of functionalities, and overall usefulness (Sandström et al. 2008). Specifically, the experience of using the five main functions of IPTV (Video on Demand (VoD), personalized features, two-way communication, value-added services, entertainment and media content) were regarded as main variables for the measurement of Product Experience.

I measured Sophistication of Technology through the versatility and capabilities of the product and service (Shih and Venkatesh 2004). In particular, technological sophistication was measured through the ability to use the technology, level of understanding, variety of use, and sophistication relative to similar existing technologies.

For measuring Functional Similarity, general similarity, appropriateness to intended purpose, and similarity in the context of media use were selected (Lee et al. 2002). Complementarity was measured at three levels: entertainment (pleasure, hobby, and entertainment), information supply, and communication with other media (Jeffers and Atkin 1996). Substitution Effect was measured with regard to

TV, Internet, mobile phone, DMB (Digital Multimedia Broadcasting), and other existing media in terms of IPTV's potential to substitute their functionalities, the content they provide, and the time spent using this media (Li 2004).

Household Innovativeness was measured by curiosity, creativity, risk preference, voluntary simplicity, creative re-use, and multiple use potential (Price and Ridgeway 1983). Social Communication was measured by the availability of assistance for use, access to use knowledge, and wealth of information sources (Venkatesh 2000). I measured Complexity through four indicators: difficulty of use, complexity in the method of use, understanding of detailed functions, and need of explanation of detailed functions. Relative Advantage was measured through price advantage, speed and convenience of operation, and easy portability (Moore and Benbasat 1991).

As for mediating variables, Rate of Use was measured by the number of hours spent using a product or service (Shih and Venkatesh 2004). Variety of Use was measured through the variety of content types for which a product or service is used as the means of access (Ram and Jung 1990). Satisfaction with IPTV was measured through positive feelings and overall satisfaction with a product/service, and a favorable quality assessment (Cronin and Taylor 1992; Shih and Venkatesh 2004). Intention to re-use was measured by the intention to continue to use the

current product or service, and intention to recommend it to others (Hellier et al 2003).

4.4 Analysis and results

4.4.1 Analytical instruments

This study used the PLS (Partial Least Squares) technique for data analysis. PLS is generally used for causal predictive analysis rather than for testing the goodness of fit of an overall model (Chin 1998; Wold 1985). SmartPLS 2.0 M3 was used as the PLS statistical program in this study. SmartPLS provides an improved graphic interface and a more stable platform (<http://www.smartpls.de>). As an additional analysis, I performed an inter-group average analysis on the two groups of IPTV users Japan and Korea using the statistical package SPSS 12.0.

4.4.2 Reliability and validity tests

Reliability in statistics refers to the consistency of scores obtained by repeatedly testing the same respondents on the same test under identical conditions.

Reliability is demonstrated by composite reliability greater than 0.7 in PLS (Chin 1998). **Table 15** shows the result of composite reliability. As **Table 15** shows, the values of composite reliability in both Japan (i.e., 0.807-0.973) and Korea (i.e., 0.824-0.954) respectively were greater than 0.7. Therefore, the IPTV Use-Diffusion Model is reliable.

Table 15 Reliability and convergent validity analysis

Measures	Japan		Korea	
	CR*	AVE**	CR*	AVE**
Product experience	0.966	0.878	0.953	0.834
Sophistication of technology	0.968	0.860	0.958	0.819
Similarity	0.906	0.708	0.950	0.863
Complementarity	0.918	0.736	0.898	0.747
Substitution effect	0.932	0.821	0.925	0.757
Household innovativeness	0.962	0.834	0.962	0.834
Communication	0.978	0.937	0.947	0.856
Complexity	0.956	0.879	0.952	0.869
Relative advantage	0.945	0.850	0.952	0.870
Rate of use	0.935	0.877	0.941	0.888
Variety of use	0.912	0.775	0.930	0.816
Satisfaction	0.967	0.908	0.962	0.865
Intention to re-use	0.955	0.915	0.926	0.863

*Composite Reliability, **Average Variance Extracted

Test scores are valid to the extent that they measure what they are intended to measure. There are multiple sources of information required for the process of test validation. In this study, I performed two validity tests – Convergent Validity and Discriminant Validity. First, Convergent Validity is demonstrated by loadings greater than 0.7 and AVE (Average Variance Extracted) greater than 0.5. Second, Discriminant Validity is demonstrated by the square root of the AVE being greater than any of the inter-construct correlations (Hair et al. 1998). **Table 15** and **Table 16** show the results of Convergent Validity and Discriminant Validity, respectively.

Table 16 Discriminant validity analysis

Korea Japan	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Product Experience (1)	0.937 0.913	0.427	0.178	0.430	0.303	0.252	0.334	-0.001	0.335	0.085	0.217	0.601	0.093
Sophistication of Technology (2)	0.581	0.927 0.905	0.343	0.589	0.621	0.218	0.387	0.097	0.207	-0.001	0.302	0.567	0.199
Similarity (3)	0.236	0.385	0.841 0.929	0.275	0.442	0.047	0.291	0.346	0.072	0.009	0.326	0.118	0.277
Complementarity (4)	0.239	0.344	0.378	0.858 0.864	0.552	0.217	0.397	0.068	0.302	0.017	0.299	0.482	0.142
Substitution Effect (5)	0.382	0.541	0.379	0.412	0.906 0.870	0.143	0.353	0.176	0.114	0.035	0.343	0.386	0.243
Household Innovativeness (6)	0.264	0.260	0.262	0.201	0.257	0.913 0.913	0.184	-0.036	0.244	0.165	0.228	0.207	0.132
Communication (7)	0.538	0.329	0.219	0.353	0.401	0.260	0.968 0.925	0.167	0.403	0.056	0.355	0.318	0.189
Complexity (8)	0.016	0.119	0.363	0.180	0.162	0.192	0.105	0.938 0.932	0.048	0.010	0.179	-0.050	0.289
Relative Advantage (9)	0.656	0.461	0.241	0.246	0.314	0.235	0.575	-0.048	0.922 0.933	0.100	0.176	0.269	0.097
Rate of Use (10)	0.031	-0.043	0.101	0.191	0.130	0.073	0.193	0.134	-0.081	0.936 0.942	0.095	0.058	0.110
Variety of Use (11)	0.227	0.366	0.362	0.230	0.200	0.233	0.243	0.189	0.213	-0.002	0.880 0.903	0.155	0.241
Satisfaction (12)	0.657	0.571	0.183	0.248	0.451	0.195	0.427	-0.110	0.554	-0.008	0.160	0.953 0.930	0.000
Intention to Re-use (13)	0.637	0.600	0.260	0.230	0.365	0.221	0.402	-0.071	0.563	-0.012	0.238	0.872	0.957 0.929

As **Table 15** and **Table 16** show, AVE values for Japan (0.708-0.937) and Korea (0.747-0.888) were greater than 0.5. Additionally, the square root values of AVE in Japan and Korea were greater than any of the inter-construct correlations. Therefore, the IPTV Use-Diffusion Model has the validity.

4.4.3 Hypotheses testing

This part statistically explores the connections, if any, between independent variables, mediating variables, and dependent variables. In particular, **Table 17** shows the results of structural equation analysis with regard to the relationship between the mediating variables (Rate of Use and Variety of Use) and the dependent variables (Satisfaction and Intention to Re-use), and each independent variable.

Table 17 Results of hypothesis testing

Exogenous variables	Endogenous variables							
	Mediating variables				Outcome variables			
	Rate of use		Variety of use		Satisfaction		Intention to re-use	
	Japan	Korea	Japan	Korea	Japan	Korea	Japan	Korea
Product experience	0.064	0.099	0.016	-0.046	0.400***	0.360***	-0.019	0.300***
Sophistication of technology	-0.088	-0.179***	0.016	0.283 ***	0.331***	0.223***	0.051	0.319***
Similarity	-0.006	0.046	0.160***	0.224 ***	-0.102**	-0.041	0.131**	0.065*
Complementarity	-0.057	0.145***	0.059	0.028	0.104*	0.012	-0.042	-0.012
Substitution effect	0.069	0.088*	0.124 **	-0.102 *	0.047	0.172***	0.109	0.006
Household innovativeness	0.154 ***	0.020	0.148 ***	0.098 **	-0.005	-0.004	0.105*	0.023
Communication	0.013	0.266***	0.186 ***	0.141 **	0.028	0.028	0.049	0.032
Complexity	0.013	0.049	0.069	0.052	-0.068*	-0.154***	0.217***	-0.140***
Relative advantage	0.062	-0.298***	0.010	-0.016	0.031	0.145***	0.028	0.174***
Rate of use	-	-	-	-	0.044	-0.007	0.088*	-0.012
Variety of use	-	-	-	-	0.151***	0.164***	0.233***	0.241***
R²	0.039	0.141	0.234	0.224	0.507	0.547	0.167	0.523

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

For Japan, to test the hypothesis of: 1) Common elements of IPTV users' behavior, 2) The use-adoption of IPTV, and 3) Additional elements of IPTV users' behavior pattern, I performed a structural equation analysis. First, Satisfaction, Product Experience, Sophistication of Technology, Similarity, Complementarity, and Complexity were statistically significant for Japan. These results imply that satisfaction with IPTV was positively influenced by Product Experience, Sophistication of Technology, Similarity, and Complementarity. Conversely, the complexity of converged media service had a negative influence on Satisfaction with IPTV in Japan. Second, intention to re-use IPTV, Similarity, Household Innovativeness, and Complexity were statistically significant for Japan. Thus, it can be inferred that intention to re-use IPTV was influenced by variables Similarity, Household Innovativeness, and Complexity. Third, for Rate of Use, only one independent variable (Household Innovativeness) was statistically significant for Japan. Because the coefficient is positive, the Rate of Use was likewise positively influenced by the Household Innovativeness. Finally, Variety of Use, Similarity, Substitution Effect, Household Innovativeness, and Communication were statistically significant for Japan. Variety of Use of IPTV service was influenced by variables from Similarity, Substitution Effect, Household Innovativeness, and Communication.

For Korea, to test the hypothesis of 1) Common elements of IPTV users' behavior, 2) The use-adoption of IPTV, and 3) Additional elements of IPTV users' behavior patterns, I performed a structural equation analysis. First, Satisfaction, Product Experience, Sophistication of Technology, Substitution Effect, Complexity, and Relative Advantage were statistically significant for Korea. These results show that satisfaction with IPTV was positively influenced by Product Experience, Sophistication of Technology, Substitution Effect, and Relative Advantage. Conversely, the complexity of converged media service had a negative influence on Satisfaction with IPTV for Korea. Second, Intention to Re-use IPTV, Product Experience, Sophistication of Technology, Similarity, Complexity, and Relative Advantage were statistically significant for Korea. It can be also inferred that Intention to Re-use of IPTV was positively influenced by variables Product Experience, Sophistication of Technology, Similarity, and Relative Advantage. On the other hand, Complexity of IPTV service had a negative influence on the intention to re-use. Third, Rate of Use, Sophistication of Technology, Complementarity, Substitution Effect, Communication, and Relative Advantage were statistically significant for Korea. Because the coefficients of Complementarity, Substitution effect, Communication were positive, the Rate of Use is likewise positively influenced by these variables. On the other hand, since

the coefficients of Sophistication of Technology and Relative Advantage were negative, the Rate of Use was likewise negatively influenced by Sophistication of Technology and Relative Advantage. Finally, Variety of Use, Sophistication of Technology, Similarity, Substitution Effect, Household Innovativeness, and Communication were statistically significant for Korea. Because the coefficients of Sophistication of Technology, Similarity, Household Innovativeness, and Communication were positive, Variety of Use was likewise positively influenced by these variables. On the other hand, because the coefficient of Substitution Effect was negative, the Variety of Use was negatively influenced by this variable.

Table 18 Summary of hypotheses testing

	Path analysis	Estimate		Result	
		Japan	Korea	Japan	Korea
H1a	Household innovativeness → Variety of use	0.148***	0.098**	S	N
	Household innovativeness → Rate of use	0.154***	0.020	S	N
	Communication → Variety of use	0.186***	0.141**	S	S
	Communication → Rate of use	0.013	0.266***	N	S
	Complexity → Variety of use	0.069	0.052	N	N
	Complexity → Rate of use	0.013	0.049	N	N
	Relative advantage → Variety of use	0.010	-0.016	N	N
	Relative advantage → Rate of use	0.062	-0.298***	N	S
H1b	Product experience → Variety of use	0.016	-0.046	N	N
	Product experience → Rate of use	0.064	0.099	N	N
	Sophistication of technology → Variety of use	0.016	0.283***	N	S
	Sophistication of technology → Rate of use	-0.088	-0.179***	N	S
H1c	Similarity → Variety of use	0.160***	0.224***	S	S
	Similarity → Rate of use	-0.006	0.046	N	N
	Complementarity → Variety of use	0.059	0.028	N	N
	Complementarity → Rate of use	-0.057	0.145***	N	S
	Substitution effect → Variety of use	0.124**	-0.102*	S	S
	Substitution effect → Rate of use	0.069	0.088*	N	S
H2a	Household innovativeness → Satisfaction	-0.005	-0.004	N	N
	Household innovativeness → Intention to re-use	0.105*	0.023	S	N
	Communication → Satisfaction	0.028	0.028	N	N
	Communication → Intention to re-use	0.049	0.032	N	N
	Complexity → Satisfaction	-0.068*	-0.154***	S	S
	Complexity → Intention to re-use	0.217***	-0.140***	S	S

	Relative advantage → Satisfaction	0.031	0.145***	N	S
	Relative advantage → Intention to re-use	0.028	0.174***	N	S
H2b	Product experience → Satisfaction	0.400***	0.360***	S	S
	Product experience → Intention to re-use	-0.019	0.300***	N	S
	Sophistication of technology → Satisfaction	0.331***	0.223***	S	S
	Sophistication of technology → Intention to re-use	0.051	0.319***	N	S
H2c	Similarity → Satisfaction	-0.102**	-0.041	S	N
	Similarity → Intention to re-use	0.131**	0.065*	S	S
	Complementarity → Satisfaction	0.104*	0.012	S	N
	Complementarity → Intention to re-use	-0.042	-0.012	N	N
	Substitution effect → Satisfaction	0.047	0.172***	N	S
	Substitution effect → Intention to re-use	0.109	0.006	N	N
H3	Variety of use → Satisfaction	0.151***	0.164***	S	S
	Variety of use → Intention to re-use	0.233***	0.241***	S	S
	Rate of use → Satisfaction	0.044	-0.007	N	N
	Rate of use → Intention to re-use	0.088*	-0.012	S	N

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

<Note> S indicates support of hypothesis and N indicates non-support of hypothesis.

Table 19 Results of comparison between Japan and Korea

Variables	Nation	Rate of use	Variety of use	Satisfaction	Intention to re-use	Equal variance	Mean	P-value
Product experience	Japan			***		No	4.380	0.323
	Korea			***	***		4.315	
Sophistication of technology	Japan			***		No	3.925	0.049
	Korea	***	***	***	***		3.771	
Similarity	Japan		***	*		Yes	3.736	0.000
	Korea		***		*		3.306	
Complementarity	Japan			*		No	4.520	0.044
	Korea	***					4.382	
Substitution effect	Japan		**			Yes	4.585	0.000
	Korea	*		***			3.697	
Household innovativeness	Japan	***	***			No	4.498	0.148
	Korea						4.385	
Communication	Japan		***			Yes	4.436	0.000
	Korea	***	*				4.111	
Complexity	Japan					No	4.185	0.000
	Korea			**			3.831	
Relative advantage	Japan					No	4.088	0.000
	Korea	***		***	***		4.716	
Rate of use	Japan		-		*	No	4.226	0.114
	Korea		-				3.964	
Variety of use	Japan		-	***	***	No	3.324	0.352
	Korea		-	***	***		3.244	
Satisfaction	Japan		-	-	-	No	4.528	0.002
	Korea		-	-	-		4.318	
Intention to re-use	Japan		-	-	-	Yes	4.250	0.00
	Korea		-	-	-		3.893	

***p<0.001, **p<0.05, *p<0.1

4.4.4 Comparison between Japan and Korea

It would be insightful to recognize different characteristics with regard to innovative diffusion patterns of IPTV consumers between Japan and Korea because such comparative analysis can provide more practical and theoretical clues to researchers and practitioners interested in the converged high-tech environment.

Table 18 shows results of different characteristics of IPTV consumers' diffusion patterns between Japan and Korea based on the t-test.

First, **Table 19** shows both similar and different innovative patterns of IPTV consumers between Japan and Korea by indicating 'Yes' or 'No'. In particular, Product Experience, Sophistication of Technology, and Variety of Use were crucial determinants of satisfaction with IPTV users of both countries. The Variety of Use is the only variable influencing intention to re-use of IPTV users in both Japan and Korea. In addition, Variety of Use was strongly and positively influenced by Similarity and Communication of both countries.

Second, Similarity and Complementarity were important determinants of satisfaction for IPTV users in Japan. On the other hand, Substitution Effect and Relative Advantage were positively influenced and Complexity was negatively influenced by satisfaction with IPTV users in Korea.

Third, Product Experience, Sophistication of Technology, Similarity, and Relative Advantage were positively related to intention to re-use in Korea. In contrast, Rate of Use was the only variable affecting intention to re-use of IPTV users in Japan.

Fourth, Substitution Effect and Household Innovativeness were the main factors affecting consumers' attitude and behavior toward IPTV services in Japan. On the other hand, Sophistication of Technology was an important determinant of Variety of Use in Korea.

Finally, Sophistication of Technology, Complementarity, Substitution Effect, Communication, and Relative Advantage were more likely to influence Rate of Use than other factors such as Product Experience, Similarity, and others in Korea. In contrast, Household Innovativeness was interestingly the only variable affecting Rate of Use in Japan.

4.5 Discussion

In this part, given the statistical results based on the proposed hypotheses and comparative study on different characteristics of innovative diffusion patterns of IPTV consumers between Japan and Korea, I will differently discuss and suggest

some practical and theoretical recommendations to practitioners and researchers.

In the case of Japan, service providers should consider improving the level of consumers' satisfaction and going beyond the intention to re-use in order to ensure the success of innovative use-diffusion of IPTV. Another approach to improving Satisfaction and Intension to Re-use, service providers should improve technical functionality by magnifying technological sophistication. In terms of Product Experience, firms should technically and functionally distinguish their products from other existing ones so as to reduce the uncertainty of potential consumers' adoption- and use-diffusion patterns. Additionally, service concerns often can explain the variation in consumers' purchasing patterns toward a certain innovative item. Thus, it would be possible to overcome the chasm between early adopters and the early majority. Finally, the IPTV market in Japan could successfully develop diffusion only if they continuously and adequately manage the main factors (Complementarity, Substitution Effect and Relative Advantage) influencing consumers' satisfaction and intention to re-use. Thus, service providers in Japan not only should emphasize similarity with existing media services such as DMB (Digital Multimedia Broadcasting) and CATV (Cable TV), but should also stress distinguishing advantages from other services in the converged high-tech market.

In the case of Korea, study results suggest that to enhance Satisfaction and

intention to re-use, service providers should stress functional advantages to potential consumers by showing distinguishing technological sophistication and Relative Advantage from competitors' items. Specifically, they should minimize the uncertainty felt by potential users on their service by stressing similarity with existing media services. They should then establish a marketing strategy in such way that potential consumers are willing to take the IPTV service vis-à-vis other existing media services.

The comparative analysis provides some important information to practitioners and researchers. Given the result of comparative analysis between Japan and Korea, a group of early adopters (i.e., Japanese consumers) are interested in technology itself. On the other hand, group of majority adopters (i.e., Korean consumers) are interested in factors influencing purchasing behavior, including technology. Especially, the group of majority adopters in Korea highly regards actual effectiveness (e.g., verified items or standardized technology). Therefore, practitioners and researchers should carefully grasp consumers' purchasing patterns and characteristics of technology to overcome the chasm caused by discontinuity of innovativeness. In particular, practitioners should take into account different levels of technology, different cultures, and other factors affecting innovative diffusion patterns to reduce business risk in a rapidly converging high-tech market.

Researchers should empirically take into account different outcomes to further build a more generalized theory.

4.6 Summary and implications

Changes in the global economy are diverse, dynamic, and quite often unpredictable. The convergence trends have been observed in technology as well as in consumer product development (Lee and Olson 2010). In these circumstances, many firms, especially in high-tech markets, have attempted to satisfy the demand of their customers and to keep track of their competitors. As a practical solution, some scholars have proposed an innovative diffusion process with a focus on adoption patterns in converged high-tech markets (e.g., Motohashi et al., 2012). However, in recent years, other scholars have argued that this approach shows only one way to explain and predict innovative consumers' behavior patterns in rapidly converged markets, and therefore introduced the Use-Diffusion approach that could overcome the conventional approach. Regarding this concern, I attempted to explore the innovative diffusion process of IPTV by comparing consumers' innovative behavior patterns between Japan and Korea. To test the hypotheses, I used the theoretical framework of UDM by Shih and Venkatesh (2004) and

additional theoretical perspectives (Media Substitution Theory and TCE Theory) to generate factors affecting consumers' innovative behavior patterns regarding IPTV services.

Based on the empirical tests, I found several important results that would contribute to service providers for launching new business models and strategies and to researchers for further study in converged high-tech markets. First, Product Experience and Sophistication of Technology, drawn from UDM of Shih and Venkatesh (2004), were found to be the most important factors in explaining the innovative diffusion process of IPTV users. Therefore, technological sophistication containing high-performance functions is able to provide more diverse services and convenient features to consumers than other existing media services. Service providers should recognize technological sophistication as a crucial element affecting potential consumers' innovative patterns.

Second, Similarity, Complementarity and Substitution Effect discussed on media substitution theory by Barbara and Thomas (2003) and TCE Theory by Berry et al. (2002) have shown to be the main determinants for enhancing users' satisfaction with IPTV services, especially in the broadcasting and telecommunications convergence service. In particular, these factors prove to be very useful in explaining the superiority of IPTV services over other existing

converged media services such as DMB (Digital Multimedia Broadcasting) and CATV. To begin with, service providers of IPTV must not only increase consumers' loyalty by improving more sophisticated service, but also by expanding through word-of-mouth affecting the early majority group as opinion leaders by stressing interactivity and communication functions of IPTV. Finally, satisfaction could be fulfilled by these three factors, and thus the early majority group's intention to re-use will increase in the IPTV market.

Third, Complexity and Relative Advantage are crucial measures of IPTV's current technological level, functional performance, and quality with regard to services (Rogers, 2003). According to Moore's Chasm Theory (1991), Household Innovativeness is an attribute of characterizing innovators and early adopters of consumer groups' innovative patterns. Based on the results, I argue that these variables are highly pertinent in comparing different levels of IPTV technology or quality of the IPTV service and a degree of current and potential consumers' purchasing behavior in Japan and Korea.

Fourth, according to the results, users' satisfaction with and intention to re-use IPTV is associated with consumer characteristics, which affect an evolvement of the adoption life cycle proposed by Rogers' model (Rogers 2003). Especially, the result shows important information that IPTV users in Japan appeared to be still in

the phase of satisfaction (i.e., phase of early adopters), while Korea has passed to the phase of re-use (i.e., phase of early majority). Therefore, in order for Japan to overcome the chasm, they should carefully look for factors that may influence intention to re-use. Actually, the Chasm Theory proposed by Moore (1991) has not been yet empirically validated because it has only been conceptually pointed out as a simple theoretical framework to examine the innovative diffusion process. In this study, I attempted to apply the concept of chasm to an empirical analysis of IPTV Use-Diffusion Model for understanding the diffusion process of high-tech products. Given are results, it can be argued that UDM is more explanatory and predictable than the Adoption-Diffusion Model, especially in the converged innovative environment. In particular, since UDM clearly points out how consumers frequently use converged technology products or services, how varied consumers diversely use of the same products or services and how consumers continuously re-use converged technology products or services, it can explain and determine consumer's adoption behavior toward new products or services, and thereby, also the process of their diffusion. Moreover, new model I proposed provides more comprehensive picture to understand consumer's satisfaction toward new products or services and intention to re-use than conventional approaches in the rapidly changing high-tech market environment.

This study has some limitations in that the empirical method for investigating the chasm occurring in the innovative diffusion of IPTV is not fully validated due to the insufficient accumulated knowledge based on previous studies. However, the PLS (Partial Least Squares) model and the comparative analysis employed in this study are significant as new methodological alternatives. This study is also significant in that it compares the different innovative behaviors of IPTV users of Japan and Korea with regard to differences of market development and infrastructure.

Future research should expand on the comparative analysis of IPTV Use-Diffusion to understand the current status of the IPTV market in different countries, testing the Chasm Theory. Moreover, future research should analyze what potential problems may occur in high-tech markets, such as the IPTV market, by continuously looking at both Adoption- and Use-Diffusion patterns, by comparing different patterns of customer behavior, and by exploring practical approaches to developing and enhancing converged high-tech markets.

Chapter 5 People stick to current IT convergence service? cultural comparative view of service provider and service user

IT convergence has become a prevalent theme within IT industry. Convergence is taking place in many different forms and the internet is at the center of the phenomenon. Digital convergence has evolved from the convergence of computers and telecommunications into the convergence of broadcasting and telecommunications involving media's digital contents. Thus, this convergence is leading the diffusion of new business models and the many changes in industrial and economic activities. IT convergence services are actualizing news businesses and industries in a multitude of ways and forms.

IPTV (Internet Protocol Television), a representative IT convergence service based on FTTH (Fiber to the Home) broadband Internet, is providing the next-generation broadcast contents encompassing advantages such as high-definition pictures and interactive applications to satisfy the variable needs of consumers related to the convergence of broadcasting and telecommunications. The mobile internet, which combines fixed internet functions and wireless mobile functions,

continues to evolve, developing into WiBro (Wireless Broadband Internet) / WiMAX (World Interoperability for Microwave Access) and WCDMA (Wideband Code Division Multiple Access) / HSDPA (High Speed Downlink Packet Access), then into the 4th generation mobile communications LTE (Long Term Evolution)-Advanced to meet consumers' multiple needs related to the intelligence network environment based on the convergence of so called ubiquitous networks.

In addition, internet phones are emerging that connect the existing phone voice options to the packet method-based data communications network through voice and data convergence. In addition, the development of smart phones and other digital convergence products is rising, complete with supporting services for these devices that include personal computer functions added to conventional mobile phones features using a mobile OS (Operating System).

As such, IT convergence services are currently being activated within diverse markets, and to meet and satisfy consumers' varying needs, they must rival and complement each other for market success.

Meanwhile, such IT-enabled convergence poses challenges as well as opportunities for businesses. IT convergence is not only changing the existing market and distribution environment, but also transforming the industrial ecosystem. For instance, the online human social network service has created a

prosumer environment where, beyond communities and the sharing of information, consumers can produce and reuse contents. This environment has created new business models and has changed the distribution structure in conventional product sales and distribution industry markets. As a result, IT convergence has provided suppliers with cost reduction results and blue ocean services, and given consumers low-prices tied to high-quality products and services.

In recent months, to realize the “creative economy,” Korea has been pursuing the convergence of IT/science and technology and industries. By doing so, it is attempting to boost the nation’s economy and advance the job market. Such national industrial policy direction is well suited to the digital convergence and diffusion of creative new business models that are currently in the center of the IT industry.

The features that set the IT convergence service apart from the traditional IT service paradigm justify studies dedicated to IT convergence. The uniqueness and rise of IT-driven convergence service warrant the undertaking of dedicated research. In accepting and diffusing new services through new technologies, cultural differences between nations and individuals’ characteristics will serve as the moderating effects of the existing innovation diffusion model, and this will be the sure starting point of new and meaningful research approaches.

Thus, the purpose of this study is to identify what factors are salient in providing the usefulness perception of IT-convergence service and subsequently extend intention for the continued usage of current service, and to focus on two categories: service provider factors and user factors. As for service provider factors, previous studies imply that system quality and service quality factors are expected to be especially crucial. In terms of user factors, I examine the role of two factors perceived value of the convergence functions and the degree of family innovativeness— which affect the usefulness perception of an IT convergence service and subsequent intention for its extended usage. In addition, based on Hofsted's cultural model (2001; 2005), this study analyzes the cultural difference between Japan and Korea from the perspective of user acceptance and diffusion of IT convergence service, while deriving implications from such differences.

5.1 Research model

5.1.1 Research model development

The objective of this study is to examine the differentiated characteristics of IT convergence service vis-à-vis the existing service in the viewpoint of service

providers and service users, and to define the cultural difference between the two nations based on Hofstede's model (2001; 2005). To accomplish this, first, using the TAM theory, represented by the adaptation to and use of IT systems, the relationship between usefulness perception and reuse intention was modeled. This model, to which Shih and Venkatesh's (2004) use-diffusion model viewpoint was applied, was designed based on the TRA and TPB theories considering individual service users' attitudes and behaviors. Lastly, service provider factors and service user factors were presented as indirect factors that continue to influence the use through usefulness perception. This intends to divide the antecedent factors, which influence the service users' usefulness perception, into differentiated values/advantages. These are provided at the level of service provision and into individual characteristics and propensities considered for service demands, and analyze their influence relationships. System quality and richness in convergence functions in the viewpoint of service supply, as well as economic benefit and innovativeness in the viewpoint of service demand were considered, and these factors were based on Delone and McLean's (2003) IS success model and on literature about convergence and innovative services (Altgeld and Zeeman, 2007; Harris and Goode, 2000; Gerard et al., 2009).

By combining the use-diffusion model proposed by Shih and Venkatesh (2004)

with a traditional TAM-based adoption-diffusion model, I designed a conceptual research model focusing especially on the perspective of the provider and user, as shown in **Figure 8** below.

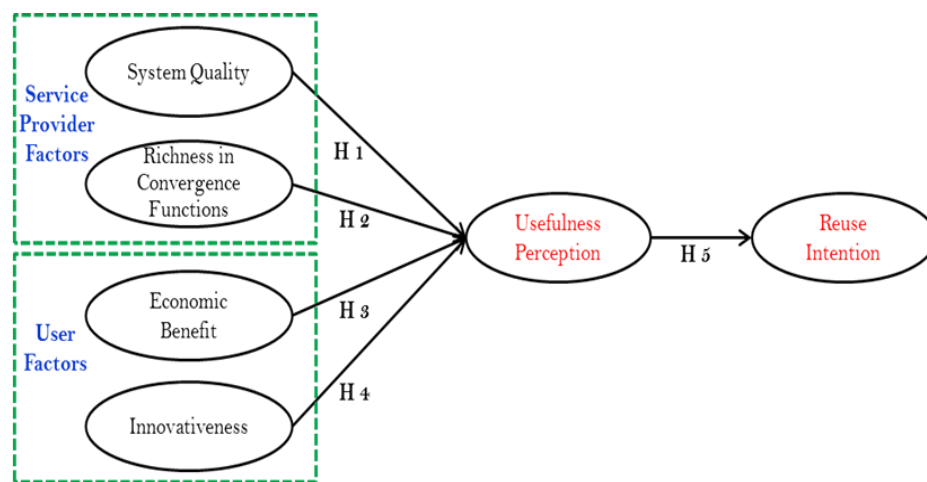


Figure 8 Research model

5.1.2 Hypotheses development

DeLone and McLean (1992), through research on the existing literature, defined the IS Success, which reflected diverse viewpoints on IT system evaluation. They classified various corresponding measurement variables into six categories, and developed a multiple-scale measurement model that handles the

interdependence of those categories. Of the six component variables of DeLone and McLean's (1992) IS Success Model, system quality refers to technical success, and it is already known through statistical verification in previous studies that system quality has positive effects on users' use and satisfaction with regard to IS. System quality is measured by accessibility, response time, reliability, and usability (Nitesh et al., 2009), and it represents system functions with regard to the use of services. Particularly, in order to accurately and stably deliver the diverse functions of IT convergence service to customers, system quality, namely, the perfection of technical infrastructure, may be the most important. The service system quality, provided by service providers, stimulates the customers' perceived usefulness along with service quality, and prods the customers to repeat the use.

Convergence involves telecommunications, media, and IT areas all being integrated into one market. Duysters and Hagedoorn (1998) forecasted that the convergence of telecommunications and computer industries would grow into one information entertainment industry (combination of telecommunications, media and IT). Adner and Levinthal (2000), in the technical viewpoint, defines convergence as a cluster wherein various technologies are applied to one common application. Technical convergence occurs according to technological levels, and stems from technical changes and advances. In other words, technical convergence

refers to the process by which different industrial areas are shared together based on common knowledge and technologies.

IT-convergence driven service is a new business model that may disrupt traditional services. For example, as a comprehensive service realizing the convergence paradigm, IP-TV service offers additional functions including VOD attractiveness, content variety, personalization, and interactive application that have not been available with traditional TV service. In the IPTV model proposed by Altgeld and Zeeman (2007), IPTV service functions are classified into TV service, VOD (video on demand), personal video recorders, PVRs (network personal video recorder), electronic program guides, information service), interactive TV, interactive applications, and broadband applications. Also, convergence functions that are differentiated from the existing TV, such as VOD, interactive TV/applications, variety of contents, and personalization were presented. As such, the richness of the convergence function, thanks to differentiated advantages created by technical advances and convergence, increases user usefulness, thereby providing new values.

Industrial convergence is seen as the possible output of technical convergence. Within the business network, new business opportunities are explored by shedding key corporate capabilities and work-based traditional roles. Technical competitive

advantages provided by convergence challenge one to do business and provide one with business opportunities (Bonometti, 2009). Technical improvement in telecommunications infrastructure enables an addition of new functions to existing services, and provides individuals with lifestyle conveniences and usefulness along with the natural convergence of other industries and services. In other words, system quality signifies the degree of technical improvement, and provides diverse new functions to customers through services. Although the provision of fast, high-definition images is the result of technical improvement (system quality), it is recognized by customers as service quality improvement, and it is one of the important key factors that should be considered by service providers to enhance customer values. Service providers can, through convergence-based technological improvement, provide customers with diverse convergence functions differentiated from existing services, and these convergence functions create new customer values and have positive effects on customers' usefulness perception. Thus, this study established hypothesis 1 and hypothesis 2 as follows.

H1: System Quality of IT convergence service is positively associated with the Usefulness Perception of IT convergence service.

H2: Richness in Convergence Functions of IT convergence service is positively

associated with the Usefulness Perception of IT convergence service.

Rogers (2003) argued that an individual or a decision-making organization form an attitude toward innovation through the process of perceiving innovative characteristics based on the initial innovation perception, and that, after adopting innovations, they undergo the process of repeatedly implementing or using innovations, thus determining whether to continue to adopt them. Whether to initially adopt or continue to adopt innovations is influenced by the user's perceived characteristics, of which a representative characteristic is economic advantage. This theory is discussed mainly in TCE (Transaction Cost Economics), and as such it is associated with opportunity cost that incurs in online/offline market transactions. When a consumer determines the purchase of a product in e-commerce, he first primarily considers mainly the economic benefit, provided by the TCE theory (John, 1931), and this is much differentiated advantage of online commercial transactions. In Rogers's (2003) innovation diffusion theory, of innovative characteristics, the relative advantage means the differentiated advantage between the existing service and the innovative service, and its component detailed variables include price competitiveness based on the bundling service (ex. TPS, QPS) (Melinda et al., 2010). As cost, incurred for using services,

plays the most important role in the user's determination of purchase, it can be reinterpreted as cost-effectiveness with regard to the user's perceived usefulness, and will have indirect effects on the intention of reuse.

Gerard et al. (2009) defined consumer innovativeness as an individual's propensity to accept a new product, and argued that individual consumers' innovativeness may vary according to nations and markets. According to recent studies, consumer innovativeness improves the actual acceptance of new high-tech products (Hirunyawipada and Pawan, 2006), and consequently, innovativeness is defined as individual consumers' characteristics that show creative and challenging propensity for innovative products. In actuality, a review of past literature confirms that there are studies on the verification of relationships between consumer innovativeness and demographic variables (e.g., income, age, life cycle, number of households, etc.) or on the relationships with situational variables such as the nation's cultural factors and individuals' characteristics (Dickerson and Gentry, 1983; Gatignon and Robertson, 1985; Hofstede and McCrae, 2004). Consequently, individuals' innovativeness stimulates the individuals' perceived usefulness of innovations, thus leading to a repeated use of such innovations and continuity thereof. This study established hypothesis 3 and hypothesis 4 as follows.

H3: Economic Benefit is positively associated with the Usefulness Perception of IT convergence service.

H4: Innovativeness is positively associated with the Usefulness Perception of IT convergence service.

The innovative functions may act as disruptive elements to the new business model. To understand it, this study examines the critical forces that enable users to gain the perception of usefulness and ultimately give them its extended usage. In their existing study on acceptance and diffusion, in order to have an in-depth understanding of the acceptance of new products, Shih and Venkatesh (2004) emphasized the importance of research on the diffusion of use, and presented a use and diffusion model. The use and diffusion model is a new innovation diffusion model, as an alternative to the acceptance and diffusion model, which was presented by Shih and Venkatesh (2004) based on the logic that, as discussed in research by Mick and Fournier (1998), consumers' viewpoints of, thoughts about, and experience of technical products create a paradox about technology. Many existing studies based on the acceptance and diffusion model, such as Rogers' (2003) diffusion of innovation theory, Fishbein and Ajzen's (1975) TRA (Theory of Reasoned Action) theory, Ajzen's (1991) TPB (Theory of Planned Behavior)

theory, and Davis'(1989) TAM (Technology Acceptance Model) theory, researched on multiple factors that influence the acceptance and diffusion of innovation along with their relationships.

Davis (1989) proposed the perceived usefulness and the perceived ease of use as the two major determinants of the use of systems. The perceived usefulness is defined as the degree of belief that the use of particular systems can positively improve work performance, and it literally is understood as the relative advantage and value that must be used (Gefen et al., 2003). In other words, only when customers perceive the usefulness of innovation, will the decision to adopt or reuse the related service be made. Thus, this study established hypothesis 5 as follows.

H5: Usefulness Perception of IT convergence service is positively associated with the Reuse Intention of IT convergence service.

5.2 Research methodology

5.2.1 Survey development and measures

The questionnaire for this study was designed to explore the process of using

and diffusing the advanced IT convergence services, based on the experience of IPTV service users. Variables of the questionnaire and their respective measurement indicators were recomposed by transforming the operant definition of those already widely used in existing literature into the form of questions, and the multiple-item Likert 7-point scale method was applied to measurement indicators that explain variables.

This research model was designed to consist of six variables and a total of 22 measurement indicators. By referring to research by Delone and McLean (2003) and Nitesh et al. (2009), this study developed system quality measurement indicators. System quality is explained by a total of four detailed indicators in terms of infrastructures, namely, service accessibility, response time, reliability and usability. The richness in convergence functions, which is the differentiated function provided only by the representative IT convergence service IPTV, is measured by five detailed indicators introduced in the study by Altgeld and Zeeman (2007), and Han and Suh (2010), namely, VoD (Video on Demand), personalization, interactive applications, value-added service, and content variety. The economic benefit herein, which was designed by referring to the research by Harris and Goode, means price competitiveness compared with other services. This is somewhat different from the so-called service quality proposed by Parasuraman

et al. The perception of usefulness is measured by four detailed indicators, namely, usefulness, effectiveness, productivity and necessity of service, and these referred to research by Davis who proposed the TAM theory, and by Gefen et al. Household innovativeness, which refers to research by Gerard et al. (2009) and Rosanna and Rogers (2002), was measured in terms of curiosity for something new, desire to purchase something new, and ability to acquire new information. Reuse intention, which refers to the intention to continue to use the current service, is measured in terms of the reuse intention of and loyalty to the current service, based on the studies by Marios (2002) and Tung et al. (2011). All variables and measurement indicators used in this research model are outlined in **Table 20**.

Table 20 Survey measures

Study construct		Items with similarity	Literature source (ex. Lim et al., 2007)
Service provider factors	System quality	Accessibility	DeLone and McLean, 2003/ Nitesh et al., 2009
		Response time	DeLone and McLean, 2003/ Nitesh et al., 2009
		Reliability	DeLone and McLean, 2003/ Nitesh et al., 2009
		Usability	DeLone and McLean, 2003/ Nitesh et al., 2009
	Richness in convergence functions	VOD (video on demand)	Altgeld and Zeeman, 2007
		Personalization	Altgeld and Zeeman, 2007
		Interactive applications	Altgeld and Zeeman, 2007/ Han and Suh, 2010
		Content variety	Altgeld and Zeeman, 2007/ Han and Suh, 2010
User factors	Economic benefit	The goods as worth every cent	Harris and Goode, 2004
		Happy with the value for money	Harris and Goode, 2004
		Products as excellent value for money	Harris and Goode, 2004
		The goods as cheaper	Harris and Goode, 2004
	Innovativeness	Enjoying the novelty of owning new	Gerard et al., 2009/ Rosanna and Rogers, 2002
		Being eager to buy new	Gerard et al., 2009/ Rosanna and Rogers, 2002

		Often requesting advice about new products	Gerard et al., 2009/ Gilles, 2004/ Rosanna and Rogers, 2002
		Excited about new products	Gilles, 2004 / Rosanna and Rogers, 2002
Usefulness perception		Using chart-master would make it easier to do my job.	Davis, 1989/Gefen et al., 2003
		Using chart-master would enhance my effectiveness on the job.	Davis, 1989/Gefen et al., 2003
		Using chart-master in my job would increase my productivity.	Davis, 1989/Gefen et al., 2003
		I would find chart-master useful in my job.	Davis, 1989/Gefen et al., 2003
Reuse intention		Visiting again in the future	Marios, 2002
		Recommending someone to shop	Tung et al., 2011

5.2.2 Sample and data gathering

Research data were gathered through the random sampling of Japanese and Korean IPTV service users. A pre-survey was executed targeting a group of experts consisting of professors and researchers who engage in innovative technologies and services, and based on the findings of the survey, the measurement variables and questions of the questionnaire were revised and complemented. In the case of Japan, a total of 1,000 IPTV users across the nation were surveyed via the Internet for 20 days (Sep. 1 ~ Sep. 20, 2009). In the case of Korea, 250 IPTV users across four cities (Seoul, Busan, Daegu, and Incheon) were surveyed for 30 days (Oct. 15 ~ Nov. 14, 2008) through of one-on-one interviews. For demographic characteristics of the subjects, in the case of Japanese respondents, of the total, males represent 71.5%, those in their 30s represent 31.7%, company workers represent 82.0%, university graduates represent 58.8%, and the monthly income group (\$2,500 ~ \$5,000) represents 34.4%. For Korean respondents, of the total, males represent 59.2%, those in their 30s (age 30 to 39) represent 54.0%, company works represent 89.2%, university graduates represent 69.2%, and the largest monthly income group (\$2,500 ~ \$5,000) represents 50.4%.

Table 21 Profile of sample projects (Japanese vs. Korean)

Demographic characteristics		Japanese		Korean	
		Numbers	Percentage	Numbers	Percentage
Gender	Male	715	71.5	148	59.2
	Female	285	28.5	102	40.8
	Total	1,000	100	250	100
Age group	20 – 29	135	13.5	67	26.8
	30 – 39	317	31.7	135	54.0
	40 – 49	320	32.0	36	14.4
	Over 50	228	22.8	12	4.8
	Total	1,000	100	250	100
Occupation	Students	18	1.8	9	3.6
	Stay-at-home wives	57	5.7	10	4.0
	Working adults	820	82.0	223	89.2
	Other	105	10.5	8	3.2
	Total	1,000	100	250	100
Education	High school graduates	320	32.0	27	10.8
	College students	17	1.7	21	8.4
	College graduates	588	58.8	173	69.2
	Master’s degree or higher	75	7.5	29	11.6
	Total	1,000	100	250	100

Income (monthly)	Less than \$2,500	100	10.0	38	15.2
	\$2,500 – 5,000	344	34.4	126	50.4
	\$5,000 – 7,500	174	17.4	56	22.4
	Over \$7,500	382	38.2	30	12.0
	Total	1,000	100	250	100

5.3 Analysis and results

5.3.1 Analytical instruments, reliability and validity tests

This study, using the approach/estimation method PLS (Partial Least Squares) statistical technique, executed an empirical analysis of the 2-dimensional hierarchical structure model. PLS is a structural equation statistical method that analyzes casual-predication rather than measuring the goodness-of-fit of research models and it is used mainly for exploratory research in the initial stage of theory development (Chin, 1998; Wold, 1985). For this reason, PLS was adopted as the analysis tool herein, and for the PLS statistical program, the SmartPLS Version 2.0 M3 was used. SmartPLS involves the same method and function as those of PLS-Graph, but provides an enhanced GUI and a more stable platform (<http://www.smartpls.de>).

Reliability, which refers to the possibility that the same or similar measured value can be obtained by repeatedly measuring the same concept using an independent measurement tool, generally measures the internal consistency of measurement indicators. Reliability is analyzed by dividing it into measurement indicators and constructs (Peter, 1981). Reliability analysis of measurement

indicators is surveyed by the loading of constructs, and when the corresponding loading meets the 99% reliability-level statistical quantity or at least over a 0.6 loading value, and then the reliability can be ensured (Chin, 1998). The reliability analysis of construct is evaluated by composite reliability, and when the reliability exceeds the composite reliability critical value of 0.7, it can be guaranteed (Chin, 1998). The loading of measurement indicators herein ranges from 0.707 to 0.943 and from 0.669 to 0.932, in the cases of Japan and Korea, respectively. The measured value of composite reliability ranges from 0.872 to 0.960 and from 0.861 to 0.945, for Japan and Korea, respectively. These values exceed the loading critical value of 0.6 and the composite reliability critical value of 0.7, suggesting that the reliability of all variables of this research model is guaranteed.

Validity refers to whether the measurement tool accurately measured the target of measurement. Validity is evaluated in terms of content validity, convergent validity, and discriminant validity. Content validity herein was evaluated on the basis of the expanded literature based on existing literature, as well as through the verification of consistency between measured indicators, or the interviewing of experts and professors in the related fields. Convergent validity is evaluated by AVE (average variance extracted), and the measured AVE herein ranges from 0.630 to 0.859, and from 0.609 to 0.863, for Japan and Korea, respectively. These values

exceed the convergent validity critical value of 0.5 (Hair et al., 1998), suggesting a significant convergent validity. Discriminant validity is evaluated by the square root of AVE, and when the square root of AVE corresponding to each construct is greater than the correlation coefficient of other constructs, and then the discriminant validity can be secured (Fornell and Larcker, 1981). Thus, it was confirmed that the reliability and validity of all variables of this research model were met.

Table 22 Results of reliability and validity (Japanese Data)

Constructs	Indicators	Loading	CR	AVE	Constructs					
					SYSQ	CONF	ECOB	INNV	USEF	REUS
System quality	SYSQ01	0.837	0.898	0.689	(0.830)					
	SYSQ02	0.869								
	SYSQ20	0.727								
	SYSQ03	0.879								
Richness in convergence functions	CONF01	0.801	0.912	0.722	0.386	(0.850)				
	CONF02	0.879								
	CONF03	0.889								
	CONF04	0.826								
Economic benefit	ECOB12	0.707	0.872	0.630	0.452	0.467	(0.794)			
	ECOB16	0.815								
	ECOB17	0.824								
	ECOB18	0.823								
Innovativeness	INNV01	0.905	0.937	0.788	0.241	0.302	0.261	(0.888)		
	INNV03	0.885								
	INNV04	0.916								
	INNV11	0.842								
Usefulness perception	USEF02	0.913	0.960	0.859	0.351	0.412	0.324	0.269	(0.927)	
	USEF05	0.910								
	USEF06	0.940								
	USEF07	0.943								
Reuse intention	REUS01	0.892	0.889	0.800	0.395	0.392	0.382	0.254	0.599	(0.894)
	REUS04	0.897								

Table 23 Results of reliability and validity (Korean Data)

Constructs	Indicators	Loading	CR	AVE	Constructs					
					SYSQ	CONF	ECOB	INNV	USEF	REUS
System quality	SYSQ01	0.840	0.906	0.707	(0.841)					
	SYSQ02	0.869								
	SYSQ20	0.767								
	SYSQ03	0.883								
Richness in convergence functions	CONF01	0.869	0.861	0.609	0.503	(0.780)				
	CONF02	0.669								
	CONF03	0.785								
	CONF04	0.786								
Economic benefit	ECOB12	0.723	0.922	0.749	0.479	0.491	(0.865)			
	ECOB16	0.908								
	ECOB17	0.917								
	ECOB18	0.897								
Innovativeness	INNV01	0.877	0.929	0.767	0.230	0.430	0.221	(0.876)		
	INNV03	0.885								
	INNV04	0.887								
	INNV11	0.852								
Usefulness perception	USEF02	0.903	0.945	0.812	0.342	0.420	0.496	0.287	(0.901)	
	USEF05	0.854								
	USEF06	0.920								
	USEF07	0.926								
Reuse intention	REUS01	0.932	0.926	0.863	0.425	0.422	0.609	0.246	0.612	(0.929)
	REUS04	0.926								

5.3.2 Hypotheses testing

This study aims to conduct a comparative analysis of Japanese and Korean users' consumption patterns and perceptions of IT convergence services and to explore the key factors influencing their reuse intentions, thereby providing the differentiated implications of innovative convergence services. First, the result of verifying Japan's IPTV service users is examined (See **Table 24**). There was a statically high significance between the four leading variables (system quality, richness in convergence functions, economic benefit, and innovativeness), and the perception of usefulness. ($\beta=0.180$, $t\text{-value}=4.635$; $\beta=0.264$, $t\text{-value}=6.621$; $\beta=0.087$, $t\text{-value}=2.317$; $\beta=0.123$, $t\text{-value}=3.491$) In addition, the perception of usefulness implied a statically significant impact ($\beta=0.599$, $t\text{-value}=21.987$) on reuse intention. Verification revealed that five hypotheses were all supported statistically.

Next, the verification of hypotheses for Korean IPTV users is examined (See **Table 24**). System quality was not statistically significant to perception of usefulness ($\beta=0.060$, $t\text{-value}=1.244$). However, there was a statistically significant influence between three leading variables (richness in convergence functions, economic benefit, and innovativeness) and perception of usefulness ($\beta=0.159$, $t\text{-value}=3.491$).

value=2.757; $\beta=0.362$, t-value=7.059; $\beta=0.125$, t-value=2.916). The usefulness perception's influence on reuse intention was also found to be statistically significant ($\beta=0.612$, t-value=18.772). Verification revealed that, with the exception of hypothesis 1, all other four hypotheses were statistically supported.

As in **Figure 9**, the results of comprehensive statistical verification are examined. The major management factors (system quality, richness in convergence functions) – that IPTV providers have to consider for the provision of service – and individuals' decision making factors considered for the use of service (economic benefit, innovativeness) all served as important determinants of users' usefulness perception, and directly and indirectly had significant impacts on users' intention of reuse. With regard to users' usefulness perception, the explanation power of the four antecedent variables was relatively high at 23~30%, and with regard to the intention of reuse of service, the explanation power of usefulness perception was very high at 36~38%. This is a very meaningful statistical result that resulted from the re-verification of the existing innovation use/diffusion theories.

Table 24 Results of hypotheses testing (Japanese vs. Korean)

	Path	Japanese		Korean		Test results
		β	t-value	β	t-value	
H1	System quality → Usefulness perception	0.180 ***	4.635	0.060	1.244	Mixed (Partial support)
H2	Richness in convergence functions → Usefulness perception	0.264 ***	6.621	0.159 ***	2.757	Supported
H3	Economic benefit → Usefulness perception	0.087 **	2.317	0.362 ***	7.059	Supported
H4	Innovativeness → Usefulness perception	0.123 ***	3.491	0.125 ***	2.916	Supported
H5	Usefulness perception → Reuse intention	0.599 ***	21.987	0.612 ***	18.772	Supported

Note. * $t > 1.645$, ** $t > 1.965$, *** $t > 2.578$

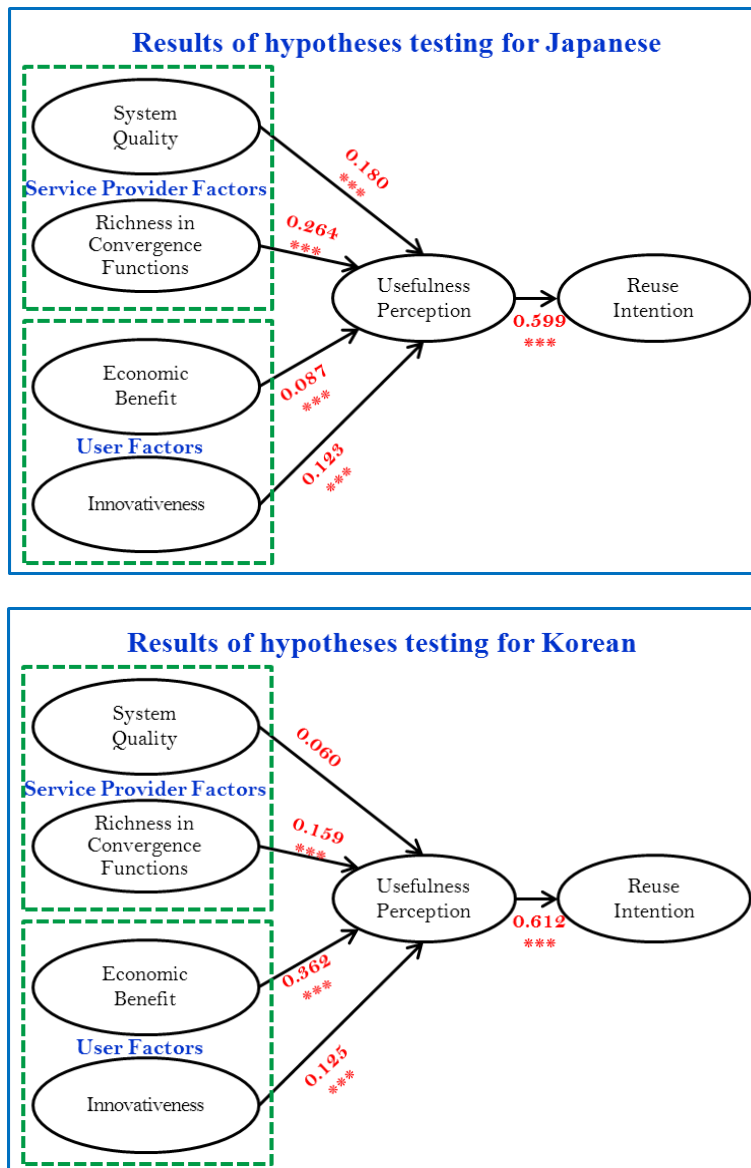


Figure 9 Results of hypotheses testing for Japanese and Korean in IPTV service

5.3.3 Cultural comparative analysis between Japan and Korea

Dutch cultural and human psychologist Geert Hofstede (1928~) concluded based on his research on the interaction of national and organizational cultures, that national or regional cultural groups widely influence societal, organizational and personal behaviors. He thus classified and modeled cultures from five viewpoints. Additionally, targeting IBM branch managers in 76 nations for several years from 1967 to 1973, he classified cultural characteristics into five categories and analyzed them by nation, and quantified the levels of such differences (indicators and ranking) (See **Table 25**).

Table 25 Results of Hofstede's five cultural differences (Japanese vs. Korean)

	Power Distance		Individualism /Collectivism		Masculinity /Femininity		Uncertainty Avoidance		Long / Short-Term Orientation	
	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score
Japan	33	54	23	46	1	95	7	92	4	80
Korea	28	60	43	18	41	39	17	85	5	75

In relation Japan and Korea, this study seeks to compare and analyze a perception difference in IT convergence service (IPTV) through the statistical verification result of the research model. With regard to such a result, based on the Hofstede (2001; 2005) theory, this study also seeks to examine how the cultural

characteristic differences between the two nations would influence consumers' perception and behaviors regarding the IT convergence service, and to derive resulting implications.

Particularly, this study mainly discusses the three perspectives – in which the two nations are distinctively different – among Hofstede's research results, which include the viewpoints of Individualism/Collectivism, Masculinity/Femininity, and Uncertainty Avoidance, with focus on the analysis of the innovation and diffusion of IT convergence service related to the two nations' cultural aspects.

According to Hofstede's research, Japan is strong in individualistic and masculine cultures, making these characteristics different from those of Korea (see **Table 25**). This represents Japan's individualistic societal characteristics explain Japanese have relatively strong individualistic culture to value individual persons and their identities compared with Korean although the Japanese national culture scores moderately in this area (and demonstrates some tendencies towards both individualism and collectivism). In addition, this also indicates Japan's cultural propensity of masculine society to recognize competition, assurance, ambition and possession as high values and pursue them as social norms. Japan is extremely competitive (usually on a group level). This is something that is fostered from a very young age and serves as the main motivational factor in business.

Consequently, such cultural characteristics are accurately consistent with Japan's higher statistical numbers in system quality concerning the IPTV service system service (see **Table 24** and **Figure 9** as shown in this study), compared with Korea. In other words, Japan's masculine yet individualistic culture, linked with technical and systematic aspects, bolsters Japanese people's propensity to possess more innovative and multi-functional IT convergence service, as well as to meet individuals' diverse needs, leading them to vastly prefer specialized IT convergence service. Thus above all, in order to penetrate the Japanese market, strategic marketing (experience and noise) may be important to bolster technical and functional advantages (the competitiveness of quality), and to intensively promote and publicize them.

According to Hofstede's research, Korea demonstrates some tendencies towards femininity and is not strong masculinity culture compared with Japan. (see **Table 25**). This represents Korea is stronger in collective culture, compared with Japan, and groups to which individuals belong for a long period, such as family, religious, school and regional groups define such collective culture. In other words, Korea is strongly inclined to value groups over individuals, thus valuing the benefits to be shared by members within groups, as well as their usefulness. In addition, this also indicates Korea's cultural propensity of relative feminine society

to recognize free time and comfortable living as the main motivational factor in business especially to young generation. Such cultural characteristics of Korea are accurately consistent with the country's high statistical numbers in economic benefits concerning the IPTV service (see **Table 24** and **Figure 9** as shown in this study). In contrast to Japan in the 2000s, Korea overcame various global economic crises, achieved rapid economic growth, and saw its individual national consumption trends change. In other words, Korean consumers are very sensitive about their perceived service price competitiveness and economic benefits, and this characterizes Koreans the strongest. In addition, from the collective perspective, Korea is extremely interested in "economic democratization." Korea's higher propensity of valuing groups, compared with Japan, can be explained from the perspective of usefulness perception in this study. With the popularization of the internet, Korea has rapidly diffused online community culture, and boosted the use of price comparison sites and social network/commerce activities. This is Koreans' consumption propensity that is created by Korea's collective culture and by the online network characteristic of not incurring transaction costs. This resulting characteristic is in contrast to that of Japan, so in order to penetrate Korean markets, particular market strategies such as bundling services (TPS/QPS) for price competition are required.

5.4 Summary and implications

In line with digital convergence being quickly diffused into IT industries, in order to research the differentiated characteristics and features between the existing conventional broadcasting and telecommunications service and the IT convergence service, this study attempted approaches from the viewpoint of the supply of and demand for innovative services on the basis of the innovation acceptance-diffusion theory by Rogers (2003) and Davis (1989). In addition, the IPTV service use and diffusion of Japan and Korea – which are geographically adjacent and have deep historical relationships – were analyzed, and in order to survey the cultural difference and individual national propensity and perception between the two nations based on Hofstede's (2001; 2005) cultural theory, statistical comparative verification was performed.

Japan began a full-swing commercial IPTV service in 2007, and this study surveyed and analyzed Japanese IPTV service users based on data surveyed in 2009. As a result, Japanese IPTV users were equivalent to early adopters among the five customer categories proposed in Rogers' (1995) technology acceptance model, and showed significant interest in the technical and functional benefits of IPTV service (IT convergence service). This suggests that the Japanese users accurately,

albeit second to innovators, perceive the functional advantages of the IT convergence as differentiated from the existing service. In this case, when the service provider properly provides satisfactory convergence functions to users, then this will help overcome the chasm and move them to the next stage as the early majority. This is how the innovation of IT convergence service is gradually diffused. Then, the role and responsibility of the service provider are very important to diffuse innovations, and in particular, the enhancement of technical quality and the faithful provision of diverse functions and uses need to be ensured to maximize customer satisfaction over the IT convergence service.

Meanwhile, Korea started a pilot IPTV service in 2008, and began to provide a full swing commercial IT service in 2009. This study used data surveyed in 2008, so Korean IPTV users are equivalent to innovators among the five customer categories proposed by Rogers' (1995) technology acceptance model. In this context, the statistical results of this study were examined. Korean IPTV users did not accurately recognize the technical and functional difference (relative advantage) between the existing service and the IPTV service (IT convergence service), but showed much interest in price competition and economic benefits due to bundling (ex. TPS, QPS).

Korea launched commercial IPTV service in 2009, two years later than Japan

did in 2007. Nonetheless, as of the end of December 2012, Japan's IPTV subscribers numbered 3.57 million, while those of Korea numbered 6 million. This suggests that for Korea, the IPTV service use and diffusion are quite fast. This reflects Korea's propensity for a strong collective culture compared to Japan. Representative examples of Koreans' collective cultural propensity include their feverish support for the Korean team in the 2002 World Cup co-hosted by Korea and Japan, and the widely spread candle-lit demonstrations of Korean people to thwart Korea-USA FTA beef imports.

This study attempted a multidimensional analysis of the innovative service of IT convergence service – which is recently emerging as a growth engine of the industrial economy – from the viewpoint of service supply and demand, and from the cultural viewpoint of the two nations (Japan and Korea). As a result, interestingly, new results and implications, which were not found in other existing literature, were derived.

Based on the number of the two nations' (Japan and Korea) IPTV subscribers as of 2012, (3.57 million and 6 million, respectively), the diffusion stage was estimated, revealing that Japan and Korea were currently equivalent to the stage of the early majority among the five customer categories proposed by Rogers' (1995) innovation use-diffusion theory. In actuality, in order to accurately analyze IT

convergence service and thus derive new research implications, it is required to additionally survey and analyze the current IPTV service users. However, this study is limited in making such attempts. Thus, in order to overcome such limitations, I am planning to further the research and anticipate more complete research achievement in the future.

Chapter 6 Conclusion

6.1 Summary

Due to the increasingly rapid development of IT-based technology, there has been a proliferation in the area of technology Innovation, to include digital convergence technology service. One case of this, broadcasting and telecommunications convergence service has already progressed beyond general public knowledge, and has taken its place as a key and widely adopted technology in consumers' everyday life.

Within this field of technology innovation and digital convergence technology service, the concepts of user acceptance as well as innovative adoption and diffusion have been topics of recent studies. However, these studies are lacking in the analysis and recommendation regarding the limitations of the studies. In particular in the field of broadcasting and telecommunications convergence service and digital convergence technology service, in the areas of the model, market conditions, adoption and innovation with consumers, and diffusion, there exists a lack of both new theoretical analysis that ties them all together, nor is there a structural model for explanation. This leads to a further hindrance in overcoming

the limitations of these descriptive studies.

Therefore, in this study I have attempted to overcome these stated hurdles, as well as providing a more structured approach in analyzing the adoption and diffusion of digital convergence technology service. This study in particular takes a look at IPTV, a key example of broadcasting and telecommunications convergence service, and its characteristics of innovative acceptance and diffusion, which takes into consideration both its use-diffusion as well as its adoption-diffusion. I have analyzed the factors that affect its adoption and diffusion by taking into consideration the use-diffusion and adoption-diffusion. This research also takes a comparative look between Japan and Korea, and provides additional insight on an international level, above and beyond just the theoretical aspects.

The methodology included steps to survey current non-users of IPTV in Korea to discern the intent to subscribe using the adoption-diffusion model, as well as surveying current IPTV users to discern their satisfaction with the service and their intention to re-use using the use-diffusion model. In this case, I have found that the use-diffusion model surpasses the adoption-diffusion model in its ability to explain the diffusion of innovations in real-world situations. This conclusion held when conducted in Japan, reinforcing this theoretical finding on an international level.

In conclusion, through this research I was able to more concretely establish the

use-diffusion model as a powerful explanatory tool in the field of digital convergence technology service, and proving its conclusion holds even across international boundaries. In addition I was able to present a new model that takes into consideration 3 levels of analysis, that includes i) a holistic analysis that involves both service user and service provider, ii) an international comparative perspective with Japan and Korea, and iii) Hofstede's Model of National Culture.

This research provides a fresh perspective by going beyond the limited analysis of just the service user, to include the service provider as well as innovative adoption and diffusion. Moreover, it has further additional insight regarding the cross-cultural application of this theory, by comparing the results of the same study done in Japan, and analyzing the results using Hofstede's Model of National Culture to capture the behaviors and attitudes of providers (to include difference in value provided) and consumers (to include personal taste and preferences) regarding the adoption and diffusion of IPTV, and related technologies.

6.2 Implications

This research discussed digital convergence technology service, and the ways in which the consumer uses it, the way it expands with the passing of time, perspectives from the service/technology point of view, the consumer point of view, and a comprehensive view incorporating the perspectives of both the service provider and service consumer. Moreover, by including both an international and humanistic perspective, this research stands on its own as a comprehensive discussion related to the field of digital convergence technology service and its adoption and diffusion. This research has the following theoretical and practical implications.

The theoretical implications of this study are as follows. First, there was an empirical evaluation of the use-diffusion model proposed by Shih and Venkatesh (2004) that compared it to a traditional adoption-diffusion model. Although there have been some attempts in recent years, to explain the use-diffusion model as an alternative to the adoption-diffusion model, these attempts fall short of establishing whether and to what degree the former exceeds the latter in terms of explanatory power. The findings of this study provide concrete evidence that the use-diffusion model surpasses the adoption-diffusion model in its ability to explain and predict

the diffusion of innovations in real-world situations, especially in the innovative convergence environment of Japanese and Korean consumers. In particular, since the use-diffusion model clearly points out how consumers frequently use converged technology products or services, how varied consumers use the same products or services in diverse ways, and how consumers continuously reuse converged technology products or services, it can explain and determine consumers' adoption behavior towards new products or services, and thereby, also the process of their diffusion.

Second, there is the new research model of the acceptance of digital convergence service and the diffusion of innovations from the new, integrated perspective of the service providers and the service users in the form of a structural equation by using the TAM (Technology Acceptance Model) theory and the IS success model. The new research model examined the differentiated characteristics of IT convergence service vis-à-vis the exiting IT service from the viewpoint of service providers and service users, and also defined the cultural difference between the two nations (Japan and South Korea) based on Hofstede's (2001; 2005) cultural model. The new research model proposed provides a more comprehensive picture than a conventional user, which only related approaches for understanding the consumer's intention to re-use with innovative converged services in the

rapidly changing converged high-tech market environment. In conclusion, this study has created a methodological precedent in applying the concepts of innovative adoption and diffusion in the innovative convergence environment and related theoretical models to a broadcasting and telecommunications convergence service (IPTV). This study has made an especially meaningful scholarly contribution in attempting an empirical application of the use-diffusion model and proposing the new research model from the new, integrated perspective of the service providers and the service users with national perspectives

The practical implications of this study are as follows. First, it provides a comprehensive perspective on the innovative adoption and diffusion at the IT convergence market and industry with national point of view and related business strategy. It therefore offers directions of the future strategic plan to service providers for allocation of resources and capabilities toward innovative convergence services. This study points out especially concrete directions in a high-tech marketing strategy for entering, surviving and succeeding at the market of innovative convergence service.

Second, it suggests ways for service providers to respond to government policies relating to innovative convergence service. This study offers advice as to how to respond to policy and regulatory measures relating to the development of

innovative convergence service and business models and how to analyze the level of consumer adoption and diffusion, and consumer benefits through concrete examples.

Third, it demonstrates how innovative converged services can deliver benefits to consumers and proposes related business models through the example of IPTV service. This study outlines a concrete business model and explains through it how to prepare market entry and how to launch market development efforts.

Finally, this study provides methods for analyzing the adoption and diffusion of innovation within the innovative high-tech convergence market and chasms which may be encountered by service providers, and points toward formulating marketing strategies to successfully enter and survive in the market of innovative converged services.

6.3 Limitations and future research

This research has some limitations in that it can only provide some recommended information, especially when seen from a technology management strategy perspective. Below I outline the itemized limitations, which also serve as areas for future research.

First, this study is limited in scope at an individual convergence service level that may or may not be extrapolated to the industry in general. When considering an individual case such as broadcasting and telecommunications convergence service, the next logical requirement dictates the potential applicability in the industry as a whole, based on the findings of adoption and diffusion of this particular case. That is, I must be able to utilize the findings of this particular study and determine its applicability in the underlying industries, to be able to use it as a forecasting tool for the future.

Second, this research as it currently stands cannot necessarily account for the more diverse and detailed breakdown of the adoption and diffusion effect on different markets and in the component areas that make up the innovative convergence service. That is, the market as a whole comprises many individuals, each with a dynamic and different need. Therefore, a study on adoption needs to take into consideration these differing parts making up the whole. Moreover, since adoption is directly related to time, further research should focus on the way adoption among consumer changes over time, and how this affects the adoption and diffusion process in general.

Third, this research does not address the concrete strategic response of firms regarding the adoption and diffusion of innovative convergence service. That is,

because it is a descriptive study on how the technology is related to societal change, it does not necessarily provide a prescriptive recommendation for a firm's management point of view. Further research needs to explore how CRM (Customer Relation Management) relates to this new finding, and how in the field of innovative convergence service the demand of the consumer changes, and in turn investigate how to build customer loyalty within this context of adoption and diffusion. I predict that additional research must be done regarding Switching and Lock-In strategies, and to establish a adoption-diffusion model that addresses these pursuits. A comprehensive model must include a general approach to the adoption-diffusion process, a consideration for the passing of time, changes in behavior on the part of the customer, to include both Switching and Lock-In.

References

- Agarwal, R. and Karahanna, E. (2000) *Time flies when you're having fun: Cognitive absorption and beliefs about information technology usage*, MIS Quarterly, 24(4), pp.665-694.
- Agarwal, R. and Prasad, J. (1997) *The role of innovation characteristics and perceived voluntariness in the acceptance of information technologies*, Decision Sciences, 28(3), pp.557–582.
- Ajzen I. (1991) *The theory of planned behavior*, Organizational Behavior and Human Decision Processes, 50(2), pp.179-211.
- Amberg, M.; Hirschmeier, M.; Wehrmann, J. (2003) *The Compass Acceptance Model for the Analysis and Evaluation of Mobile Information Systems*, International Journal for Mobile Communications (IJMC), Finland.
- Alexandra, M.(2007) *Social Acceptance of Renewable Energy Innovations: the Role of Technology Cooperation in Urban Mexico*, Development studies Institute(DESTIN), London School of Economics and Political Science(LSE), London, UK.
- Altgeld J. and Zeeman J.D. (2007) Whitepaper IPTV / VOD: The IPTV / VOD

- challenge-Upcoming business models, IBM Paper for the International Engineering Consortium (IEC).
- Arbeitsbericht (2003) *Institut für Wirtschafts informatik*, Institute of Economic computer science, Georg-August-Universität, Göttingen.
- Atkin, D. (1995) *Audio information services and the electronic media environment*, The Information Society: An International Journal, 11(1), pp.75-83.
- Baaren E, van de Wijngaert L. and Huizer E. (2008) *'I Want My HDTV'? Underlying Factors of Perceived Usefulness for High Definition Television*, Lecture Notes in Computer Science, 5066/2008, pp.283-292.
- Bagozzi, R.P. and LEE, K.H. (1999) *Consumer acceptance of and resistance to innovations: Decision making and implementation processes*, Advances in Consumer Research, 26, pp.218–225.
- Baldwin, T. F., McVoy, D. S. and Steinfield, C. (1996) *Convergence: Integrating Media, Information and Communication*, Thousand Oaks and London: Sage Publications.
- Barbara K. K. and Thomas J. J.(2003) *From Here to Obscurity?: Media Substitution Theory and Traditional Media in an On-line World*, Journal of the American Society for Information Science and Technology, 54(3), pp.260–273.

- Bass, F.M. (1969) *A new product growth for model consumer durable*, Management Science, 15, pp.215–227.
- Bauer, R.A. (1960) *Consumer Behavior as Risk Taking*, in Hancock, R.S., (Edt.) Dynamic Marketing for a Changing World, Proceeding of the 43rd Conference of the American Marketing Association, Chicago, p.390.
- Benbasat, I. and Dexter, A.S. (1992) *An investigation of the effectiveness of color and graphical presentation under varying time constraints*, MIS Quarterly, March, pp.59-84.
- Berry, L. L., Carbone, L.P. and Haeckel, S. H. (2002) *Managing the Total Customer Experience*, MIT Sloan Management Review, 43(3), pp.85-89.
- Bettman, J.R. (1973) *Perceived Risk and Its Components: A Model and Empirical Test*, Journal of Marketing Research, p.184.
- Bonometti R. (2002) *Cost-effective strategies for technology and product developments*, Journal of Global Competitiveness, 10(1), pp.124-31.
- Borchert, J., Goos, P. and Hagenhoff, S. (2004) *Innovations-und Technologie management: Eine Bestandsaufnahme*, Innovation and technology management: an overview in Schumann, M. (ed).
- Bucklin, R. E and Sismeiro, C.(2000) *A model of web site browsing behavior estimated on clickstream data*, Journal of Marketing Research, pp.249–

267.

- Bullinger, H.J. and Schreiner, P. (2003) *Service Engineering: Ein Rahmenkonzept für die systematische Entwicklung von Dienstleistungen*[A conceptual framework for the systematic development of services], In: Bullinger, H.J. and Scheer, A.W, Service Engineering-Entwicklung und Gestaltung innovativer Dienstleistungen, pp.51-82.
- Burnham, T.A., Frels, J.K. and Mahajan, V. (2003) *Consumer switching cost: A typology, antecedents, and consequences*, Journal of Academy Marketing Science, 31(2), pp.109–126.
- Buse, S.(2002) Der mobile Erfolg-Ergebnisse einer empirischen Untersuchung in ausgewählten Branchen, In Electronic Business and Mobile Business, Frank Keuper (Edt.), Wiesbaden p.92.
- Cai, X. (2001). *A Test of the Functional Equivalence Principle in the New Media Environment*, Unpublished doctoral dissertation, Indiana University, Indiana
- Campbell, D.T. and Fiske, D.W. (1959) *Convergent and Discriminant Validation by the Multitrait-Multimethod Matrix*, Psychological Bulletin, 56(2), pp.81-105.
- Chatman, E. A. (1986) *Diffusion theory: a review and test of a conceptual model in*

- information diffusion*, Journal of American Society for Information Science, 37, pp.377–386.
- Chin, W. (1998) *The Partial Least Squares Approach to Structural Equation Modeling*, G. A. Marcoulides, ed. Modern Methods for Business Research, Lawrence Erlbaum Associates, Mahwah, NJ, pp.295-336.
- Chlivickas, E., Petrauskaite, N. and Ambrusevič, N.(2009) *Leading priorities for development of the high technologies market*, Journal of Business Economics and Management, 10(4), pp.321–328.
- Cognitative, R. (1999) *E-commerce and the Evolution of Retail Shopping Behaviour*, Pulse of the Customer, 1(2), pp.67-89.
- Cox, D.F.(1967) *Risk Handling in Consumer Behavior-an Intensive Study of Two Cases*, in Cox, D.F. (Edt.), Risk Taking and Information Handling in Consumer Behavior, Boston, p.37.
- Cunningham, S.M. (1967) *The Major Dimensions of Perceived Risk*, in Cox, D.F., (Edt.), Risk Taking and Information Handling in Consumer Behavior, Boston, p.83.
- Cronin, J. J. Jr. and Taylor, S.A. (1992) *Measuring Service Quality: A Reexamination and Extension*, Journal of Marketing, 56(3), pp.55-68.
- Davis, F. D. (1989) *Perceived Usefulness, Perceived Ease of Use, and User*

- Acceptance of Information Technology*, MIS Quarterly, 13(3), pp.319-340.
- Davis, F.D., Bagozzi R.P. and Warshaw, P.R. (1989) *User acceptance of computer technology: A comparison of two theoretical models*, Management Science, p.982.
- DeLone W.H. and McLean E.R.(1992) *Information systems success: The quest for the dependent variable*, Information Systems Research, 3(1), pp.60–95.
- DeLone W.H. and McLean E.R.(2003) *The DeLone and McLean Model of Information Systems Success: A Ten-Year Update*, Journal of Management Information Systems, 19(4), pp.9-30.
- De Mooij M. and Hofstede G. (2002) *Convergence and divergence in consumer behavior: Implications for international retailing*, Journal of Retailing, 78, pp.61–69.
- De Mooij M. (2010) *Global marketing and advertising: Understanding cultural paradoxes* (3rd ed.), Thousand Oaks, CA: Sage.
- Dickerson M.D. and Gentry J.W.(1983) *Characteristics of Adopters and Non-Adopters of Home Computers*, Journal of Consumer Research, 10(3), pp.225-235.
- Dishaw, M.T., Strong, D.M. (1998) *Assessing Software Maintenance Tool*

- Utilization Using Task-Technology Fit and Fitness-for Use Models*,
Journal of Software Maintenance: Research and Practice 10(3), pp.151-179.
- Döring, N. (2002) *Kommunikative Funktionen von Kurzmitteilungen*, Zeitschrift für Medienpsychologie, 14 (3), pp.118-128.
- Duysters G. and Haagedorn J.(1998) *Technological convergence in the IT industry: The role of strategic technology alliances and technological competencies*, International Journal of the Economics of Business, 5, pp.355-368.
- Eastlick, M. A. (1993) Predictors of videotex adoption, Journal of Direct Marketing, 7(3), pp.66–74.
- Eom, Chan-wang (2006) *Arguments on and policy direction for IPTV Services*, Korean Society for Internet Information Journal, 7(1), pp.9–13.
- Eurostat (2002) How Europeans spend their time. Brussels: European Commission.
- FCC (2005) IPTV and FCC regulations, 11st Annual Report, <http://www.fcc.org>.
- Fidler, R. (1997) *Mediamorphosis; Understanding New Media*, California: Pine Forge press.
- Fishbein, M. and Ajzen, I. (1975) *Belief, Attitude, Intention and Behavior: An Introduction to Theory and Research*, Anderson-Wesley Publishing

Company.

- Flynn, L.R., Goldsmith, R. and Eastman, J.K. (1996) *Opinion leaders and opinion seekers: Two new measurement scales*, Journal of the Academy of Marketing Science, 24(2), pp.55–64.
- Fornell C. and Larcker D.F. (1981) *Evaluating structural equations with unobservable variables and measurement error*, Journal of Marketing Research, 18, pp. 39-50.
- Gatignon, H.A. and Robertson, T.S. (1985) *A propositional inventory for new diffusion research*, Journal of Consumer Research, 11(4), pp.849–867.
- Gatognon, H., Eliashnerg, J. and Robertson, T.S. (1989) *Modeling multinational diffusion patterns: An efficient methodology*, Marketing Science, 8, pp.231–247.
- Gefen D., Karahanna E. and Straub D.W. (2003) *Trust and TAM in Online Shopping: an Integrated Model*, MIS Quarterly, 27(1), pp.51-90.
- Gefen, D. and Staub, D. (2000) *The Relative Importance of Perceived Ease of Use in IS Adoption: A Study of eCommerce Adoption*, Journal of the Association for Information Systems, Nr. 8.
- Gerard J.T., Eden Y., Simon B. (2009) *Global Consumer Innovativeness: Cross-Country Differences and Demographic Commonalities*, Journal of

International Marketing, 17(2), pp.1-22.

Gerpott, T.J. (1999) *Strategisches Technologie-und Innovationsmanagement: eine konzentrierte Einführung[concentrate introduction of measures]*, Stuttgart, p.55.

Gillespie, A., Krishna, M., Oliver, C., Olsen, K. and Thiel, M. (1999) *Online Behavior: Stickiness*, [http:// elab. vanderbilt. dedu / research](http://elab.vanderbilt.edu/research).

Goodhue, D. L. and Thompson, R. L. (1995) *Task-Technology Fit And Individual Performance*, MIS Quarterly, 19(2), pp.213-236.

Gwon, Ho-yeong (2005) IPTV Trends and Strategy. Korean Broadcasting Institute.

Ha, W.K. and Hong, Y. K. (2008) IPTV innovation, The Electronic Times Co., Ltd.

Hahn, M., Park, S., Krishnamurti, L. and Zoltners, A. A. (1994) *Analysis of New Product Diffusion Using a Four-Segment Trial-Repeat Model*, Marketing Science, 13(3), pp.224-247.

Hair, J.F. Jr, Anderson, R.E., Tatham, R.L., and Black, W. C. (1998) *Multivariate Data Analysis*, 5th ed., Prentice-Hall, Upper Saddle River, NJ.

Hall E.T. (1976) *Beyond culture*. Garden City, NY: Anchor.

Harms, A. (2002) *Adoption technologiebasierter Self-Service-Innovationen: Analyse der Wirkungsmechanismen, im Entscheidungsprozess der Konsumenten*, Wiesbaden.

- Han, E.J. and Suh, B.M. (2010) *Competitive Analysis among Interactive Broadcasting Media in Korea Affected by the Introduction of IPTV: Adopting the Niche Theory*", Journal of Society for e-Business Studies, 15(4), pp.219-244.
- Harris L.C. and Goode M.M.H.(2004) *The four levels of loyalty and the pivotal role of trust: a study of online service dynamics*, Journal of Retailing, 80, pp.139-158.
- Hellier, P. K., Carr, G. M., and Richard, J. A. (2003) *Customer Repurchase Intention: A General Structural Equation Model*, European Journal of Marketing, 37, pp.1762-1800.
- Hirunyawipada, T and Paswan, A.K. (2006) *Consumer innovativeness and perceived risk: implications for high technology product adoption*, Journal of Consumer Marketing, 23(4), pp.182–198.
- Hoffman, Donna L. and Novak, Thomas P. (1996) *Marketing in Hypermedia Computer-Mediated environments; Conceptual Foundations*, Journal of Marketing , 60, pp.50-68.
- Hoffmann, S and Soyezy, K. (2010) *A Cognitive Model to Predict Domain-specific Consumer Innovativeness*, Journal of Business Research, 63(7), pp.778-785.
- Hofstede G. (2001) *Culture's consequences* (2nd ed). Thousand Oaks, CA: Sage.

- Hofstede G. and McCrae R.R. (2004) *Personality and culture revisited: Linking traits and dimensions of culture*, Cross-Cultural Research, 38(1), pp.52-88.
- Hofstede G. and Hofstede G.J. (2005) *Cultures and Organizations. Software of the Mind* (2nd ed). New York: McGraw-Hill.
- Hofstede G. (2010) *The GLOBE debate: Back to relevance*, Journal of International Business Studies, 41, pp.1339-1346.
- Hofstede G., Hofstede G.J., Minkov M. (2010) *Cultures and Organizations: Software of the Mind* (Rev. 3rd ed.), New York: McGraw-Hill.
- Huberman, B. A., Pirolli, P. L.T., Piktow, J. E. and Lukose, R.M. (1998) *Strong Regularities in World Wide Web Surfing*, Science, 280(3), pp.95-97.
- Hyori Jeon, Yonghee Shin, Munkee Choi, Jae Jeung Rho and Myung Seuk Kim (2011) *User adoption model under service competitive market structure for next-generation media services*, ETRI Journal, 33(1), pp.110–120.
- Hwang, Bu-gun, Kim, Yong-gyu, Kim Mi-jeong and Choe Seong-jin (2006) *An analysis of similarities of IPTV and digital CATV*, The Korean Society of Broadcasting Engineers Journal, 12, pp.24–39.
- http://www.soumu.go.jp/main_sosiki/joho_tsusin/eng/Statistics/pdf/090612_1.pdf
- Jang, Dae-ryeon and Cho, Seong-do (2002) *A study on users of high-tech products*

on resistance against innovation within organizations, and control effects of perceived self-capability, Korean Society of Consumer Studies, 13(3), pp.245–262.

Jeffrey, L. and Atkin, D (1996) *Predicting Use of Technologies for Consumer and Communication Needs*, Journal of Broadcasting & Electronic Media, 40, pp.318–330.

John R.C. (1931) *Institutional Economics*, American Economic Review, 21, pp.648-657.

Jones, T.O. and Sasser,W.E. (1995) *Why satisfied customers defect*, Harvard Business Review, Nov-Dec, pp.88–99.

Joo, Y. and Kim, Y. (2004) *Determinants of corporate adoption of e-Marketplace: an innovation theory perspective*, Journal of Purchasing & Supply Management, 10, pp.89–101.

Ju, Yeong-hyeok and Han, Sang-man (2001) *A Study of behavioral characteristics of profitable customers' visit to websites: centering on comparison of models of revenue*, Marketing Research, 16(2), pp.69–91.

Kahneman, D. and Lovallo, D. (1988) *Timid choices and bold forecasts: a cognitive perspective on risk and risk taking*, Management Science, 39, pp.17–33.

- Kerschbaumer, K. (2000) *AOLTV Could Jump-start IPTV*, Broadcasting and Cable. New York.
- Kim, Byeong-seon (2004) *Reevaluation of media substitution in home space: centering on comparison of the use of Web and TV watching*, Korea Press Journal, 48(2), pp.57–78.
- Kim, Chang-hwan (2005) *Broadband TV Service Trends*. IT Report, Korea Electronics Technology Institute, Available from Internet: www.eic.re.kr.
- Kim, Do-yeon (2005) *Influential factors and policy arguments regarding the introduction of IPTV*, Research on Broadcasting, pp.117–138.
- Kim, Gyeong-gyu, Yi, Jeong-u and Kim, Hye-seon (2003) *Reliability and risk on the behavior of adopting internet banking*, Business Administration Research, 32(6), pp.1771–1797.
- Kim, Jin-woo and Lee, In-sung (2005) *Use contexts for the mobile internet: a longitudinal study monitoring actual use of mobile internet services*, Korean Business Information Journal, 18(3), pp.269–292.
- Kim, K.S. (2001) *Structural Equation Modeling with AMOS*, Seoul: Goryeo Jeongbo Saneop.
- Kim, Mun-tae and Yi, Jong-ho (2007) *Innovativeness of N-generation Consumers Influencing Use-Diffusion and Re-adoption of Convergence Products*,

- and the Influence of Reference Group's Conformity, *Industrial Economics Research*, 20(3), pp.1253–1278.
- Kim, S.H. (2004) *High-tech Marketing*, Pakyoungsa, pp.63–73 (in Korean).
- Kim, Y.J.(2005) *A study on the participation in, use of, and satisfaction over cyber communities*, *Korea Press Journal*, 49(3), pp.291–318.
- Kivi, A., Smura, T., and Toyli, J. (2008) *Technology product evolution and the diffusion of new product features*. *Technological Forecasting & social change*, 79, pp.107-126
- Kluckhohn F.R. and Strodtbeck F.L. (1961) *Variations in value orientations*. Westport, CT: Greenwood Press.
- Korsakiene, R. (2009) *The innovative approach to relationships with customers*, *Journal of Business Economics and Management*, 10(1), pp.53–60.
- Kotler, P. and Zsoltman, G. (1976) *Targeting prospects for a new product*, *Journal of Advertising Research*, pp.7–18.
- Lederer, Albert I., Donna J. Maupin, Mark P. Sena and Young Zhuang (2000) *The Technology Acceptance Model and the World Wide Web*, *Decision Support Systems*, 29(3), pp.269-282.
- Lehner, F. (2003) *Mobile und drahtlose Informationssysteme. Technologien, Anwendungen, Märkte*[*Mobile and wireless information systems*].

Technologies, applications, markets], Heidelberg, Germany.

Lee, E.J., Lee, J.K. and David, W.S. (2002) *The influence of communication source and mode on consumer adoption of technological innovation*, Journal of Consumer Affairs, 36(1), pp.1–27.

Lee, E. J., Lee, J. K., and David, W. S. (2002) *The influence of communication source and mode on consumer adoption of technological innovation*, Journal of Consumer Affairs 37(2), pp.256-278.

Lee, S. M. and Olsen, D. (2010) *Convergenomics: Strategic Innovation in the Convergence Era*, Gower.

Li, Shu-Chu Sarrina (2004) *Exploring the factors influencing the adoption of interactive cable television services in Taiwan*, Journal of Broadcasting and Electronic Media, 48(3), pp.466–483.

Lindolf, T.R. (1992) *Computing tales: parents' discourse about technology and family*, Social Science Computer Review, 10(3), pp.291–309.

Mahajan, V., Muller, E. and Bass, F.M. (1990) *New product diffusion models in marketing: A review and directions for research*, Journal of Marketing, 54, pp.1–90.

Mahajan, V., Sharma, S. and Betties, R.A. (1988) *The adoption of the M-form organizational structure: A test of imitation hypothesis*, Management

Science, 34, pp.1188–1201.

Mahler A. and Rogers E. M. (1999) *The diffusion of Interactive Communication Innovations and the Critical Mass: the Adoption of Telecommunications Services by German Banks*, Telecommunications Policy, 23, 719-740.

Malhotra, Y., Dennis, F. and Galletta, A. (1999) *Extending the technology acceptance model to account for social influence: theoretical bases and empirical validation*, Proceeding of the 32nd Hawaii International Conference on System Sciences, pp.6–14.

Marios K. (2002) *Applying the Technology Acceptance Model and Flow Theory to Online Consumer Behavior*, Information Systems Research, 13(2), pp.205-223.

Martin, I.M. and Stewart, D.W. (2001) *The differential impact of goal congruency on attitudes, intentions, and the transfer of brand equity*, Journal of Marketing Research, 38, pp.471–484.

Meade, N.M. and Islam, T. (1998) *Technological forecasting-model selection, model stability, and combining models*, Management Science, 44, pp.1115–1130.

Melinda L.A., Ray L.B., Michael K.B. (2010) *The effect of incentives on customer evaluations of service bundles*, Journal of Business Research, 63(1),

pp.71-76.

Midgley, D.F. and Dowing, G.R. (1978) *Innovativeness: The concept and its measurement*, *Journal of Consumer Research*, 4(4), pp.229–242.

Mick, D. and Fournier, S. (1998) *New product diffusion models in marketing: a review and direction for research*, *Journal of Marketing*, 54, pp.1–26.

Moore G.A. (1991) *Crossing the chasm: marketing and selling technology products to mainstream customers*, New York: Harper Business.

Moore, G.A.(1995) *Inside the Tornado*, New York: Harper Business.

Moore, G.C. and Benbasat, I. (1991) *Development of an instrument to measure the perceptions of adopting an information technology behavior*, *Information Systems Research*, 2(3), pp.173–191.

Motohashi K., Lee D.R., Sawng Y.W. and Kim S.H. (2012) *Innovative converged service and its adoption, use and diffusion: a holistic approach to diffusion of innovations, combining adoption-diffusion and use-diffusion paradigms*, *Journal of Business Economy and Management*, 13(2), pp.308-333

Myung-Hwan Rim, Sang-Sup Cho and Choon-Geol Moon (2005) *Measuring economic externalities of IT and R & D*, *ETRI Journal*, 27(2), pp.206–218.

- Nam, S.J. and Kim, S.H. (2003) *The effect of competitive characteristics on the diffusion of innovative products*, Marketing Research, 18(1), pp.31–52.
(in Korean)
- Neudorfer,R. (2004) *Critical Success Factors for the Management of innovative Mobile Business Models*, 6th Undergraduate and Graduate Students eConference.
- Nishi T. (2008) IPTV kakumei-hoso netto mobile no business model, Nikkei Business Publications, Inc. Tokyo, Japan
- Noyes, J.M. and Garland, K.J (2006) *Comment on evaluating cognitive demand*, Perceptual and Motor Skills, 102(1), pp.118–120.
- Parasuraman A., Zeithaml V.H., Berry L.L.(1985) *A conceptual model of service quality and its implications for future research*, Journal of Marketing, 49, pp.41–50.
- Parasuraman A., Zeithaml V.H., Berry L.L.(1994) *Reassessment of expectations as a comparison standard in measuring service quality: Implications for further research*, Journal of Marketing, 58(1), pp.111-124.
- Park, Gwang-sun (2004) *A Study on the characteristics of early adopters in digital satellite broadcasting services*, Korea Press Journal, 48(1), pp.84–111.
- Park Jae-moon (2005) *An Empirical Study on the Use-Diffusion and Adoption of*

Innovation—Centering on Consumer Experiences in Major High-Tech Products: a Doctoral Paper on Business Administration, Graduate School of Dong-Eui University.

Parsons T. and Shils E.A. (1951) *Toward a general theory of action*, Cambridge, MA: Harvard University Press.

Peter J. (1981) *Reliability: A review of psychometric basics and recent marketing practices*, *Journal of Marketing Research*, 16, pp.6-17.

Price, L.L. and Ridgway, N.M. (1983) *Development of a scale to measure use innovativeness*, *Advances in consumer Research*, 10, pp.679–684.

Ram, S. (1987): *A model of innovation resistance*, *Advances in Consumer Research*, 14, pp.208–212.

Ram, S. and Sheth, R. (1989): *Consumer resistance to innovation: The marketing problem and its solution*, *Journal of Consumer Marketing*, 6(2), pp.5–14.

Ram, S. and Jung, H.S. (1990) *The conceptualization and measurement of product usage*, *Journal of the Academy of Marketing Science*, 18(1), pp.67–76.

Reichwald, R. (1982) *Neue Systeme der Börtechnik und Büroarbeitsgestaltung-Problemzusammenhänge*, Reichwald, R. (Hrsg.): *Neue Systeme der Bürotechnik: Beiträge zur Bürogestaltung aus Anwendersicht*, Berlin.

Robertson, T.S. (1971) *Innovative Behaviour and Communication*, New York:

Holt, Rinehart and Winston.

Robertson, T.S. and Gatignon, H. (1986) *Competitive effects on technology diffusion*, Journal of Marketing July, pp.1-12.

Rogers, E.M. (1983) *Diffusion of Innovation*, 3rd edition, New York: Free Press.

Rogers, E.M. (1995) *Diffusion of Innovations*, 3rd edition, New York/London

Rogers, E.M. (1995) *Diffusion of Innovation*, 4th edition, New York: Free Press.

Rogers, E.M. (2003) *Diffusion of innovations*, 5th Edition, New York: Free Press

Rogers, E.M. and Cartano, D.G. (1962) *Methods of measuring opinion leadership*, Public Opinion Quarterly, 26, pp.435-441.

Rogers, E.M. and Shoemaker, F.F. (1971) *The Diffusion of Innovations*. The Free Press, New York, NY.

Rosanna G. and Roger C. (2002) *A critical look at technological innovation typology and innovativeness terminology: a literature review*, Journal of Product Innovation Management, 19, pp.110-132.

Sandström Sara, Bo Edvardsson, Per Kristensson and Peter Magnusson (2008) *Value in use through service experience*, Managing Service Quality, 18(2), pp.112-126.

Sawng, Y.W., Kim, S.-H., Lee, J., and Oh, Y. S. (2011), *Mobile Service Usage Behavior in Korea: An Empirical Study on Consumer Acceptance of*

- Innovative Technologies*, Technological and Economic Development of Economy, 17(1), pp.151-173..
- Schmalen, H. and Pechtl, H. (1996). *Die Rolle der Innovationseigenschaften als Determinanten im Adoptionsverhalten*, Zf bf, Nr.48, pp.814-822.
- Shih, C.F. and Venkatesh, A. (2004) *Beyond adoption: development and application of a use-diffusion model*, Journal of Marketing, 68, pp.59–72.
- Silberer, G., Magerhans, A. and Wohlfahrt, J. (2002) *Kundenzufriedenheit und Kundenbindung im Mobile Commerce*, Silberer, G.; Wohlfahrt, J.; Wilhelm, T. (Eds.): Mobile Commerce. Grundlagen, Geschäftsmodelle, Erfolgsfaktoren. Wiesbaden, pp.309-324.
- Sultan, F., Farley, J.U. and Lehmann, D.R. (1990) *A meta-analysis of applications of diffusion models*, Journal of Marketing Research, 27, pp.70-77.
- Tellis G.J., Stremersch S., Yin E.(2003) *The international take-off of new products: The role of economics, culture, and country innovativeness*, Marketing Science, 22(2), pp.188-208.
- Tinnell, C.S. (1985) *An ethnographic look at personal computers in the family setting*, Marriage and Family Review, 8(1–2), pp.59–69.
- Tung G.S., Kuo C.J., Kuo Y.T. (2011) *Promotion, Switching Barriers, and Loyalty*, Australian Journal of Business and Management Research, 1(2), pp.30-44.

- Turowski, K. and Pousttch, K. (2004) *Mobile Commerce Grundlagen und Techniken[Principles and Techniques]*, Springer Verlag, Berlin .
- Venkatesh, V. (2000) *Determinants of perceived ease of use: integrating control, intrinsic ease of use: integrating control, intrinsic motivation, and emotion into the technology acceptance model*, Information System Research, 11(4), pp.342–365.
- Villanen, J., Modee, K. and Koivula, J.(2004) *Mobile Enterprise in Germany State-of-the-art*, Expectations and Perspectives for Mobile Business Processes in Small and Medium-sized Enterprises on the German Market.
- Weiber, R. (1992) *Diffusion von Telekommunikation: Problem der kritischen Masse*, Wiesbaden.
- Weiber, R. (1994) *Ausgewählte Theorieansätze zur Erklärung des Nachfrageverhaltens bei technologischen Innovationen[Selected theories to explain the behavior of demand for technological innovations]*, Pohl, A. (Hrsg.), Arbeitspapier zur Marketingtheorie, 4, Trier, pp.110-118.
- Wold, H. (1985) *Partial Least Squares*, in S. Kotz and N. L. Johnson (Eds.), Encyclopedia of Statistical Sciences, 6, New York: Wiley, pp.581-591.
- Yi, Jae-sin (2008) *Development Direction for IPTV Services*, East-West Communication, 11, pp.297–328.

Yi, Sang-u, Gang Jae-won, Sin Ho-cheol and Kim Yun-jeong (2005) *The Converge and Adoption Model on IPTV in the Multimedia Environment—Centering on Similarity and Media*, Korea Information Society Development Institute.

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