The Pennsylvania State University

The Graduate School

College of Communications

CONTRASTING DIFFUSION PATTERNS FOR PC AND MOBILE VIDEOS: A USER-CENTRIC VIEW OF THE INFLUENCING FACTORS

A Dissertation in
Mass Communications

by

Baixue Wu

Submitted in Partial Fulfillment
of the Requirements
for the Degree of

Doctor of Philosophy

August, 2010

The dissertation of Baixue Wu was reviewed and approved* by the following.

Dennis K. Davis
Professor of Communications
Dissertation Co-advisor

Richard D. Taylor
Palmer Chair Professor of Telecommunications Studies
Dissertation Co-advisor
Chair of Committee

Shyam S. Sundar
Distinguished Professor
Co-Director, Media Effects Research Laboratory

Carleen F. Maitland
Associate Professor of Information Sciences and Technology

John S. Nichols
Professor of Communications
Associate Dean for Graduate Studies and Research

*Signatures are on file in the Graduate School.

ABSTRACT

As both computer and mobile phone reach nearly ubiquity in the U.S. market, the slow uptake of mobile video, in contrast to the thriving usage of PC-based video, warrants a deeper understanding of user-oriented factors contributing to the two diffusion paths.

Unlike the majority of existing diffusion research practices, the dissertation examines the differences between mobile and PC video diffusion patterns through the lenses of user-oriented influences in the user-technology relationship. Built upon the established adoption user group classification, the research is informed by the Uses and Gratification theory, the Social Technical theory, and the Technical Affordance perspective. These synergistic theoretical arguments share the recognition of the role of user in the dynamic, usually socially intertwined user-technology interactions. The key research questions that the dissertation sets out to answer include: Does the importance of quality of viewing experience in adoption decision for PC video and mobile video differ significantly across the adoption groups? Do the adoption groups have different expected technology affordances or discover technology affordances different from expectation after experiencing the technology by mode of video?

Results suggest PC video has significant advantages over mobile video in terms of a broad range of affordances – convenience, space and user-creativity related affordances. Particularly, higher level of affordance is expected and experienced toward PC video among Early Adopters/Early Majority, usually equivalent to the critical mass for any technology, signaling the need for a stronger push for relevant affordance for mobile video.

The research reports a strong, positive correlation between expectation and actual experience of technology affordance for both mobile and PC videos, which implies a phenomenon of "expect it, and you'll find it." There is also some evidence to show that this correlation is even stronger among later adoption groups, underscoring the paramount practice of building positive expectations for mobile video among the mass market in order to achieve critical mass for adoption.

The dissertation reveals how users acquire or identify affordances as related to mobile and PC videos in the adoption process. Trial and error is found to be the most frequently leveraged channel to discover affordance. Despite a few subtle differences across market and adoption groups, social exchanges and information seeking are also highly utilized channels for both video technologies. The user's reliance on the above channels together with the significant presence of false affordance, unexpected affordance and unusual affordance clearly illustrate the relational nature of technology affordance involving the user and the technological artifact. This understanding is needed for mobile video marketers to best align technology development, promotion and support efforts to catalyze the market acceptance of the technology.

Further delving into the formation of false and unexpected affordances, the research indicates some evidence that the cue-heuristic-affordance connection can be used to reduce dissonance in user experience, and hence facilitate user adoption.

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Chapter 1

INTRODUCTION AND BACKGROUND

1.1.Introduction

As the market acceptance of computer-based video exceeds that of mobile video at a much accelerated rate, the need to understand the driving forces behind the diverging diffusion patterns is becoming more central than ever before. In June 2008, a report from Ipsos MediaCT, a market research firm, finds that in the U.S., the amount of video watched on a TV drops from 75% to 70% from 2007 to 2008, video consumption via a computer on the other hand has grown from 11% to 19% while mobile video consumption remains virtually unchanged at 1%. The slow adoption progress of mobile video in contrast to that of PC video in the U.S. has been highly visible in the telecommunication industry press in the past three years. In April 2007, Apple announced the monumental benchmark of 100 million units of iPod sold. Even though most favored as a music player, iPod now also has a version for video. With the music player's tremendous popularity and market penetration, one would think the success for iPod video is imminent and inevitable. However, just six months prior to the announcement, Nielsen Media Research reported less than 1% of content played on iPods is video. Among the one third of the iPod owners whose devices are video enabled, only 11% spend time with video on their device. A recent research study in July, 2007 by Knowledge Network, a market research firm, estimated that approximately only 6% of cell phone users are using their cell phone for video consumption. Seemingly still in the shadow of its predecessors (e.g., the Pocket TV and other variances since 1963)'s unimpressive market adoption, mobile video is slowly catching on with a future filled with much hype yet also much uncertainty. According to Nielsen, 15 million people have watched video via their mobile phone in 2009, translating into approximately 6% of the adult population in U.S. On the other

hand, comScore reports nearly eight in ten adult Americans watch an online video via a computer in 2009 (comScore, 2010).

The above stark contrast has sparked many theorizations and continuous interest in the exploration for the reasons. Arguments have been made about influences ranging from industry policies (e.g., Comments of CTIA to FCC regarding mobile broadband, 2009), technology standards (e.g.,Weissberger, 2009), to content cost and selection (e.g., Strother & Fowle, 2009). However, little research in the discipline of diffusion research has examined these two different diffusion patterns with a focus on the user-technology relationship. There is a practical value in understanding user oriented factors concerning why the PC-based video technology is drastically more embraced than mobile video. This understanding will enhance manufacturers and marketers' practices to better design and promote product capabilities to reduce adoption barriers. In this research, the author attempted to integrate a set of cross-discipline concepts in providing a user-oriented explanation for not only the gap between mobile video and PC video diffusions in the U.S., but also the difference in mobile video consumption across international markets - the U.S. and the South Korea/Japan (SK/J) market.

In terms of theoretical development, this research synthesized several synergistic frameworks to examine the user's interaction with the technological artifact (PC video vs. mobile video). The included theoretical frameworks included the Uses and Gratifications (U&G) theory with recent influences from the Social Cognitive Theory, the Social Technical perspective and the Technology Affordance theory. In doing so, the research aimed to make contributions to the field of communications in three aspects: Firstly, the research will engage a more focused

examination of user experiences and user perceptions as related to media usage rather than country-specific, mostly macro-level variables as did a significant portion of the extant international diffusion studies. Secondly, informed by the concept of technology affordance, the research makes the distinction of user intent to adopt before and after usage. Thirdly, with the recognition that the network of influences on adoption is complex and non-linear, the research brings forth the importance of social engagement shaping the user's abilities to identify and transform technical capabilities. The interpretation of technology capabilities is argued to be grounded in social learning in addition to own trial and error and external information seeking.

1.2.Overview of Chapters

Chapter Two examines the relevant literature underlying the core theoretical perspectives for the research: Psychological effects of screen size, Uses and Gratifications theory, Social Technical theory, and the concept of technology affordance. This chapter ends with the presentation and explanation of the research questions for the dissertation.

In Chapter Three, the research design and implementation is outlined. Key measurements used in the survey are operationalized. This chapter also explains methodology of data collection, practical challenges and solutions involved.

Chapter Four delves into detailed analysis of the data addressing and answering the research questions set forth in Chapter One. Analytical procedures and approaches are documented. Significant effects are identified and reported.

The final chapter shares the resulting implications from the research data. Four areas of key findings are examined: Quality of experience, modality affordance, expectation and experience, and conceptualizing affordance as a relational concept. In addition, research contributions and limitations are discussed. Future research focuses are suggested.

Chapter 2

THEORECTICAL FRAMEWORK AND LITERATURE REVIEW

It is the goal of this dissertation to examine the user-technology-environment dynamics and extract the user-centric variables that have a significant influence in the varying diffusion speeds of mobile video and PC video in the context of diverse international markets. This effort is critical given the several notable challenges with modern diffusion research to be discussed later in this chapter, especially those with a focus on international comparison. This chapter further investigates a set of inter-related theoretical perspectives from the fields of mass communications, social informatics and perceptual psychology. It is argued that these synergistic frameworks offer additional explicatory contribution to the diffusion research space.

2.1. The Traditional Diffusion Theoretical Framework

It has been a long-standing quest in both the academic and industry arenas for answers concerning why certain technologies and innovations succeed or fail, and what are their implications. In the past decade with the advancement in computing power and sophistication, the rate of innovation and new technological developments seems accelerated, making the search for these answers especially vital. The diffusion theory provides a paramount framework to study these topics. Innovation diffusion research seeks to understand the processes of the formation, distribution, adoption and continued application of innovations and technologies.

From its origin, the diffusion theoretical framework consists of diverse inter-disciplinary conceptual roots. In his review of historical origins and development of the diffusion research, Rogers (2003) traced back to Gabriel Tarde, the French scholar and a keen observer of social

trends in the early 20th century. Tarde's book - The Laws of Imitation first prompted a systematic contemplation of why only a small select group of innovations survive and become mainstream. Tarde touched upon several fundamental diffusion concepts such as "imitation", equivalent to adoption in modern research, and the S shaped diffusion curve over time. Rogers noted another early critical contributor to diffusion research - Georg Simmel, the German sociologist who originated the concept of the "stranger". The concept of the stranger has spawned ideas and theories for formulating the communication process in the diffusion of an innovation. The innovator, the earliest adopter of any innovation, is very much like the stranger who tends to be attracted to and most likely open to the newest ideas in their social network but remain as a less engaged member. With its modern research roots in rural sociology (Ryan and Gross, 1943) in the U.S., the research on diffusion of innovation has evolved into a collection of knowledge that is inter-disciplinary in nature (Rogers, 2003). This inter-disciplinary characteristic is thanks to not only the application of the diffusion theory in diverse industries and social issues, but also the commonly recognized five stages of innovation-decision process that have invited scholarly investigation across fields.

Diffusion is "the process in which an innovation is communicated through certain channels over time among the members of a social system" (Rogers, 2003, p5). Besides substantial research attention dedicated to the four key elements – innovation, communication and channels, time factor, and members of a social system, the collective diffusion research is credited for outlining a seemingly logical and coherent process for understanding how a new idea is disseminated. The diffusion process has five stages: 1) Knowledge, 2) persuasion, 3) decision, 4) implementation, and 5) confirmation, which are often understood as linear and sequential. The locus of the

process is in individuals exposed to the new idea. It is typically assumed that individuals are rational entities that make decisions to maximize the benefits to self, avoid unwanted consequences and seek validations to reduce uncertainty of innovations. In addition, this process model has been later frequently applied to adoptions of innovations in an organizational setting, treating organizations like individuals that carry certain pro or anti innovation psychological traits.

While identifying the technology attributes that are more or less likely to catalyze diffusion constitutes a central investigation in diffusion studies, the most important conception from the diffusion work lies in the categorization of adopters into five groups: innovators, early adopters, early majority, late majority, and laggards with each bearing varying degrees of exposure to new ideas, ability to transmit information and decision tendency to use and modify the new technology. The diffusion theory implies a need for a fit between what the user is seeking and what the user is gaining or perceives to gain from the innovation in order for the new concept to be accepted and disseminated.

2.2. Limitations of Diffusion Theory

Diffusion theory is recognized for its monumental contribution to explaining generations of technological successes and failures. However, this framework has several inherent limitations that cannot be overlooked. First, the theory implicitly assumes a coherent inner logic in the existence of technology and innovation. By categorizing the decision flow for adopting an innovation into the aforementioned five stages, it implies a linear, single-direction of the process flowing from gaining knowledge of the innovation to making a decision about adoption, and

finally developing a confirmation of the innovation. Even though the diffusion pattern of most innovations has been found to manifest an S shape over the course of early adoption, critical mass and mass acceptance, the notable Bass model (Bass, 1969) and its variances that aim to quantify the influences of communications and other factors are linear, suggesting that an increase in interpersonal and mass communication exposing fresh new audiences to the new idea would generally result in an expanded adoption of the new idea.

Second, diffusion research shows a pro-innovation inclination with a stronger interest in reporting successful innovations. Rejected innovations and technological failures have limited visibility in the decades of the innovation research. In the rare situations when innovation rejections are studied, the blame is typically on individual users who were found to be less socially connected, ill informed, and demonstrate a weak propensity to adopt innovations.

Third, the diffusion research establishes a simple, intuitive proposition that human beings are aware of and can articulate their own needs and desires, and have cogent cognitive capacity to weigh the pros and cons of a given new idea based on their needs. There is substantial discussion pointing to the need for a fit between the features of the innovation and the needs in order for the innovation to succeed. However, diffusion scholars have not quite developed a way to address the question about where the needs come from. The search for this answer often does not go far, and typically rests on either the innate characteristics of the users or the influence of the change agent whose job is to create a need when the need is not obvious to facilitate the adoption of the innovation. Even when innovation adoption is being examined within an organizational setting, the CEO or the few top management members of the organization are the

sole player included in the examination of the decision making process, mostly ignoring the on-going processes and interactions taking place between the key decision makers and the rest of the organization.

Lastly, the diffusion theory zooms in its focus on the characteristics of technologies and innovations, which have been shown across technology categories to be significantly predicative of the success of an innovation. Technological advantage and usefulness is a central construct that diffusion researchers take great efforts to include and measure. This priority is visibly present in the original diffusion model as well as in ensuing modified models. For example, the Technology Acceptance Model (Davis, 1989) proposed deriving explanation for users' decision to use a new technology through two variables: perceived usefulness and perceived ease of use. Venkatesh et al. (2000, 2003) extended the technology acceptance model to a Unified Theory of Acceptance and Use of Technology (UTAUT), gaining a significant level of explaining power. Building on these earlier model development efforts, Fife and Pereira (2005) presented a diffusion theoretical model that assigns more weight to cultural and social context determinants in estimating market acceptance of emerging mobile services, which proved to be especially effective in a multi-national comparative setting.

2.3. Main Developments of International Diffusion Research

International comparison is an integral aspect of the diffusion research of the modern telecommunication innovations. In recent years, telecommunications innovations are becoming an area of diffusion research that attracts increasing cross-country investigation.

The effort of modeling and forecasting diffusion patterns across countries has practical benefits. The continuing line of research has brought new perspectives and indicators as well as presented unique challenges in the arena of diffusion research (Meade & Islam, 2006). The studies comparing telecommunications diffusion trends across different countries and cultures and their findings can be broadly categorized into three areas. These three areas also indicate the general groups of predictors and influencing variables examined by scholars in related forecasting models for diffusion patterns on the international level.

The first area is observation and simulation of the influences of diffusion parameters (innovation coefficient and imitation coefficient), which are the two primary contributing and predicting factors in the Bass model. The existing research indicated that diffusion parameters differed across countries and innovations (Mahajan and Muller, 1994; Ganesh and Kumar, 1996) without many generalizable themes. Talukdar and others' study in 2002 analyzed the diffusion parameters for developed and developing countries separately, and found that the diffusion parameters are significantly different across these two groups of countries. Takada and Jain (1991) identified a positive relationship between the imitation coefficient and the time lag of product introduction. Other research revealed that the imitation coefficient was negatively related to cosmopolitanism (Gatignon *et al.*, 1989; Kumar *et al.*, 1998). Through their summary review of international studies on various telecommunication technologies, Puumalainen and Sundqvist (2005) noted innovation and imitation coefficients tend to be higher in rich but late adopting countries, but do not seem to make a difference in poor countries.

The second area of investigation in international studies of telecommunications innovations centers on the impact of country-specific characteristics in the diffusion of telecommunications innovations. The most common factors that have a significant effect in telecommunications diffusions include the country's wealth, cosmopolitanism, and the lead-lag effect (Dekimpe et al, 1998, 2000a; Takada and Jain, 1991; Mahajan and Muller, 1994; Kumar *et al.*, 1998; Gatignon et al., 1989). Interestingly, while wealthier countries tend to take the lead in new telecommunication technology adoption, the diffusion rate in later adopting countries was found to be faster within the country (Dekimpe et al, 1998, 2000a). This theme was supported by Bagchi and others' (2003) investigation of cell phone market penetration in Latin American countries as well as Kshetri and Cheung (2002)'s observation of the cell phone phenomenon in China. The argument for the accelerator effect for late adopting countries is they are afforded the opportunity to observe and judge the benefits of the innovation. It has also been found that countries are more likely to adopt if their neighboring countries have already adopted, which is termed as cross-country learning effects (Takada and Jain, 1991; Mahajan and Muller, 1994; Kumar *et al.*, 1998; Dekimpe *et al.*, 2000a; Rogers, 2003) or a "contagion" effect (Midgley & Dowling, 1978). Other researchers further discovered more elements including a country's mobility, urbanization, cultural variables (e.g., social homogeneity, innovation's compatibility with local values), political stability, and government policy (Dekimpe *et al.*, 2000a; Gatingnon et al., 1989; Puumalainen and Sundqvist, 2005; Kshetri and Cheung, 2002; Kshetri el al, 2004) all playing an important role in a country's willingness to adopt and the length of time taken for the country to adopt. Beyond the traditional approach of treating each country as an individual entity in predicting country-specific influences on the country's diffusion results, Islam, Fiebig and Meade (2002) as well as Kumar and Krishnan (2002) presented modified Bass and

Gompertz models integrating inter-country influences and have found more accurate prediction for individual countries.

The third main area of international telecommunication diffusion research describes the characteristics of the innovator or early adopters versus laggards in the population within a country. Hyvonen and Repo (2004) identified those who are most likely to use mobile services in Finland as younger, considering themselves to be experts of technology as well as having a favorable attitude towards new technology. In addition to their analysis of the driving factors of government policy and political environment, Sangwan and Pau (2005) also noted the Chinese early cell phone users' higher social status, stronger cosmopolitanism and level of wealth in their anatomy of mobile diffusion in China in the last ten years. A recent comparison of Internet diffusion in the U.S., Sweden and India by Vencatesh and Shih (2006) further confirms that the general characteristics of the different types of adopters with different level of innovativeness hold true across countries. The innovators and the early adopters are found to possess a higher social-economic status in their society and tend to be much more open to new technologies. The difference between the countries, if any, is a matter of magnitude.

2.4. Key Challenges in Current International Diffusion Research

The challenges emerging from the current international diffusion research (especially those related to telecommunication products and services) lie in three key aspects. Firstly, there are limited generalizable empirical findings that can be effectively leveraged to predict or guide diffusion efforts across the countries. The predictors or influencing variables included in the various forecasting models (Meade & Islam, 2006) span across a wide spectrum of constructs ranging from GDP per capita to the role of a demographic variable (i.e. gender) in society. These

predictors are also not applicable across products, the diffusion patterns of which are often found to be best explained by different sets of influences. Inter-country studies concerning take-off and diffusion patterns of new products often rely on cross-cultural differences as explanatory measures (Hofstede, 1991), which have been found to be best weakly linked to the resulting differences (Tellis, Stremersch, Yin, 2003).

Secondly, with regards to studying the innovation coefficient (i.e., external influence/mass media influence) and the imitation coefficient (i.e., internal influence/interpersonal communication influence), the current diffusion research lacks an updated and more integrated approach in treating these two influences. While these two variables were distinct and rightly separate in the early era of diffusion research (and when the Bass Model was first formulated), the border between mass communication and interpersonal communication is becoming increasingly faded.

The concept of media is generally interpreted as primarily related to mass media in the form of television, radio and the press despite human communication largely manifests through a wide array of other vehicles such as objects of art and products that we use on a daily basis other than the mass media. Cathcart and Gumpert (1983) recognized this problem and noted, "The traditional division of communication study into interpersonal, group and public, and mass communication is inadequate because it ignores the pervasiveness of media." They brought emphasis to mediated communication, a term that cuts across the walls of mass media and personal communication theories.

Arguably, the limitation of theoretical development bridging the gap between communication originated through a formal medium, which can be interpreted as a communication technology, and interpersonal communication is probably due to the evolution history of communication technologies. Before the commercialized launch of technologies that enable exchange of ideas on both a one-to-one level and a collective level without interfering with each other, there was no significant technological basis for such theoretical thinking. Computer mediated communication (CMC) is one of the earlier fields in which researchers started to study interactive media and searched for appropriate communication theories to understand the impact of interactiveness. Besides the useful concepts of social cues and contexts from the personal communication (Bandura, 1986; Fulk, et a., 1990), the literature of CMC also has drawn from broader mass media theories such as McLuhan's idea of medium as message as well as level of media richness and corresponding media choice from Daft, et al. (1986,1987). However, the challenge of finding a set of holistic theories emerged. In their research of the group software systems, Poole and Jackson (1993) pointed out, "with new technologies, the line between the various contexts begins to blur, and it is unclear that models based on mass media or face-to-face contexts are adequate." As information technologies have developed rapidly in the late 1990s and early 21st century, CMC research faces a need to extend its domain and collaborate with mass media and personal communications for a better understanding of the nuances, pervasiveness and interdependence of interactive media.

In the mean time, the research of mass media encounters its own struggle of explaining the process in which the emerging communication technologies, the Internet in particular, influence the audience. For example, in their overview of theories of mass communications, DeFleur and

Ball-Rokeach (1989) dismissed computer and telephone as significant means of mass media, overlooking the potential implications of their usage on the mass society. Morris and Ogan (1996) criticized the tendency for mass media researchers to narrowly define the media under study probably out of the fear of "demassification" and "its implications for the liberal pluralist state." They called for broadening the boundary of mass media research as well as the typology of communication to allow for synthesizing and applying theories that used to be supported by individual sub-fields of communications.

Diffusion researchers will benefit from taking into consideration of the above theoretical developments and related empirical evidence that support an integrated view of the impact of communication in the diffusion process. Adding to the complexity of international comparison, the unequal penetration of various communication technologies such as Internet across countries may warrant a potentially different method in defining and operationalizing the innovation coefficient and the imitation coefficient depending on state of the country's infrastructure.

The third challenge in international diffusion research related to telecommunication is a general absence of research focused on user experience and user perceptions, a micro yet essential dimension of innovation diffusion. While conceptualizing the users and the market into the five adopter categories is one of the most important contributions from this work, Rogers (2003) outlined five conditions that significantly determine the success or failure of an innovation. The five conditions consist of 1) whether or not an innovation is perceived to have relative advantage over its predecessors or existing competitors; 2) whether or not the innovation is perceived to be "consistent with the existing values, past experiences, and needs of potential adopters"; 3)

whether or not the innovation is perceived to be difficult to use or understand; 4) whether or not the user has an opportunity to try the innovation; and 5) whether or not the innovation is observable. This emphasis on users in the founding literature helps foster a long-term theoretical curiosity towards user experience, user perceptions and user autonomy in diffusion research until today (e.g., Lin, 1998, 2001). However, this unique tradition is currently not visible in diffusion studies on the international level.

The majority of recent international diffusion literature remains strong in studying consumer traits and technological advantages across countries, but thin in examining the actual adoption process and associated pre and post stages. Tellis et al. (2009) conducted a 15-country study that includes the top-tier biggest economies and most populous markets in the world, establishing a multi-facet operational definition for consumer innovativeness. Tested through structural equation modeling techniques, consumer personality factors were found to significantly drive adoption of mobile shopping in Spain (Aldas-Manzano, Ruize-Mafe, Sanz-Blas, 2009). As a new business practice, Internet banking has received much research attention in Europe, which mostly yields insights on differing psychological characteristics of adopters compared to non-adopters (Ozdemir et al., 2008, Gounaris & Koritos, 2008, Gerrard et al., 2006).

Contesting the persistent focus on consumer characteristics as antecedents of adoption, several propositions for new theoretical extensions are emerging. Kauffman and Techatassanasoontorn (2005) suggested a focused examination on the multiple diffusion states – introduction, early diffusion, partial diffusion, and maturity for information technologies, many of which have more than one generation of products. They also included the theory of network externalities

underscoring the dimension of influence from peers. Burns (2007) chose variety seeking as a new angle to uncover the motivation for innovative behaviors. His proposed framework has a stronger process orientation with a culturally neutral and non-technical-determinist stand. An obvious limitation is, however, its lack of explanatory ability for adoption consequences. Studying post-trial consumer experience, Johnson (2008) introduced the concept of technology assimilation into diffusion research. He argued that this conceptual addition contributes to understanding user experience as an adoption determinant other than technology benefits. The above research discoveries reflect the call for fresh inter-disciplinary theoretical perspectives in explaining diffusion patterns and adoption behaviors.

To explore new lenses to examine the contrasting diffusion of mobile video and PC video across countries, this dissertation reviews the following inter-disciplinary theories and argues for the benefit of integrating their explicative perspectives in addition to the diffusion literature.

2.5. Effect of Screen Size on User Experience and Subsequent Adoption

When looking at the disparity between mobile video and PC video consumptions, one dominant difference is the larger screen that comes with the computer as opposed to the small screen embedded in a typical hand-held mobile device. The computer screen which usually ranges from 12 inches to 19 inches in current days can be four to ten times of the size of a portable device that is from 2.4 inches to 3.5 inches in diagonal measurement. The screen size has been found by a sufficiently large body of literature to be one of the few form factors significantly associated with the user's cognitive and psychological states in his or her interactions with the device (e.g.,

Lombard et al., 1995, 2000; Maniar, Benette and Gal, 2007; Reeves, et al, 1999; Reeves & Nass, 1996).

The findings most relevant to the topic of interest for this research from this long-standing body of studies center on the impact of screen size on user engagement, personal space, feeling of presence, quality of experience, and technology adoption.

Most prominent of all the branches of the related arguments, the Media Equation theory (MET) conceptualized by Reeves and Nass (1996) reasoned that people tend to respond to mediated or simulated objects or figures as if they were real. As summarized by Griffin (2000), "people treat modern communication media as if they were human, so established principles of interpersonal communication also predict human responses to computers and television. The media equation (media = real life) is an unconscious, automatic response that occurs because our slow-to-evolve brains don't distinguish between mediated and real life experience". The idea of transferring human characteristics to non-human objects and things is not new. Psychologists have shown that anthropomorphic perceptions start in very early infancy of humans (www.athropomorphism.org). The practice of anthropomorphism is as old as ancient Greek mythology. For example, the Roman God Apollo was interpreted as a representation of the sun. Animism is a common theme in religions as well as literature across cultures and races. The modern society has produced countless technologies – cars, ships, computers, robots, to name just a few that mimic human forms and behaviors in design and continue to reinforce our natural tendency to describe, treat and think of objects as humans.

While it is understood that humans, by instinct, develop personification of things, it is worthwhile to examine under what conditions people would be more likely to engage in this behavior or thinking, or what factors would trigger the likelihood for people to experience this innate tendency. The Media Equation theory creators and other inspired researchers have contributed to this learning. Screen size of a media technology is one of the few key variables that have received continuous research attention.

Within this school of thoughts, the existing body of empirical research has mainly delved into the psychological effects of screen size on the following constructs and their variances or sub-dimensions:

1) User engagement or emotions
2) Personal space
3) Presence

Engagement is defined by Merriam-Webster as "emotional involvement and commitment". Emotion is "a conscious mental reaction (as anger or fear) subjectively experienced as strong feeling usually directed toward a specific object and typically accompanied by physiological and behavioral changes in the body". User engagement or emotion centers around several intertwined concepts – attention, memory, arousal, and evaluative valence which have been found to alter as screen size changes.

A between-subjects experiment was conducted by Reeves et al. (1999) using three screen sizes (small=2 inches, medium=3 inches and large=56 inches) and varying video contents. The

experiment reveals that the largest screen generated the highest level of attention and arousal in comparison to the small and medium screens. Furthermore, the screen size interacts with the media content so that contents with more arousing nature (such as violence and sex) on the largest screen produced the most arousal among the subjects.

Results from additional experimental studies further confirmed that images on a large screen invoke more arousal, better memory, more excitement than do images on a small screen (Kim& Biocca, 1997, Reeves & Nass, 1996; Lombard et al., 1995, 2000).

Attention is reported to be impacted by screen size and image motion (Reeves, et al., 1999; Ravaja, 2004). Heo and Sundar (2004) found a prominent interaction effect between screen size and media contents on attention and arousal. Entertainment contents on a larger screen are predicted to produce the most engaging experience for the audience. In addition, various experiments have shown that different television screen sizes played a significant role in viewers' evaluation of people shown in the contents (Lombard, 1992; Reeves, Lombard & Melwani, 1992; Reeves, Detenber & Steuer, 1993). A comparison of the results of the same tasks performed on a Palm Pilot and a 17-inch desktop computer (Goldi, 1999) demonstrated that users of the small device and screen expressed a much higher level of trust, engagement, liking as well as a stronger sense of privacy and closer distance to the device.

Personal space is another important variable found to be impacted by screen size of media technologies. The existing research imply that media users or audience tend to maintain their distance and personal space with the media devices or people in the contents presented in the

persons. The screen size of the media device directly influences people's perceived scope of physical personal space as well as social space.

Testing varying television screen sizes (small = 10 inches, medium = 26 inches and large = 42 inches in diagonal measurement) and viewing distances, Lombard's (1995) experimental observations indicated that news anchors appearing on a larger screen were more likely to invoke a violation of the viewer's sense of personal space, yet were more likely to induce positive emotional responses. Trying to affirm the correlation between emotive reactions and personal space operationalized as screen size and group size, a recent replication of Lombard's 1995 experiment by Fielding et al (2006) did not, however, yield a similar conclusion. It is worth noting that this study did not test the largest TV screen size used in Lombard's original study.

Nevertheless, numerous research studies outside of the communications fields showed evidence that personal space or the sense of privacy and ownership can be affected by media form factors including screen size. Little, Briggs, and Conventry (2005) compared the level of privacy felt by respondents working with computer screen sizes of 12 inches, 15 inches and 17 inches. The 12-inch screen was perceived to be more private than the larger screens. In addition, adding privacy partitions interestingly did not increase respondents' perceived privacy for the 17-inch screen. In their attempt to enable interaction between small (personal) spaces (screens) and big (public) spaces (screens), Jin, Takahashi and Tanaka (2006) uncovered a sense of strong personal ownership of the smaller mobile screen which is becoming an extension of the user.

Thanks to the perception of being an extension of the user, devices with much smaller screens increasingly lend themselves to consumer adoption. A qualitative tracking of mobile phone users' daily rituals and routines in Japan (Ito et al., 2005) discovered that the young men and women inseparable from their mobile devices were relying on these small screens to create their own personal territory and psychological sanctuary in a society where space is limited and interference with others is strongly discouraged. As the authors stated, "we believe that it is crucial to retain attentive to the local particulars of setting, context, and situation in the face of these translocal flows if we are to avoid a technical determinist argument that these technologies necessarily lead to a blurring of spatial and social boundaries. Electronic media have effects that break down certain prior social boundaries,…, but they also have effects of constructing and reifying other social boundaries."

Presence is an increasingly important dimension of user experience affected by media screen size. The International Society for Presence Research defines presence as "a psychological state or subjective perception in which even though part or all of an individual's current experience is generated by and/or filtered through human-made technology, part or all of the individual's perception fails to accurately acknowledge the role of the technology in the experience."

Lombard and Ditton (1997) extrapolated six general ways in explicating the concept of presence:

1) Presence as social richness, which is typically measured by semantic differential scale items such as impersonal-personal, unsociable-sociable.
2) Presence as realism, which is operationalized as the response to the question of "how real did the overall experience feel?"

3) Presence as transportation, the notions of "You are there," "It is here," and "We are together."
4) Presence as immersion, the evidence of which can be tracked by recording physiological reactions
5) Presence as social actor within medium, and lastly
6) Presence as medium as social actor

Screen size, image size or field of view is found to be one of the distinct and significant physical factors that influence the extent to which people feel present. Realism and immersion are the two facets of presence that are arguably most reported to be impacted by screen size. Respondents in Yuyama's study (1982, cited in Lombard & Ditton, 1997) indicated a greater degree of sensation of reality when they watched a 54-inch image as opposed to a 28-inch image. Measuring reactions to action films on a 70-inch screen versus a 35-inch screen, Reeves, Detenber, and Steuer (1993) found a greater sense of being "part of the action" among those watching the larger screen. Additional experimental research further established the correlation between larger screen size and a stronger feeling of participation from the viewers (Lombard, Reich, Grabe, Campanella, and Ditton, 1995; Lombard and Ditton, 1997; Grabe, et al., 1999) when screen sizes with approximately 20 inches in difference were contrasted.

A look into the motivations behind consumers' purchase decisions on larger TV sets (Pressler, 1996) revealed the desire to have an experience that is, coupled with high definition television signals, like "looking out a window, almost feels three-dimensional" (Brinkley, 1998). In examining the importance of presence in relation to restoration, Sponselee, Kort, & Meijnders

(2004) found that arousal after a stress task decreased significantly faster for respondents who viewed a relaxing and restorative film on a 72-inch screen than for those who did so on a 31-inch screen. This again affirms the impact of screen size on moderating the level of presence as a more realistic representation of the nature.

Screen size is also proved to have an interacting effect with media contents on how users experience presence. In particular, combined with motion in target objects, larger screen size (50 deg vs. 28 deg in this study) induces a much stronger subjective sense of realism and a slightly higher level of vection, a self-motion reaction of the respondent to the perceived environment. The difference in screen size does not, however, affect subjective or behavioral reactions to still images (IJsselsteijn et al., 2001).

Multimedia communication has become an essential part of our modern life. As the categories of media technologies are expanding quickly, researchers have also developed a consensus in using multimedia to describe a media usage scenario where multiple modalities of communication such as TV, radio, Internet, mobile phone are simultaneously taking place. However, in its most fundamental definition, multimedia refers to a combination of textual and pictorial expressions or representations (Mayer, 2005). Not surprisingly, this term now becomes very common in representing the integration of texts, still images, animations, videos onto a computer system (Jonassen, 2000). Research associated with multimedia experience imply that screen size and image size become a heuristic cue for inferring and assessing multimedia experiences, and therefore call for more attention from technology developers to consider feature efficacy as a result of screen size.

At the early stage of mobile Internet service, Jones et al (1999)'s research showed that users with small displays tended to follow hyperlinks less frequently than those with large displays. In examining users experience with video-based M-learning, Maniar, Bennette and Gal (2007) found that a PDA screen size would perform better than a typical cell phone screen size. A study on user performance in information-rich virtual environments by Polys, Kim and Bowman (2005) uncovered an interaction effect between screen size and information layout. Specifically, an information bar where function labels are organized across the screen (similar to a Google tool bar on an Internet browser) made it easier for the users to find feature functions than a label positioned closely adjacent to a feature on a small screen. Interestingly, the larger number of applications are loaded on a device, the less likely the user trusts the device, the less engaging the user is, and hence the less effective the user finds the device to be; however, this same negative experience takes place regardless of the screen size of the device (Goldi, 1999).

In addition to the impact associated with specific technology features, researchers have also looked into the effect of screen size on users' overall perceived quality of service (QoS) and quality of experience (QoE) for multimedia technologies. Testing varying levels of display type and size (eye tracker, computer monitor, head-mount eye trek and PDA), frame rate, and simulated participant mobility, Gulliver and Ghinea (2003) reported that increased visual immersion (represented by a projected field of view equivalent to a 52-inch TV screen and the close attachment of the eyes to the device) was positively associated with video information simulation, but negatively affected users' perception of video quality and enjoyment. Even though users watching content on 2" and 13" screens (Reeves, Lang, Kim, & Tartar, 1999) did

not show significant variance in attention or arousal, Westerink & Roufs (1989) found that larger screen size and image size more likely generate a perception of better image quality. In Knoche and Sasse (2006)'s summary on factors contributing to QoE for mobile TV, display size and shape along with device use and immersion were identified as the three aspects of handset integration and usability, which is one of the four key influences on user uptake of mobile TV.

While there is a rich body of literature investigating the relationship between screen size and media experience as discussed in the above, relatively little research directly link screen size with user adoption of emerging communication technologies such as cell phone or portable media device.

The most explicit impact of screen size on media adoption seems related to the adoption and ownership of television. When TV first emerged in the 1950s, a 16-inch screen was the norm. The TV screen expanded to 25 inches in the 1970s. Today TV screens of 27 inches or larger are common and widely available. In examining adoption of Digital TV, Chan-Olmsted and Chang (2006) uncovered the desire for bigger screen size is one of the significant predictors of intention to adopt DTV sets. In the Preliminary Television Market and Industry Research sponsored by the US Environmental Protection Agency, the report (2006) attributed the continuous and rapid growth of Television shipments since 2000 in part to consumers showing a higher preference for a larger TV screen size. Lee et al (2006) modified and applied the Bass diffusion forecast model on the Korean domestic market for LCD TV display. Interestingly, the group found that consumers showed a stronger preference for 40 inches over larger display size despite a firm predicted likelihood for the introduction of 50-inche LCD TVs into the Korean market, implying

a larger screen is not always better and there might be an optimal threshold for television screen size.

Even though screen size is rarely mentioned specifically as one of the reasons why or why not people adopt a media technology, existing studies have shown that screen size is implicitly linked to the usefulness of the technology, which is a key predictor of adoption behavior. When studying mobile technology adoption by doctors in South Africa, Banderker and Van Belle (2006) discovered that doctors initially found the small screen of the mobile device a hindrance in its utility until they learned about the ability of the device to retrieve a significant amount of data. Berman et al. (2007) from IBM Institute of Business Value keenly noted that "as high-speed access (both mobile and fixed) becomes less of an obstacle, media enablement hinges more on the device itself. Factors such as content transmission speed, battery life and screen size determine whether a device is actually suitable for media consumption."

Beyond usability, users' actual experience with the media technology and derived perceptions of usefulness after adoption plays a significant role in facilitating the further diffusion of the media technology (Karahanna, Straub, & Chervany, 1999). Thanks to its long-standing effects on user experience discussed earlier, screen size indirectly impacts the adoption of media technology. PC-based video and mobile video are expected to yield different levels of QoE due to their difference in screen size.

2.6. What is Motivating Users to Adopt - Updated Uses and Gratifications Theory

Together, several theoretical concepts shed lights on these additional factors, other than screen size, that warrant consideration when examining the contrasting adoption patterns of PC video and mobile video. One particularly helpful perspective is the uses and gratification theory with a stronger cognitive focus in recent developments (Katz & Blumler, 1974; LaRose & Eastin, 2003). Since officially established in 1974 by Katz and Blumler, the uses and gratifications theory has been used extensively by communication researchers as a general foundation in explicating media choice and usage. While vague in identifying the origins of needs and the process how needs influence behaviors, this theory has a great appeal in its simplistic logic. Under this theory, the audience and users are driven by needs and gratifications sought in media usage. Conversely, media technologies catch on and are adopted because they meet the consumer needs and desires, and satisfaction of needs reinforce behaviors.

Motivated by the traditional U&G framework, researchers have studied a wide spectrum of needs and gratifications related to new media, especially mobile telephony and computer-based Internet (Angleman, 2000). A large-scale survey in Hong Kong conducted by Leung & Wei (2000) revealed additional reasons for using mobile phone beyond talking, which included mobility, immediacy, instrumentality. Setting out to look for the presence of the traditional needs in mobile phone usage, Stafford and Gillenson (2004) were surprised to find that mobile phone users did not seem to be motivated by any content-related reasons; instead, the users were much more likely to state speed, ease of use and connectivity, attributes associated with the device itself as the key factors in using their mobile phone. In contrast, Internet users (who typically access Internet via a larger-screen computer) have been observed by many researchers to be

highly driven by Internet contents. Despite differences contributed by demographic and social-economic factors, Lin (1999) summarized the main dimensions of motivation for Internet usage to include relaxation, companionship, habit, passing time, entertainment, social interaction, information/surveillance, arousal, and escape. The interactivity nature of the Internet (Schumann & Thorson, 1999; Ko, 2002) was particularly identified as a strong feature that satisfies users' need to seek information and social companions (Lin, 2001).

A significant portion of the recent research about Internet and new media usage remains close to this principal theory but with a renewed application of the social cognitive theory (SCT). The newer focus leveraging SCT is consistent with the conceptual development of the "expectancy-value model" proposed by Palmgreen and Raybum's (1984), which laid the ground for distinguishing "Gratification Sought" (GS) and "Gratification Obtained" (GO). In his updated discussion on SCT, Bandura (2008, 2001) explained the contributions of SCT to understanding mass media effects as well as innovation diffusion through personal determinants, behavioral determinants and environmental determinants. SCT offers the capable and reflective self as the originator of the push in the ensuing "law of motion" in media effects and social influences. This view is fundamentally shared by the U&G framework.

As summarized by LaRose and Eastin (2004), "Uses and gratifications can be understood in socio-cognitive terms (SCT). Where uses and gratification researchers have explored gratifications, SCT proposes expected outcomes and where uses and gratifications researchers posit needs, SCT proposes behavioral incentives. Expected positive outcomes of Internet exposure should cause further exposure. What people have gotten in the past from the Internet is

an important part of the basis for their current expectations about it. However, expectations are also shaped by vicarious learning, based on observations of the experiences of others, and also self-efficacy. However, it is the current expectation about outcomes of behavior that best determines behavior." For example, in Valacich et al.'s analysis the hierarchy of online needs (2007), user evaluation and satisfaction with a website is found to be dependent on user expectation (i.e., the extent to which the website is perceived to meet the varying levels of sensual and experiential requirements) and the nature of the website.

With continuous evolution of this theoretical framework, some researchers saw a need in linking the social background of the media users, the expectations they develop towards media usage and the gratifications they are achieving (McQuail, 1994). In several separate studies, Friedson (1953) and Schramm et al. (1961) reported that children's media preferences are significantly associated with the degree to which they were attached to parents and peers as well as how well the child was integrated with the home and school environments. In an effort to compare the priority of needs and gratifications sought between American and Dutch residents, Wilhoit and de Bock (1980) found that Dutch respondents placed a higher importance on the need to be entertained while American respondents valued the need to have influence more. A comparison of mobile phone usage in the U.S. and Japan (Katz and Sugiyama, 2006) found that mobile phone has become a new fashion element in people's daily life. Flanagin (2005) factor analyzed the various reasons and motivations for using Instant Messaging (on mobile phone) among the younger generations and found that the ability of IM to provide opportunities for social entertainment, task accomplishments, social attention, and meeting new people explained nearly 70% of the variance in IM usage. The shift to a closer examination of the social contexts where

media usage takes place is a step toward mitigating the original assumption of this framework that the users are self-conscious, articulate and active agents. Elliot and Rosenberg (1987) observed that "media gratifications are primarily the result of the social situation and background factors, and may depend more on habit than on internalized need states." More recently, the distinct influence of SCT on U&G is apparent in its integration of environmental determinants and social learning (Bandura, 2008). The concepts of “vicarious learning” and “social prompting function” under SCT are central in supporting the proposition of a often non-linear, multi-pattern social diffusion process of new media and innovations in general.

Taken together, the updated and extended U&G perspective suggests a reinforcement effect on media technology usage when the actual experience meets expected outcome, both of which are under the influence of the social contexts and the user’s psychological predispositions. Conversely, the media technology usage or adoption would be interrupted or hindered when there is a disconnect between the expectation and the experience moderated by, again, the social settings and user characteristics.

2.7. Adoption is More Than an Individual Decision - The Social Technical Theory

While the U&G perspective takes note of the importance of social contexts, the relationship between technology and social contexts is not fully elaborated within this framework. On the other hand, the social technical theory has been established in the discipline of informatics to give this relationship the attention it deserves especially in studying the implementation of new technologies.

The central thinking of this theory is technologies and innovations do not follow an overly simplified linear development cycle from conception to acceptance, and then to varying levels of impact (often assumed positive) on the population and the society, as the traditional technology determinism proponents would argue. Instead, technologies and innovations as well as associated human actions such as design and adoption are embodiment of choices situated in economic, social and cultural contexts, leading to potentially vastly different outcomes and purposes, intended or unintended.

It is important to distinguish this perspective from the social deterministic view of technology. While opposing the acceptance of an inherent and self-evident advantageous value of technology, the social technical perspective also refrains from reducing the meanings of technological features and characteristics to the mere analysis of social powers typically represented by Marxist models of class struggles and materialistic determinism (Winner, 1986). As Winner eloquently argued alongside the series of notable historical examples (e.g., Robert Moses' bridge passes in Long Island and the tomato harvest machine in California), in studying and unveiling the functions and processes through which technologies solidify, change or create orders in society, we come to understand technology in itself is not neutral, value free, innately progressive, and the meanings of its characteristics are often beyond its original purposes.

The social technical theory is guided by four principles: 1) the seamless web principle, 2) the principle of change and continuity, 3) the symmetry principle, and 4) the principle of action and structure (Sawyer & Tyworth, 2006). In a brief summary, the seamless web principle accentuates the interplay and interconnectedness of technology and other parts of the society,

opposing granting privilege to either a technology or a social deterministic view. With the principle of change and continuity, the social technical theory addresses both on-going changes and stability embedded in the changes. The symmetry principle requires examining the interaction of technology and social forces in the process rather than treating it as a discrete end state. Lastly, the social technical theory advocates a careful balance of analysis concerning agency and structure, providing a holistic understanding of technology users' autonomy and the social conditions that are shaping user decisions.

Scholars with the social technical view (Kling, McKim & King, 2003) have proposed social technical interaction network models in an attempt to understand the interactions between multiple individual actors or separate actor groups in a system. In this effort, technology users are conceptualized as an integral social actor of the social technical interaction network (Lamb & Kling, 2003). In their conceptualization of user as a social actor, Lamb and Kling (2003) keenly observed that this individualistic and cybernetic approach that the diffusion research and other traditional information system research take to study users "provides relatively little detail about the contexts that shape ICT use, and so diminishes the importance of organizational structures and complex social environments. This focus tends to amplify technology specifics and to attenuate the social context, particularly people's relationships with those who have requested information or whom they are trying to persuade with information gathered and packaged through the use of ICTs. Moreover, within the complex social settings that commonly constitute organizations, individuals don't always have the opportunity to choose the systems they would prefer to use. Therefore, when aggregated to predict organization-wide activity, a thinly socialized concept of the user leads to frequent overestimates of ICT use". Inspired by Scott's

(1995) institutionalist synthesis, Lamb and Kling presented four dimensions of their conceptualization of user as a social actor. The four dimensions help disentangle the web of complex relationships and contexts within an organizational setting:1) Affiliations that are multilevel, multivalent and multi-network, 2) environment, a collective of dynamic contexts and internal routines and practices shaped by industry and external normative requirements, 3) interactions through which the different parts and levels of the organization synergize, collide, and integrate, and then create self-reinforcing or disruptive resources, information and influences, 4) identities, presentations of self or a collective identity representing partial or whole values and practices of the organization. These four dimensions are "*not* isolated contextual attributions, but are multiply associated with the characteristics of other dimensions of a social actor". Explained in the framework of the four dimensions, the user of a technology or innovation does not only carry his or her intrinsic characteristics and act on those, but also behave according to normative practices and expectations. The user improvises and dynamically changes roles within the varying contexts created by affiliations and the organizational environment. The user's identity is no longer representing just his or her beliefs, but also perceived to embody the organization's values and practices. The overall background of the organizational relationships, practices and purposes are both enabling and constraining the user; the user actively constructs unique changes and reinforces the status quo.

Unlike the user in most diffusion research or the traditional U&G studies who is expected to act on rational and need-driven calculations, the user in the social technical perspective is perceived to be complex and situated in social habitués (Bourdieu, 1984) that enables and constraints him

or her at the same time. The user's actions are of definite significance but more so against a clear exposure of the intricate web of relationships within which these actions take place.

Adding the social technical perspective as a complementary extension of the traditional technology diffusion research will not only strengthen the explanatory power of the independent variables in the model (Surry & Farquhar, 1996; Fife and Pereira, 2005), but also come closer to a dialectic view of the influences and co-developments of the social contexts and the technological artifacts. For instance, in the field of new media, moving beyond Goffman's concept of social situations (1961), Meyrowitz (1985) suggested that the formulation of social identity and practices are not only contingent on the particular social situations, but also can be altered and given different meanings with the addition of electronic media into the mix. Following an inseparable and interconnected view of the relationship between media/culture, social structure and agency, the essential insight from this group of thoughts is to present media as a force no less powerful than the traditional sense of structural positions or "habitués". However, unlike the technology deterministic point of view, this thinking has empowered a series of studies to examine the co-developmental nature of the usage of new media technologies, the social and cultural contexts that help bring those technologies into birth and in turn have been shaped and recreated by them (Bijker, Hughes, and Pinch 1987; Edwards 1995; Haraway 1991; Hine 2000; Ito & Okabe, 2004). As Ito and Okabe (2004) formerly proposed, "we believe that it is crucial to retain attentive to the local particulars of setting, context, and situation in the face of these translocal flows if we are to avoid a technical determinist argument that these technologies necessarily lead to a blurring of spatial and social boundaries. Electronic media have effects that break down certain prior social boundaries, as Myerowitz proposes, but

they also have effects of constructing and reifying other social boundaries. We draw broadly from approaches in social and cultural studies of technology that see the technical and social as inseparable outcomes of ongoing and historically contextualized practice" (P. 6).

2.8. Adoption is a Relational Affair between User and Technology - The Concept of Technology Affordance

Both the U&G perspective and the social technical theory are a departure from a technology-centric or deterministic view in studying the development and diffusion of new technological artifacts. Adding to the integrated treatment of user, technology and society, the concept of technology affordance (Gibson, 1977, 1979) has also emerged to be a useful theoretical tool in studying and comparing technological diffusion in varying political, social and cultural settings.

In Gibson's original definition, affordance equates to "action possibilities" possessed by an object or the environment, which are independent of the actor's awareness, perception or ability to uncover these possibilities. Most importantly, affordance encapsulates a relational action possibility between the actor and the environment. The affordance of an object can be relative to an actor and hinges on "information pick-up", a process in which information about the actor self and the environment are both reflected and inseparable. Norman (1988) further popularized and modified this concept in artifact design to stress those perceivable capabilities in relation to a specific actor instead of all latent properties.

Acknowledging the complexity in the actor-technology relationship, Gaver (1991) explored several facets of affordance that were not explicitly discussed before. Besides perceptible affordance, he introduced hidden affordance, false affordance, and sequential affordance which conceptualizes the process enabling actions to take place one after another once a preceding affordance is activated. Another extension of the epistemology of affordance comes from Wiredu (2008) in his observations about the evolution of mobile computing. Wiredu argued for a historical perspective in "developing" affordance perceptions, which recognizes that affordance is a perception activity derived from past experience beyond biological or physiological sense-making. We apply what we learn from the past which are conditioned by our social and cultural beings to the artifact that we are currently experiencing. And what we are experiencing again becomes part of the historical asset we will draw from when facing future technologies and products. These above conceptual definitions imply user expectations of what action possibilities are available and how they can be activated in a media technology, even though the expectations may be formed through direct visualization (i.e., information pick up), direct experience, or accumulated learnings. In this sense, the theorization using the concept of affordance is aligned with the social cognitive theory.

Affordance has been increasingly applied to understanding the adoption of media technologies. For example, qualitative interviews and surveys (Bradner et al., 1999) on a chatting system called BABBLE, the IMing and video conferencing respectively showed evidence that these technologies provide a functional fit to support social exchanges, which in turn is correlated with their wide adoption. In addition, media affordance can play a subtle yet significant role in the audience's psychological evaluation of the media technology and its content. Investigating what

in a piece of technology amounts to its credibility in the user's perception, Sundar (2007a) presented "the MAIN model" which proposes that the audience take "cues" transmitted by one or more affordances of the medium, and formulate their own "heuristic" judgment. These mental judgments on the media experience consequentially lead to acceptance or rejection of specific elements or the entirety of the technology. In a more focused attempt to isolate the social psychological impact of interactivity, Sundar (2007b) observed that interactivity, an affordance embedded in many modern media technologies, may help central information processing instead of being used merely as a peripheral cue. More importantly, the user satisfaction exhibits a V pattern across the low, medium and high interactivity scenarios. Simply, interactivity may facilitate user experience to a certain level, which induces a stronger likelihood to embrace the technology. However, excessive interactivity will overkill the enhancing effect of interactivity. The decomposition of the process of affordance identification through the MAIN model offers hopeful user-oriented lenses through which matching and mismatching cue-heuristic-affordance relations can be studied to understand the resulting adoption or rejection behavior.

As a relational concept pointing to both the actor situated in a context and the technology, affordance is also being used to explicate a major struggle in the technology (especially interface) design world, which is concerned with the mismatch between functions and usability. The mismatch occurs when functions are underutilized or hindering, or when functions are transformed by the user and exceed original intentions. In the former scenario, an often cited example is the VCR and its program recording capability. While the VCR has been designed to enable the recording function, few find it usable to their satisfaction, hence rendering this feature a usability failure (Dumas & Redish, 1999). More recently, rich media formats such as animation

and video are prevalent on websites and intended to create a fuller user experience. However, while novel, non-text website features including visual and audio elements very often do not live up to the expectation. Rau, et al. (2007) found that rich web portal design common in Chinese websites contributes negatively to the users' task performance and overall satisfaction in information search. Conversely, SMS is an entirely unexpected feature driving cell phone usage across cultures. The SMS function is not intuitively user friendly with the challenge of using a small keypad for entering texts, and yet, its rapid popularity among adolescents and in Asia-Pacific markets proved the resilience of user adaption (Raudaskoski, 2003). Nothing can serve as a better illustration for the concept of affordance - the interplay of user and technology than these surprising market failures and successes.

While currently lacking a focused research attention, the dimension of affordance as a process can offer important implications in understanding unforeseen adoption and diffusion of media technologies. As Geser (2004) eloquently argued, the history of modern technologies attests to "the large role of the unintended and completely non-anticipated adoption patterns". Through his decades of work dedicated to technological diffusion, Rogers (2003) acknowledged that the transformation of technology and the user's role in this transformation have been under studied. If we recognize affordance as a process-oriented construct, then we can infer at least three distinct rules applied to affordance that help explain why certain technologies fail or succeed, often beyond their creators' expectation. Firstly, the affordance of a media technology can be evolutionary. The affordances can evolve from basic applications to much more potent, sophisticated or diverse action possibilities based on the actor's accumulated knowledge from prior relationships between the actor and the technology. A device or an application enabling a

smooth transition through the affordance progression can solicit user competence and confidence, which in turn fosters user acceptance. Secondly, the affordance of a media technology can be socially formulated. We develop understanding and application of affordances based on observation of others and in the context of social interactions with others (Raudaskoski, 2003). The concept of "co-experience" raised by Battarbee (2003) specifically highlights an aspect of user experience contingent upon social interaction and group collaboration. The examples of mobile poker and using virtual chat room to form a virtual theatre group (cited in Battarbee, 2003) are simple albeit unexpected incidences where an affordance of a media technology would not have become "visible" without a social context. Thirdly, affordance of a media technology can be created and recreated by incorporating the actor's idiosyncratic profile information - psychological or behavioral preferences and patterns. This is reflected in what is typically considered to be artificial intelligence in a technology such as the capability of an automobile to recognize and store its primary driver's driving patterns, which subsequently enhances the driver's ability to drive safely and smoothly. The process-oriented nature of affordance leaves room for potential modification of technological applications based on the continuous actor-device relationship. Affordance is often implicitly framed to be a property residing in the technology waiting for the actor to uncover (e.g., Sundar, 2007b). Conceptualizing affordance as a relational construct instead of a property returns the concept to its original ecological and relational nature unifying the two necessary components – actor and environment/object(s).

Affordance can be a particularly useful theoretical concept to understanding adoption and diffusion of communication technologies. This concept complements the U&G framework as

well as the social technical theory in providing a better explanation for often unconscious and inarticulate development of media and technological usage. The same technology can be adopted at different speeds in different countries thanks to the users' perceptions, experiential learnings, and vicarious learnings unique in the social environments. Users do not always have or are able to articulate neatly prioritized needs that motivate them to use certain technology features. But a probe into what they expect of the technology, how they play with the technology and what they infer and anticipate but do not receive in the technology will reveal social and cultural assumptions, which in turn shed light on the diffusion pattern of the technology. In the same vein, despite delivering similar contents, the different technologies – mobile video and PC video can have contrasting diffusion rates as a result of different user-technology-environment dynamics.

2.9. Integration of Cross-disciplinary Theoretical Perspectives

This dissertation aims to draw from the cross-disciplinary perspectives discussed earlier in the chapter to formulate the variables and research questions addressed in the research. Summarizing the above frameworks, there are several notable synergistic arguments that can help shed new lights on diffusion research. The presence of user influences is shared by U & G, Social Technical and Technology Affordance perspectives. These theories jointly paint a coherent story illustrating that adoption is a result of an evolving experiential relationship between user and technology. Under the general premise that users assert certain expectations and are motivated by anticipated benefits in technology adoption (i.e., U & G with a social cognitive focus), the interplay between user and technology is conditioned on the user's ability in uncovering and "creating" affordances embedded in the technology. Affordance discovery is an iterative process,

in which the user engages in a continuous cue-decoding exercise as well as autonomous transformation of the technical capabilities. The user's ability in doing so is formed by dual-force of inner efficacy and the web of social influences as argued by the U & G and Social Technical theories. Theorizing affordance as a relational concept, often moderated through cues and heuristics, expands the somewhat simplistic explanation for technology adoption offered by traditional diffusion theories such as the TAM model (Davis, 1989), which heavily rely on investigation of technological advantages.

Historically, each of these theories has contributed its fair share of enlightenment to the overall understanding how users embrace technology, especially media technologies. However, researching for adoption and diffusion in today's world calls for a much more holistic application of the individualized theories as technology and social environment accelerate in intertwining and complexity. This dissertation research particularly delves into two broad areas of research inquiry that are under studied. First, how is adoption understood as a process rather than a stand-alone moment of behavior? Moving away from the primary practice of predicting static determinants of adoption such as user characteristics, this research attempts to examine the paired relationship of affordance expectation and discovery. Second, how does social engagement play a role in the user-technology dynamics? The influence of social engagement is reflected in the channels through which the user learns and acquires the ability to uncover an affordance, as well as the type of affordance uncovered and used for social purposes. As a starting point to add to the knowledge, this research focuses on the study of social engagement as affordance discovery channels.

The integration of the aforementioned frameworks is anticipated to not only yield fresh explanatory factors for adoption patterns of two increasingly indispensible technologies, but also extend the application of these traditionally media or information technology theoretical norms into the field of innovation diffusion.

2.10. Research Hypothesis

Drawing from the theoretical frameworks and research discoveries discussed in the above sessions, the research aims to test the following research hypotheses in the context of comparing the U.S. market and the combined market of Japan and South Korea.

Due to the psychological differences in the state of mind as a result of different screen sizes, it seems reasonable to infer that PC video generally delivers a better quality of experience (QoE) than mobile video does. One intuitive argument for a slower mobile video uptake could be PC video has a relatively superior QoE than movie video. The U&G theory enriched with the social cognitive perspective indicates that media adoption or usage usually happens when a pre-existing need is satisfied. The logical implication is the more the technology satisfies the more important need, the more likely people would use the technology. If QoE is considered an important need and PC video is able to deliver on it more effectively, it would not be surprising to see a much wider adoption of PC video rather than mobile video. Hypothesis 1 is established to address this reasoning.

Hypothesis 1. QoE will be perceived by respondents as more important when it comes to watching PC video than when watching mobile video.

Furthermore, because the overall diffusion speed for a new technology is typically determined by the adoption rates of the early adopters and early majority, it is essential to examine what factors are contributing to the adoption decisions of the different adoption groups (Rogers, 1963). In this scenario, because a new technology typically goes from a basic, rudimentary state to an advanced state in technological development, early adopters often face a less mature technology product than later adopters. Hence, the author hypothesizes that the earlier adopters tend to have a lower threshold of expectation for QoE for either video technology. In other words, QoE is not as important to earlier adopters as later adopters. This leads to Hypothesis 2.

Hypothesis 2. QoE will be expected by respondents to be more important among later adoption groups than the earlier adoption groups.

Hypothesis 2.1. QoE will be expected to be more important to the U.S. market than the SK/J market as SK/J is an earlier adopter market than U.S.

Beyond QoE, there are diverse technology capabilities expected of and received from PC video and mobile video respectively. For the focus of the research, these technology affordances can be generally categorized into three groups. The first group is a set of convenience related affordances associated with time and location. This category of affordances represents the properties of either technology that enable the user to watch video without having to comply with a specific time schedule or location requirement. For example, the traditional broadcast TV has a pre-established TV program schedule, which the user has to follow otherwise would miss the desired content. The label of convenience related affordances is used as a semantic shorthand

for the underlying time-shifting and location-shifting technological ability. Convenience in accessibility has been noted as part of the affordance taxonomy in various recent research studies investigating mobile and computer technologies (Lai, et al., 2007; Conole & Dyke, 2004). The second group of affordances covers space related affordances pertinent to personal or private boundaries - both physical and psychological boundaries. The third and last group refers to user creativity and expression related affordances, which equates the extent to which the user can utilize the medium to tell his or her own identity. All three categories of affordances are closely related to the environment and social settings that the user constantly transitions into. The interplay of the expectation of these affordances and their actualization is anticipated to help formulate the user's decisions on when and where to use PC video or mobile video.

Again, given the less advanced state of the technology when first introduced, earlier adopters have fewer features and less technical capability to play with. It is reasonable to hypothesize that earlier adopters expect less from the technology and later adopters expect more at their respective adoption time. On the other hand, the diffusion theory generally observes that earlier adopters possess more experience, knowledge, financial means as well as natural curiosity than later adopters. Earlier adopters hence have a stronger likelihood to explore and transform technical affordances more often than latter adopters even though they may not have the most advanced version of the technology.

Hypothesis 3.1. Earlier adoption groups will expect less in all three categories of affordances from both video technologies than later adoption groups.

Hypothesis 3.2. Earlier adoption groups will discover more in all three categories of affordances from both video technologies than later adoption groups.

The promising benefit of applying the affordance concept in diffusion research is to enable the measurement of false affordances and unexpected affordances. Measuring these incidences helps pin point disconnects between what the technology is designed to accomplish and what the user is able to identify and utilize. The framework surrounding affordance implies a possible positive correlation between adoption failures and the amount of false affordances. As a result, it is hypothesized that users experience more false affordances with mobile video than PC video.

Furthermore, the amount of false affordance and unexpected affordance is telling of the degree to which technology affordance is a fluid, relational concept between the user and the technology. The author hypothesizes that the various adoption groups experience different amounts of false affordances and unexpected affordances. Thanks to earlier adopters' innovative characteristics, it is expected they are better in figuring out the technology and experience less false affordances. In the mean time, the earlier groups are expected to uncover more creative ways to use the technology than the later groups.

Hypothesis 3.3. Adoption groups will experience more false affordances with mobile video than PC video.

Hypothesis 3.4. Earlier adoption groups will experience less false affordances and more unexpected affordances from both video technologies than later adoption groups.

Lastly, the Social Technical theory suggests that identification and utilization of technology affordances is more than a matter between one individual user and the technology. In addition to influences from other information sources and their own self study, the user comes to acquire some of the technology affordances via social engagement. One reason for the lag in mobile video dispersion could be that users leverage social channels less often in learning the affordances as they do with PC video.

Hypothesis 4. Adoption groups will use social channels less often for mobile video than PC video.

Testing the above hypotheses helps address the void in the current diffusion research in terms of exploring user-centric metrics and variables as explanatory factors in media technology adoption. More importantly, the closer examination of the user-technology relationship is expected to yield a new dimension of factors illuminating market acceptance of mobile video vs. PC video.

Chapter 3

DESIGN & METHODOLOGY

The research study employed an online survey with sample randomly drawn from a market research panel. The data collection was conducted from February 19 to March 23, 2009.

3.1. Surveying Process and Ending Sample

The respondents for the research were regular consumers segmented into the three collapsed adoption groups – innovator, early adopter/early majority, and late majority/laggards in terms of general communication technology adoption. The segmentation is based on a battery of questions described under *Key Concepts and Measurements.*

The research sample was randomly selected from a commercial market research panel – SurveySavvy panel owned by Luth Research, the market research firm which the author currently works at. The SurveySavvy panel consists of more than 2 million households worldwide with approximately 70% of the panel population residing in the U.S. Started with 1,000 seed panelists recruited through the traditional Random Digit Dialing method in 1999, the panel has grown organically via a patented three-tier referral system and is Internet based.

The online survey was fielded from February 19 to March 23, 2009. After the survey instrument was programmed into the online surveying system, Email invitations were sent to members of the SurveySavvy panel with a secure login and password. Data cleaning was performed during and after the fielding to ensure problematic online survey taking issues such as straight-lining rating questions are addressed.

The research yielded a total of 1,587 completed surveys with 1,513 completed surveys in the U.S. market with 310 completes for PC Video Non Users and Mobile Video Non Users respectively, 336 completes for Mobile Video Users and 557 PC Video Users. The higher number of completes for PC Video Users was because more respondents have used PC Video and therefore completed the online survey faster than other groups of users. The total number of completed surveys for the U.S. exceeded the originally anticipated 1,000 respondents. A total of 74 completes including all three adoption groups were gathered in the SK/J market, which was lower than the 300 SK/J respondents initially anticipated. Due to the practical challenge of limited sample availability in the SK/J market, the data from SK/J market only served as a supplemental investigation for inter-country comparison in the analysis.

Table 3.1. Survey Respondents by Market

	U.S.A.	SK/Japan	Total
PC Video Users	557 36.8%	41 55%	598 37.7%
Mobile Video Users	336 22.2%	30 41%	366 23.1%
PC Video Non Users	310 20.5%	2 3%	312 19.7%
Mobile Video Non Users	310 20.5%	1 1%	311 19.6%
Total	1,513 100.0%	74 100%	1,587 100.0%

The gender and income distributions of the respondents are listed in Table 3.2a. and Table 3.2b. below. While gender distributions are overall balanced in either market, SK/J respondents clustered around the lower and higher ends of the income spectrum and U.S. respondents had a more even spread across all categories. The average age is 35 years for SK/J respondents and 49 years for U.S. respondents. When users and non-users of both video technologies were

compared, there was a significant skew towards women among non-users. Users, proxy of earlier adopters, tended to possess higher income levels, and were more likely to be employed outside of home. These characteristics of being more wealthy and more socially exposed remained consistent with the innovation theory literature.

Table 3.2a. Respondent Demographics by Market

		Market			
		USA		SK/JP	
		Count	Column N %	Count	Column N %
GENDER	Female	756	50%	34	46%
	Male	757	50%	40	54%
INCOME	$14,999 OR LESS	95	6%	14	19%
	$15,000-$24,999	170	11%	1	1%
	$25,000-$34,999	185	12%	1	1%
	$35,000-$49,999	288	19%	0	0%
	$50,000-$74,999	320	21%	6	8%
	$75,000-$99,999	165	11%	0	0%
	$100,000-$124,999	81	5%	1	1%
	$125,000-$149,999	36	2%	0	0%
	$150,000-$199,999	27	2%	0	0%
	$200,000-$249,999	14	1%	2	3%
	$250,000-$349,999	3	0%	1	1%
	$350,000 OR MORE	1	0%	38	51%
	PREFER NOT TO SAY	128	9%	10	14%

Table 3.2b. Respondent Demographics by User and Non-User

		User or Non User					
		User			Non User		
		Mean	Count	Column N %	Mean	Count	Column N %
AGE		43			57		
GENDER	F		431	45%		359	58%
	M		533	55%		264	42%
INCOME	$14,999 OR LESS		70	7%		39	6%
	$15,000-$24,999		79	8%		92	15%

	$25,000-$34,999		105	11%		81	13%
	$35,000-$49,999		163	17%		125	20%
	$50,000-$74,999		203	21%		123	20%
	$75,000-$99,999		104	11%		61	10%
	$125,000-$149,999		25	3%		11	2%
	$150,000-$199,999		22	2%		5	1%
	$200,000-$249,999		12	1%		4	1%
	$250,000-$349,999		4	0%		0	0%
	$350,000 OR MORE		38	4%		1	0%
	PREFER NOT TO SAY		59	6%		42	7%
EMPLOYMENT	EMPLOYED FULL-TIME		415	43%		167	27%
	EMPLOYED PART-TIME		92	10%		50	8%
	HOMEMAKER		57	6%		64	10%
	NO VALUE		69	7%		42	7%
	NOT EMPLOYED		48	5%		32	5%
	NOT EMPLOYED AND NOT LOOKING FOR WORK		6	1%		0	0%
	NOT EMPLOYED, BUT LOOKING FOR WORK		8	1%		6	1%
	RETIRED		112	12%		217	35%
	SELF-EMPLOYED		89	9%		40	6%
	STUDENT		68	7%		5	1%
MARITAL_STATUS	DIVORCED		92	10%		76	12%
	NEVER MARRIED		250	26%		60	10%
	NO VALUE		74	8%		43	7%
	NOW MARRIED		434	45%		365	59%
	SEPARATED		18	2%		5	1%
	UNMARRIED PARTNER		76	8%		29	5%
	WIDOWED		20	2%		45	7%

3.2. Key Constructs and Measurements

This section details the key constructs and measurements included in the survey instrument.

3.2.1. PC Video and Mobile Video

The first media technology investigated in this research is computer-based video (referenced as PC video throughout the paper). Currently there are several ways to access video on a computer including downloading video contents onto a computer, viewing the video or Television online, or using the computer as a media player playing pre-packaged DVDs or other digital formats of video. In terms of contents, computer-based video can be commercial movie or Television entertainments (e.g., DVD, downloads from www.walmart.com), real-time online Television broadcasting, or user-generated videos (e.g., YouTube). Even though computer display size varies, there is some indication of an increasingly common production for a 15.4-inche display (See http://www.idc.com/getdoc.jsp?containerId=IDC_P15548). The other technology of interest for the research is mobile video. Mobile video is typically delivered through portable small-size devices such as iPod, mp4 (more commonly known in the Asia Pacific markets), and cell phone. Thanks to the market saturation of cell phone, mobile video is often seen as equivalent to cell phone video. As Yoram Solomon summed up in his paper – The Economics of Mobile Broadcast TV (2006), there are several delivery mechanisms for mobile video (through a cell phone): **1)** Unicast, using standard mobile network topology (EDGE, EV-DO, etc) for a one-to-one download; **2)** Download, similar to above but designed for later viewing from the mass storage of a device; **3)** Multicast, a one-to-many delivery over standard mobile network topology; **4)** Broadcast, a separate one-to-many network model, examples are the DVB-H and MediaFLO technologies now being deployed worldwide; **5)** Sideload, wired or unwired (USB,

Bluetooth) transfer between from the mass storage of another device such as a PC. Most today's cell phones have a screen of 1.8 inches to 2.6 inches. Touch-screen cell phones or smart phones may have a 3.5 inch display.

Even though there are multiple access/delivery options that the consumers have in receiving video contents through a computer or mobile device, consumers tend to differentiate their ways of using video through these two types of media in two ways: 1) whether or not they need to download the video first and then view it, or 2) whether or not they can access and view the video whenever they want to. For a clearer and user-oriented definition for the two concepts of interest in this paper, computer-based video is operationalized to be accessing and viewing a video through a computer and the video content can either be pre-downloaded to the computer or accessible real time online. Mobile video is operationalized to be accessing and viewing a video through a mobile device, which can either be an iPod like non-networked portable video device or a cell phone; the video content can be either pre-downloaded to the mobile device or accessible real time. Not making the distinction between the types of content delivery mechanism is necessary for this research to be focused on device related effects. Given the availability of various portable devices for video consumption in the current market and their continuous presence, it is more informative to the industry for this research to include watching video via all major types of portable mobile video devices discussed earlier as the form of mobile video.

3.2.2. Adoption Groups

The general segmentation practice in diffusion research is to categorize the adoption group membership according to when the respondent purchased and/or used the media technology of interest (Rogers, 1963). However, the mobile video technology is currently less adopted in the U.S. market and one key research purpose is to study the reasons for its slower adoption speed in comparison to PC video. Thus, it is not realistic to expect to see clear grouping of the adoption groups based on time of adoption for mobile video. The author included a battery of likert-scale questions measuring social-economic, personality and communication characteristics of the respondents together with the time of adoption question to determine the adoption group categories. The measurement instrument was developed with consideration of the Product Specific Adoption Potential scale (Lieven & Gino, 2003) to broaden the dimensions of user characteristics beyond innovativeness. The resulted adoption groups were in line with what Rogers (2003) defines in terms of group characteristics.

For a more focused comparison in this research, the five adopter categories were condensed to three groups combining: 1) innovator expected to include approximately 3% of all users, 2) early adopters and early majority expected to include approximately 47% of all users, and 3) late majority and laggards expected to include approximately 50% of all users. As outlined by Rogers (2003), groups 1) and 2) are typically residing to the left of the mean of time to adopt on the continuum of the market acceptance timeline, pushing towards a critical mass for the technology while group 3) takes up the downward distribution to the right of the mean.

3.2.3.Quality of Experience (QoE)

The quality of viewing experience was measured in user ratings of video image clarity, initial latency (in the situation of real time video downloading), the extent of smooth flow of the motion, the frequency of interruption of buffering (in the situation of real time video downloading), the degree of user immersion into the video content, physical comfort for eyes and body, and overall satisfaction with the viewing experience. The extant literature about mobile video and PC video (including Internet video) often views the quality of video viewing experience as an uni-dimensional variable that is all about smoothness of the motion. However, recent industry publications argued for the inclusion of video image clarity, initial latency, and buffering during the viewing experience as additional dimensions of QoE for video viewing (Dey, 2007). Furthermore, Gulliver and Ghinea (2003) demonstrated a direct relationship between visual immersion and resulted enjoyment. Therefore, this research employed a multi-dimensional definition of QoE incorporating the above aspects for video viewing for PC video and mobile video. The actual measurements include individual ratings of the following statements using a 5-point Likert scale with 5 being "Very Important" and 1 "Not Important At All":

1. Image resolution
2. The length of time for initial buffering before the first image appears on screen (in the situation of watching the video online without downloading first)
3. The number of times the video viewing gets interrupted by the need for buffering (in the situation of watching the video online without downloading first)
4. The overall smoothness of the video
5. The physical comfort (eye and posture) of watching via a computer
6. The overall enjoyment of watching video using a computer

For users, this QoE measurement specifically refers to their expected importance based on their recollection prior to their first use and adoption of the technology. On the other hand, for non-

users, it directly measures what they currently consider as important because they have not yet started using the technology.

3.2.4.Convenience Related Affordances

Convenience is an often cited factor for why users choose to watch PC video or mobile video over the traditional television. While convenience is usually considered a benefit or outcome brought by a certain technological capability, this research uses "convenience related affordance" as a proxy for the reference of two technical capabilities of the target technology: the ability of using the technology to consume time-shifted video contents (for example, watching the video online when missing the television broadcast) (Alper, 2008) and the ability to access video contents in a location-shifted manner without the need to be tied to a television set. The measurement related to this concept was two-fold: 1) how well the user expects the technology to deliver on this affordance, and 2) how well the technology has delivered on this affordance in user discovery (for actual users) or perception (for non users). Both measures took the form of a Likert-scale question. Using a 5-point scale with 5 being "Agree Completely" and 1 "Disagree Completely," respondents were asked to indicate their level of agreement with the following statements:

Expectation:

1. I expected watching video on [TARGET VIDEO TECHNOLOGY] to give me more convenience in terms of when to watch video.
2. I expected watching video on [TARGET VIDEO TECHNOLOGY] to give me more convenience in terms of where to watch video.
3. I expected watching video on [TARGET VIDEO TECHNOLOGY] to give me more convenience in terms of whom to watch video with.

Experience:

1. I found that watching video on [TARGET VIDEO TECHNOLOGY] gives me more convenience in terms of when to watch video.
2. I found that watching video on [TARGET VIDEO TECHNOLOGY] gives me more convenience in terms of where to watch video.
3. I found that watching video on [TARGET VIDEO TECHNOLOGY] gives me more convenience in terms of whom to watch video with.

3.2.5.Space Related Affordances

The background literature illustrated a sense of privacy or personal domain enhanced by a smaller screen size when viewing contents as well as the ability of mobile technology exemplified by the cell phone to break down the traditional physical boundaries of buildings and locations. From another angle, the personal boundary can be seen as extended to incorporate the device when it is being used and connected with the user by activities like watching a video. The space including the user and the device then becomes a social meaning intended and utilized by the user according to the social context. For example, a teenager in a mostly adults/parents gathering may resort to watching mobile video to signal he is disinterested and not to be bothered. Similar to the convenience related affordances, space related affordances were measured by liker scales on expected affordance performance and actual/perceived affordance delivery. Using a 5-point scale with 5 being “Agree Completely” and 1 “Disagree Completely,” respondents were asked to indicate their level of agreement with the following statements:

Expectation:

1. I expected watching video on [TARGET VIDEO TECHNOLOGY] to give me a sense of doing things in my own space.
2. I expected I could make my own decisions more often when watching video on [TARGET VIDEO TECHNOLOGY].

Experience:

1. I found that watching video on [TARGET VIDEO TECHNOLOGY] gives me a sense of doing things in my own space.
2. I found that I can make my own decisions more often when watching video on [TARGET VIDEO TECHNOLOGY].

3.2.6.User Creativity/Self Expression Related Affordances

While video content in itself is not the focus of the research, it is the ultimate motivation driving the user's interest in utilizing the various video accessing technologies. The notion of agency is evident in this form of user creativity, which refers to "the extent of manipulability afforded by the interface to assert one's influence over the nature and course of the interaction" (Sundar, 2008). One increasing manifestation of user agency in video content is user generated content. The user may need to use the device to create, modify or disseminate the self-made video content or video content received from other users. According to Interactive Advertising Bureau, in 2006, user generated content (UGC) sites attracted 69 million users in the United States alone. By 2011, UGC sites are projected to attract 101 million users in the U.S. AccuStream iMedia Research reported in January 2008 that there were a total of 22.4 billion views of User Generated Content (UGV) in 2007, including professional, semi-professional and partner channel video views on UGV sites. The market growth rate was estimated to be 70% in 2007, up from a total 13.2 billion views generated in 2006. Heeding this trend, it is important for this research to include the ability to generate and distribute UGV as one key dimension of the technology affordance of the PC video and mobile video. The measurement related to user creativity/expression related affordance was similar to those for convenience and space related affordances.

Again, using a 5-point scale with 5 being "Agree Completely" and 1 "Disagree Completely," respondents were asked to indicate their level of agreement with the following statements:

Expectation:

1. I expected to be able to not only watch but create and share video contents with others using [TARGET VIDEO TECHNOLOGY].
2. I expected watching, creating and sharing video using [TARGET VIDEO TECHNOLOGY] to be a reflection of who I am and how I live my life.

Experience:

1. I found that I am able to not only watch but create and share video contents with others using [TARGET VIDEO TECHNOLOGY].
2. I found that watching, creating and sharing video using [TARGET VIDEO TECHNOLOGY] has become a reflection of who I am and how I live my life.

3.2.7.False Affordances

Explained by Gibson ("ill" affordance, 1986) and Gaver (1991), false affordance is an "unpredictable" result of a perceived affordance, indicating a disconnection between what the user imagines the affordance to be and what the technology artifact actually does. Vyas and Chisalita (2005) further elaborated on the concept at three levels – functional level, appearance level and interactional level. This research measured false affordance by asking three open ended questions with one for each of these three levels inquiring what specific "breakdowns" or challenges that were unpredicted and not anticipated as related to PC video and mobile video viewing experiences.

3.2.8.User-defined Affordances

There can be also "hidden" affordances in a technology that are not visible on the surface and may not be entirely intended by the designer. While the possibility for an affordance to be not

perceptible is not within Gibson's original definition of the concept, it can be reasoned that one affordance visible to one user may not be detected by another. Thus, one group of users (for example, Innovators) may see certain capabilities while other groups may not. The varying degrees of affordance identification remain a true reflection of Gibson's ecological view of user and technology. The interest of the research is to measure the number of affordances uncovered and developed by the user, specifically across the various adoption groups, in the process of interacting with the technology artifact that are not based on originally designated or generally understood functions. The research presented an open-ended question for measurement of this concept and the author coded the responses to determine how many and what are the user-defined affordances in PC video and mobile video.

3.3. Survey Instrument

The survey instrument was approximately 15 minutes long with six open ended questions and comprised the following sections:

Section I: Demographics, psychographics and usage questions to establish adoption group membership and respondent profile

Section II & III: PC video experience reporting and evaluation among users and non users (i.e., usage frequency and patterns, measurements of QoE, convenience related affordances, space related affordances, creativity/expression related affordances, false affordances, and user-defined affordances)

Section IV & V: Mobile video experience reporting and evaluation among users and none users (i.e., usage frequency and patterns, measurements of QoE, convenience

related affordances, space related affordances, creativity/expression related affordances, false affordances, and user-defined affordances)

Depending on the respondent's adoption group membership and usage patterns for the respective technology, he or she was shown questions most relevant to their situation. For example, a non-user of mobile video was asked about perceptions and expectations, but was not asked about the actual experience.

The measurements of the key constructs in the survey were mostly new and grounded in the theoretical and practical reasons discussed in Section 3.2. The classification of the five adoption groups relies on a simplified version of the measurement from Marez, et al. (2007), which included 19 aspects and 47 likert-scale items.

Prior to conducting the survey, the author implemented a pre-test. The sampling for the pre-test followed the same procedure used for the final survey. Sample was randomly drawn from Luth Research's online research panel. The pre-test yielded 141 completed surveys. A few changes were made to the survey instrument. The changes included modifying the question about usage of information learning channels to be a rating question to allow for more rigorous analysis. The order of a few questions was revised to facilitate the survey flow. Reliability tests were performed for all key concepts measured in the survey instrument with acceptable results. The theoretical reasons for these key concepts were discussed in Section 3.2.

Table 3.3. Reliability Test Results on Key Concepts in Pre-test

Quality of Experience scale questions Cronbach's Alpha = 0.904
Expected Convenience Affordance scale questions (3 items) Cronbach's Alpha = 0.787
Expected Space Affordance scale questions (2 items) Cronbach's Alpha = 0.838
Expected User-Defined/Self-Expression Affordance scale questions (2 items) Cronbach's Alpha = 0.831
Actual Convenience Affordance scale questions (3 items) Cronbach's Alpha = 0.809
Actual Space Affordance scale questions (2 items) Cronbach's Alpha = 0.841
Actual User-Defined/Self-Expression Affordance scale questions (2 items) Cronbach's Alpha = 0.804

The final survey instrument is in Appendix.

3.4. Analysis Procedures

The author employed a set of multivariate statistical procedures including multivariate analysis of variance (MANOVA) and multivariate analysis or co-variance (MANCOVA) as well as chi-square testing in analyzing the collected data from both markets. Two post-hoc mechanisms were considered to reduce the potential inflated probability of finding significant differences due to the sheer number of tests included in the MANOVA procedure. The first option was to perform Bonferroni post-hoc tests. The other option was running individual ANOVA tests. To increase the efficiency of the analysis given multiple statements for each key concept, the author used Bonferroni tests.

Analysis of variance and chi-square testing are appropriate due to the inclusion of primarily categorical independent variables. The independent variables in this study are market (U.S. versus Japan/South Korea), mode of video (PC versus Mobile), and the condensed adoption group (Innovators, Early Adopters/Early Majority, and Late Majority/Laggards). The dependent variables include convenience related affordances, space-related affordances, user creativity/self-expression related affordances, false affordances, and user-defined affordances, which are described in details in ***3.3 Key Constructs and Measurements***. Open ended data were coded and incorporated into crosstabulation as well as the statistical procedures for analysis.

Before analysis was performed to investigation the research questions, a cluster analysis was conducted for both computer and mobile respondents to classify respondents into the three adoption groups – Innovators, Early Adopters/Early Majority, and Late Majority/Laggards. The cluster analysis was performed using the 34 attitudinal statements derived from the innovation adoption scale developed by Marez, ET AL. (2007) together with variables of length of usage, and likelihood to adopt.

Following the cluster analysis, a Discriminant analysis was performed for both computer and mobile segmentation variables. The segmentation was found to correctly classify 92% of the originally grouped cases, and 89% of the cross-validated cases. The result confirmed a reliable innovation adopter segmentation method for the study.

Table 3.4. Cluster Analysis Classification Results

		Collapsed Segments	Predicted Group Membership			Total
			Innovators	Early Adopters/Early Majority	Late Majority/Laggards	
Original	Count	Innovators	99	6	0	105
		Early Adopters/Early Majority	26	339	13	378
		Late Majority/Laggards	0	24	403	427
	%	Innovators	94.3	5.7	.0	100.0
		Early Adopters/Early Majority	6.9	89.7	3.4	100.0
		Late Majority/Laggards	.0	5.6	94.4	100.0
Cross-validated(a)	Count	Innovators	91	14	0	105
		Early Adopters/Early Majority	35	325	18	378
		Late Majority/Laggards	0	35	392	427
	%	Innovators	86.7	13.3	.0	100.0
		Early Adopters/Early Majority	9.3	86.0	4.8	100.0
		Late Majority/Laggards	.0	8.2	91.8	100.0

a Cross validation is done only for those cases in the analysis. In cross validation, each case is classified by the functions derived from all cases other than that case.
b 92.4% of original grouped cases correctly classified.
c 88.8% of cross-validated grouped cases correctly classified.

To validate if the condensed three-group adoption group construct serves as a more or equally effective independent variable in comparison to the traditional five-group adoption group, a separate set of analysis was performed to investigate based on five adoption groups. The results showed that the five-group approach yielded less clear behavioral patterns, which may make it more difficult to derive actionable implications from the results. There was also evidence supporting more distinct differences between the more broadly classified three adoption groups. Therefore, a three-group adoption group independent variable was adopted.

Chapter 4

ANALYSIS & RESULTS

4.1.1. Hypotheses 1. QoE will be thought to be more important when it comes to watching PC video than when watching mobile video.

A multivariate Analysis of Variance (MANOVA) was performed with mode of video (PC vs. Mobile), market, user group (user vs. non user) and adoption group being entered as independent variables. The six scale measurements of expected QoE were the dependent variables.

There was a significant interaction effect found between mode of video and user group ($F=8.410$, $p<0.001$) in the U.S. market. Prior to developing actual experience with either mode of video, users were found to place a much higher level of importance than non-users in image resolution, length of time for initial buffering, number of times for video interruption, overall smoothness of video, physical comfort and the overall enjoyment when considering to use both video technologies. More importantly, users tended to consider these QoE factors more important for using mobile video than PC video while non-users demonstrated an entirely opposite predisposition, giving a higher score of importance to these factors for PC video than for mobile video.

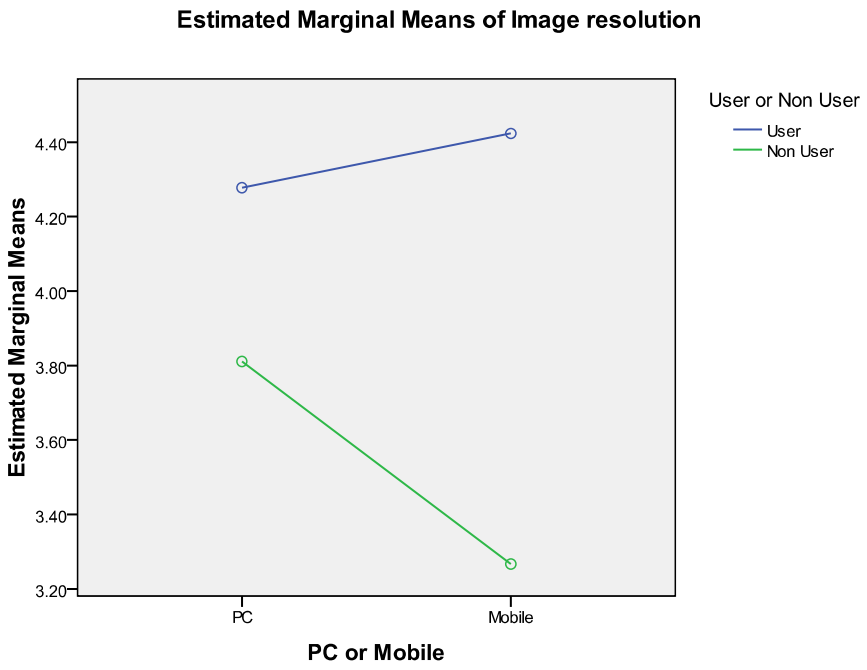


Figure 4.1. Expected Importance – QoE: Image Resolution

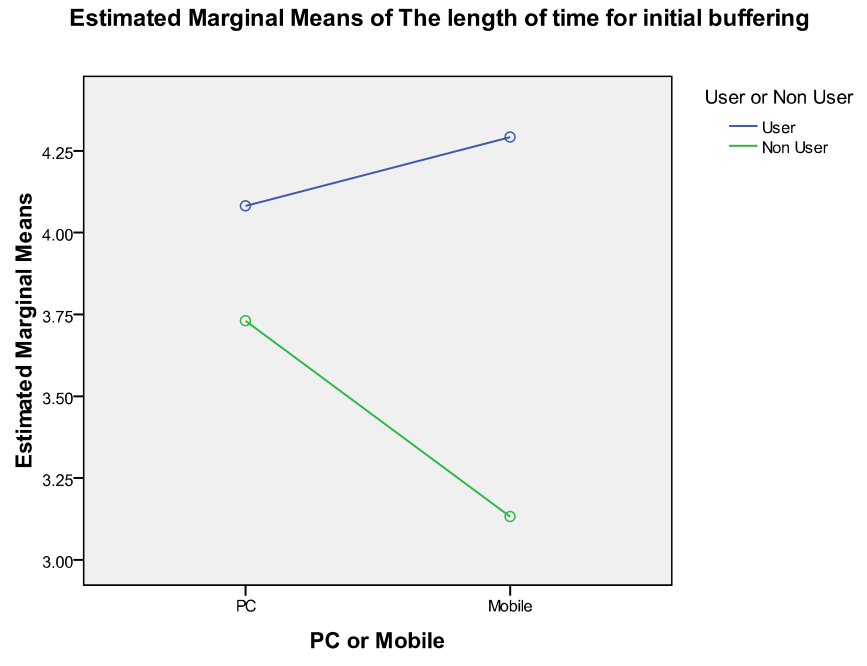


Figure 4.2. Expected Importance – QoE: Initial Buffering

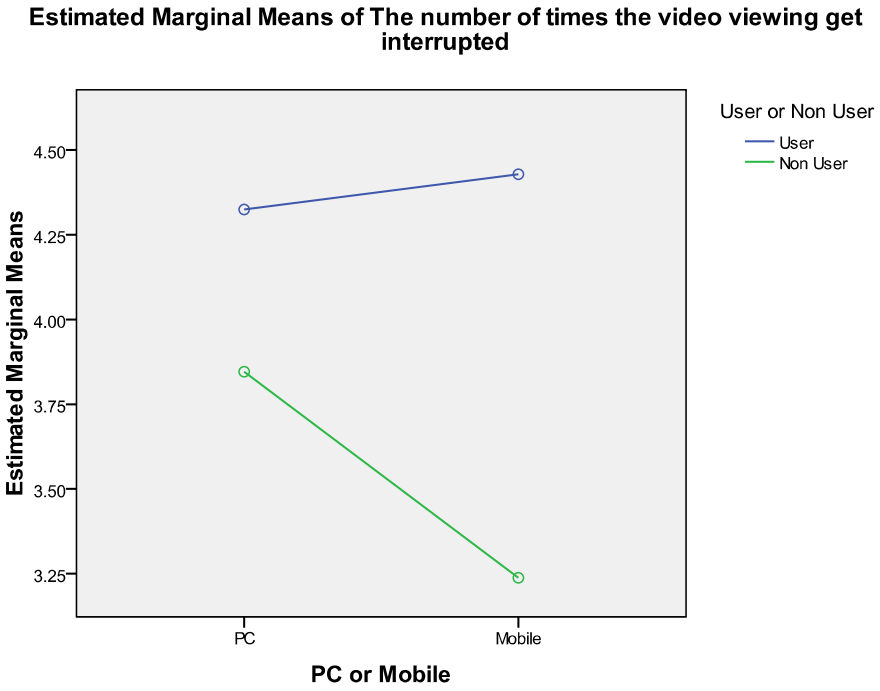


Figure 4.3. Expected Importance – QoE: Number of times video viewing get interrupted

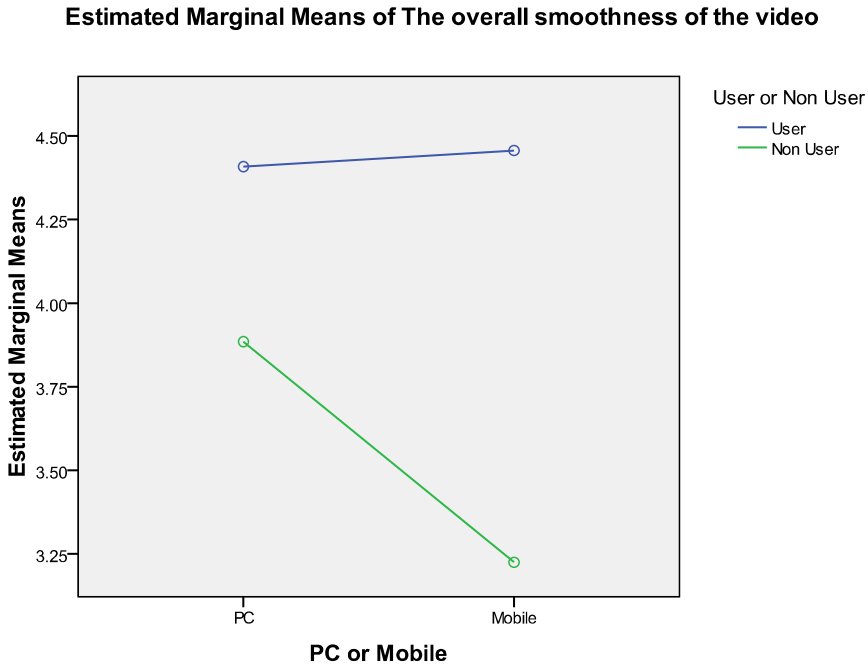


Figure 4.4. Expected Importance – QoE: Overall Smoothness of Video

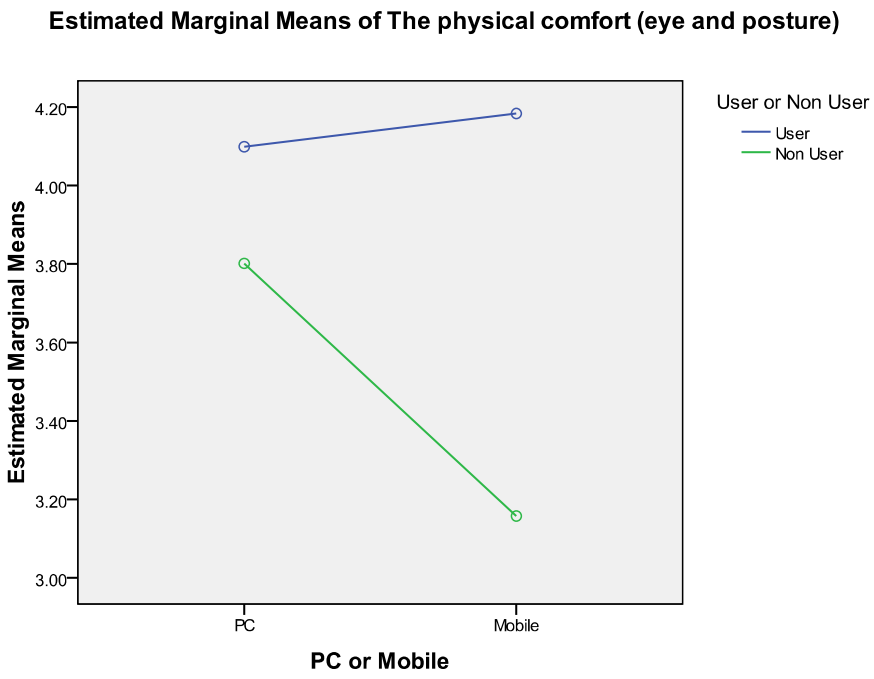


Figure 4.5. Expected Importance – QoE: Physical Comfort

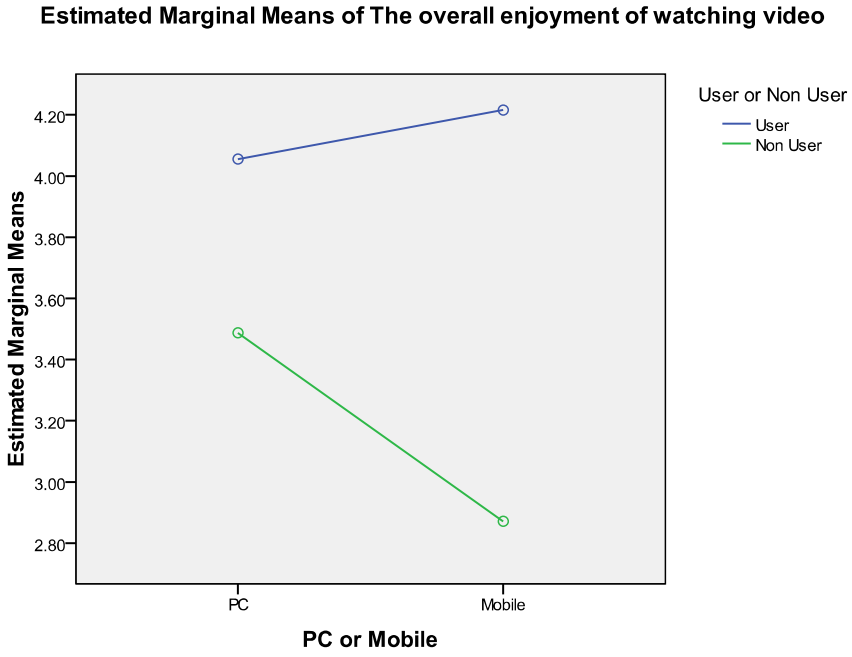


Figure 4.6. Expected Importance – QoE: Overall Enjoyment of Watching Video

Hypothesis 1 is not fully supported by the results. In fact, this hypothesis is only true among non-users who tend to consider QoE more important in watching PC video than in watching mobile video. One reason could be non-users have not developed a concrete idea of what to expect in QoE with mobile video due to its newness to the market. However, the study did not measure the perception of novelty related to both technologies, and thus this reasoning could not be validated.

4.1.2. Hypothesis 2. QoE will be expected to be more important among later adoption groups than the earlier adoption groups.

The MANOVA test also indicated an interactive effect between mode of video and adoption group ($F=7.586$, $p<0.01$) in the U.S.. Specifically, the last adoption group – Late Majority/Laggards placed a significantly higher importance in QoE when deciding whether to start watching PC video than mobile video. The Early Adopters/Early Majority by in large viewed QoE equally important in their decisions to watch PC or mobile video. Among the Innovators, QoE was cited as more important for mobile video than PC video. A Bonferroni post hoc test confirmed this distinct contrast among the adoption groups ($p<0.01$). In addition, the earlier adoption groups indicated a higher level of importance of QoE in their decision to start using both technologies. This was true for all QoE measurements. This trend associated with adoption group is consistent with the earlier finding associated with user group because users can be conceptualized to be earlier adopters than non-users. Hence, Hypothesis 2 is rejected.

The SK/J market did not demonstrate statistically significant trends in the data probably due to small sample size.

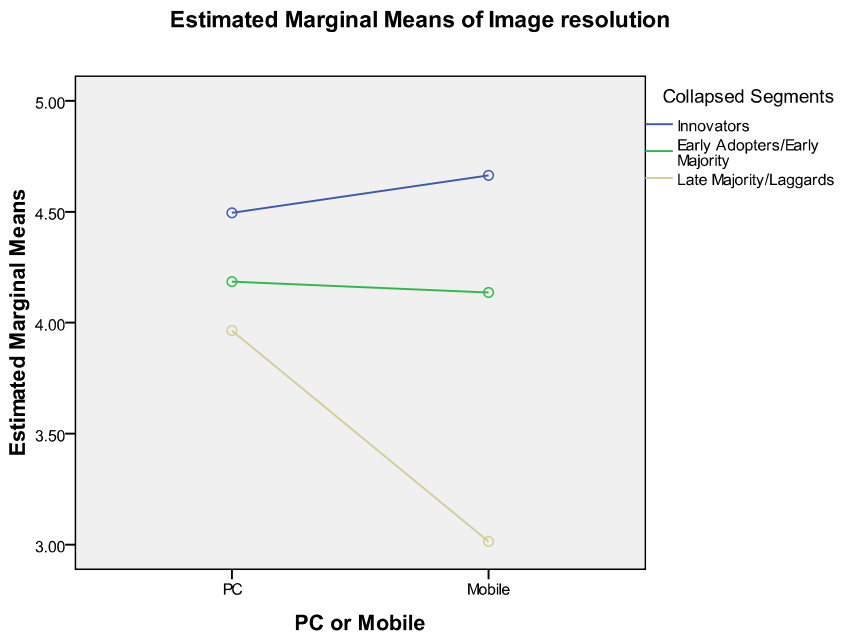


Figure 4.7. Expected Importance – QoE: Image Resolution by Adoption Group

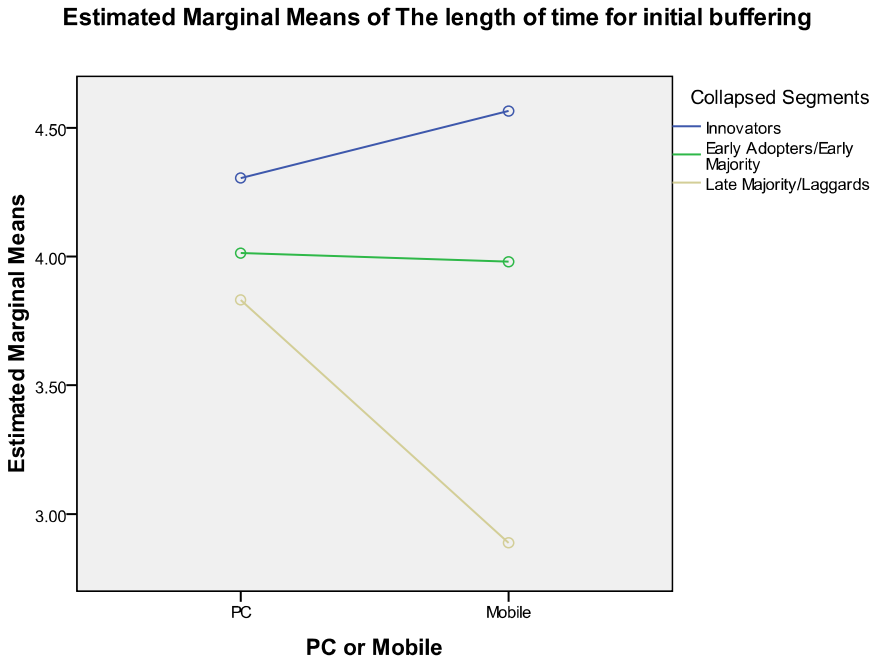


Figure 4.8. Expected Importance – QoE: Initial Buffering by Adoption Group

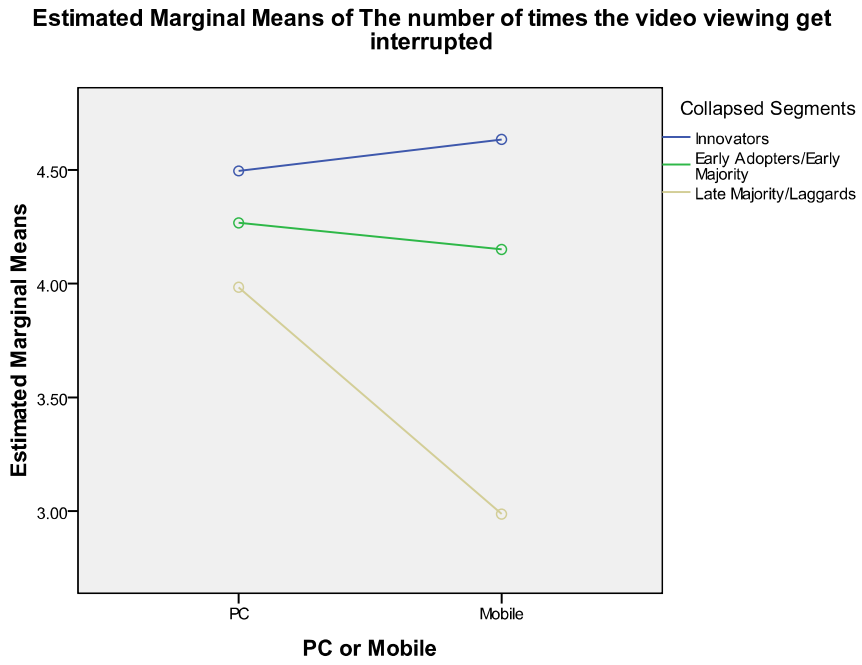


Figure 4.9. Expected Importance – QoE: Number of Times Video Viewing Get Interrupted by Adoption Group

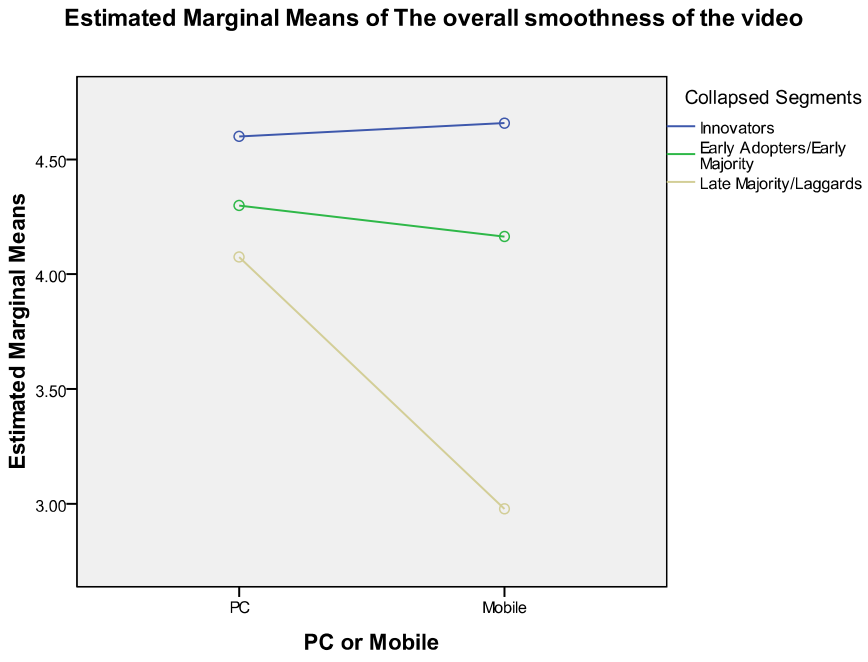


Figure 4.10. Expected Importance – QoE: Number of Times Overall Smoothness of Video by Adoption Group

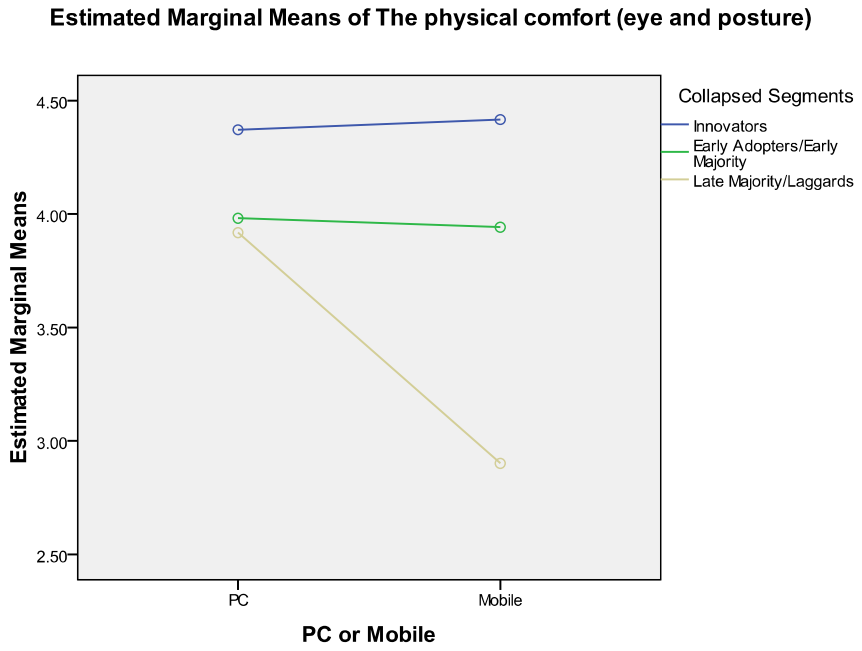


Figure 4.11. Expected Importance – QoE: Physical Comfort by Adoption Group

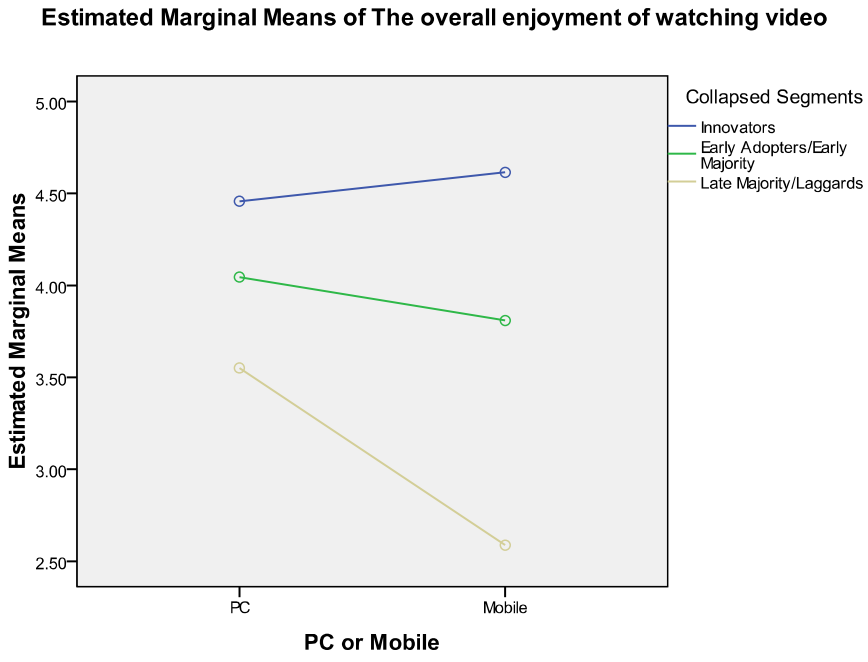


Figure 4.12. Expected Importance – QoE: Number of Times Overall Enjoyment of Watching Video by Adoption Group

4.1.3. Hypothesis 2.1. QoE is expected to be more important to the U.S. market than the SK/J market as SK/J is an earlier adopter market than U.S.

There was no main effect of market (SK/J vs. U.S.) found in the test. This hypothesis is not supported. However, there are a few within market findings worth mentioning. In the South Korea/Japan market (SK=20, Japan=54), a main effect associated with user group was uncovered ($F=3.537$, $p<0.01$). For both modes of video, users gave significantly higher importance scores than non-users for all measures of QoE except for physical comfort prior to their actual experience with the technologies. Interestingly, non-users were much more likely than users to cite physical comfort as an important decision factor for using both PC video and mobile video before they came to have any actual experience with the technology.

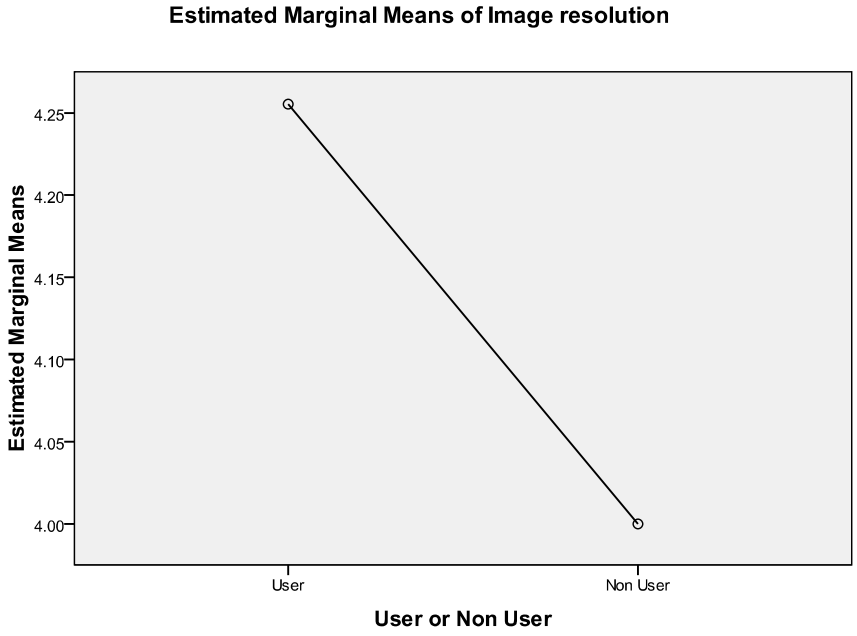


Figure 4.13. Expected Importance – QoE: Image Resolution by User Group

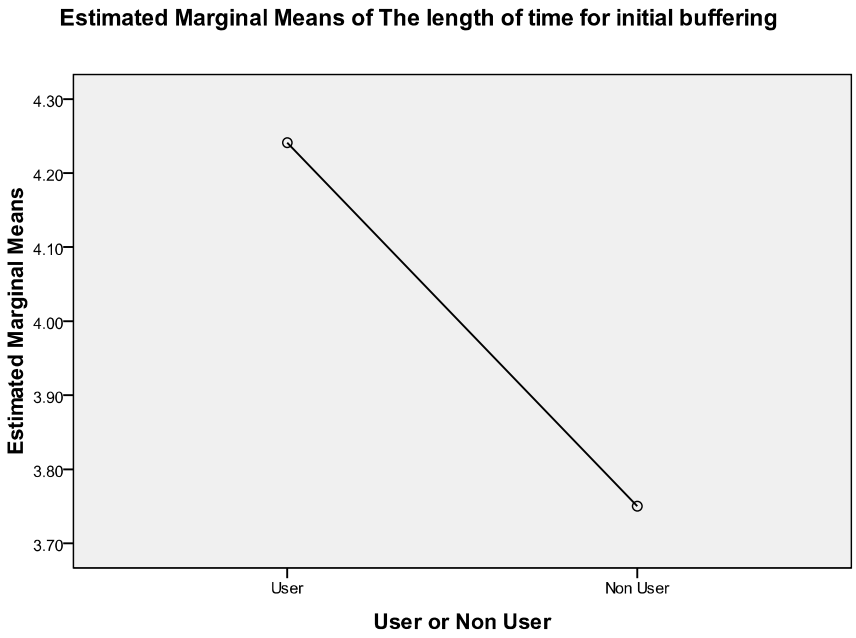


Figure 4.14. Expected Importance – QoE: Initial Buffering by User Group

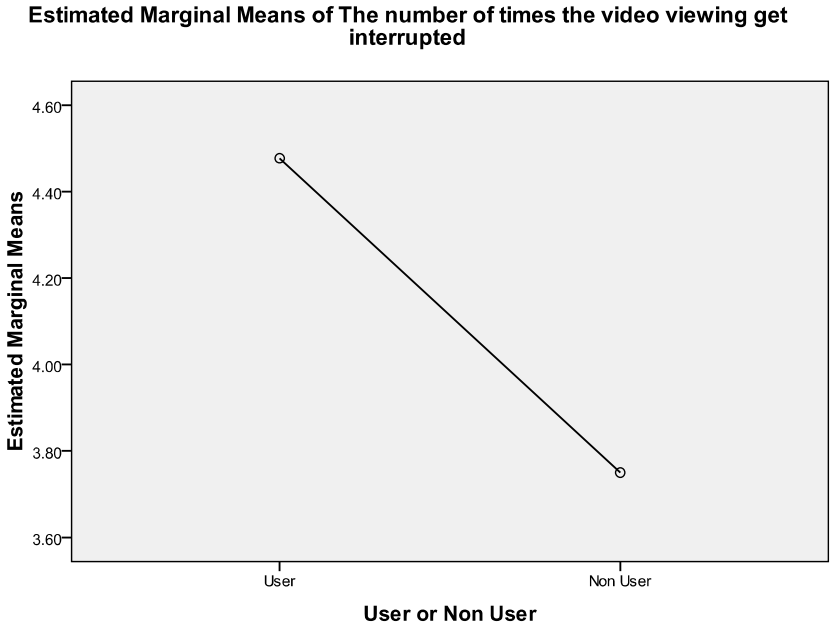


Figure 4.15. Expected Importance – QoE: Number of Times Video Viewing Get Interrrupted by User Group

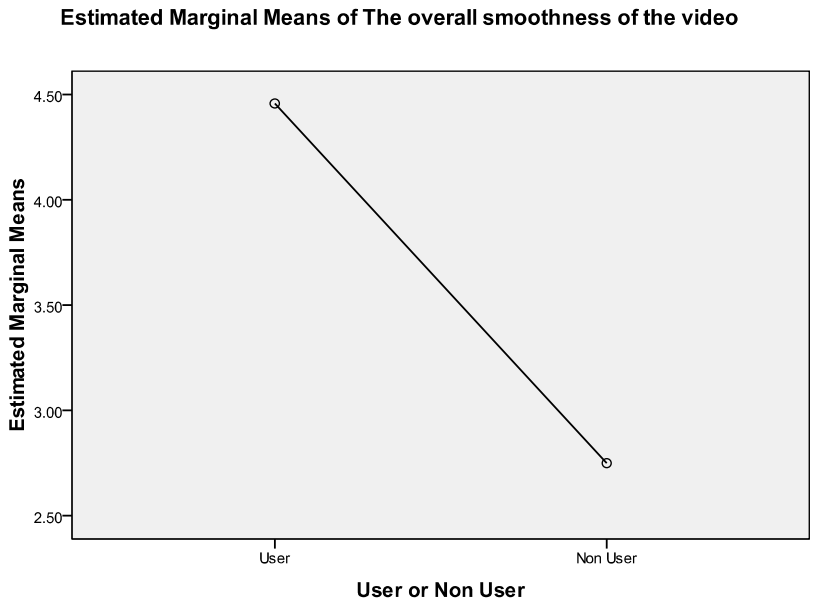


Figure 4.16. Expected Importance – QoE: Overall Smoothness of Video by User Group

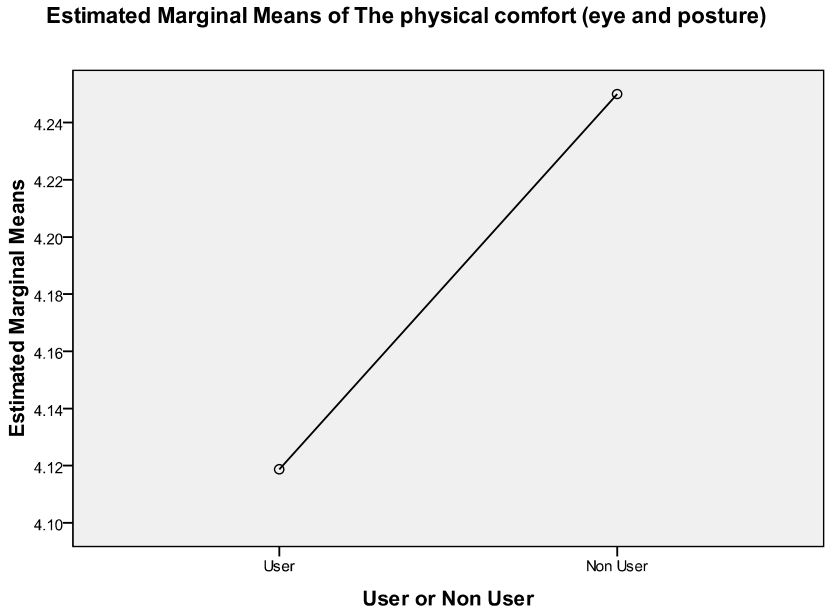


Figure 4.17. Expected Importance – QoE: Physical Comfort by User Group

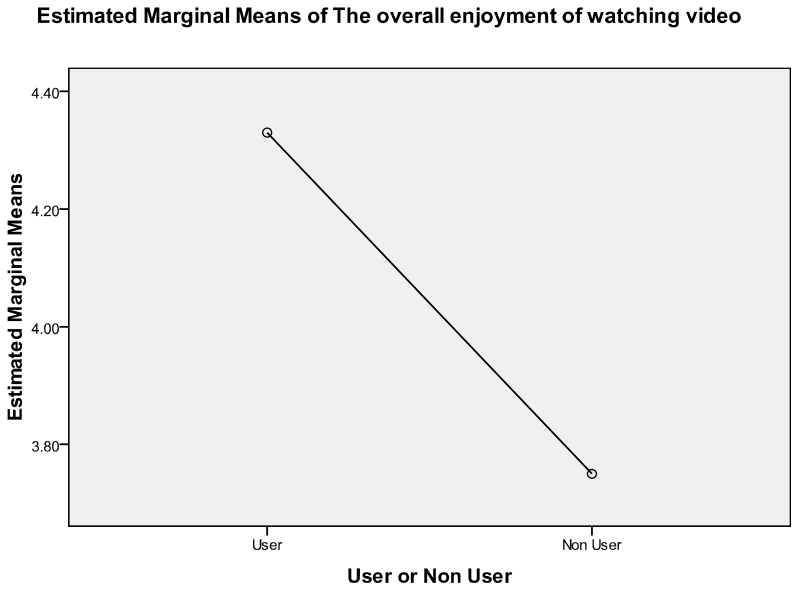


Figure 4.18. Expected Importance – QoE: Overall Enjoyment of Watching Video by User Group

4.2. Hypothesis 3.1. Earlier adoption groups expect less in all three categories of affordances from both video technologies than later adoption groups.

The sections 4.2.1 to 4.2.3 describe the detailed analysis and results for Hypothesis 3.1. Overall, this hypothesis is rejected. Earlier adoption groups demonstrated a higher level of expectation across all three categories of affordances compared to later adoption groups. More interestingly, the level of expectation is higher for PC video than mobile video across all adoption groups.

4.2.1. Expectation - Convenience Related Affordances

A general linear multivariate test was run testing four independent variables – market, mode of video, adoption group and user group. Two interaction terms were entered to test the hypothesized differences, which included interaction between mode of video and market, and interaction between mode of video and adoption group. Mode of video ($F=7.032$, $p<0.01$),

adoption group (F=60.742, p<0.01), and user group (F=42.012, p<0.01) showed statistically significant main effects on respondents' expectations for convenience related affordance, namely, expected convenience provided by PC or mobile device as related to when, where and with whom to watch video. While market was found to have no significant main effect, an interaction effect between market and mode of video was uncovered in relation to convenience related affordance (F=3.447, p<0.05). An additional three-way interaction effect involving mode of video, adoption group and user group was tested to be significant (F=8.533, p<0.01).

Table 4.1. Expectation – Convenience Affordance Multivariate Tests

Effect		Value	F	Hypothesis df	Error df	Sig.
Intercept	Pillai's Trace	.697	1207.007[a]	3.000	1576.000	.000
	Wilks' Lambda	.303	1207.007[a]	3.000	1576.000	.000
	Hotelling's Trace	2.298	1207.007[a]	3.000	1576.000	.000
	Roy's Largest Root	2.298	1207.007[a]	3.000	1576.000	.000
PC_MOBILE_NEW	Pillai's Trace	.013	7.032[a]	3.000	1576.000	.000
	Wilks' Lambda	.987	7.032[a]	3.000	1576.000	.000
	Hotelling's Trace	.013	7.032[a]	3.000	1576.000	.000
	Roy's Largest Root	.013	7.032[a]	3.000	1576.000	.000
Segment3	Pillai's Trace	.207	60.742	6.000	3154.000	.000
	Wilks' Lambda	.795	63.961[a]	6.000	3152.000	.000
	Hotelling's Trace	.256	67.195	6.000	3150.000	.000
	Roy's Largest Root	.246	129.546[b]	3.000	1577.000	.000
USER_NONUSER	Pillai's Trace	.074	42.012[a]	3.000	1576.000	.000
	Wilks' Lambda	.926	42.012[a]	3.000	1576.000	.000
	Hotelling's Trace	.080	42.012[a]	3.000	1576.000	.000
	Roy's Largest Root	.080	42.012[a]	3.000	1576.000	.000

Market	Pillai's Trace	.004	2.104[a]	3.000	1576.000	.098
	Wilks' Lambda	.996	2.104[a]	3.000	1576.000	.098
	Hotelling's Trace	.004	2.104[a]	3.000	1576.000	.098
	Roy's Largest Root	.004	2.104[a]	3.000	1576.000	.098
PC_MOBILE_NEW * Market	Pillai's Trace	.007	3.447[a]	3.000	1576.000	.016
	Wilks' Lambda	.993	3.447[a]	3.000	1576.000	.016
	Hotelling's Trace	.007	3.447[a]	3.000	1576.000	.016
	Roy's Largest Root	.007	3.447[a]	3.000	1576.000	.016
PC_MOBILE_NEW * Segment3	Pillai's Trace	.032	8.533	6.000	3154.000	.000
	Wilks' Lambda	.968	8.594[a]	6.000	3152.000	.000
	Hotelling's Trace	.033	8.656	6.000	3150.000	.000
	Roy's Largest Root	.033	17.140[b]	3.000	1577.000	.000

a. Exact statistic

b. The statistic is an upper bound on F that yields a lower bound on the significance level.

PC_MOBILE_

Specifically, the interaction effect between market and mode of video revealed that the SK/J market consistently expected to receive more convenience from both modes of video than the U.S. market in terms of when and where to watch video. However, the SK/J market had a drastically lower expectation for convenience from mobile video than the U.S. market when it comes to allowing them to watch video with whomever they want. Despite these differences, respondents' expectation for convenience related affordances was higher for PC video than mobile video in both markets across all three measures (when, where and with whom to watch video).

Figure 4.19. Expectation – Convenience Affordance: When to Watch Video by Mode of Video * Market

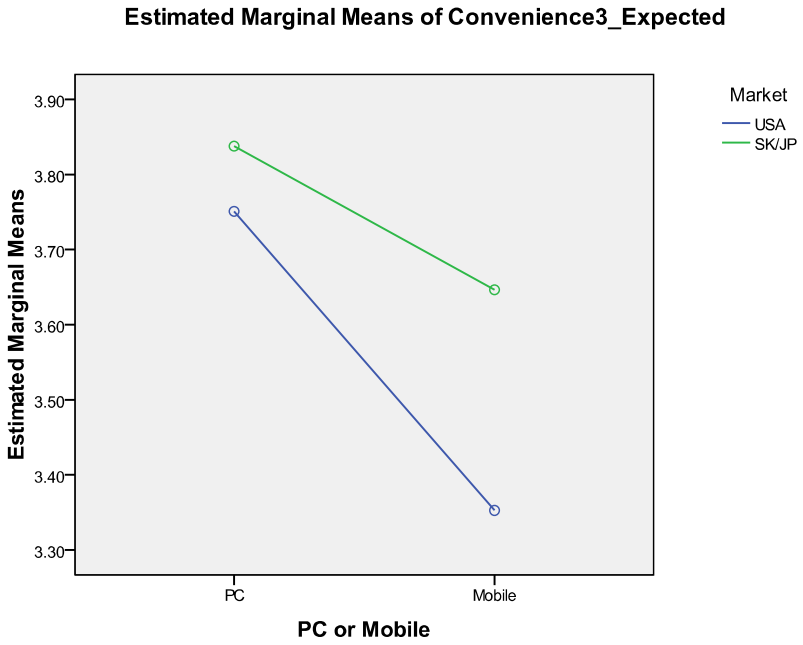
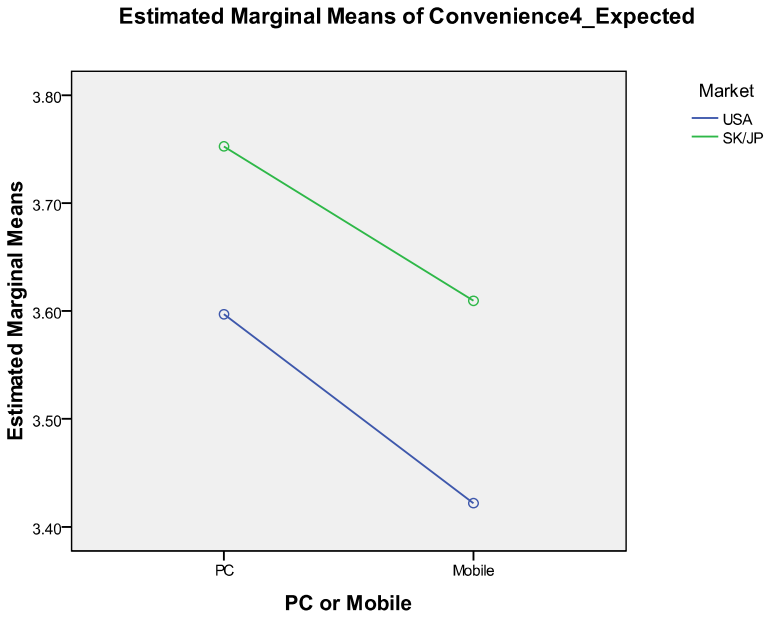


Figure 4.20. Expectation – Convenience Affordance: Where to Watch Video by Mode of Video * Market



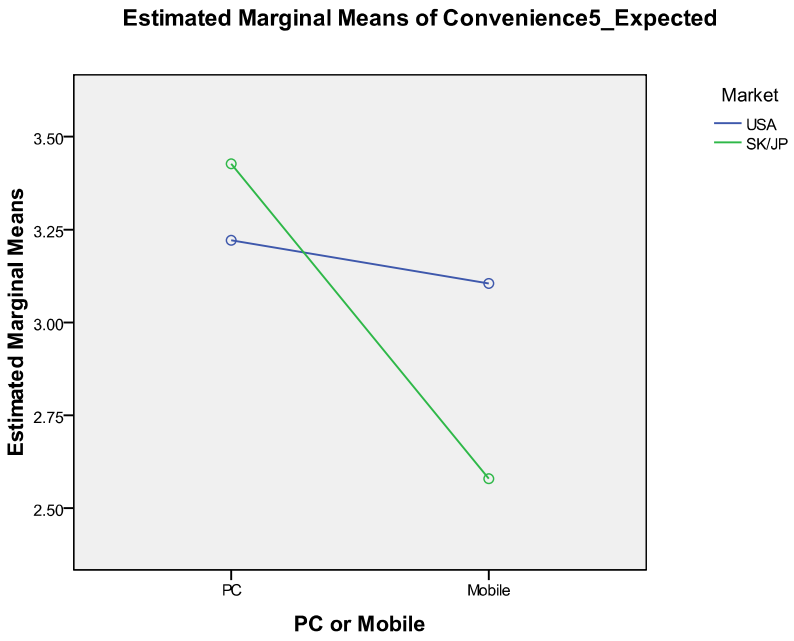


Figure 4.21. Expectation – Convenience Affordance: Whom to Watch Video by Mode of Video * Market

As part of the interaction effect between mode of video and adoption group, Innovators had the highest expectation for convenience affordance for both modes of video across all three measures. Innovators also tended to show primarily "even" level of expectation for both modes of video while Early Adopters/Early Majority and Late Majority/Laggards indicated a lower expectation for mobile video than PC video for when and where to watch video. The only exception is for "with whom to watch video", for which all three adoption groups expected less convenience from mobile video than PC video.

Figure 4.22. Expectation – Convenience Affordance: When to Watch Video by Mode of Video * Adoption Group

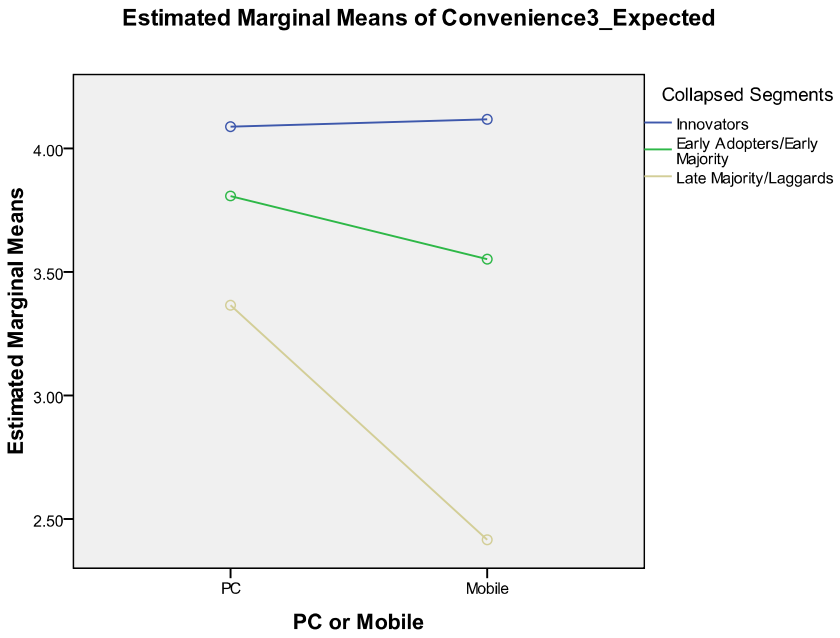
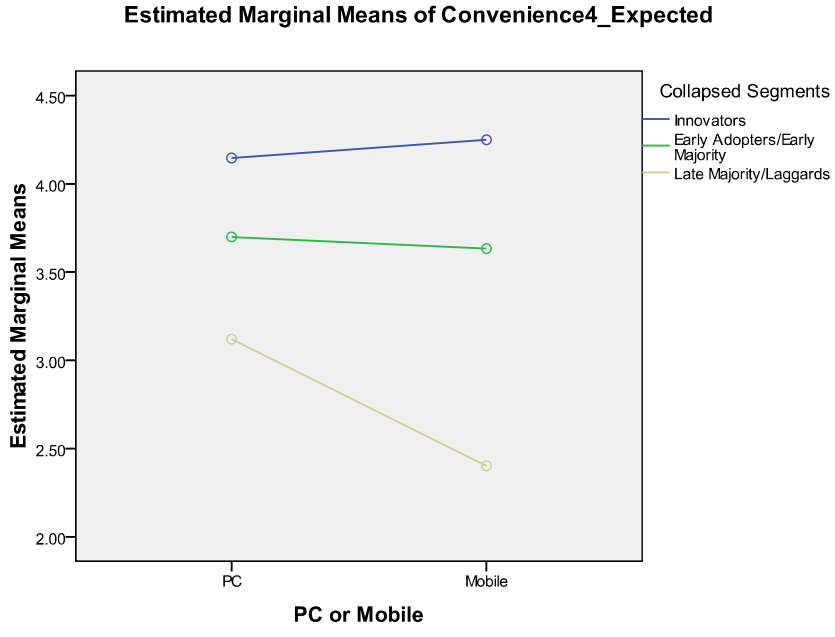


Figure 4.23. Expectation – Convenience Affordance: Where to Watch Video by Mode of Video * Adoption Group



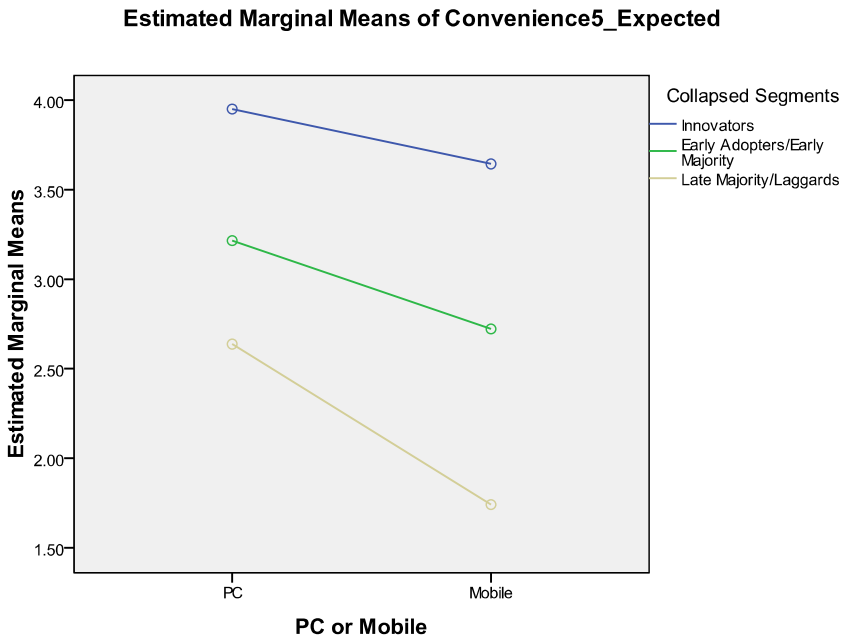


Figure 4.24. Expectation – Convenience Affordance: Whom to Watch Video With by Mode of Video * Adoption Group

4.2.2. Expectation - Space Related Affordances

A MANOVA test was again used to determine if market, mode of video, user group and adoption group have any differences on the amount of affordance expected as related to providing a sense of doing things in own space and being able to make decisions more (i.e., space related affordance). Market was not found to bear influence on expected space related affordance. PC video was expected to afford users more convenience than mobile video for both space affordance measures ($F=14.390$, $p<0.01$). Interestingly, users who have had experience with the technologies recalled that they expected a higher space affordance for both modes of video than non-users. A Bonferroni post-hoc test found respondents associated with an earlier adoption group reported a higher expectation for both modes of video ($p<0.01$).

Table 4.2. Expectation – Space Affordance Multivariate Tests

Effect		Value	F	Hypothesis df	Error df	Sig.
Intercept	Pillai's Trace	.679	1671.435[a]	2.000	1577.000	.000
	Wilks' Lambda	.321	1671.435[a]	2.000	1577.000	.000
	Hotelling's Trace	2.120	1671.435[a]	2.000	1577.000	.000
	Roy's Largest Root	2.120	1671.435[a]	2.000	1577.000	.000
PC_MOBILE_NEW	Pillai's Trace	.018	14.390[a]	2.000	1577.000	.000
	Wilks' Lambda	.982	14.390[a]	2.000	1577.000	.000
	Hotelling's Trace	.018	14.390[a]	2.000	1577.000	.000
	Roy's Largest Root	.018	14.390[a]	2.000	1577.000	.000
Segment3	Pillai's Trace	.201	88.319	4.000	3156.000	.000
	Wilks' Lambda	.799	93.778[a]	4.000	3154.000	.000
	Hotelling's Trace	.252	99.264	4.000	3152.000	.000
	Roy's Largest Root	.252	198.562[b]	2.000	1578.000	.000
USER_NONUSER	Pillai's Trace	.044	36.407[a]	2.000	1577.000	.000
	Wilks' Lambda	.956	36.407[a]	2.000	1577.000	.000
	Hotelling's Trace	.046	36.407[a]	2.000	1577.000	.000
	Roy's Largest Root	.046	36.407[a]	2.000	1577.000	.000
Market	Pillai's Trace	.001	.917[a]	2.000	1577.000	.400
	Wilks' Lambda	.999	.917[a]	2.000	1577.000	.400
	Hotelling's Trace	.001	.917[a]	2.000	1577.000	.400
	Roy's Largest Root	.001	.917[a]	2.000	1577.000	.400
PC_MOBILE_NEW * Market	Pillai's Trace	.002	1.937[a]	2.000	1577.000	.144
	Wilks' Lambda	.998	1.937[a]	2.000	1577.000	.144
	Hotelling's Trace	.002	1.937[a]	2.000	1577.000	.144
	Roy's Largest Root	.002	1.937[a]	2.000	1577.000	.144

PC_MOBILE_NEW * Segment3	Pillai's Trace	.022	8.768	4.000	3156.000	.000
	Wilks' Lambda	.978	8.800[a]	4.000	3154.000	.000
	Hotelling's Trace	.022	8.833	4.000	3152.000	.000
	Roy's Largest Root	.021	16.604[b]	2.000	1578.000	.000

a. Exact statistic

b. The statistic is an upper bound on F that yields a lower bound on the significance level.

c. Design: Intercept + PC_MOBILE_NEW + Segment3 + USER_NONUSER + Market + PC_MOBILE_NEW * Market + PC_MOBILE_NEW * Segment3

In addition, a closer look at the interaction effect between adoption group and mode of video revealed that the difference between the expected space affordance of PC video, which is higher, and that of mobile video is much smaller among Innovators and Early Adopters/Early Majority than the difference reported for the two video technologies by Late Majority/Laggards ($F=8.768$, $p<0.01$).

4.2.3. Expectation - Creativity Related Affordances

For expected creativity affordance, a MANOVA test was performed using market, mode of video, user group, and adoption group as independent variables. The results revealed significant main effects from mode of video ($F=6.253$, $p<0.01$), user group ($F=4.815$, $p<0.01$) and adoption group ($F=133.294$, $p<0.01$) with market being the only exception. Similar to previous findings, PC video was expected to provide much more creativity affordance compared to mobile video. Users expected more creativity affordance from both videos than non users. The Bonferroni post-hoc test confirmed respondents associated with earlier adoption groups expressed a higher expectation for creativity affordance for both technologies ($p<0.01$).

Table 4.3. Expectation – Creativity Affordance Multivariate Tests

Effect		Value	F	Hypothesis df	Error df	Sig.
Intercept	Pillai's Trace	.614	1254.675[a]	2.000	1577.000	.000
	Wilks' Lambda	.386	1254.675[a]	2.000	1577.000	.000
	Hotelling's Trace	1.591	1254.675[a]	2.000	1577.000	.000
	Roy's Largest Root	1.591	1254.675[a]	2.000	1577.000	.000
PC_MOBILE_NEW	Pillai's Trace	.008	6.253[a]	2.000	1577.000	.002
	Wilks' Lambda	.992	6.253[a]	2.000	1577.000	.002
	Hotelling's Trace	.008	6.253[a]	2.000	1577.000	.002
	Roy's Largest Root	.008	6.253[a]	2.000	1577.000	.002
Segment3	Pillai's Trace	.289	133.294	4.000	3156.000	.000
	Wilks' Lambda	.713	145.553[a]	4.000	3154.000	.000
	Hotelling's Trace	.401	157.961	4.000	3152.000	.000
	Roy's Largest Root	.395	311.630[b]	2.000	1578.000	.000
USER_NONUSER	Pillai's Trace	.006	4.815[a]	2.000	1577.000	.008
	Wilks' Lambda	.994	4.815[a]	2.000	1577.000	.008
	Hotelling's Trace	.006	4.815[a]	2.000	1577.000	.008
	Roy's Largest Root	.006	4.815[a]	2.000	1577.000	.008
Market	Pillai's Trace	.000	.369[a]	2.000	1577.000	.691
	Wilks' Lambda	1.000	.369[a]	2.000	1577.000	.691
	Hotelling's Trace	.000	.369[a]	2.000	1577.000	.691
	Roy's Largest Root	.000	.369[a]	2.000	1577.000	.691
PC_MOBILE_NEW * Market	Pillai's Trace	.006	4.475[a]	2.000	1577.000	.012
	Wilks' Lambda	.994	4.475[a]	2.000	1577.000	.012
	Hotelling's Trace	.006	4.475[a]	2.000	1577.000	.012
	Roy's Largest Root	.006	4.475[a]	2.000	1577.000	.012

PC_MOBILE_NEW * Segment3	Pillai's Trace	.021	8.343	4.000	3156.000	.000
	Wilks' Lambda	.979	8.358[a]	4.000	3154.000	.000
	Hotelling's Trace	.021	8.373	4.000	3152.000	.000
	Roy's Largest Root	.018	14.088[b]	2.000	1578.000	.000

a. Exact statistic

b. The statistic is an upper bound on F that yields a lower bound on the significance level.

c. Design: Intercept + PC_MOBILE_NEW + Segment3 + USER_NONUSER + Market + PC_MOBILE_NEW * Market + PC_MOBILE_NEW * Segment3

The interaction terms included in the model were also found significant. The first interaction term is between market and mode of video ($F=4.475$, $p<0.05$). Interestingly, the SK/J market indicated a much higher expectation for creativity affordance for PC video, and yet a much lower expectation for mobile video than the U.S. market despite that the SK/J market is much more mature in terms of mobile phone adoption.

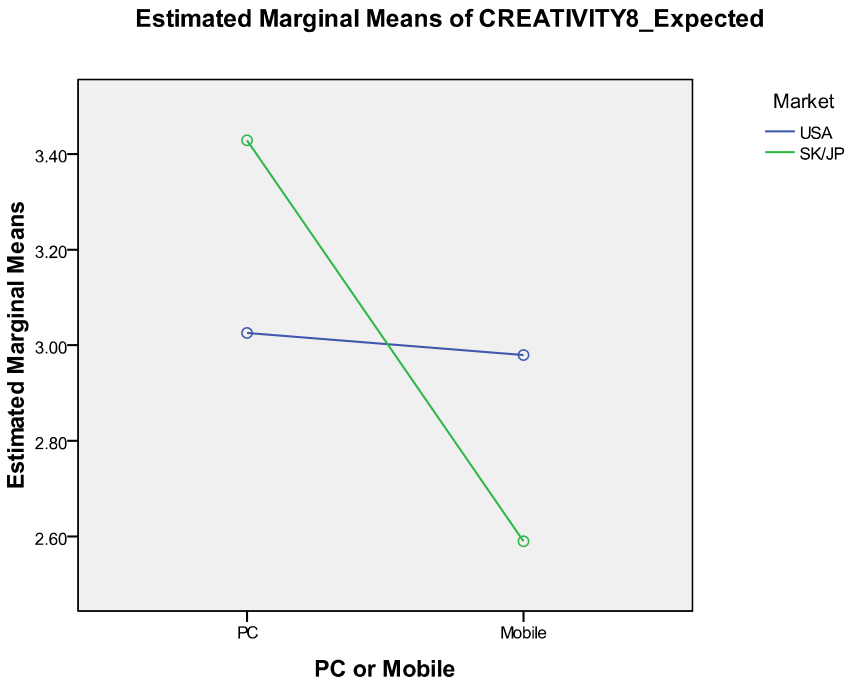
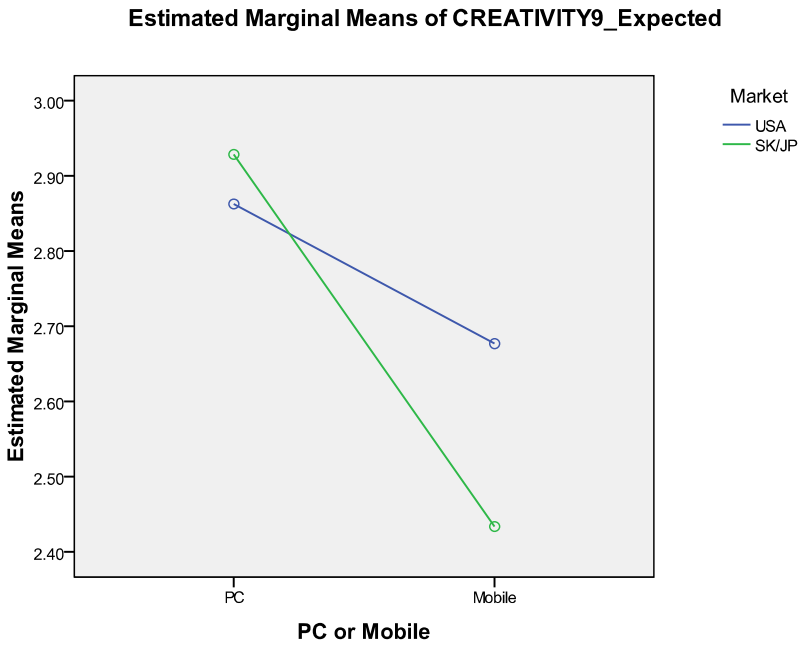


Figure 4.25. Expectation – Creativity Affordance: Ability to Create and Share by Mode of Video * Market

Figure 4.26. Expectation – Creativity Affordance: Reflection of Who I Am by Mode of Video * Market



The second interaction effect is associated with adoption group and mode of video ($F=8.343$, $p<0.01$). In addition to maintaining a higher expectation for creativity affordance for both PC video and mobile video, Innovators tended to show a much more even expectation for both technologies than their later adoption group counterparts.

Figure 4.27. Expectation – Creativity Affordance: Ability to Create and Share by Mode of Video * Adoption Group

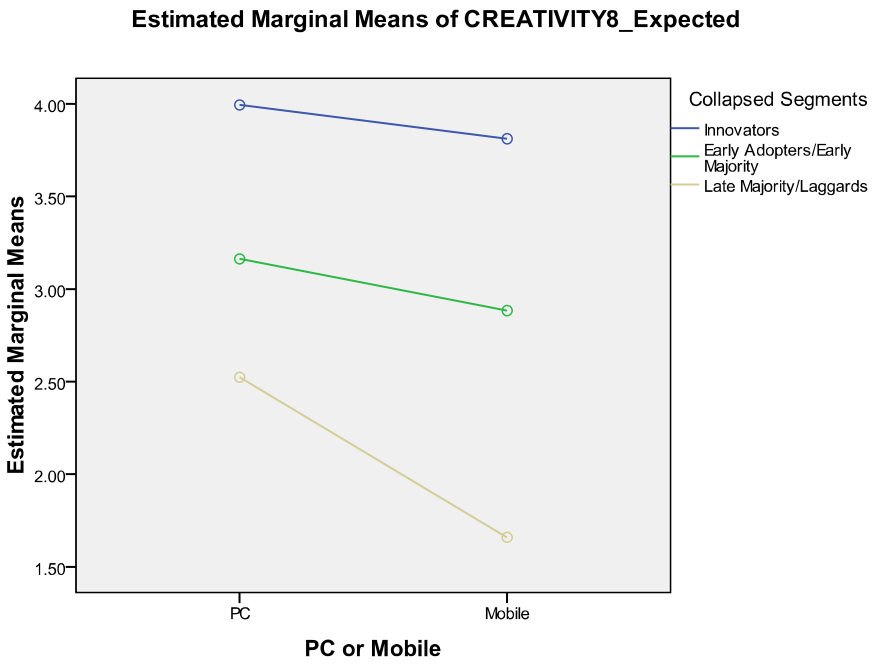
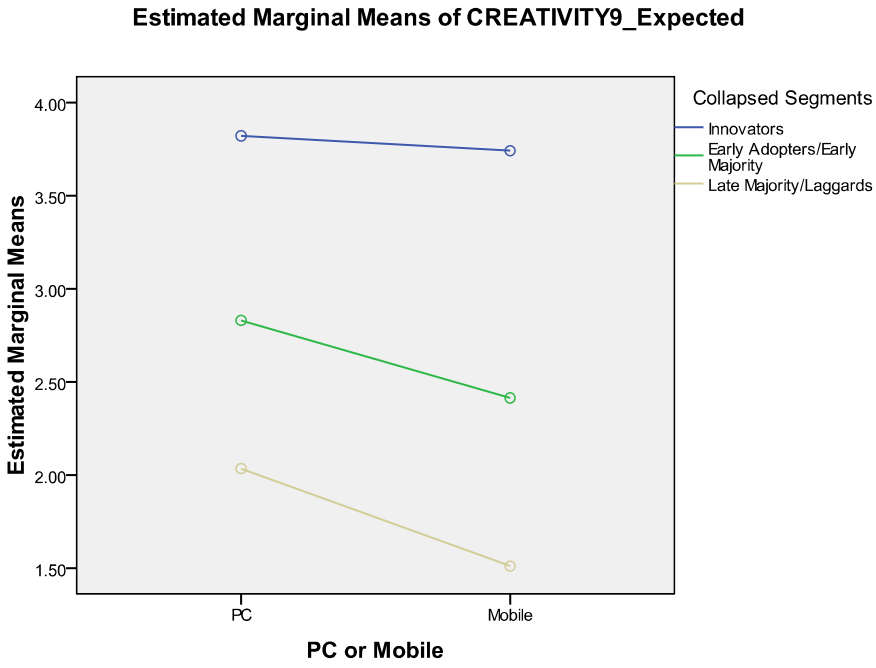


Figure 4.28. Expectation – Creativity Affordance: Reflection of Who I Am by Mode of Video * Adoption Group



4.3. Hypothesis 3.2. Earlier adoption groups will discover more in all three categories of affordances from both video technologies than later adoption groups.

The sections 4.3.1 to 4.3.3 describe the detailed analysis and results for Hypothesis 3.2. Overall, this hypothesis is supported. Earlier adoption groups reported a higher level of experienced affordance across all three categories of affordances compared to later adoption groups. More interestingly, the level of experienced affordance is higher for PC video than mobile video.

4.3.1. Discovery - Convenience Related Affordances

For data of PC or Mobile ***users***, a MANOVA test was run with the independent variables – market, mode of video and adoption group included to determine their effects on how much convenience related affordance respondents discovered as related to when, where and with whom to watch video. The test was performed for the user data only because this section of the questionnaire is only applicable to respondents who have had experience with the technology. All three independent variables were found to have significant influence on discovered convenience related affordance (Mode of video: $F=5.796$, $p<0.01$; market: $F=2.952$, $p<0.05$; adoption group: $F=28.63$, $p<0.01$). Overall, PC video was considered offering much more convenience in terms of when, where and with whom to watch video than mobile video, which is similar to the trend with expected convenience affordance. The SK/J market indicated they discovered more convenience affordance with PC video than mobile video than the U.S. market across all measures. A Bonferroni post-hoc test revealed that the more innovative adoption groups discovered more convenience provided by both modes of video ($p<0.01$).

Furthermore, this imbalanced discovered convenience affordance is moderated by both market and adoption group. The SK/J market respondents indicated they experienced much more convenience afforded by PC video and mobile video than did the U.S. market respondents except that the SK/J market cited a much lower level of experienced convenience affordance for mobile video than the U.S. market on measurement of with whom to watch video (interaction effect between market and mode of video: $F=3.16$, $p<0.05$). The three different adoption groups exhibited different patterns in their discovered convenience afforded by PC video and mobile video respectively ($F=3.645$, $p<0.01$). Innovators consistently discovered a much higher, and more importantly, more even level of convenience associated with both modes of video than the other two adoption groups when thinking about when and where to watch video. The other two adoption groups both cited more convenience affordance with PC video than mobile video from their experiences. However, all three groups shared a similar pattern when responding to how much convenience was afforded for allowing the respondents to watch video with whomever they want. Innovators are largely similar to Early Adopters/Early Majority as well as Late Majority/Laggards in that they reported a much higher convenience affordance for PC video than mobile video.

Table 4.4. Discovery – Convenience Affordance Multivariate Tests

Effect		Value	F	Hypothesis df	Error df	Sig.
Intercept	Pillai's Trace	.803	1297.807[a]	3.000	954.000	.000
	Wilks' Lambda	.197	1297.807[a]	3.000	954.000	.000
	Hotelling's Trace	4.081	1297.807[a]	3.000	954.000	.000
	Roy's Largest Root	4.081	1297.807[a]	3.000	954.000	.000
PC_MOBILE_NEW	Pillai's Trace	.018	5.796[a]	3.000	954.000	.001
	Wilks' Lambda	.982	5.796[a]	3.000	954.000	.001
	Hotelling's Trace	.018	5.796[a]	3.000	954.000	.001
	Roy's Largest Root	.018	5.796[a]	3.000	954.000	.001
Segment3	Pillai's Trace	.165	28.630	6.000	1910.000	.000
	Wilks' Lambda	.836	29.730[a]	6.000	1908.000	.000
	Hotelling's Trace	.194	30.832	6.000	1906.000	.000
	Roy's Largest Root	.185	59.035[b]	3.000	955.000	.000
Market	Pillai's Trace	.009	2.952[a]	3.000	954.000	.032
	Wilks' Lambda	.991	2.952[a]	3.000	954.000	.032
	Hotelling's Trace	.009	2.952[a]	3.000	954.000	.032
	Roy's Largest Root	.009	2.952[a]	3.000	954.000	.032
PC_MOBILE_NEW * Market	Pillai's Trace	.010	3.160[a]	3.000	954.000	.024
	Wilks' Lambda	.990	3.160[a]	3.000	954.000	.024
	Hotelling's Trace	.010	3.160[a]	3.000	954.000	.024
	Roy's Largest Root	.010	3.160[a]	3.000	954.000	.024
PC_MOBILE_NEW * Segment3	Pillai's Trace	.023	3.645	6.000	1910.000	.001
	Wilks' Lambda	.977	3.657[a]	6.000	1908.000	.001
	Hotelling's Trace	.023	3.669	6.000	1906.000	.001

	Roy's Largest Root	.022	6.850[b]	3.000	955.000	.000

a. Exact statistic

b. The statistic is an upper bound on F that yields a lower bound on the significance level.

c. Design: Intercept + PC_MOBILE_NEW + Segment3 + Market + PC_MOBILE_NEW * Market + PC_MOBILE_NEW * Segment3

4.3.2. Discovery - Space Related Affordances

For data of PC or Mobile ***users***, a MANOVA test indicated no main effects from market. The main effects found were for mode of video ($F=8.989$, $p<0.01$) and adoption group ($F=41.469$, $p<0.01$). PC video users were more likely to report space affordance discovered and received than Mobile video users. In a Bonferroni post-hoc test, respondents in earlier adoption groups reported more space affordance for both modes of video ($p<0.01$).

Table 4.5. Discovery – Space Affordance Multivariate Tests

Effect		Value	F	Hypothesis df	Error df	Sig.
Intercept	Pillai's Trace	.766	1563.543[a]	2.000	955.000	.000
	Wilks' Lambda	.234	1563.543[a]	2.000	955.000	.000
	Hotelling's Trace	3.274	1563.543[a]	2.000	955.000	.000
	Roy's Largest Root	3.274	1563.543[a]	2.000	955.000	.000
PC_MOBILE_NEW	Pillai's Trace	.018	8.989[a]	2.000	955.000	.000
	Wilks' Lambda	.982	8.989[a]	2.000	955.000	.000
	Hotelling's Trace	.019	8.989[a]	2.000	955.000	.000
	Roy's Largest Root	.019	8.989[a]	2.000	955.000	.000
Segment3	Pillai's Trace	.160	41.469	4.000	1912.000	.000
	Wilks' Lambda	.840	43.389[a]	4.000	1910.000	.000

	Hotelling's Trace	.190	45.312	4.000	1908.000	.000
	Roy's Largest Root	.190	90.809[b]	2.000	956.000	.000
Market	Pillai's Trace	.004	1.778[a]	2.000	955.000	.170
	Wilks' Lambda	.996	1.778[a]	2.000	955.000	.170
	Hotelling's Trace	.004	1.778[a]	2.000	955.000	.170
	Roy's Largest Root	.004	1.778[a]	2.000	955.000	.170
PC_MOBILE_NEW * Market	Pillai's Trace	.000	.156[a]	2.000	955.000	.855
	Wilks' Lambda	1.000	.156[a]	2.000	955.000	.855
	Hotelling's Trace	.000	.156[a]	2.000	955.000	.855
	Roy's Largest Root	.000	.156[a]	2.000	955.000	.855
PC_MOBILE_NEW * Segment3	Pillai's Trace	.008	2.032	4.000	1912.000	.088
	Wilks' Lambda	.992	2.033[a]	4.000	1910.000	.087
	Hotelling's Trace	.009	2.035	4.000	1908.000	.087
	Roy's Largest Root	.008	3.935[b]	2.000	956.000	.020

a. Exact statistic

b. The statistic is an upper bound on F that yields a lower bound on the significance level.

c. Design: Intercept + PC_MOBILE_NEW + Segment3 + Market + PC_MOBILE_NEW * Market + PC_MOBILE_NEW * Segment3

4.3.3. Discovery - Creativity Related Affordances

PC or Mobile ***users*** were also asked about the level of creativity affordance they actually discovered in their experience. A MANOVA test returned two main effects with mode of video ($F=5.437$, $p<0.01$) and adoption group ($F=63.156$, $p<0.01$). PC video was found to afford more creativity than mobile video. Based on a follow-up Bonferroni test, earlier adoption groups discovered more creativity with both modes of video than later adoption groups ($p<0.01$).

Table 4.6. Discovery – Creativity Affordance Multivariate Tests

Effect		Value	F	Hypothesis df	Error df	Sig.
Intercept	Pillai's Trace	.705	1138.606[a]	2.000	955.000	.000
	Wilks' Lambda	.295	1138.606[a]	2.000	955.000	.000
	Hotelling's Trace	2.385	1138.606[a]	2.000	955.000	.000
	Roy's Largest Root	2.385	1138.606[a]	2.000	955.000	.000
PC_MOBILE_NEW	Pillai's Trace	.011	5.437[a]	2.000	955.000	.004
	Wilks' Lambda	.989	5.437[a]	2.000	955.000	.004
	Hotelling's Trace	.011	5.437[a]	2.000	955.000	.004
	Roy's Largest Root	.011	5.437[a]	2.000	955.000	.004
Segment3	Pillai's Trace	.233	63.156	4.000	1912.000	.000
	Wilks' Lambda	.768	67.349[a]	4.000	1910.000	.000
	Hotelling's Trace	.300	71.568	4.000	1908.000	.000
	Roy's Largest Root	.294	140.323[b]	2.000	956.000	.000
Market	Pillai's Trace	.001	.403[a]	2.000	955.000	.668
	Wilks' Lambda	.999	.403[a]	2.000	955.000	.668
	Hotelling's Trace	.001	.403[a]	2.000	955.000	.668
	Roy's Largest Root	.001	.403[a]	2.000	955.000	.668
PC_MOBILE_NEW * Market	Pillai's Trace	.011	5.461[a]	2.000	955.000	.004
	Wilks' Lambda	.989	5.461[a]	2.000	955.000	.004
	Hotelling's Trace	.011	5.461[a]	2.000	955.000	.004
	Roy's Largest Root	.011	5.461[a]	2.000	955.000	.004
PC_MOBILE_NEW * Segment3	Pillai's Trace	.006	1.484	4.000	1912.000	.204
	Wilks' Lambda	.994	1.485[a]	4.000	1910.000	.204
	Hotelling's Trace	.006	1.485	4.000	1908.000	.204

	Roy's Largest Root	.006	2.924[b]	2.000	956.000	.054

a. Exact statistic

b. The statistic is an upper bound on F that yields a lower bound on the significance level.

c. Design: Intercept + PC_MOBILE_NEW + Segment3 + Market + PC_MOBILE_NEW * Market + PC_MOBILE_NEW * Segment3

The MANOVA test also found one significant interaction effect between market and mode of video (F5.461, $p<0.01$). Similar to the finding for expected creativity affordance, the SK/J market indicated a much higher level of experienced creativity affordance for PC video, and yet a much lower level for mobile video than the U.S. market. In the U.S. market, users discovered largely similar level of creativity affordance for both modes of video.

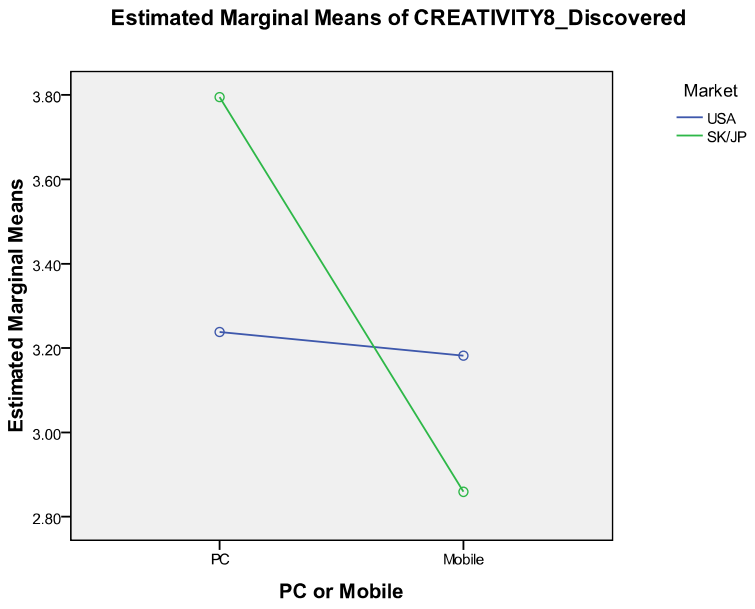


Figure 4.29. Discovery – Creativity Affordance: Ability to Create and Share by Mode of Video * Market

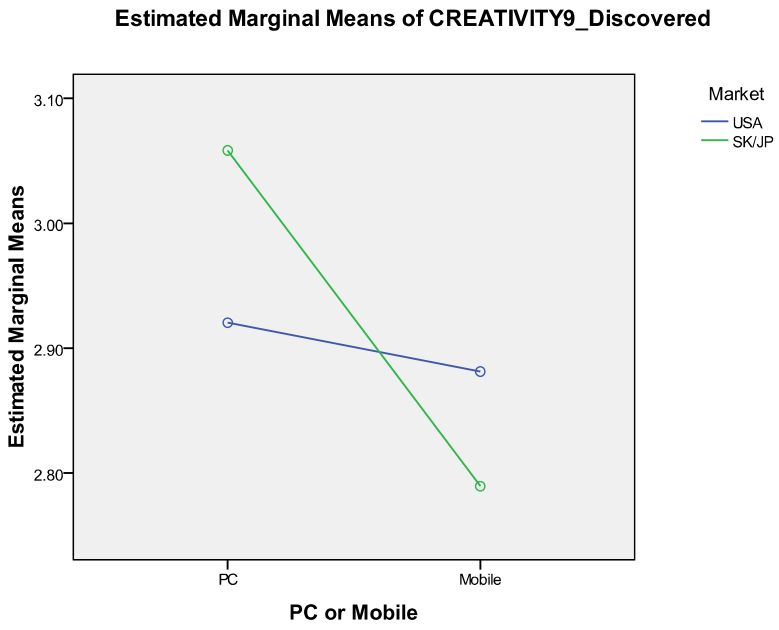


Figure 4.30. Discovery – Creativity Affordance: Reflection of Who I Am by Mode of Video * Market

4.4. Hypothesis 3.3. Adoption groups experience more false affordances with mobile video than PC video.

Hypothesis 3.4. Earlier adoption groups experience less false affordances and more unexpected affordances from both video technologies than later adoption groups.

4.4.1. False Affordances

The specific things that respondents expected to be able to do before starting to use PC or Mobile video and later found they couldn't do were coded. The coded categories were then further classified into the three broad groups of affordances: 1) convenience related affordance (i.e., when, where and with whom to watch video), 2) space related affordance (i.e., a sense of doing things in own space, making own decisions more often), and 3) creativity related affordance (i.e.,

ability to watch, create and share with others and feeling the ability to do so reflecting who I am). Respondents who did not cite any mention of false affordance were coded as “Did not report any false affordance”.

A Chi-Square test assessing the correlation between adoption group and the occurrence of experiencing false affordance revealed that Innovators were more likely than the other adoption groups to have reported at least one false affordance in using either PC or Mobile video. Therefore, the statement from Hypothesis 3.4 about earlier adopters experiencing less false affordances was not supported.

Table 4.7. False Affordance * Collapsed Segments Crosstabulation

			Collapsed Segments			
			Innovators	Early Adopters/Early Majority	Late Majority/Laggards	Total
False Affordance	Did not report any false affordance	Count	164	402	169	735
		% within Collapsed Segments	66.9%	79.6%	79.0%	76.2%
	Reported at least one false affordance	Count	81	103	45	229
		% within Collapsed Segments	33.1%	20.4%	21.0%	23.8%
Total		Count	245	505	214	964
		% within Collapsed Segments	100.0%	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	15.739(a)	2	0.000
Likelihood Ratio	15.015	2	0.001
Linear-by-Linear Association	9.875	1	0.002
N of Valid Cases	964		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 50.84.

Directional Measures

		Value	
Nominal by Interval	Eta	False Affordance Dependent	0.128
		Collapsed Segments Dependent	0.101

A similar Chi-Square test reported that mobile video and PC video received comparable share of false affordance. Hypothesis 3.3 was not supported.

Table 4.8. False Affordance * PC_Mobile Crosstabulation

			PC_Mobile		
			Computer Users	Mobile Users	Total
False Affordance	Did not report any false affordance	Count	464	271	735
		% within PC_Mobile	77.6%	74.0%	76.2%
	Reported at least one false affordance	Count	134	95	229
		% within PC_Mobile	22.4%	26.0%	23.8%
Total		Count	598	366	964
		% within PC_Mobile	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1.578(b)	1	0.209		
Continuity Correction(a)	1.388	1	0.239		
Likelihood Ratio	1.567	1	0.211		
Fisher's Exact Test				0.213	0.120
Linear-by-Linear Association	1.577	1	0.209		
N of Valid Cases	964				

a. Computed only for a 2x2 table

b. 0 cells (.0%) have expected count less than 5. The minimum expected count is 86.94.

Directional Measures

			Value
Nominal by Interval	Eta	False Affordance Dependent	0.040
		PC_Mobile Dependent	0.040

Market was not found to be significantly correlated with the occurrence of false affordance. The U.S. and SK/JP markets shared similar patterns.

Table 4.9. False Affordance * Market Crosstabulation

			Market		Total
			USA	SK/JP	
False Affordance	Did not report any false affordance	Count	681	54	735
		% within Market	76.3%	76.1%	76.2%
	Reported at least one false affordance	Count	212	17	229
		% within Market	23.7%	23.9%	23.8%
Total		Count	893	71	964
		% within Market	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.002(b)	1	0.969		
Continuity Correction(a)	0.000	1	1.000		
Likelihood Ratio	0.002	1	0.969		
Fisher's Exact Test				1.000	0.534
Linear-by-Linear Association	0.002	1	0.969		
N of Valid Cases	964				

a. Computed only for a 2x2 table

b. 0 cells (.0%) have expected count less than 5. The minimum expected count is 16.87.

Directional Measures

		Value	
Nominal by Interval	Eta	False Affordance Dependent	0.001
		Market Dependent	0.001

4.4.2. Unusual Affordances

Following a process similar to the one used for coding false affordance, responses were categorized for the affordances mentioned by respondents as unusual and originated from the user's own application or creativity. The coded categories were then further classified into the three broad groups of affordances: 1) convenience related affordance (i.e., when, where and with

whom to watch video), 2) space related affordance (i.e., a sense of doing things in own space, making own decisions more often), and 3) creativity related affordance (i.e., ability to watch, create and share with others and feeling the ability to do so reflecting who I am). Respondents who did not cite any mention of unusual affordances were coded as "Did not report any unusual affordance".

A Chi-Square test was run to assess the correlation between adoption group and the occurrence of unusual affordance. The results reported that the earlier adoption groups tend to have reported more creative or unusual ways to use either PC or Mobile video. Thus, the statement of Hypothesis 3.4 about earlier adopters having a stronger likelihood to have more creativity related affordances was supported.

Table 4.10. Unusual Affordance * Collapsed Segments Crosstabulation

			Collapsed Segments			
			Innovators	Early Adopters/Early Majority	Late Majority/Laggards	Total
Unusual Affordance	Did not report any unusual affordance	Count	187	425	190	802
		% within Collapsed Segments	76.3%	84.2%	88.8%	83.2%
	Reported at least one unusual affordance	Count	58	80	24	162
		% within Collapsed Segments	23.7%	15.8%	11.2%	16.8%
Total		Count	245	505	214	964
		% within	100.0%	100.0%	100.0%	100.0%

	Collapsed Segments			

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	13.385(a)	2	0.001
Likelihood Ratio	13.164	2	0.001
Linear-by-Linear Association	12.931	1	0.000
N of Valid Cases	964		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 35.96.

Directional Measures

			Value
Nominal by Interval	Eta	Unusual Affordance Dependent	0.118
		Collapsed Segments Dependent	0.116

Another Chi-Square test showed that mobile video was no different from PC video in generating the amount of creative, unusual application of the respective technology.

Table 4.11. Unusual Affordance * PC_Mobile Crosstabulation

			PC_Mobile		
			Computer Users	Mobile Users	Total
Unusual Affordance	Did not report any unusual affordance	Count	502	300	802
		% within PC_Mobile	83.9%	82.0%	83.2%
	Reported at least one unusual affordance	Count	96	66	162
		% within PC_Mobile	16.1%	18.0%	16.8%
Total		Count	598	366	964
		% within PC_Mobile	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.636(b)	1	0.425		
Continuity Correction(a)	0.502	1	0.478		
Likelihood Ratio	0.632	1	0.427		
Fisher's Exact Test				0.426	0.239
Linear-by-Linear Association	0.636	1	0.425		
N of Valid Cases	964				

a. Computed only for a 2x2 table

b. 0 cells (.0%) have expected count less than 5. The minimum expected count is 61.51.

Directional Measures

		Value	
Nominal by Interval	Eta	Had No unusual Affordance Dependent	0.026
		PC_Mobile Dependent	0.026

Interestingly and somewhat expectedly, more respondents from the SK/JP market reported creative or unusual ways to use either PC or Mobile video than those from the U.S. market.

Table 4.12. Unusual Affordance * Market Crosstabulation

			Market		Total
			USA	SK/JP	
Unusual Affordance	Did not report any unusual affordance	Count	749	53	802
		% within Market	83.9%	74.6%	83.2%
	Reported at least one unusual affordance	Count	144	18	162
		% within Market	16.1%	25.4%	16.8%
Total		Count	893	71	964
		% within Market	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	4.005(b)	1	0.045		
Continuity Correction(a)	3.372	1	0.066		
Likelihood Ratio	3.610	1	0.057		
Fisher's Exact Test				0.068	0.038
Linear-by-Linear Association	4.001	1	0.045		
N of Valid Cases	964				

a. Computed only for a 2x2 table

b. 0 cells (.0%) have expected count less than 5. The minimum expected count is 11.93.

Directional Measures

		Value	
Nominal by Interval	Eta	Unusual Affordance Dependent	0.064
		Market Dependent	0.064

4.5. Hypothesis 4. Adoption groups use social channels less often for mobile video than PC video.

One inquiry for this research is to observe the relational aspect of the concept of affordance. The results offered some support for conceptualizing affordance as a relational construct, reflecting an iterative process of capability decoding and encoding between the user and the technology.

The data also suggested a significant role of social connections and exchanges in the user's overall adoption and discovery process. However, this section reported no evidence to support Hypothesis 4. Users were found to leverage a similar amount of social channels in affordance discovery for both mobile and PC videos.

4.5.1. Affordance Discovery Process Manifested in False Affordance Identification

The data on channels through which respondents learned about false affordances was studied in two ways. Firstly, the variables indicating frequency of using each channel were coded into dichotomous usage variables indicating the presence of absence of the specific channels. When examining false affordance, namely, things that respondents initially thought they could do but later found they couldn't, 97% of all respondents, regardless of the mode of video, stated they have had own trial and error. Nine in ten people indicated they had physically talked with other people in learning what they are able to do. Three fourths said they had exchanged information with other people online. Slightly more than 80% cited they learned what they couldn't do by actually doing things together with other people.

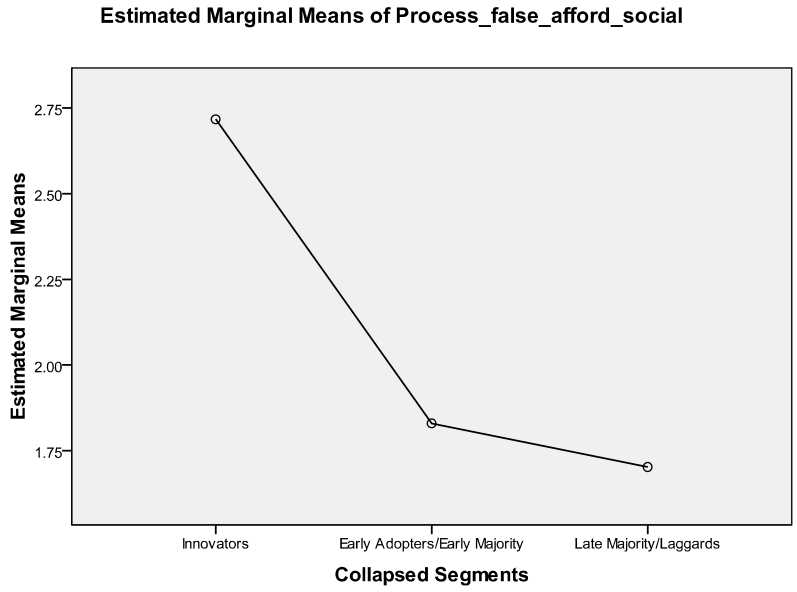
Table 4.13. Means to Discover False Affordances

	Self Evident	Reading Manual	Searching Info Online	Own Trial and Error	Physically Talking with People	Exchanging Info Online	Doing Things Together with Others	Watching TV	Listening to Radio
Never use	8%	25%	8%	3%	9%	26%	19%	26%	37%
Have at least some use	92%	75%	92%	97%	91%	74%	81%	74%	63%

Secondly, two compound variables were developed in order to condense the number of channels. The frequency variables (rating 5 = almost always) for the channels of "reading manual", "searching info online", "watching TV", and "listening to radio" were combined to form a compound variable called "information", denoting the respondent's efforts in information seeking in the process of identifying false affordances (4 items; Cronhach $\alpha = 0.749$). The frequency variables for the channels of "physically talking with people", "exchanging info online" and "doing things together with others" were condensed into a second compound variable called "social" indicative of the extent to which the respondent was engaged in social interaction in the process (3 items; Cronhach $\alpha = 0.752$). The compound variables were each represented by the sum of all included items divided by the number of items included. Together with the original frequency variable for "my own trial and error", the two compound frequency variables for "information" and "social" were entered into a MANOVA test as dependent variables. Market, mode of video, and adoption group were the independent variables. None of the independent variables except for adoption group ($F=10.560$, $p<0.01$) was found to have significant influence on how often the respondents leveraged the three main channels in uncovering false affordances.

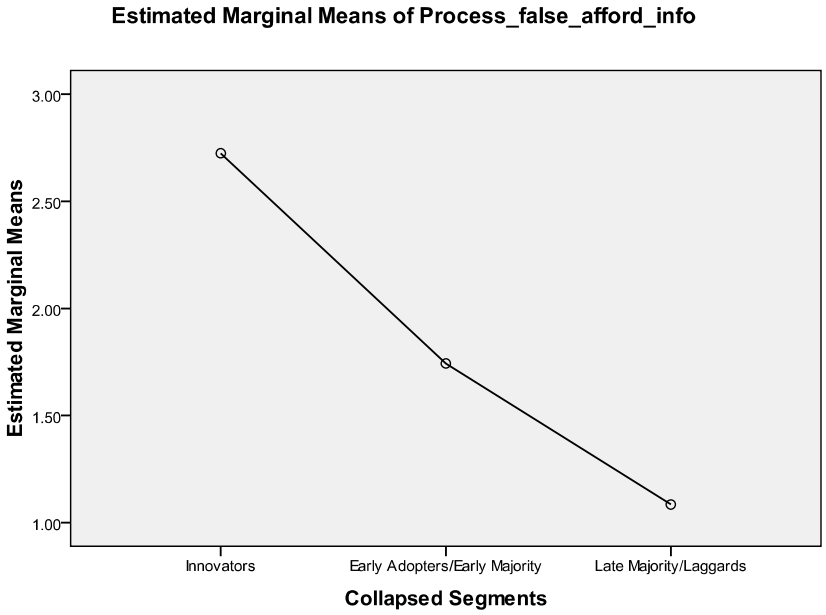
Specifically, Innovators reported a much more frequent usage of social exchanges than the other two adoption groups in learning about false affordances ($p<0.01$). The two latter adoption groups' difference was insignificant.

Figure 4.31. Means to Discover False Affordance: Social Channels by Adoption Group



Innovators, again, were the most active in seeking information (through self study, search, or paying attention to mass media) among the three adoption groups, followed by Early Adopters/Early Majority ($p<0.01$). Late Majority/Laggards trailed behind in significant distance ($p<0.05$).

Figure 4.32. Means to Discover False Affordances: Information Channels by Adoption Group



The post-hoc Bonferroni test revealed no statistically significant differences among the three adoption groups in terms of the presence of own trial and error.

4.5.2. Affordance Discovery Process Manifested in Unexpected Affordance Identification

A similar analytical process was conducted for discovered unexpected affordance. A set of simple dichotomous variables were first formed to examine the selection of learning channels. In addition, condensed variables – "social" and "information" as well as "own trial and error" were analyzed using MANOVA with market, mode of video and adoption group being the independent variables.

In discovering things that they initially didn't think they could do, 79% or more respondents indicated they have used at least some level of trial and error, physically talking with other people, exchanging information online and doing things together with others.

Table 4.14. Means to Discover Unexpected Affordances

	Self Evident	Reading Manual	Searching Info Online	Own Trial and Error	Physically Talking with People	Exchanging Info Online	Doing Things Together with Others	Watching TV	Listening to Radio
Never use	8%	16%	8%	2%	9%	21%	17%	26%	32%
Have at least some use	92%	84%	92%	98%	91%	79%	83%	74%	68%

The four-item “information” frequency variable and three-item “social” frequency variable were both developed with an acceptable level of reliability (4 items; Cronhach $\alpha = 0.767$ and 3 items; Cronhach $\alpha = 0.778$). The compound variables were each represented by the sum of all included items divided by the number of items included.

The MANOVA test reported two main effects for market ($F=3.434$, $p<0.05$) and adoption group ($F= 5.736$, $p<0.01$) respectively as well as an interaction effect between mode of video and adoption group ($F=2.124$, $p<0.05$).

Table 4.15. Unexpected Affordance Discovery Channels Multivariate Test

Effect		Value	F	Hypothesis df	Error df	Sig.
Intercept	Pillai's Trace	.471	63.764[a]	3.000	215.000	.000
	Wilks' Lambda	.529	63.764[a]	3.000	215.000	.000
	Hotelling's Trace	.890	63.764[a]	3.000	215.000	.000
	Roy's Largest Root	.890	63.764[a]	3.000	215.000	.000
PC_MOBILE_NEW	Pillai's Trace	.035	2.564[a]	3.000	215.000	.056
	Wilks' Lambda	.965	2.564[a]	3.000	215.000	.056
	Hotelling's Trace	.036	2.564[a]	3.000	215.000	.056
	Roy's Largest Root	.036	2.564[a]	3.000	215.000	.056
Market	Pillai's Trace	.046	3.434[a]	3.000	215.000	.018
	Wilks' Lambda	.954	3.434[a]	3.000	215.000	.018
	Hotelling's Trace	.048	3.434[a]	3.000	215.000	.018
	Roy's Largest Root	.048	3.434[a]	3.000	215.000	.018
Segment3	Pillai's Trace	.148	5.736	6.000	432.000	.000

	Wilks' Lambda	.853	5.908[a]	6.000	430.000	.000
	Hotelling's Trace	.170	6.079	6.000	428.000	.000
	Roy's Largest Root	.163	11.725[b]	3.000	216.000	.000
PC_MOBILE_NEW * Segment3	Pillai's Trace	.057	2.124	6.000	432.000	.049
	Wilks' Lambda	.943	2.138[a]	6.000	430.000	.048
	Hotelling's Trace	.060	2.152	6.000	428.000	.047
	Roy's Largest Root	.056	4.048[b]	3.000	216.000	.008
PC_MOBILE_NEW * Market	Pillai's Trace	.030	2.203[a]	3.000	215.000	.089
	Wilks' Lambda	.970	2.203[a]	3.000	215.000	.089
	Hotelling's Trace	.031	2.203[a]	3.000	215.000	.089
	Roy's Largest Root	.031	2.203[a]	3.000	215.000	.089

a. Exact statistic

b. The statistic is an upper bound on F that yields a lower bound on the significance level.

c. Design: Intercept + PC_MOBILE_NEW + Market + Segment3 + PC_MOBILE_NEW * Segment3 + PC_MOBILE_NEW * Market

The U.S. market manifested a much more pronounced dependence on social exchanges and own trial and error than the SK/J market. On the other hand, the U.S. market reported a lower tendency in seeking information by self than the SK/J market. Additionally, the U.S. market was found to rely on trial and error more often than its SK/J counterpart.

Figure 4.33. Unexpected Affordance Discovery: Social Channels by Market

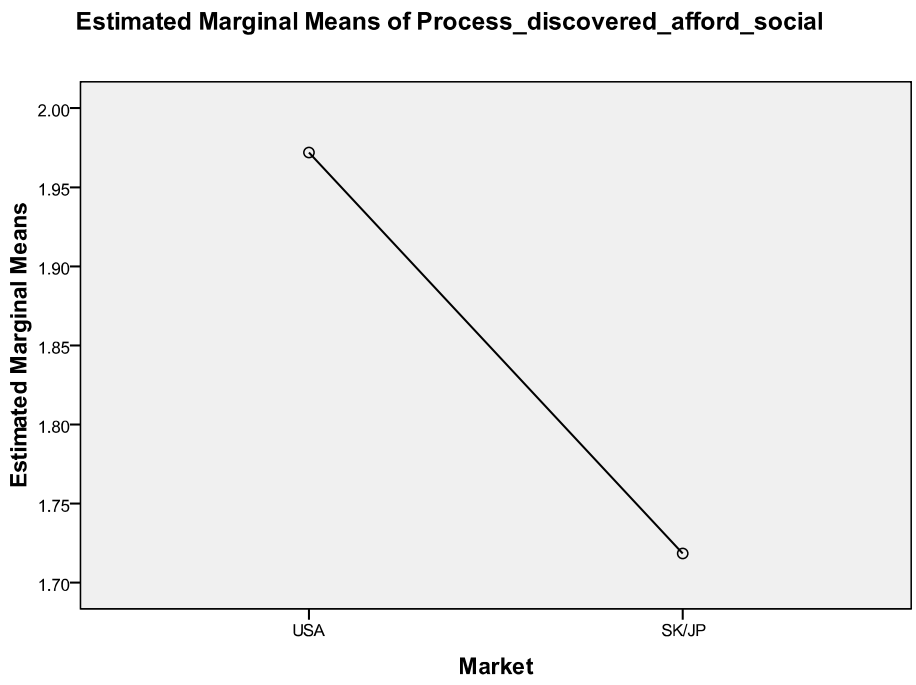
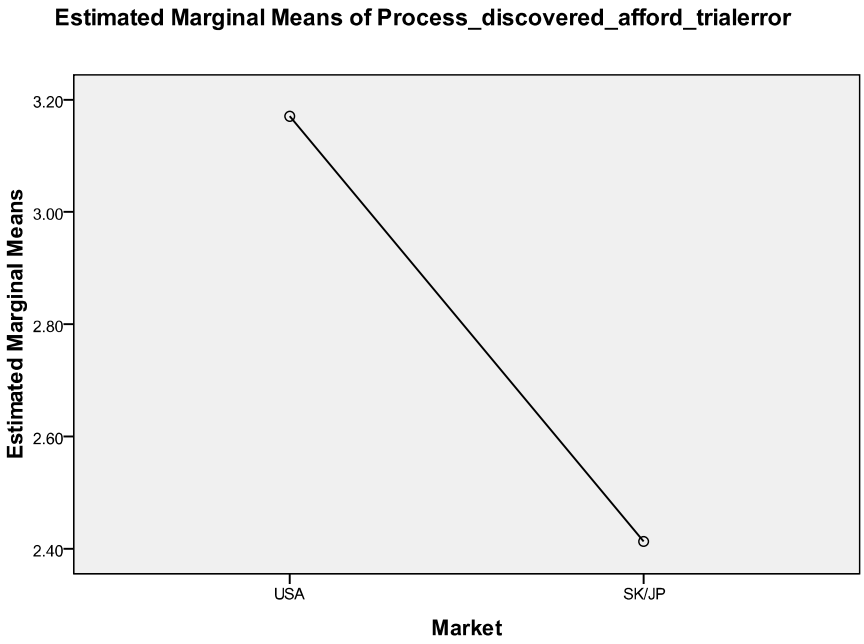


Figure 4.34. Unexpected Affordance Discovery: Information Channels by Market



The three adoption groups showed contrasting behavioral frequency in using social, information channels and own trial/error, which were further moderated by mode of video. Overall, consistent with the results with false affordance, Innovators cited a more frequent usage of social exchanges and seeking information by self than the other two groups ($p<0.01$). A new pattern of behaviors was observed in that Late Majority/Laggards were found to have reported more usage of social exchanges, seeking information and own trial/error for PC video than mobile video. This particular trend with Late Majority/Laggards might be attributed to the fact that mobile video remains a novel technology on the market, therefore, those who usually last adopt innovations would not have been able to allocate time to inquire about or try the emerging technology.

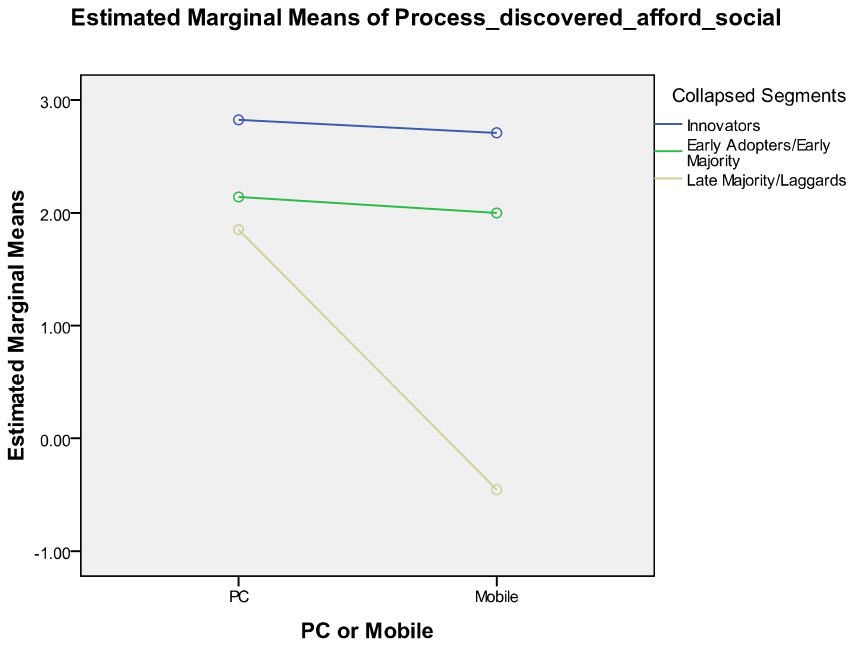


Figure 4.35. Unexpected Affordance Discovery: Social Channels by Mode of Video*Market

Figure 4.36. Unexpected Affordance Discovery: Information Channels by Mode of Video*Market

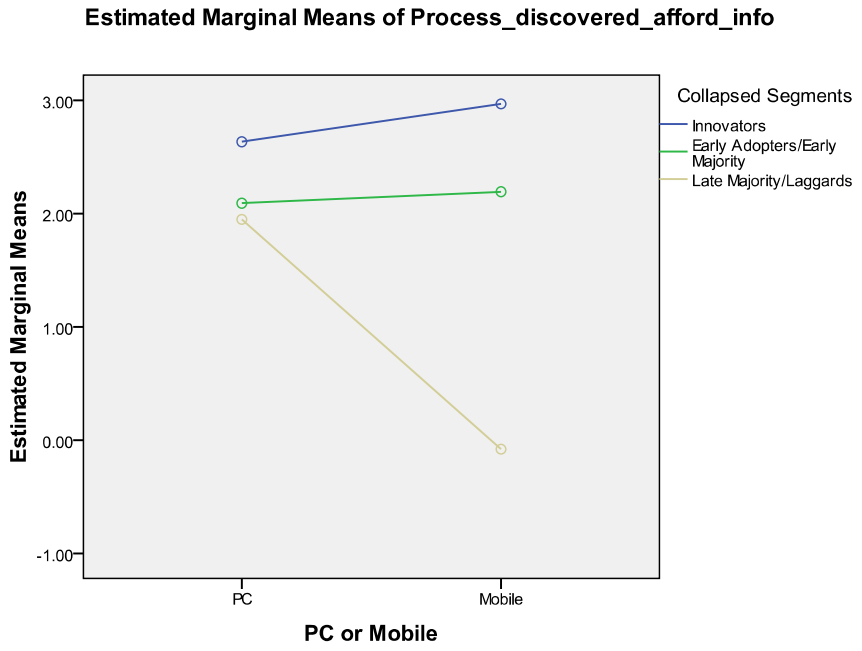
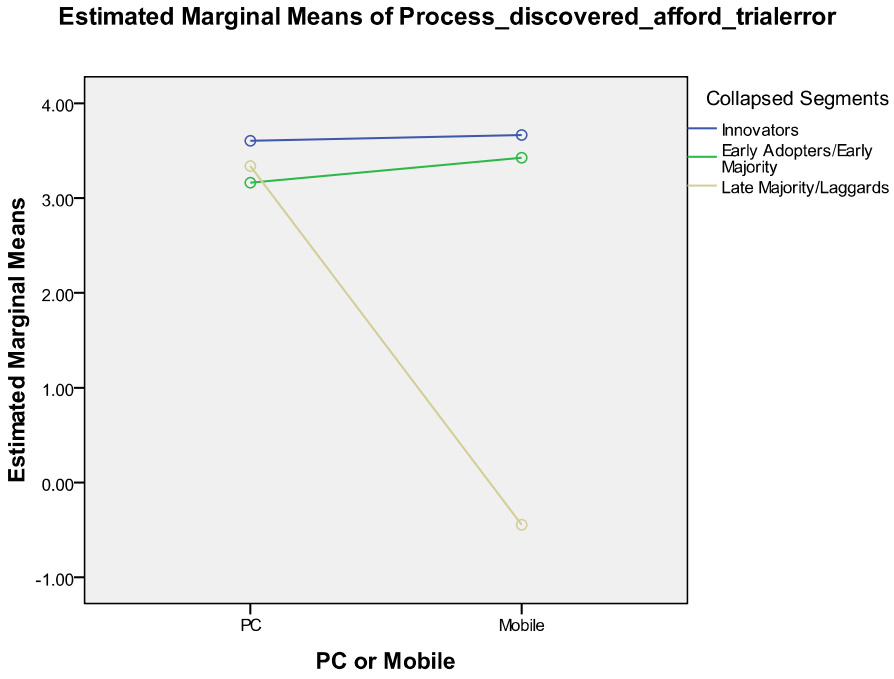


Figure 4.37. Unexpected Affordance Discovery: Trial & Error by Mode of Video*Market



4.5.3. Affordance Discovery Process Manifested in Unusual/User-defined Affordance Identification

The previous analytical process was again applied here for examining unusual and user-defined affordance.

Echoing the findings reported earlier, trial and error, searching information online, physically talking with people, and exchanging information online were reported to be the main approaches used by respondents (cited by 80% or more respondents) in discovering unusual things that they could do with the PC or Mobile video.

Table 4.16. Means to Discover Unusual Affordance

	Self Evident	Reading Manual	Searching Info Online	Own Trial and Error	Physically Talking with People	Exchanging Info Online	Doing Things Together with Others	Watching TV	Listening to Radio
Never use	14%	22%	15%	5%	16%	29%	21%	28%	38%
Have at least some use	86%	78%	85%	95%	84%	81%	79%	72%	62%

The four-item "information" frequency variable and three-item "social" frequency variable for unusual affordance were tested with an acceptable level of reliability (4 items; Cronhach α =

0.790 and 3 items; Cronhach α = 0.842). The compound variables were each represented by the sum of all included items divided by the number of items included.

The MANOVA test reported a main effect from adoption group (F= 6.171, p<0.01). Two interaction effects were also identified: one was between mode of video and adoption group (F=2.788, p<0.05), and the other was between mode of video and market (F=3.108, p<0.05).

Table 4.17. Unusual/User-Defined Affordance Discovery Channels Multivariate Tests

Effect		Value	F	Hypothesis df	Error df	Sig.
Intercept	Pillai's Trace	.529	84.661[a]	3.000	226.000	.000
	Wilks' Lambda	.471	84.661[a]	3.000	226.000	.000
	Hotelling's Trace	1.124	84.661[a]	3.000	226.000	.000
	Roy's Largest Root	1.124	84.661[a]	3.000	226.000	.000
PC_MOBILE_NEW	Pillai's Trace	.013	.972[a]	3.000	226.000	.407
	Wilks' Lambda	.987	.972[a]	3.000	226.000	.407
	Hotelling's Trace	.013	.972[a]	3.000	226.000	.407
	Roy's Largest Root	.013	.972[a]	3.000	226.000	.407
Market	Pillai's Trace	.021	1.632[a]	3.000	226.000	.183
	Wilks' Lambda	.979	1.632[a]	3.000	226.000	.183
	Hotelling's Trace	.022	1.632[a]	3.000	226.000	.183
	Roy's Largest Root	.022	1.632[a]	3.000	226.000	.183
Segment3	Pillai's Trace	.151	6.171	6.000	454.000	.000
	Wilks' Lambda	.853	6.238[a]	6.000	452.000	.000
	Hotelling's Trace	.168	6.304	6.000	450.000	.000
	Roy's Largest Root	.136	10.301[b]	3.000	227.000	.000

PC_MOBILE_NEW * Segment3	Pillai's Trace	.071	2.788	6.000	454.000	.011
	Wilks' Lambda	.929	2.824[a]	6.000	452.000	.010
	Hotelling's Trace	.076	2.859	6.000	450.000	.010
	Roy's Largest Root	.074	5.630[b]	3.000	227.000	.001
PC_MOBILE_NEW * Market	Pillai's Trace	.040	3.108[a]	3.000	226.000	.027
	Wilks' Lambda	.960	3.108[a]	3.000	226.000	.027
	Hotelling's Trace	.041	3.108[a]	3.000	226.000	.027
	Roy's Largest Root	.041	3.108[a]	3.000	226.000	.027

a. Exact statistic

b. The statistic is an upper bound on F that yields a lower bound on the significance level.

c. Design: Intercept + PC_MOBILE_NEW + Market + Segment3 + PC_MOBILE_NEW * Segment3 + PC_MOBILE_NEW * Market

Among the three adoption groups, Innovators unsurprisingly had a significant lead in using social exchanges and seeking information voluntarily ($p<0.01$). However, Late Majority/Laggards reported a much higher usage of social exchanges for mobile video than PC video while Innovators indicated a higher usage for PC video than mobile video. In terms of seeking information voluntarily, Early Adopters/Early Majority were found to have no significant difference from Late Majority/Laggards, both groups lagging behind Innovators in seeking information in the process of discovering unusual affordances. The Bonferroni test did not yield significant differences between the three adoption groups in engaging in trial and error.

Figure 4.38. Means to Discover Unusual Affordances: Social Channels by Mode of Video * Adoption Group

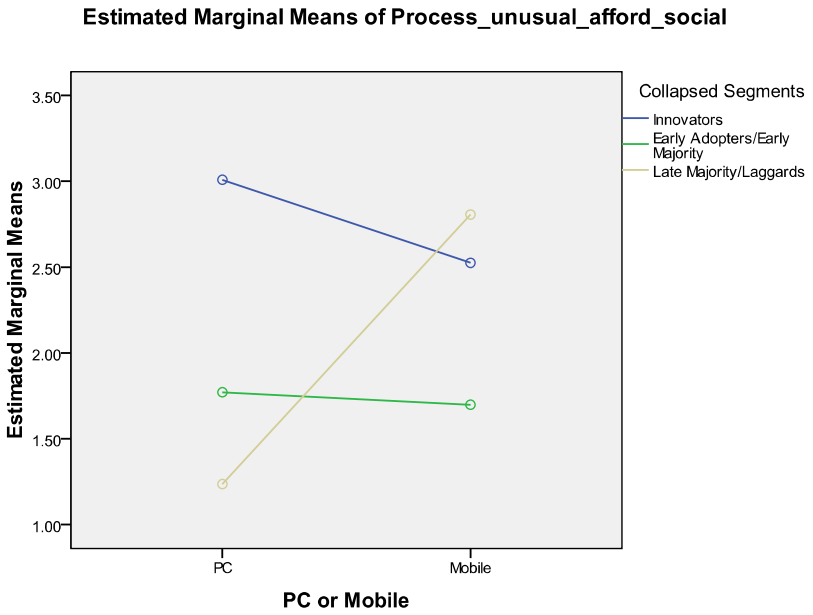
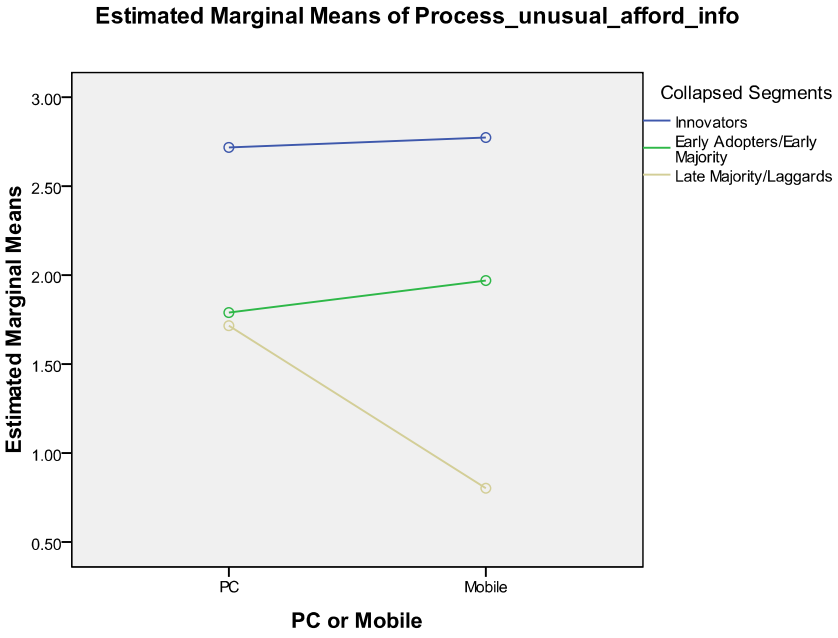


Figure 4.39. Means to Discover Unusual Affordances: Information Channels by Mode of Video * Adoption Group



In addition, the ways to discover unusual affordances were found to be different for PC and mobile videos in the two markets. As the charts showed below, respondents in the U.S. reported a much higher dependence on social exchanges for mobile video than PC video while respondents in the SK/J posted an opposite profile learning more through social exchanges for PC video than mobile video. On the other hand, compared to those in the U.S., respondents in the SK/J market were much more actively seeking information voluntarily for PC video than mobile video. In terms of using trial and error, the U.S. respondents cited more incidences for both modes of video overall. Furthermore, the U.S. respondents reported more trial and error efforts for PC video than mobile video while the SK/J respondents did that more often for mobile video than PC video.

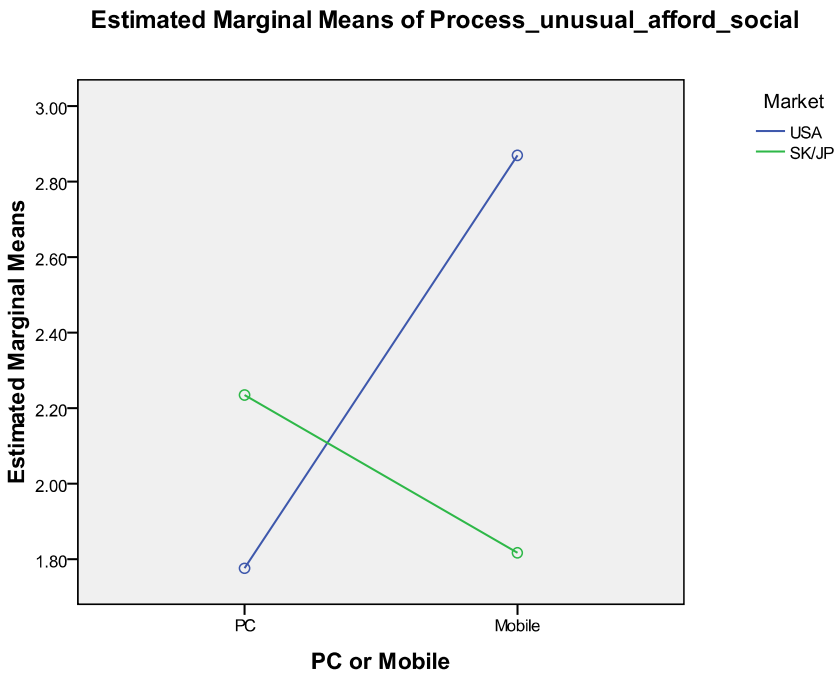


Figure 4.40. Means to Discover Unusual Affordances: Social Channels by Mode of Video * Market

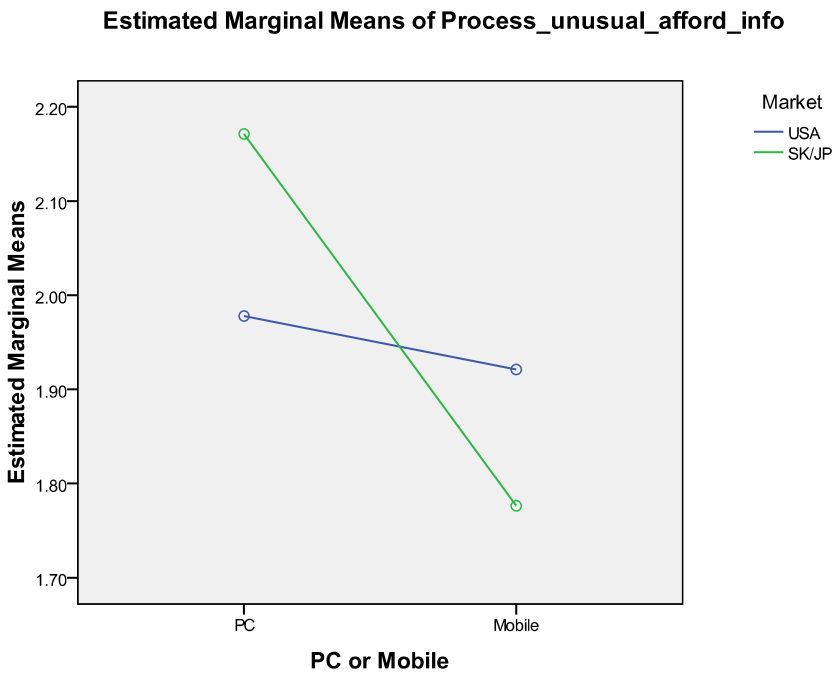


Figure 4.41. Means to Discover Unusual Affordances: Information Channels by Mode of Video * Market

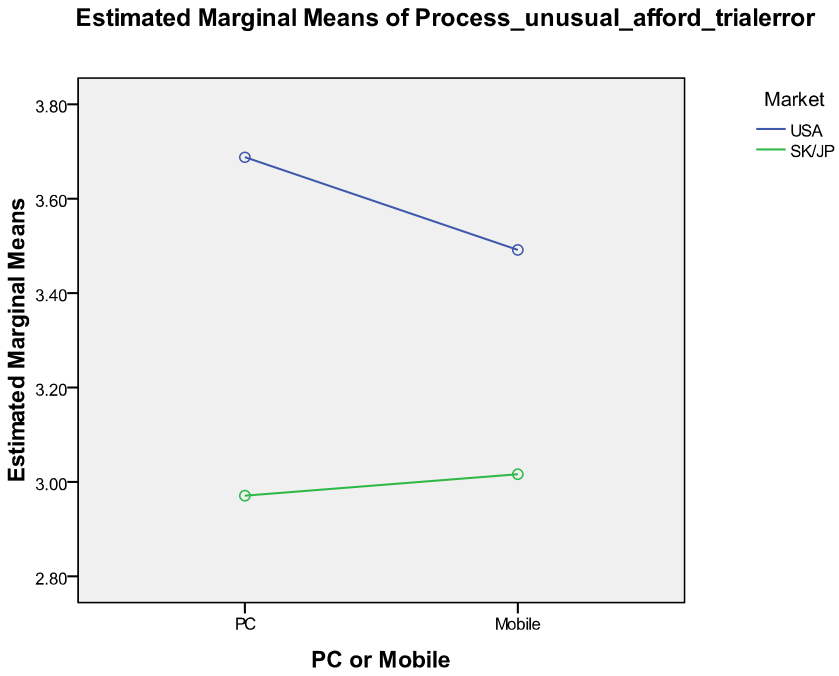


Figure 4.42. Means to Discover Unusual Affordances: Trial & Error by Mode of Video * Market

Chapter 5

IMPLICATIONS AND DISCUSSIONS

5.1. Quality of Experience

The expectation for QoE for PC video and mobile video is clearly different depending on if the user is a member of the Innovators, Early Adopters/Early Majority, or Late Majority/Laggards. Interestingly, Innovators placed a higher level of importance for QoE in their decisions to start using mobile video than PC video. Early Adopters/Early Majority by in large viewed QoE equally important in their decisions to watch PC or mobile video. To the opposite of Innovators, the last adoption group – Late Majority/Laggards placed a significantly higher importance in QoE when deciding whether to start watching PC video than mobile video.

This seemingly higher expectation for QoE for mobile video from Innovators, coupled with the generally greater level of QoE associated with larger screens (represented by PC video in this case) as suggested by the existing line of research on screen sizes, may have explained part of the reason why mobile video still encounters resistance for adoption. Without a corresponding satisfactory actual experience to support the high expectation, Innovators may not be able to transfer initial enthusiasm into sustained adoption. Given Innovators' usual high social influencing power, there could be a ripple effect that is still not working to mobile video's advantage in establishing a smooth user experience.

The U&G theory has reasonably predicted the slower uptake of mobile video in this research. For Innovator and Early Adopters/Early Majority, expectation of QoE for mobile video is higher or equal to that of PC video. However, these adoption groups' actual experienced QoE is much lower for mobile video than for PC video. This disparity reveals a void of satisfaction in QoE for

mobile video, which would have been much needed to cultivate dispersion of this technology according to the U&G theory. Even though this phenomenon is most pronounced among Innovators and Early Adopters/Early Majority, these groups usually consist of the critical mass of an innovation. Mobile video would need to deliver more potent performance in QoE for these groups to meet the relatively higher expectation placed on the technology.

5.2. Modality Affordance

Overall, compared to mobile video, PC video was considered offering a much higher level of convenience, space and creativity related affordances, which is found to be true for both expectation and actual experience. Compared to PC video, mobile video is obviously much more portable, and yet is being considered as not any more convenient than PC video in allowing the user to watch video wherever he or she wants. Furthermore, somewhat unexpectedly, mobile video received a significantly larger share of occurrence of false affordance and unusual affordance than PC video, implying a greater degree of uncertainty in user knowledge for mobile video. However, when false affordance and unusual affordance were entered into the model together with mode of video, mode of video was found to remain a significant influence on experienced affordances with PC perceived to be delivering more efficacy. This incongruent relationship between the heuristic of being portable and the affordance of enabling users to access video wherever they want seems surprising. One reason could be that, with 80% of all households owning at least one computer (U.S. Census, 2007), computers in the U.S. are prevalent enough so consumers are not sensitive to the cue of a smaller device size. This implies the prominence of a cue and the derived affordance heuristic in a technology product might be leveled off or even cancelled out by other heuristics from its alternate technology available to the user.

The SK/J market and the U.S. market actually shared many similar patterns in expected and experienced affordances as related to mobile and PC video technologies. A few notable differences include that the SK/J market expected and experienced much more convenience affordance from PC video as well as mobile video than the U.S. market except for the ability to allow them to watch with whomever they want, for which the SK/J reported a much lower expectation and much more limited experience with mobile video in comparison to the U.S. market. Nine in ten people own a cell phone in South Korea and Japan respectively (Mobile Market Watch, 2009; Ipsos, 2005). The high penetration of the mobile phone coupled with the current industry-wide mobile video standards (ISDB-T for Japan and DMB for South Korea) might render it rarely necessary to share a mobile screen with someone else in the SK/J market. Furthermore, the SK/J market expected and experienced much more creativity affordance, namely, the ability to create, share and express self, from PC video yet much less from mobile video than the U.S. market. Interestingly, the SK/J market did not differ from the U.S. market in terms of expected and experienced affordance allowing the user to make more video viewing decisions on his or her own for both video technologies, even though it has been argued that consumers in the SK/J market tend to have much limited sense of personal space compared those in the U.S..

What is also noteworthy is SK/J market reported more creative, unusual usage of both mobile and PC video technologies than the U.S. market. However, there was no significant difference found in the occurrence of false affordance between the two markets. Neither market was more likely to expect certain utility of the target technologies and later to be disappointed.

Earlier adopters tended to indicate a higher level of expectation and actual experienced utility for all three types of affordance (convenience, space and creativity) for both technologies. Innovators seemed to have very similar, if not entirely equal, levels of expectation for both video technologies in terms of convenience, space and creativity affordances from the technologies while other adoption groups showed an expectation skewed higher towards PC video. Because the critical mass for technology adoption usually lies in Early Adopters/Early Majority, the perceived advantages that this group of adopters place in PC video in all three types of affordance may in part account for the prominent market lead that PC video has over mobile video. When it comes to false affordance and unusual affordance, earlier adopters also tended to have reported more incidences than later adopters.

The diffusion theory generally suggests that earlier adopters especially Innovators possess more experience and knowledge of how technology works. Therefore earlier adopters were initially expected to have encountered less false affordance. But this inference was not supported. On the other hand, following the same reasoning about the creativity of the earlier adopters in the diffusion theory, the research indeed found support for earlier adopters' higher probability of using both PC and mobile videos in ways that are out of the box. The learning from the research seems to indicate that earlier adopters make no less mistakes than later adopters despite their richer experience and knowledge. What sets the earlier adopters apart from the later adopters lies in their persistent creativity in leveraging new innovations. This enriches the understanding of the characteristics of the adoption groups in the current diffusion theory.

5.3. Expectation and Experience

The research data revealed an interesting correlation between expectations and actual experiences for technology affordances. A linear regression was performed to examine how effectively a user's expectation predicts his or her reported experience on a specific affordance aspect of the target video technology. Across all of the three broad dimensions of technology affordance (i.e., convenience, space and creativity), expectation accounts for 40% or more of the variance in the actual experience. This significant influence of expectation on the resulting experience signals the phenomenon of "expect it, you'll find it."

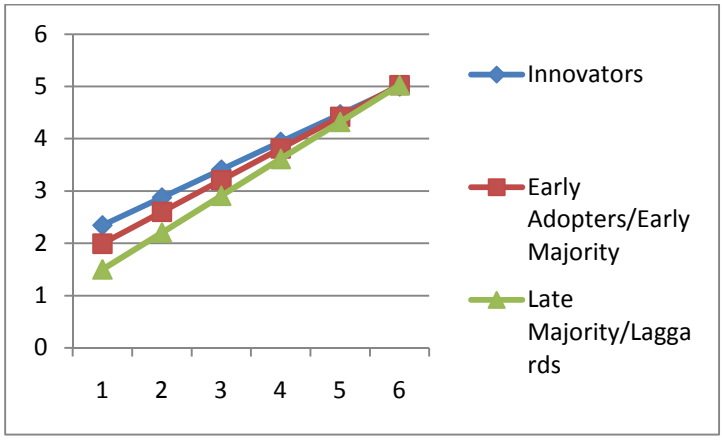
Table 5.1. Impact of Expectation on Actual Experience

Independent Variable	Dependent Variable	R Square	Significance	Standardized Co-efficient
Expected Convenience Affordance – Where to Watch	Experienced Convenience Affordance – Where to Watch	0.418	<0.01	0.647
Expected Convenience Affordance – When to Watch	Experienced Convenience Affordance – When to Watch	0.477	<0.01	0.690
Expected Convenience Affordance – Whom to Watch With	Experienced Convenience Affordance – Whom to Watch With	0.446	<0.01	0.688
Expected Space Affordance – Doing Things in Own Space	Experienced Space Affordance – Doing Things in Own Space	0.480	<0.01	0.659
Expected Space	Experienced Space	0.344	<0.01	0.586

Affordance – Making Own Decisions Often	Affordance – Making Own Decisions Often			
Expected Creativity Affordance – Create & Share	Experienced Creativity Affordance – Create & Share	0.399	<0.01	0.632
Expected Creativity Affordance – Reflection of Me	Experienced Creativity Affordance – Reflection of Me	0.555	<0.01	0.745

This correlation was found to be stronger among later adoption groups for two of the three convenience related affordances (when and where) as well as the affordance related to making own decisions for both video technologies ($p<0.05$ for both "when" and "where" related affordance), which means the same amount of increase in expectation would result in a sharper increase in actual experienced benefits among the later adopters than the earlier adopters.

Figure 5.1. Regression: Expectation for Convenience Affordance and Adoption Group



This strong correlation between expectation and resulted experience reflects the tenet of the Uses and Gratification theory coupled with its modern update of social cognitive theory. Essentially, the user projects a level of expectation onto the target technology. Often construed to be progressive benefits, the expected outcomes propel the users to try out the technology. Once the

expectations are affirmed in experience, the adoption of the technology is reasonably believed to be able to be sustained.

The finding speaks about the importance of building expectations for new technologies. The development of an anticipatory attitude of beneficial affordance can be argued to be half of the work needed for successful adoption. Setting a positive expectation is particularly important in some areas to helping latter adoption groups catch on with adoption, who otherwise would take longer to start using a new technology.

In the case of PC and mobile video technologies, PC video has an advantage of attaining higher expectations for affordance delivery over mobile video. In addition, the expectations from the two latter adoption groups skew significantly higher towards PC, which understandably result in a faster adoption cycle for PC video because the affordance expectations of Early Adopters/Early Majority as well as Late Majority/Laggards for PC video are turned into experienced affordances that serve as a catalyst to induce the adoption.

5.4. Affordance as a Relational Concept

One key hypothesis the research sets out to test is that technology affordance is process oriented and in part co-created by the user and the designer (whose part of the creation is through the embedded and introduced features). In explaining affordance, Gibson's emphasis on "information pick-up" of the "action possibilities" by the actor leaves open two questions. First, how does "information pick-up" come about to formulate a tangible grasp of an affordance? Second, how does a user identify some "action possibilities" but not others, which could be

uncovered by a different user as his or her own set of action possibilities? In the end, how affordances are identified and realized can shed lights on why the spread of PC video technology is faster and wider than that of mobile video.

Observations on false affordance (i.e., initially expected but later falsified capabilities), unexpected affordance (i.e., initially unexpected but later confirmed capabilities) and unusual affordance (i.e., unordinary and creative capabilities) reveal that that the arrival of an affordance is often not clear. Understanding what a technology can do is a process that has more confusion than what a technology marketer may typically think. One in four users in the study encountered at least one incidence of false affordance, and nearly 20% of users experienced at least one unexpected or unusual affordances. Noticeably, mobile video received a larger share of false affordance and unusual affordance than PC video. The stronger tendency to yield uncertain interpretation of what the technology affords in capabilities might have further contributed to mobile video's slower uptake. Applying the concept of affordance in diffusion research seemed to pay off. It helps uncover the degree of disconnect between the perception of a technology advantage and the actual technological capability. As a result, doing so explains the failure and success in technology adoption.

When asked about how they actually learned about the false affordance, unexpected affordance and unusual affordance reported, respondents overwhelmingly reported trial and error as the primary method of discovery (nine in ten respondents cited the approach). While appearing common sense, trial and error involves a tactile interaction between the user and the technology, clearly signaling the process where the user at first is not entirely sure of the "hidden"

affordance, which later manifests as a false or true utility. Interestingly, there is little difference among the three adoption groups in terms of the amount of trial and error involved in their respective discovery of false affordance, unexpected affordance and unusual affordance. This universally high engagement of trial and error provides opportunities for marketers to develop on-device and embedded feature discovery and support functions, which better accommodates the user's natural tendency to learn. The U.S. market shows a higher level of self-dependence on trial and error than the SK/J market, which is consistent with the long established American "ethic of self-reliance" (Sniderman & Brody, 1977).

In addition, social exchanges and external information serve to be frequent channels to help develop the resulted affordances that the user gradually picks up. On average, 80% of the users in the study cited the use of talking with other people, physically doing things together with others, and exchanging online with other people as ways to correct certain preconceived affordance perceptions or create affordances that they never thought they could before. The social technical theory clearly provides a useful way to interpret these findings. The user is not an isolated agent in the use of PC and mobile video technologies. While mobile video is learned equally through social channels as PC video, the frequent use of social channels in itself is an astounding statement for the impact of social influences in both forms of technology.

There are a few notable differences among the sub-groups. Thanks to the vast resources usually available to them, Innovators report a higher frequency of social exchanges and information seeking than the other two later adoption groups across both modes of video. One interesting contrast showed that the earliest two adoption groups reported almost identical level of

information seeking activities for PC video and mobile video in learning unexpected and unusual affordances while the last adoption group – Late Majority/Laggards reported seeking information much more often for PC video than mobile video. This lack of voluntary information gathering from Late Majority/Laggards on mobile video might be due to the fact that mobile video is still a fairly new technology. However, it also signifies the importance of sparking sufficient interest and expectation among the Late Majority/Laggards to motivate them to self educate if mobile video marketers hope to move the market acceptance up a level. There is a tendency, though not always found to be statistically significant, that the U.S. market uses social exchanges more while the SK/J market uses information seeking more in the process of uncovering unexpected and unusual affordances.

Taking the hint from the above social learning nature of affordance, technology marketers can facilitate user experience and lower adoption barriers by establishing peer-to-peer teaching/learning vehicles to address user issues, especially uncommon challenges or questions. This can be one way to accelerate market acceptance of mobile video as an emerging technology. A broader implication from conceptualizing affordance as a relational concept lies in the debate about the "openness" of the technology platform. Affordance formation hinges on the user's ability to develop awareness of a capability of the target technology, or even co-create a capability that may not be originally intended. This relation between the detected affordance and the user is in many cases unique, even though a set of commonly recognized features are usually "officially" marketed. For instance, mobile video is typically understood to be used for entertainment and killing time by watching movies when on the go. One unique approach of using mobile video reported in the research is recording how a food dish is made at a friend's

party and learning how to make it at a later time. The particular respondent discovering this affordance of self-teaching of mobile video sees something other users generally do not see. To others, mobile video does not possess the affordance of self-teaching because it is not "visible" to their consciousness. For a technology to become easier for adoption, it may be argued that the technology needs to incorporate user creativity and transformation. The revolutionary success of the Internet attests to that. While often criticized to be imposing much control on open source development or even third-party plug-in integration, Apple is the first among cell phone manufacturers to successfully enable consumers to tap into user-oriented phone-based applications, a significant portion of which have been developed by iPhone users themselves. Consistent with the spirit of "openness", compared to mobile video, PC video is relatively more accessible, adaptable and "mashable". Users need to deal with a smaller number of operating systems and video formats with less cost when using PC video, and have more freedom in viewing, creating and sharing videos. By having fewer barriers for users to interact with the technology, PC video invites users to experiment, transform and adopt the technology. Mobile video, on the other hand, currently is still being distributed in a top-down approach with the wireless carriers or cell phone manufacturer (e.g., iPhone in the case of video content distribution) controlling contents to be viewed. In addition, there is no easy way to access video content across computer/Internet, mobile and TV platforms. As mobile video is the late comer, being unable to view contents already available and paid for on computer/Internet or TV via mobile phone disincentivizes the user to purchase and access the contents through mobile.

5.5. Affordance Cues and Heuristics

The significant presence of false affordance and unexpected affordance discovered by the research as related to PC and mobile video provides evidence to the argument that technology affordance manifests in the forms of cues and heuristics (Sundar, 2008). False affordance and unexpected affordance happen when the cues the technology transmits are not in sync with the cues that the user is searching for.

The top 10 abilities reported by respondents as false affordance can be generally classified into the three broad affordance categories: 1) interactivity affordance, 2) navigability affordance, and 3) modality affordance (see chart below). Users were found to be more likely to associate PC video with “smooth video loading/no interruption” in modality affordance and “ease of forward and rewind” in interactivity affordance in comparison to mobile video. The high expectation for a smooth video loading might be originated from the cues of a digital screen of the computer and a high-speed Internet connection. On the other hand, the expectation for ease of forward and rewind could come from the cue of a video player where the video is being shown. In the same vein, mobile video is much more likely to have invited false affordances in “speed”, “TV like picture quality,” and “ability to watch full screen/larger screen”. The cue of a touch screen in many of the more recent smartphones might have been incorrectly picked up to infer the modality affordance of having TV like picture quality might and the navigability affordance of being able to watch full screen.

Table 5.2. Types of False Affordances

Top 10 Mentions		PC_Mobile					
		Computer Users		Mobile Users		Total	
		Count	Column N %	Count	Column N %	Count	Column N %
Types of False Affordance	Speed	20	14%	19	**20%**	39	17%
	TV like picture quality	11	8%	19	**20%**	30	13%
	Ability to watch full screen/larger screen	9	6%	18	**19%**	27	11%
	Smooth video loading/no interruption	18	**13%**	5	5%	23	10%
	Ease of forward and rewind	18	**13%**	5	5%	23	10%
	More content	10	7%	8	8%	18	8%
	Watching TV broadcasts/using as a normal TV	0	0%	10	11%	10	4%
	Ability to skip commercials	9	6%	0	0%	9	4%
	Lower subscription fee/less cost	4	3%	5	5%	9	4%
	Having a single/standard video player format	3	2%	5	5%	8	3%

Table 5.3. Types of False Affordances and Possible Cues

Affordance Category	Features	Possible Cues
Interactivity Affordance	Ease of forward and rewind, abilty to skip commercials	Video player like viewing environment
Navigability Affordance	Having a single/standard video player format, ability to watch full screen/larger screen	Video player like viewing environment
Modality Affordance	TV like picture quality, more content, watching TV broadcast/as a normal TV, smooth video loading/no interruption	A digital screen, Internet connect/bandwidth

What is also noteworthy is the occurrences of false affordance for both video technologies are found to be comparable between the two markets despite a much wider adoption of mobile video in the SK/J market. The implication of the lack of difference in false affordance speaks to the possible commonality in device-human affordance interpretation shared by users across cultures. While not specifically designed to examine the relations between cues, heuristics and affordance, this research could draw benefits from the MAIN model as proposed by Sundar as a further step to understand the successful cues and heuristics and those that are not so successful in facilitating mobile video adoption. The cues correctly guiding users to the target affordances are important to both the design team and the marketing team for the mobile video products.

5.6. Research Contributions

This dissertation integrates a set of theoretical perspectives that help particularly delve into user perceptions and user experience as related to adoption, a notable void in modern international

diffusion research. The findings from the research support the argument for borrowing these "external" scholarly thoughts to shed new light on the diffusion process of emerging media technologies. The study has enriched the existent diffusion research practices in three main areas.

First, the concept of user agency has been extended by incorporating examination of user expectations in contrast with actual experience. The positive correlation between expectation and resulting experience found in the research underscores the important role of user assertion of expectations in inducing adoption. A concept emphasized by the U&G framework with a SCT twist, user intent is suggested to be a factor more critical than before recognized in diffusion studies. Traditional diffusion literature focusing on technological advantages implies that technology benefits are value free, and obvious independently of user intent. The general assumption is people would embrace the technology once certain rationalized benefits are present. Different from the above positions, this research illustrates that the various adoption groups start their respective affordance discovery journeys from divergent vantage points. The theoretical implication is that user agency not only lies in the potential transformation the user may implement on the technology (Roger, 2003), but also more importantly, need to be traced back to expectation formulation prior to the user's first exposure to or actual experience with the artifact.

Furthermore, through the lenses of technology affordance, the research suggests a much more iterative dual process of capability deciphering and capability creation leading to innovation adoption or rejection. The significant occurrence of mismatching between user perception and actual technological capability uncovered by the data indicates that technological advantages are

not as self evident as they are commonly thought to be. The study is filling a gap due to the absence of in-depth research investigation in how technological advantages are identified and to what extent they resonate with the user. While Roger (1962) has included observability (of advantages) as one of the predictors for innovation acceptance since the early era of diffusion research, few studies have focused attention on the dynamic interaction between the user and the artifact to examine what triggers recognition of capabilities and advantages (Zimmerman & Yohon, 2008). This interaction is particularly important in the first two of the five diffusion stages – Knowledge and Persuasion. This is when the advantages or benefits of the technology are becoming known and being communicated to the user. This study demonstrates a need to revisit the concept of technological advantages in diffusion theory. It is worth exploring to develop and apply a taxonomy of technological affordance depending on the type of innovation, which can be less pro-technology oriented.

On the practical application front, this study provides empirical results supporting that technology affordances with their manifestations in product features and functions are more than fixed embedded properties in the technology artifact. The "existence" of the affordances depends on the individualized user-technology relationship. To a large extent, the capability of a technology product is as good as the user's ability to decode and transform the technical functions. This area of investigation is paramount because of its practical value in allowing technology developers and marketers to optimize the chances of market acceptance for their products by facilitating this user-technology relationship.

Lastly, the research offers insights into the factors shaping how the user uncovers technology capabilities and realizes false/unexpected affordances. The data specifically point to social engagement as a critical channel for the user to form and correct his or her awareness and knowledge of technical capabilities. Again, this attests to a non-linear, iterative affordance formation process. Unlike the inter-personal communication channel defined in traditional diffusion theory, social engagement in this context provides not only the influence from learning by observing or hearing from other people, but also the actual conditions for creation of affordances (for example, using PC/online video as a long-distance or crowd education tool is usually pre-conditioned by some level of social relationship between the video producer and the video user). As social media grows at a 34% CAGR (Forrester, 2009), the impact of social engagement is here to stay. In its examination of user agency, this study recognizes and argues for the rightful place for social influences in terms of facilitating the user's affordance discovery process. It is important to isolate this particular dimension of influence of social engagement from persuasion related social influence (e.g., Iyengar, Han & Gupta, 2009) to further understand what can be done to affect affordance formation.

Three broad limitations have been discussed as related to international diffusion research in Chapter 2 – Literature Review: 1) very few generalizable trends or variables across markets, 2) the need to examine the role of integrated media given the blurring boundary between inter-personal and mass media communication channels and 3) absence of micro-level user-oriented factors in diffusion process. In response, the current research reports several empirical findings that are supported in both the U.S. and SK/J markets, including the positive correlation between expectation and experience as well as the presence of an iterative affordance discovery process.

Tested to be true in this research, these principles in user-technology interaction can be further examined across other countries, including those countries where new technologies may be less prevalently adopted. This research also finds promising evidence indicating a potentially universal user inclination to interpret technical affordances through cues and heuristics. Despite the widely agreed cultural differences between U.S. and SK/J, the respondents from these two markets seemed to have shared similar interpretations on what cues lead to picture quality or speed of download. The set of cues and associated heuristics leading to user inference of specific affordances are very worthy investigations for future research. Additionally, while not directly studied in the research, the integration of inter-personal and mass media channels is reflected in social engagement, which is an aggregated variable defined by joint activities with other people in person and online. The research results suggest social engagement plays a significantly influential role in the user's affordance discovery process, hence presents itself as a viable touch point for marketers and developers to use to increase or reduce the chances of adoption. Fundamentally, the research proposes a user behavior-oriented angle to look at the process of adoption in international diffusion research. The often discussed cultural, social-economic, and industry policy differences across markets continue to warrant investigation. However, evidence from the current research show that the understanding of the user-technology dynamics - how the user comes to realize and transform technical capabilities relevant to himself or herself has practical implications on new product development and marketing practices.

5.7.Limitations

Several limitations are noted for this research. The sample source is a self-opt in online research panel, which inevitably excludes people who may not want to participate in panel research. In

addition, the small sample size for the J/P market prevents the analysis from detecting some potential significant differences between the J/P market and the U.S. market.

It is worth reiterating the focus of the research has been on the user-technology interaction aspect of the innovation process. A multitude of other factors including types of video content, usage fees and industry policies were excluded from the consideration of the research, which may also impact the diffusion patterns of the two video technologies. In addition, the study did not measure the degree of perceived novelty associated with mobile video and PC video respectively. Perceived novelty could potentially help explain the lack of expectation from the later adopter groups towards PC video.

Furthermore, despite its own limitation, cultural differences between markets have been extensively studied and found to bear merits in explaining adoption differences. This research study might be improved by considering the differences between U.S. and SK/J cultures.

5.8. Future Research

There is a 72% growth in worldwide patents and 145% growth in U.S. patents between 1997 and 2006 (Thomson Reuters, 2007). The annual Consumer Electronic Show introduces more than 20,000 new products to the market. These trends indicate that the strong demand for innovation diffusion research is expected to continue.

While this current research has contributed to the theoretical explication of the diffusion pattern on several grounds, future research can further the knowledge of affordance identification and

discovery by delving into the question of where expectation for a specific technical capability comes from. The connection between cues, heuristics and affordances can be an illuminating theoretical concept that is worth exploring in depth in this regard. It might be hypothesized that there could be a set of universally anticipated cues for a set of target affordances. These cues and associated heuristics may transcend demographic, cultural and socio-economic differences in users (for example, the dial wheel on iPod). Once identified and understood, these cues can be incorporated in product design to reduce adoption barriers.

Another area of potential research development is an in-depth examination of social media and engagement in innovation diffusion. Moving beyond the knowledge acquisition benefit of social engagement, focused attention is needed on socially-generated affordances and its impact on market adoption of the target technology. Do technologies capable of inviting collective transformation on technical features or functions become adopted at a faster rate? To what extent should a new technology anticipate the occurrence of product transformation participated by the mass jointly? These questions are particularly relevant for new products launched in the era of Wikipedia like crowd sourcing.

The attempt of the research to integrate several synergistic theoretical frameworks proves to be successful. It shows optimism for future efforts to bring together perspectives outside of the traditional diffusion research field to inform the various aspects of the diffusion process. In order to continue to invigorate this seminal domain of scholarly work, it is necessary for researchers to experiment with new constructs and explore previously unknown correlations.

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APPENDIX: SURVEY INSTRUMENT

BOLD UPPER CASES ARE PROGRAMMING INSTRUCTIONS

SAMPLE

N=1200

US → 1000
SOUTH KOREA/JAPAN → 200

US SUB-QUOTAS:
PC VIDEO USERS → 250
NON PC VIDEO USERS → 250
MOBILE PHONE VIDEO USERS → 250
NON MOBILE PHONE VIDEO USERS → 250

SK/J SUB-QUOTAS:
PC VIDEO USERS → 50
NON PC VIDEO USERS → 50
MOBILE PHONE VIDEO USERS → 50
NON MOBILE PHONE VIDEO USERS → 50

SCREENER

S1. Which country are you currently residing in?

U.S.A.
South Korea
Japan
None of the above **[TERMINATE]**

MAIN SURVEY

1. Currently there are many technologies that allow you to watch videos and/or TV programming other than a traditional TV set. Which of the following devices have you used to view video or TV programming? Please select all that apply.

ROTATE ORDER
1.Computer (desktop or laptop) via Internet
2.Computer (desktop or laptop) without connecting to the Internet (i.e., using the computer as a DVD/video player)
3.Mobile phone
4.Portable electronic devices other than mobile phone (example: iPod)
5.None of the above

2. How often and how much time do you typically spend watching video on each of the following devices?

SHOW IF SELECTED IN Q1.	**A. About how long ago did you first start watching video using this device?**	**B. How many times a week do you watch video using this device? Please enter a whole number.**	**C. How many hours do you typically spend watching video using this device on a weekly basis? Please enter a whole number.**
1.Computer	**1. This year 2. 1 year ago 3. 2 years ago 4. 3 years ago 5. 4 years ago 6. 5 years ago 7. More than 5 years ago**		
2.Mobile phone	**SAME AS ABOVE**		
3.Portable electronic device	**SAME AS ABOVE**		

IF Q1=1/2 AND Q1 IS NOT 3, ASSIGN TO SECTION – PC VIDEO USERS
IF Q1=3 AND (Q1 IS NOT (1 OR 2)), ASSIGN TO SECTION – MOBILE VIDEO USERS

IF Q1=1-3, RANDOMLY ASSIGN TO SECTION – PC VIDEO USERS OR SECTION – MOBILE VIDEO USERS

IF Q1=4 AND (Q1 IS NOT (1-3)), RANDOMLY ASSIGN TO SECTION – PC VIDEO NON USERS OR SECTION – MOBILE VIDEO NON USERS

IF Q1=5, RANDOMLY ASSIGN TO SECTION – PC VIDEO NON USERS/SECTION – MOBILE VIDEO NON USERS

2d. How much do you agree or disagree with each of the following statements?

INSERT LIKERT SCALE ITEMS FROM MAREZ, ET AL. (2007) FOR CATEGORIZATION OF THE FIVE INNOVATOR GROUPS. 19 ASPECTS/47 LIKERT-SCALE ITEMS.

SEE APPENDIX
5 – Completely agree
4 – Somewhat agree
3 – Neither agree nor disagree
2 – Somewhat disagree
1 – Completely disagree

FOR PC VIDEO USER/NON USER SECTIONS, USE PC VIDEO INDEX:

Compatibility — lifestyle and personality Marketing strategy
7. Watching video using a computer fits my lifestyle;

27. If I would consider watching video using a computer, I would first check the ads, brochures and promotions.

Compatibility — (Technological) Innovativeness
30. I am interested in watching video using a computer but I would mind if that would imply an investment in a new device.

6. I want to be among the first to watch video using a computer.

Relative Advantage Opinion Leadership
11. The advantages of watching video using a computer are clearer to me than the disadvantages.

15. People in my environment come to me for advice for watching video using a computer.
40. I don' t understand where or when I will need to watch video using a computer.

Product Knowledge
19. I recently emailed someone about watching video using a computer or recently talked to someone about it.

Cost (Relative Advantage)
1. Subscription fees or costs for watching video using a computer seem expensive to me.
35. I consider myself well-informed about the possibilities and (dis)advantages of watching video using a computer.

Optimism
44. The fast technological developments are a good thing.

Tangibles (Relative Advantage)
45. If you don' t want to run behind, adoption of new technologies is necessary.

Trialability — Physical Willingness-to-pay
41. I liked to/would like to try out watching video using a computer before subscribing to a fee-based service.
22. Even if it may incur a cost, watching video using a computer is something I really want.

Trialability — Vicarious Control/Self-efficacy
28. Before starting to watch video using a computer I prefer to look around for a while and see how others are experiencing the application.

46. I have no problem to sort out on myself how watching video using a computer works.

Image Prestige
33. Watching video using a computer would have a positive impact on my image and social status.

Effectiveness (Relative Advantage)

36. Watching video using a computer certainly makes some things easier for me.
38. Watching video using a computer says something positive about me.

Observability — visibility Voluntariness
12. One of the nice things about watching video using a computer is that it is something to show off with among friends.

42. If I would pay a fee for watching video using a computer it would completely be my own decision. No one would influence me in making that decision.

17. I see many people in my environment who watch video using a computer.

Observability — Result Demonstrability/Communicability
24. I am perfectly able to explain the strengths and the weakness of watching video using a computer to others

Enjoyment
4. Watching video using a computer seems very user friendly to me.

Social influence
9. Most people in my environment are enthusiastic about watching video using a computer.

Social influence — interpersonal communications
3. Before watching video using a computer, I would like the advice of some people.

Social influence — Compliance
2. Watching video using a computer is considered as ‘ trendy ’ in my environment.

Social influence — Identification
47. Watching video using a computer ertainly tells something about me and my personality.

Complexity/Comfort Level
8. I worry that watching video using a computer offers different possibilities, which makes it rather complicated.
16. Watching video using a computer is a topic of discussion among my friends and family.

Reliability
10. My friends and family will probably expect me to be one of the first to watch video using a computer

31. I doubt the reliability and proper functioning of watching video using a computer.

Perceived Risk (financial)
18. I fear that watching video using a computer would be way above my budget.

Perceived Risk (social)
21. If I watched video using a computer, people in my environment would think I am odd.

FOR MOBILE VIDEO USER/NON USER SECTIONS, USE MOBILE VIDEO INDEX:

Compatibility — lifestyle and personality Marketing strategy
7. Watching video using a mobile phone fits my lifestyle;

27. If I would consider watching video using a mobile phone, I would first check the ads, brochures and promotions.

Compatibility — (Technological) Innovativeness
30. I am interested in watching video using a mobile phone but I would mind if that would imply an investment in a new device.

6. I want to be among the first to watch video using a mobile phone.

Relative Advantage Opinion Leadership
11. The advantages of watching video using a mobile phone are clearer to me than the disadvantages.

15. People in my environment come to me for advice for watching video using a mobile phone.
40. I don' t understand where or when I will need to watch video using a mobile phone.

Product Knowledge
19. I recently emailed someone about watching video using a mobile phone or recently talked to someone about it.

Cost (Relative Advantage)
1. Subscription fees or costs for watching video using a mobile phone seem expensive to me.
35. I consider myself well-informed about the possibilities and (dis)advantages of watching video using a mobile phone.

Optimism
44. The fast technological developments are a good thing.

Tangibles (Relative Advantage)
45. If you don' t want to run behind, adoption of new technologies is necessary.

Trialability — Physical Willingness-to-pay
41. I liked to/would like to try out watching video using a mobile phone before subscribing to a fee-based service.
22. Even if it may incur a cost, watching video using a mobile phone is something I really want.

Trialability — Vicarious Control/Self-efficacy
28. Before starting to watch video using a mobile phone I prefer to look around for a while and see how others are experiencing the application.

46. I have no problem to sort out on myself how watching video using a mobile phone works.

Image Prestige
33. Watching video using a mobile phone would have a positive impact on my image and social status.

Effectiveness (Relative Advantage)

36. Watching video using a mobile phone certainly makes some things easier for me.
38. Watching video using a mobile phone says something positive about me.

Observability — visibility Voluntariness
12. One of the nice things about watching video using a mobile phone is that it is something to show off with among friends.

42. If I would pay a fee for watching video using a mobile phone it would completely be my own decision. No one would influence me in making that decision.

17. I see many people in my environment who watch video using a mobile phone.

Observability — Result Demonstrability/Communicability
24. I am perfectly able to explain the strengths and the weakness of watching video using a mobile phone to others

Enjoyment
4. Watching video using a mobile phone seems very user friendly to me.

Social influence
9. Most people in my environment are enthusiastic about watching video using a mobile phone.

Social influence — interpersonal communications
3. Before watching video using a mobile phone, I would like the advice of some people.

Social influence — Compliance
2. Watching video using a mobile phone is considered as ‘ trendy ’ in my environment.

Social influence — Identification
47. Watching video using a mobile phone certainly tells something about me and my personality.

Complexity/Comfort Level
8. I worry that watching video using a mobile phone offers different possibilities, which makes it rather complicated.
16. Watching video using a mobile phone is a topic of discussion among my friends and family.

Reliability
10. My friends and family will probably expect me to be one of the first to watch video using a mobile phone

31. I doubt the reliability and proper functioning of watching video using a mobile phone.

Perceived Risk (financial)
18. I fear that watching video using a mobile phone would be way above my budget.

Perceived Risk (social)
21. If I watched video using a mobile phone, people in my environment would think I am odd.

SECTION: PC VIDEO – USER/ADOPTERS (Q1=1 OR 2)

3. Which of the following ways describe how you watch video using a computer? Please select all that apply.

1. I play DVDs on the computer.
2. I watch video downloaded before hand from the Internet/I download the video first before watching it on the computer
3. I watch video online (for example: youTube) that is uploaded by others
4. I upload video to the Internet for others to watch using a computer
5. I watch video (TV episodes, news video, and movies) online without downloading the video first (for example: www.hulu.com)
6. I connect a computer to a TV and watch video from the computer on the TV set.
7. I send and/or receive videos to/from others through the Internet by using a computer
8.Other, Specify _____

5a. Thinking about before and after you started watching video using a computer, please describe the things about your experience of watching video via a computer that you initially expected to be able to do but discovered that you actually are not able to do? Please be as specific and exhaustive as possible.

OPEN END
[CHECK BOX] No, this does not apply to me. I didn't experience anything like this.

IF Q5A IS NOT "NO, THIS DOES NOT APPLY TO ME.", ASK Q5B

5b. When it comes to watching video via a computer, how often did you use each of the following approaches in finding out you were not able to do some of the things you thought you could do?

1. For some of the things, it is self evident (that I couldn't do what I thought I could do)
2. By reading/following the product manual
3. By searching/reading information online
4. By my own trial and error
5. By physically talking with other people
6. By exchanging information with other people online (e.g., posting a question on an online forum/community)
7. By doing things together with other people
8. By watching TV programs/ads
9. By listening to radio programs/ads
10. Other, Specify _____ **[IF "NEVER USE" IS SELECTED FOR OTHER SPECIFY, DON'T ASK RESPONDENT TO SPECIFY]**

FOR EACH OF THE ABOVE ITEMS, INSERT A DROPDOWN SCALE LIST:
5 – Almost always
4 – Most of the time
3 – Half of the time
2 – Less than half of the time
1 – Rarely
9 – Never use

6a. Thinking about before and after you started watching video using a computer, please describe the things about your experience of watching video via a computer that you initially did not expect to do but later learned to do? Please be as specific and exhaustive as possible.

OPEN END
[CHECK BOX] No, this does not apply to me. I didn't experience anything like this.

IF Q6A IS NOT "NO, THIS DOES NOT APPLY TO ME.", ASK Q6B
6b. When it comes to watching video via a computer, how often did you use each of the following approaches in finding out you were able to do some of the things you thought you could not do?

1. For some of the things, it is self evident (that I couldn't do what I thought I could do)
2. By reading/following the product manual
3. By searching/reading information online
4. By my own trial and error
5. By physically talking with other people
6. By exchanging information with other people online (e.g., posting a question on an online forum/community)
7. By doing things together with other people
8. By watching TV programs/ads
9. By listening to radio programs/ads
10. Other, Specify _____**[IF "NEVER USE" IS SELECTED FOR OTHER SPECIFY, DON'T ASK RESPONDENT TO SPECIFY]**

FOR EACH OF THE ABOVE ITEMS, INSERT A DROPDOWN SCALE LIST:
5 – Almost always
4 – Most of the time
3 – Half of the time
2 – Less than half of the time
1 – Rarely
9 – Never use

7a. Thinking about your experience with watching video using a computer, please describe the most unusual things that you have done using your ability to watch video via a computer? Please be as specific as possible.

OPEN END
[CHECK BOX] No, this does not apply to me. I didn't experience anything like this.

OPEN END

IF Q7A IS NOT "I CAN'T THINK OF ANYTHING", ASK Q7B.
7b. When it comes to watching video via a computer, how often did you use each of the following in finding out you were able to do these unusual things?

1. For some of the things, it is self evident (that I couldn't do what I thought I could do)
2. By reading/following the product manual
3. By searching/reading information online
4. By my own trial and error
5. By physically talking with other people
6. By exchanging information with other people online (e.g., posting a question on an online forum/community)
7. By doing things together with other people
8. By watching TV programs/ads
9. By listening to radio programs/ads
10. Other, Specify _____**[IF "NEVER USE" IS SELECTED FOR OTHER SPECIFY, DON'T ASK RESPONDENT TO SPECIFY]**

FOR EACH OF THE ABOVE ITEMS, INSERT A DROPDOWN SCALE LIST:

5 – Almost always
4 – Most of the time
3 – Half of the time
2 – Less than half of the time
1 – Rarely
9 – Never use

8.You indicated earlier that you have **watched video using a computer** (desktop or laptop). **Prior to** the first time you watched video on a computer, to the best of your recollection, how important did you think each of the following factors would have been for you to decide to start watching video regularly using a computer?

ROTATE THE LIST

7. Image resolution
8. The length of time for initial buffering before the first image appears on screen (in the situation of watching the video online without downloading first)
9. The number of times the video viewing gets interrupted by the need for buffering (in the situation of watching the video online without downloading first)
10. The overall smoothness of the video
11. The physical comfort (eye and posture) of watching via a computer
12. The overall enjoyment of watching video using a computer

SCALE TO USE:
5 – Very important
4 – Somewhat important
3 – Neither important nor unimportant
2 – Somewhat unimportant
1 – Not important at all

9. Again, thinking about your current experience with watching video using a computer, how satisfied are you with watching video via a computer on each of the following factors?

USE THE ORDER FROM Q8.

1. Image resolution
2. The length of time for initial buffering before the first image appears on screen (in the situation of watching the video online without downloading first)
3. The number of times the video viewing gets interrupted by the need for buffering (in the situation of watching the video online without downloading first)
4. The overall smoothness of the video
5. The physical comfort (eye and posture) of watching via a computer
6. The overall enjoyment of watching video using a computer

SCALE TO USE:
5 – Very satisfied
4 – Somewhat satisfied
3 – Neither satisfied nor dissatisfied
2 – Somewhat dissatisfied
1 – Not satisfied at all

10.You indicated earlier that you have **watched video using a computer** (desktop or laptop). Thinking back about your expectations **before** the first time you watched video on a computer, to the best of your recollection, how much do you agree or disagree with each of the following statements?

By watching video using a computer, we mean watching video with and without connecting to the Internet.

ROTATE THE LIST

4. I expected watching video on a computer to give me the same level of image resolution and quality as that from the traditional television.
5. I expected watching video on a computer to be as enjoyable as my experience with the traditional television.
6. I expected watching video on a computer to give me more convenience in terms of when to watch video.
7. I expected watching video on a computer to give me more convenience in terms of where to watch video.
8. I expected watching video on a computer to give me more convenience in terms of whom to watch video with.
9. I expected watching video on a computer to give me a sense of doing things in my own space.
10. I expected I could make my own decisions more often when watching video on a computer.
11. I expected to be able to not only watch but create and share video contents with others using a computer.
12. I expected watching, creating and sharing video using a computer to be a reflection of who I am and how I live my life.

SCALE TO USE:

5 – Agree completely
4 – Agree somewhat
3 – Neither agree nor disagree
2 – Disagree somewhat
1 – Disagree completely

11.Now thinking about your current experience with watching video using a computer, how much do you agree or disagree with each of the following statements?

USE THE ORDER FROM Q10.

4. I found that watching video on a computer gives me the same level of image resolution and quality as that from the traditional television.
5. I found that watching video on a computer is as enjoyable as my experience with the traditional television.
6. I found that watching video on a computer gives me more convenience in terms of when to watch video.
7. I found that watching video on a computer gives me more convenience in terms of where to watch video.
8. I found that watching video on a computer gives me more convenience in terms of whom to watch video with.
9. I found that watching video on a computer gives me a sense of doing things in my own space.
10. I found that I can make my own decisions more often when watching video on a computer.
11. I found that I am able to not only watch but create and share video contents with others using a computer.
12. I found that watching, creating and sharing video using a computer has become a reflection of who I am and how I live my life.

SCALE TO USE:

5 – Agree completely
4 – Agree somewhat
3 – Neither agree nor disagree

2 – Disagree somewhat
1 – Disagree completely

SECTION: PC VIDEO – NON-USER/ADOPTERS (Q1 IS NOT (1 OR 2)

12a.What do you think of watching video using a computer in general?

OPEN END

12b. How likely would you be to start watching video using a computer in the next 6 months?

5 – Very likely
4 – Somewhat likely
3 – Neither likely nor unlikely
2 – Somewhat unlikely
1 – Very unlikely

13a. Imagine you have started watching video using a computer. Please describe the most unusual things that you think that you can do because of the ability to watch video via a computer? Please be as specific as possible.

OPEN END
[CHECK BOX] I can't think of anything.

IF Q13A IS NOT "I CAN'T THINK OF ANYTHING", ASK Q13B.
13b. When it comes to watching video via a computer, how often do you think you would use each of the following approaches in learning about doing these unusual things?

1. By reading/following the product manual
2. By searching/reading information online
3. By my own trial and error
4. By physically talking with other people
5. By exchanging information with other people online (e.g., posting a question on an online forum/community)
6. By doing things together with other people
7. By watching TV programs/ads
8. By listening to radio programs/ads
9. Other, Specify _____ **IF "NEVER USE" IS SELECTED FOR OTHER SPECIFY, DON'T ASK RESPONDENT TO SPECIFY]**

FOR EACH OF THE ABOVE ITEMS, INSERT A DROPDOWN SCALE LIST:
5 – Almost always
4 – Most of the time
3 – Half of the time
2 – Less than half of the time
1 – Rarely
9 – Never use

14.How important would you say each of the following factors is to you in deciding whether to watch video regularly using a computer?

ROTATE THE LIST

1. Image resolution
2. The length of time for initial buffering before the first image appears on screen (in the situation of watching the video online without downloading first)

3. The number of times the video viewing gets interrupted by the need for buffering (in the situation of watching the video online without downloading first)
4. The overall smoothness of the video
5. The physical comfort (eye and posture) of watching via a computer
6. The overall enjoyment of watching video using a computer

SCALE TO USE:
5 – Very important
4 – Somewhat important
3 – Neither important nor unimportant
2 – Somewhat unimportant
1 – Not important at all

15. When it comes to watching video on a computer, please indicate how much you agree or disagree with each of the following statements?

By watching video using a computer, we mean watching video with and without connecting to the Internet.

ROTATE THE LIST

1. I expected watching video on a computer to give me the same level of image resolution and quality as that from the traditional television.
2. I expected watching video on a computer to be as enjoyable as my experience with the traditional television.
3. I expected watching video on a computer to give me more convenience in terms of when to watch video.
4. I expected watching video on a computer to give me more convenience in terms of where to watch video.
5. I expected watching video on a computer to give me more convenience in terms of whom to watch video with.
6. I expected watching video on a computer to give me a sense of doing things in my own space.
7. I expected I could make my own decisions more often when watching video on a computer .
8. I expected to be able to not only watch but create and share video contents with others using a computer.
9. I expected watching, creating and sharing video using a computer to be a reflection of who I am and how I live my life.

SCALE TO USE:
5 – Agree completely
4 – Agree somewhat
3 – Neither agree nor disagree
2 – Disagree somewhat
1 – Disagree completely

SECTION: MOBILE VIDEO – USER/ADOPTERS (Q1=3)

16. Which of the following ways describe how you watch video using a mobile phone? Please select all that apply.

1. I watch video downloaded before hand from the Internet/I download the video first before watching it on the mobile phone
2. I watch video online (for example: youTube) that is uploaded by others
3. I upload video to the Internet for others to watch using my mobile phone
4. I watch video (TV episodes, news video, and movies) online without downloading the video first (for example: www.hulu.com)
5. I send and/or receive videos to/from others through the Internet by using a mobile phone
6. I use my mobile phone to capture video and watch afterwards
7. Other, Specify _____

17. Thinking of a typical time when you watch video using your mobile phone, how long is the duration typically? Please enter a whole number.

_____ **Hours** _____ **Minutes [ALLOW 0 IN EITHER PLACE BUT NOT IN BOTH PLACES]**

19a. Thinking about before and after you started watching video using a mobile phone, please describe the things about your experience of watching video via a mobile phone that you initially expected to be able to do but discovered that you actually are not able to do? Please be as specific and exhaustive as possible.

OPEN END
[CHECK BOX] No, this does not apply to me. I didn't experience anything like this.

IF Q19A IS NOT "NO, THIS DOES NOT APPLY TO ME.", ASK Q19B.

19b. When it comes to watching video via a mobile phone, how often did you use each of the following approaches in finding out you were not able to do some of the things you thought you could do? Please select all that apply.

1. For some of the things, it is self evident (that I could do what I thought I couldn't do)
2. By reading/following the product manual
3. By searching/reading information online
4. By my own trial and error
5. By physically talking with other people
6. By exchanging information with other people online (e.g., posting a question on an online forum/community)
7. By doing things together with other people
8. By watching TV programs/ads
9. By listening to radio programs/ads
10. Other, Specify _____ **[IF "NEVER USE" IS SELECTED FOR OTHER SPECIFY, DON'T ASK RESPONDENT TO SPECIFY]**

FOR EACH OF THE ABOVE ITEMS, INSERT A DROPDOWN SCALE LIST:
5 – Almost always
4 – Most of the time
3 – Half of the time
2 – Less than half of the time

1 – Rarely
9 – Never use

20a. Thinking about before and after you started watching video using a mobile phone, please describe the things about your experience of watching video via a mobile phone that you initially did not expect to do but later learned to do? Please be as specific and exhaustive as possible.

OPEN END
[CHECK BOX] No, this does not apply to me. I didn't experience anything like this.

IF Q20A IS NOT "NO, THIS DOES NOT APPLY TO ME.", ASK Q20B.

20b. When it comes to watching video via a mobile phone, how did you find out you were able to do the things you thought you could not do?

1. For some of the things, it is self evident (that I could do what I thought I couldn't do)
2. By reading/following the product manual
3. By searching/reading information online
4. By my own trial and error
5. By physically talking with other people
6. By exchanging information with other people online (e.g., posting a question on an online forum/community)
7. By doing things together with other people
8. By watching TV programs/ads
9. By listening to radio programs/ads
10. Other, Specify _____ **IF "NEVER USE" IS SELECTED FOR OTHER SPECIFY, DON'T ASK RESPONDENT TO SPECIFY]**

FOR EACH OF THE ABOVE ITEMS, INSERT A DROPDOWN SCALE LIST:
5 – Almost always
4 – Most of the time
3 – Half of the time
2 – Less than half of the time
1 – Rarely
9 – Never use

21a. Thinking about your experience with watching video using a mobile phone, please describe the most unusual things that you have done using your ability to watch video via a mobile phone? Please be as specific as possible.

OPEN END
[CHECK BOX] No, this does not apply to me. I didn't experience anything like this.

IF Q21A IS NOT "I CAN'T THINK OF ANYTHING", ASK Q21B.
21b. When it comes to watching video via a mobile phone, how often did you use each of the following in finding out you were able to do these unusual things?

1. For some of the things, it is self evident
2. By reading/following the product manual
3. By searching/reading information online
4. By my own trial and error
5. By physically talking with other people

6. By exchanging information with other people online (e.g., posting a question on an online forum/community)
7. By doing things together with other people
8. By watching TV programs/ads
9. By listening to radio programs/ads
10. Other, Specify _____ **IF "NEVER USE" IS SELECTED FOR OTHER SPECIFY, DON'T ASK RESPONDENT TO SPECIFY]**

FOR EACH OF THE ABOVE ITEMS, INSERT A DROPDOWN SCALE LIST:
5 – Almost always
4 – Most of the time
3 – Half of the time
2 – Less than half of the time
1 – Rarely
9 – Never use

22.You indicated earlier that you have **watched video using a mobile phone**. **Prior to** the first time you watched video on a mobile phone, to the best of your recollection, how important did you think each of the following factors would have been for you to decide to start watching video using a mobile phone?

ROTATE THE LIST

1. Image resolution
2. The length of time for initial buffering before the first image appears on screen (in the situation of watching the video online without downloading first)
3. The number of times the video viewing gets interrupted by the need for buffering (in the situation of watching the video online without downloading first)
4. The overall smoothness of the video
5. The physical comfort (eye and posture) of watching via a mobile phone
6. The overall enjoyment of watching video using a mobile phone

SCALE TO USE:

5 – Very important
4 – Somewhat important
3 – Neither important nor unimportant
2 – Somewhat unimportant
1 – Not important at all

23.Again, thinking about your current experience with watching video using a mobile phone, how satisfied are you with watching video via a computer on each of the following factors?

USE THE ORDER FROM Q22.

1. Image resolution
2. The length of time for initial buffering before the first image appears on screen (in the situation of watching the video online without downloading first)
3. The number of times the video viewing gets interrupted by the need for buffering (in the situation of watching the video online without downloading first)
4. The overall smoothness of the video
5. The physical comfort (eye and posture) of watching via a mobile phone
6. The overall enjoyment of watching video using a mobile phone

SCALE TO USE:

5 – Very satisfied
4 – Somewhat satisfied
3 – Neither satisfied nor dissatisfied
2 – Somewhat dissatisfied
1 – Not satisfied at all

24.You indicated earlier that you have **watched video using a mobile phone**. Thinking back about your expectations **before** the first time you watched video on a mobile phone, to the best of your recollection, how much do you agree or disagree with each of the following statements?

ROTATE THE LIST

1. I expected watching video on a mobile phone to give me the same level of image resolution and quality as that from the traditional television.
2. I expected watching video on a mobile phone to be as enjoyable as my experience with the traditional television.
3. I expected watching video on a mobile phone to give me more convenience in terms of <u>when</u> to watch video.

4. I expected watching video on a mobile phone to give me more convenience in terms of where to watch video.
5. I expected watching video on a mobile phone to give me more convenience in terms of whom to watch video with.
6. I expected watching video on a mobile phone to give me a sense of doing things in my own space.
7. I expected I could make my own decisions more often when watching video on a mobile phone.
8. I expected to be able to not only watch but create and share video contents with others using a mobile phone.
9. I expected watching, creating and sharing video using a mobile phone to be a reflection of who I am and how I live my life.

SCALE TO USE:
5 – Agree completely
4 – Agree somewhat
3 – Neither agree nor disagree
2 – Disagree somewhat
1 – Disagree completely

25.Now thinking about your current experience with watching video using a mobile phone, how much do you agree or disagree with each of the following statements?

USE THE ORDER FROM Q24.

1. I found that watching video on a mobile phone gives me the same level of image resolution and quality as that from the traditional television.
2. I found that watching video on a mobile phone is as enjoyable as my experience with the traditional television.
3. I found that watching video on a mobile phone gives me more convenience in terms of when to watch video.
4. I found that watching video on a mobile phone gives me more convenience in terms of where to watch video.
5. I found that watching video on a mobile phone gives me more convenience in terms of whom to watch video with.
6. I found that watching video on a mobile phone gives me a sense of doing things in my own space.
7. I found that I can make my own decisions more often when watching video on a mobile phone.
8. I found that I am able to not only watch but create and share video contents with others using a mobile phone.
9. I found that watching, creating and sharing video using a mobile phone has become a reflection of who I am and how I live my life.

SCALE TO USE:
5 – Agree completely
4 – Agree somewhat
3 – Neither agree nor disagree
2 – Disagree somewhat
1 – Disagree completely

SECTION: MOBILE VIDEO – NON-USER/ADOPTERS (Q1 IS NOT 3)

26a.What do you think of watching video using a mobile phone in general?

OPEN END

26b. How likely would you be to start watching video using a mobile phone in the next 6 months?

5 – Very likely
4 – Somewhat likely
3 – Neither likely nor unlikely
2 – Somewhat unlikely
1 – Very unlikely

27a. Imagine you have started watching video using a mobile phone. Please describe the most unusual things that you think that you can do because of the ability to watch video via a mobile phone? Please be as specific as possible.

OPEN END
[CHECK BOX] I can't think of anything.

IF Q27A IS NOT "I CAN'T THINK OF ANYTHING", ASK Q27B.
27b. When it comes to watching video via a mobile phone, how often do you think you would use each of the following in learning about doing these unusual things?

1. For some of the things, it is self evident
2. By reading/following the product manual
3. By searching/reading information online
4. By my own trial and error
5. By physically talking with other people
6. By exchanging information with other people online (e.g., posting a question on an online forum/community)
7. By doing things together with other people
8. By watching TV programs/ads
9. By listening to radio programs/ads
10. Other, Specify _____ **IF "NEVER USE" IS SELECTED FOR OTHER SPECIFY, DON'T ASK RESPONDENT TO SPECIFY]**

FOR EACH OF THE ABOVE ITEMS, INSERT A DROPDOWN SCALE LIST:
5 – Almost always
4 – Most of the time
3 – Half of the time
2 – Less than half of the time
1 – Rarely
9 – Never use

28.How important would you say each of the following factors is to you in deciding whether to watch video using a mobile phone?

ROTATE THE LIST

1. Image resolution
2. The length of time for initial buffering before the first image appears on screen (in the situation of watching the video online without downloading first)
3. The number of times the video viewing gets interrupted by the need for buffering (in the situation of watching the video online without downloading first)
4. The overall smoothness of the video
5. The physical comfort (eye and posture) of watching via a mobile phone
6. The overall enjoyment of watching video using a mobile phone

SCALE TO USE:

5 – Very important
4 – Somewhat important
3 – Neither important nor unimportant
2 – Somewhat unimportant
1 – Not important at all

29. When it comes to watching video on a mobile phone, please indicate how much you agree or disagree with each of the following statements?

ROTATE THE LIST

1. I expected watching video on a mobile phone to give me the same level of image resolution and quality as that from the traditional television.
2. I expected watching video on a mobile phone to be as enjoyable as my experience with the traditional television.
3. I expected watching video on a mobile phone to give me more convenience in terms of when to watch video.
4. I expected watching video on a mobile phone to give me more convenience in terms of where to watch video.
5. I expected watching video on a mobile phone to give me more convenience in terms of whom to watch video with.
6. I expected watching video on a mobile phone to give me a sense of doing things in my own space.
7. I expected I could make my own decisions more often when watching video on a mobile phone.
8. I expected to be able to not only watch but create and share video contents with others using a mobile phone.
9. I expected watching, creating and sharing video using a mobile phone to be a reflection of who I am and how I live my life.

SCALE TO USE:

5 – Agree completely
4 – Agree somewhat
3 – Neither agree nor disagree
2 – Disagree somewhat
1 – Disagree completely

VITA

Baixue (Becky) Wu

Phone: 619-2345884 Fax:619-2345888 E-mail: bwu@luthresearch.com

Education

Pennsylvania State University, State College, Pennsylvania
College of Communications
Ph.D. Candidate

Expertise

A seasoned research consultant and senior executive with proven record of accomplishment in leading and managing comprehensive research initiatives resulting in strategic and actionable market insights. Advanced statistical analyst in uncovering insights beyond data. Well versed in both quantitative and qualitative research. Solid leadership skills directing top-producing teams and developing junior talents with an average of 20% annual department revenue growth rate. Provides thought leadership and disciplined execution in developing visionary new products for company.

Selected Experiences

Vice President of Research
Luth Research Inc., San Diego, California 2008 - Present
- Consults Fortune 500 clients in using research to solve business issues
- Recommends optimal research methodologies and analytical techniques
- Leads top-producing team to generate an average of 20% annual department revenue growth rate
- Leads new research product development for clients and the company
- Publishes and speaks on market trends and best practices in research methodologies

Director of Custom Research
Luth Research Inc., San Diego, California 2004 - 2008
- Drove department and company sales and growth
- Managed Fortune 500 clients
- Directed research methodology recommendations and execution
- Oversees and supports a team of four members
- Plays an integral role in online panel product developments

Research Analyst
Luth Research Inc., San Diego, California 2001 – 2004
- Designed and conducted custom research projects
- Provided statistical consulting and analysis to clients including multivariate analysis, linear/logistic regression, and cluster analysis.

Public Relations Specialist
Department of Community and Family Services, Polk County, Iowa 1999
- Conducted both quantitative and qualitative research
- Designed departmental marketing materials

Internet Marketing Specialist
NationJob Network Inc. (www.nationjob.com), Des Moines, Iowa 1999
- Analyzed Internet trends and managed web site content

Publications/Speaking

Speaks at a wide variety of industry media events, conferences and workshops including Mobile Marketing Association, High Tech Marketing Association, American Marketing Association. Publishes at publications including Quirks, Marketing News, ESOMAR.