

# Will mobile video become the killer application for 3G mobile Internet? a model of media convergence acceptance

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**Abstract** We propose and empirically test a model of user acceptance of digital media convergence. Integrating information system research, particularly the paradigm of task–technology fit and the platform–application dichotomy, and theories from media psychology and human–computer interaction, we theorize the *fit between the content applications and the media platform* as the key determinant of user evaluation and acceptance of digital media convergence. We empirically tested our theory in the context of mobile video entertainment services. Specifically, we hypothesize that both the duration of the video content (i.e., the characteristic of the content) and the attentional constraint of the mobile media platform (i.e., the characteristic of the media platform) jointly determine users’ attentional involvement (i.e., reflecting the fit) in the video content. Such involvement in turn influences users’ emotional enjoyment and satisfaction with the mobile video entertainment service. The empirical results support most

of our hypotheses. Two key findings are: (1) in the case of media convergence, the attentional constraint of the target media platform significantly influences user experience during content delivery that may lead to the rejection of media convergence; and (2) the duration of the content interacts with both the attentional constraint of the media platform and the type of interruptions from the environment in determining attentional involvement and emotional enjoyment. We discuss the theoretical contributions and practical implications from our empirical findings.

**Keywords** Digital media convergence · Media psychology · Task–technology fit · Mobile internet

## 1 Introduction

The advent of 3G mobile Internet has created more opportunities for mobile operators to increase their revenue and profits by providing high quality, diversified and personalized services (Tilson and Lyytinen 2005). Encouraged by the success of mobile Internet services, such as ringtone download and pictures taken by camera phones, some industry analysts and operators believe that mobile video entertainment services is one of the promising candidates for killer applications of 3G—“Watching video on cell phones could eventually easily surpass [demand for games, ringtones and wallpapers], to reach 100% of the population” (Kharif 2005). Operators have spent billions to upgrade their infrastructure and launched a lot of mobile video content, such as full-length movies, mobile TV programs and music videos (Reardon 2006). This further accelerates the pace of digital media convergence, where computers, communications, and multimedia merge together (Covell 1999).

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While products of digital media convergence, such as mobile Internet, are expected to generate new revenue for information and communication technology (ICT) service providers, recent market studies challenged the mobile video hype. According to a survey conducted by RBC Capital Markets, about 75% of roughly 1,000 people polled said they had no interest in watching TV on their cell phones (Reardon 2006). Another study by In-Stat revealed that only one out of eight respondents indicated they were interested in purchasing mobile video services from their mobile operators, and two thirds of mobile service subscribers were not yet ready for video services on their handsets (Chamberlain 2005). All the findings from these contradicting customer surveys challenged the role of mobile video as the killer application for 3G mobile Internet. As digital media convergence becomes a ubiquitous phenomenon, firms, especially mobile operators, feel the need to understand user reactions to media convergence (Pagani 2003).

Research on strategic management has addressed the issue of competing in the age of digital media convergence at the organizational level (e.g., Yoffie 1997). Several strategies, such as standard setting, strategic alliance, and patent scope have been explored as effective strategic tools for managing convergence. However, little is known about how end users, particularly consumers, evaluate and make adoption decisions about the converged media. In the information system (IS) field, technology adoption research has studied a variety of information technologies as the focal technology faced by end users (for reviews, see Venkatesh et al. 2003, 2007). Particularly, user adoption of mobile Internet services has been examined by a number of IS studies from different perspectives, such as value creation (e.g., Kim and Kim 2003), media richness (e.g., Chen et al. 2002), and usability (e.g., Venkatesh and Ramesh 2006). However, most of the IS work to date has followed the traditional framework of technology adoption research and treated each mobile Internet service as a singleton IT application. For instance, with mobile multimedia messaging service (MMS) as the focal case, Chen et al. (2002) incorporated media richness in the technology acceptance model (TAM) and found that media richness affects perceived playfulness, usefulness, and ease of use of the MMS. While abundant, previous research falls short in explaining the stumbled diffusion of mobile video services among end users as revealed by the market studies discussed earlier. That is, considering the fact that mobile video is richer and more enjoyable than the text-based short messaging services (SMS) and enhanced messaging services, such as mobile pictures and logos, why then have end users been slow in their acceptance of mobile video services?

Given that digital convergence always involves the transfer of some content (e.g., movies) from some traditional media (e.g., theaters or TVs) to a new one (e.g.,

mobile handsets), we argue that a new and different perspective is needed when studying user acceptance of digital media convergence—i.e., the fit between the characteristics of the media (e.g., the mobile handset and the mobile context) and the characteristics of the contents (e.g., videos). Consider the following user comments on mobile music video<sup>1</sup>:

I downloaded a music video yesterday to a Vodafone 3G mobile phone. The quality of the sound was fine. The image, given the small screen size, was adequate. But watching the video in my outstretched hand while a crowd gathered around, I found myself losing interest after about 40 seconds... In the end I couldn't bring myself to watch all three minutes of the video—besides sending me cross-eyed, it was annoying to stand there staring at the tiny screen. Does anyone actually enjoy watching music and television clips on small portable screens?

This comment clearly indicates that the misfit between the media and the content can even result in negative reactions from end users. To the best of our knowledge, little research has addressed the effect of this contingent fit on end users' acceptance of digital media convergence.

The current research attempts to address the above theoretical gap and provide insights into end users' psychological process when evaluating the digital media convergence. With mobile video entertainment services as the focal case, we adapt the theoretical framework of task–technology fit (TTF; Goodhue and Thompson 1995) to integrate different streams of relevant research and propose the fit between the media platform and the content application as the key factor determining user evaluation and acceptance of media convergence. The general research question in our research is thus: *Will the fit between the media platform and the content application influence users' evaluation and thus their acceptance of media convergence?*

The rest of the paper is organized as follows. “Section II” provides a literature review, with a focus on the theoretical foundations and key definitions. “Section III” presents the research model of user acceptance of digital media convergence. Our empirical study is described in “Section IV”. Results, theoretical contributions, and managerial implications are discussed in “Section V”. Finally, we draw conclusions in “Section VII”.

## 2 Literature review and theoretical foundations

We propose and test a model of user evaluation of digital media convergence by integrating research on digital media convergence, psychology of media entertainment, human–computer interaction (HCI), and the platform–application

<sup>1</sup> <http://blogs.smh.com.au/entertainment/archives//003536.html>

dichotomy using task–technology fit as the overarching theoretical framework. In this section, we present an overview of the relevant literature.

### 2.1 The theoretical framework of task–technology fit

Research on task–technology fit has highlighted the important impact of the fit between technology characteristics and task characteristics on individual users’ performance gains (Goodhue and Thompson 1995). Different characteristics of both technology and task were identified, such as non-routineness and the type of information system. These characteristics were found to jointly determine the task–technology fit that in turn influences technology use and individual performance. This framework has been applied in a number of IS studies, e.g., on group support system effectiveness (Zigurs and Buckland 1998) and on the extension of technology acceptance model (Dishaw and Strong 1999). We adapt the notion of task–technology fit to the context of digital media convergence, particularly the case of mobile video entertainment services. We propose that the characteristics of the video content and the mobile media must fit each other to produce user enjoyment and satisfaction when watching entertainment video. In general terms, we adopt the platform–application dichotomy to characterize the relationship between the original content (e.g., movies) and the new media (e.g., the mobile handset and context).

### 2.2 The platform–application dichotomy

A platform is a set of subsystems and interfaces that form a common structure from which a stream of derivative applications can be effectively developed and distributed (McGrath 1995). This reflects the widely-accepted metaphor of technology layering in which an IT artifact is a layered system in which technologies in the lower layer serve as the “platform” upon which technologies in the upper layer (i.e., “applications”) function. For instance, the Wintel combination is the platform while Microsoft Word is the application. In digital media convergence, content applications are transferred (and maybe transformed) from the original (old) media platform to a new one. For instance, the traditional media platform for a full-length movie (i.e., the content application) can be a TV set at home together with the underlying TV broadcasting network. When this movie is transferred to 3G mobile Internet, the media platform consists of the mobile network, the mobile devices, and the associated usage context, etc.

### 2.3 Research on digital media convergence

Digital convergence is generally described as a unification of the functions and a coming together of the previously

distinct digital technologies (Yoffie 1997). Particularly, the last couple of decades have witnessed widespread digitization of information and content, increasing incorporation of digital technologies into the products of diverse industries, and often, an accompanying shift to using von-Neumann-like platform-based (e.g., personal computer) product architectures. One important development is the so-called digital media convergence, where content and services previously offered through various media will in the future be conveyed to a single artifact, e.g., mobile handsets (Boczkowski and Ferris 2005). Consistent with our notion of the platform–application fit, Boczkowski and Ferris (2005) also separated content applications from their media platforms. However, this stream of research focuses mainly on competition strategies, such as standardization and strategic alliance, with less emphasis on end users’ evaluation and acceptance of media convergence. Because it is end users who utilize the converged media for a variety of benefits, such as entertainment, their acceptance and use will ultimately determine success of converged media. Therefore, we focus on end users’ psychological process of evaluating the digital media convergence.

### 2.4 Research on psychology of media entertainment

Research on media psychology has a direct focus on the explanation of entertainment experiences. Particularly, two key concepts are related to our research. One is *attentional involvement* (Calvert 1994) that refers to perceptual focus on mediated information and the avoidance of stimuli that do not belong to the media offering, such as unrelated own cognitions or external cues that undermine the non-mediation experience, i.e., the phenomenon of audiences being “captured” by a medium. Attentional involvement acts as the antecedent to the second key construct—*enjoyment*, i.e., users’ emotional response to the entertainment media. Here, enjoyment is a “pleasant” experiential state that includes physiological, cognitive, and affective components (Vorderer et al. 2004). This state is also termed “pleasure” and considered to be the “heart of media entertainment” (Vorderer et al. 2004). Bosshart and Macconi (1998) conducted their dimensional analysis and subdivided pleasure into four categories: (1) pleasure of the senses, as in the use of physical abilities, or in the experience of motor and sensory activity; (2) pleasure of the (ego-) emotions, as in evoking and experiencing emotions, or in mood management; (3) pleasure of personal wit and knowledge, as in the use of cognitive or intellectual powers or competence in being able to use one’s wit; and (4) pleasures of the (socio-) emotions, such as the ability to feel an emotion with and for others, to identify with others. In the context of mobile video entertainment, the second and fourth dimensions are the most relevant. Therefore,

whether users can experience pleasant emotions—“having a good time” is the key determinant of their evaluation of the converged media—namely mobile video entertainment.

### 2.5 Human–computer interaction literature on mobile technology

HCI research recognized the attentional constraint of the mobile media platform. For instance, Oulasvirta et al. (2005) discussed the fragmented nature of attentional resources in mobile HCI and pointed out that user interactions “on the move” usually happen in “bursts” like 4 to 8 s. Also, users tend to shift their attention to environment several times during the delivery of content. However, most of mobile entertainment services, especially video and music, require a non-stop session to get users attentionally involved for the joyful experience, i.e., enjoyment. Thus, attentional constraints of the mobile media platform can limit users’ attentional involvement and emotional response to the entertainment media.

### 3 Model of user evaluation of media convergence

Building upon the theoretical foundations discussed in the previous section, we adapt the task–technology fit framework to account for user evaluation of digital media convergence. Specifically, we focus on mobile video entertainment services. Particularly, we focus on the attentional constraint as the characteristic of media platform and the duration (and thus the required optimal length of attention span) as the characteristic of content application. The fit between these two factors is reflected in end users’ perceived attentional involvement, which that in turn is expected to influence end users’ enjoyment and satisfaction with the entertainment media (see Fig. 1). Our model is broadly consistent with the TTF framework. Here, content applications represent the task element in TTF (e.g., watching a movie clip of a certain duration). The media platform is analogous to the technology element in TTF (i.e., mobile handset and the associated context). Finally, the fit between the two elements (represented by attentional

involvement here) influences task performance (i.e., emotional enjoyment) and individual utilization (i.e., satisfaction and thus acceptance). Next, we present the theoretical justification for the various hypotheses in the model.

Emotional enjoyment is one dimension of hedonic value that users derive from their consumption experience (Holbrook and Hirschman 1982). Both utilitarian and hedonic values are found as important dimensions of consumer attitude, which leads to purchase and usage behavior (Voss et al. 2003). Further, in some situations consumers may choose hedonic options over utilitarian alternatives in the same product category (Dhar and Wertenbroch 2000). Also, we conducted an experiment in the context of mobile video entertainment services to empirically test our. Hedonic outcomes have been found to be a determinant of home PC adoption (Venkatesh and Brown 2001; Brown and Venkatesh 2005). Given that enjoyment is the central component of entertainment experience (Vorderer et al. 2004), we propose that emotional enjoyment is the most important factor that influences user acceptance of mobile video entertainment, compared to other possible determinants, such as utilitarian outcomes and social influences. When watching videos, such as movies, TV programs and music videos, end users tends to have emotional pleasure derived from the entertaining content. Their perceived enjoyment from this experience will positively influence their affective evaluation of the target services, i.e., their satisfaction with the converged media. Satisfaction has been shown to be the key variable for IT continuance (e.g., Bhattacharjee 2001). In digital media convergence, end users tend to make their acceptance decision based on their satisfaction after a number of trials of the new and converged media. Therefore, we hypothesize:

H1: Emotional enjoyment will positively influence user satisfaction with 3G mobile video entertainment services.

As discussed in the previous section, attentional involvement is a key prerequisite to the occurrence of entertainment experience (enjoyment). It captures the user’s sense of being there, i.e., of being transported to the site of the action and actually being there along with those who participate in

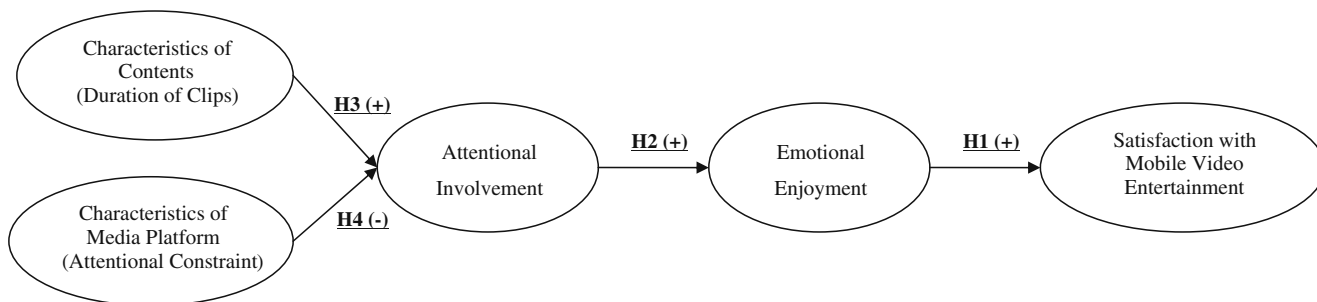


Fig. 1 Research model

the action while in reality just being in front of a computer screen. Enjoyment can thus be derived from this sensation of non-mediation (e.g., Biocca et al. 2001; Lee 2004). In digital media convergence, content applications on the new media platform will also attract user attention to a certain degree for certain time span during which a “pleasant” experiential state is generated. The higher the attentional involvement is, the greater the emotional pleasure, i.e., enjoyment. Therefore, we hypothesize.

H2: User attentional involvement will positively influence emotional enjoyment a user derives from the mobile video entertainment services.

Generally, a variety of content applications, such as e-books, e-mail, online news, music, and videos, can be transferred to a new media platform, e.g., the mobile handset. While listening to music may only require relatively low attentional involvement, watching a movie may demand more cognitive resources. We focus on the video content and categorize content applications based on the time span of attentional involvement they require from end users, i.e., the duration of a video clip. For instance, a full-length movie watched at a movie theater has an involvement span of 100 min on average; a movie trailer is typically about 90 s; a music video is about 5 min; a TV program is about 30 min; and a novel (book) may consume the time it takes to read one or more chapters. We focus on the duration of content because it is most relevant to 3G video services and the attentional constraint of the mobile media platform. Generally, longer videos tend to get users more involved and reduce distractions among viewers (Calvert 1994) because as time passes, attention inertia will be generated among viewers and make them ignore distractions in the environment. Therefore, we hypothesize:

H3: Longer video clips will create higher levels of attentional involvement among viewers.

Research on psychology of entertainment (e.g., Vorderer et al. 2004) suggests that when movies are viewed in theatres, TVs viewed at home or novels read in a quiet place, attentional involvement can be achieved for an optimal time span. This is because in these contexts, attention inertia can be easily produced and viewers can quickly get involved in the content being delivered (Calvert 1994). In digital media convergence, content applications are transferred to a new and different media platform with a specific constraint of attention that makes the optimal involvement unachievable. For instance, in the case of mobile entertainment video services, attentional constraints of the mobile media platform may be caused by:

1. Service usage context, e.g., mobile context with many interruptions and/or distractions;
2. End users’ usage of other mobile services, e.g., some users may have a habit of always making short voice calls with a mobile phone, whereas some users may already be accustomed to reading news with photos on their mobile handsets; and
3. User interface, e.g., small form factor of mobile platforms and user interfaces of some functionalities, such as media player.

As suggested in the HCI literature on mobile devices, end users thus usually cannot concentrate on content for long due to the above reasons. Thus, in the mobile media platform it is unlikely that the optimal level of involvement can be achieved and emotional enjoyment can be felt by end users. As illustrated in the user comment on mobile music video, even if the performance of the content application in the new media platform is acceptable, the attentional constraint of the mobile platform (the usage context, e.g., a crowd gathered around and the small form factor of user interface, i.e., the tiny screen) decreases the involvement level (the outstretched hand and being cross-eyed) that leads to less or even no enjoyment (losing interest in 40 s). This anecdotal comment illustrates that sometimes a content application that is entertaining on its original platform may sometimes lead to negative feelings or experiences among users (e.g., being annoyed) on a new platform. In the case of 3G mobile video entertainment services, while longer movie or TV clips have been introduced recently in order to offer greater entertainment, the attributes of mobile platform, through attentional involvement, may decrease the enjoyment users derive from the content to the point of being more of a burden than an enjoyable experience. This in turn lowers user satisfaction with the mobile video services. Therefore, we hypothesize:

H4: Attentional involvement, enjoyment, and satisfaction on the mobile media platform will be lower than those on the PC platform;

#### 4 Method and results

A within-subject experiment was conducted to test the model proposed in this paper. We performed manipulations of media platform (mobile phone vs. desktop PC) and content application (duration of video: 2 vs. 5 min). We simulated the distractive usage context of mobile services by showing, on the background screen, a mobile phone held in a moving vehicle with views of and noises from the outside. The desktop PC platform was simulated by a media player screen on the Windows desktop. For either media platform, we also simulated three interruption levels—i.e., no interruption, silent interruption (SMS vs. MSN message



**Fig. 2** Experimental design

Time Dur.	Mobile Context			Desktop Context		
	Interruption		No Interruption	Interruption		No Interruption
	Active	Silent		Active	Silent	
Long						
Short						

alerts), and active interruption (incoming phone call). All manipulations are depicted in Fig. 2 below.

A total of 32 college students, 25 of whom were women, were recruited to participate in the experiment. The average age is 21. Participants were randomly assigned to one of two groups. Group 1 viewed movie clips in a simulated context of mobile phone first, and then moved on to the desktop context. The order was reversed for Group 2. Three movies were offered to the subjects. The subjects were allowed to choose the movie that they were interested in and watch a clip of that movie. Each movie was cut continuously into clips of either 5 or 2 min. Interruptions were inserted in the middle of each clip. Each participant viewed three long clips (5 min) and three short clips (2 min) on either platform. Thus, in total, 12 clips were viewed. After viewing each clip, attentional involvement and enjoyment were measured. Finally, satisfaction with the video service was measured for each media platform. An overview of the design of the experiment is shown in Table 1.

All measurement scales are adapted from existing literature (“Appendix”). The psychometric properties of the scales, descriptive statistics, and correlations are shown in Tables 2 and 3. As we had multiple rounds of measurement, we computed the average of all rounds to obtain the final score of each measurement item. All standardized factor loadings are significant and above 0.70 (Fornell and Bookstein 1982), indicating excellent

convergent validity. Composite reliabilities exceeded the 0.70 cutoff point (Boudreau et al. 2001). The average variances extracted (AVEs) are all above the recommended 0.50 level (Hair et al. 1998), suggesting that more than one-half of the variance observed in the items was accounted for by their hypothesized constructs. Discriminant validity was assessed by comparing AVEs with squared correlations among latent variables (Fornell and Larcker 1981). All squared correlations were lower than the corresponding AVEs, thus supporting discriminant validity. Considering that attentional involvement has high correlations with both enjoyment and satisfaction (0.80 and 0.79 respectively), we further examined the possible common method variance by Harman’s single-factor test. Exploratory factor analysis with all items entered did not support a common method factor that explained the majority of the variance.

To test our hypotheses, we first tested the relationships proposed in H1 and H2 for both media platforms (mobile phone vs. PC). PLS was employed to generate the path coefficients. For H3, and H4, one-tailed paired *t*-tests were performed given our within-subject experimental design. The path diagrams for both platforms are shown in Fig. 3. Results for one-tailed paired *t*-tests of all manipulation effects are shown in Tables 4 and 5. H1 and H2 were supported by the significant path coefficients shown in Fig. 3. Attentional involvement explained about 60% of the variance of enjoyment from viewing movies on the mobile

**Table 1** Experiment schedule

Step #	Group 1		Group 2	
	Step	Time Dur.	Step	Time Dur.
1	Briefing	5:00	Briefing	5:00
2	Mobile: 3 long clips + measurement	$3 \times (5+1) = 18:00$	Desktop: 3 short clips + measurement	$3 \times (5+1) = 18:00$
3	Mobile: 3 short clips + measurement	$3 \times (2+1) = 9:00$	Desktop: 3 long clips + measurement	$3 \times (2+1) = 9:00$
4	Refreshment	1:00	Refreshment	1:00
5	Desktop: 3 long clips + measurement	$3 \times (5+1) = 18:00$	Mobile: 3 short clips + measurement	$3 \times (5+1) = 18:00$
6	Desktop: 3 short clips + measurement	$3 \times (2+1) = 9:00$	Mobile: 3 long clips + measurement	$3 \times (2+1) = 9:00$
7	Debriefing	5:00	Debriefing	5:00
Total	7 steps	65:00	7 steps	65:00

**Table 2** Measurement properties of indicators

Construct	Items	Mean	Standard Deviation	Composite Reliability	Standardized Factor Loading
Satisfaction	SAT1	4.10	1.57	0.91	0.92
	SAT2	4.09	1.79		0.91
	SAT3	4.03	1.56		0.87
	SAT4	4.12	1.63		0.88
Perceived enjoyment	PE1	4.08	1.38	0.91	0.92
	PE2	4.03	1.34		0.84
	PE3	4.06	1.48		0.99
	PE4	4.09	1.29		0.84
Attentional involvement	AI1	4.03	1.39	0.93	0.90
	AI2	4.06	1.38		0.91
	AI3	4.17	1.53		0.94
	AI4	4.07	1.46		0.87

platform that in turn determined the level of user satisfaction. Similar results were discovered in the case of the desktop PC platform.

We now turn to the results related to H3 and H4. The central proposition in these two hypotheses is that although longer video clips, such as movie clips, may increase user enjoyment through the mechanism of attention inertia, the attentional constraint of the new media platform (i.e., mobile phone) may decrease enjoyment, even to a negative level. H3 was not supported. The effect of duration on attentional involvement was not significant in the context of both media platforms. The effect of video duration on enjoyment was only marginally significant in the case of the mobile platform, indicating that under greater distraction, longer video clips tend to produce slightly greater pleasure than the quiet environment, which is consistent with the prediction of attention inertia. The lack of support of H3 could be caused by our manipulation—the long clips lasted about 5 min, which may not be substantively (cognitively) different from the short clips of 2 min. Increasing the difference in the duration between the long and short clips may lead to significant results. Thus, further empirical exploration is needed to confirm our conjecture.

H4, the key hypothesis in our paper, was supported. All differences between the two media platforms—attentional involvement, emotional enjoyment, and satisfaction—were significant at least at  $p < 0.05$ . Particularly, while all the average scores of the three constructs on the PC platform are over 4, the average scores on the mobile media platform were less than 4. This indicates that the negative feelings were high among users when content was transferred from the original platform to a new platform that had a significant attentional constraint.

Considering interruption levels, our study also revealed some interesting findings. When there were only distractions from the background (no interruption), participants still had positive experiences from long clips on the mobile platform, but not from short clips. This also indicates that

by the mechanism of attention inertia, short clip viewers may lose concentration more easily than long clip viewers. Moreover, in the situation of active interruptions (incoming phone calls) on the mobile media platform, the levels of attentional involvement, enjoyment, and satisfaction are higher in the case of short clips than in the case of long clips. While the difference was not statistically significant, this may imply that the damage generated by interruptions on users’ emotional enjoyment is greater when users are more involved in the content, i.e., when the long clip is at the middle point of delivery. This can be regarded as a boundary condition of the mechanism of attention inertia. We thus call for future research on this interesting interaction.

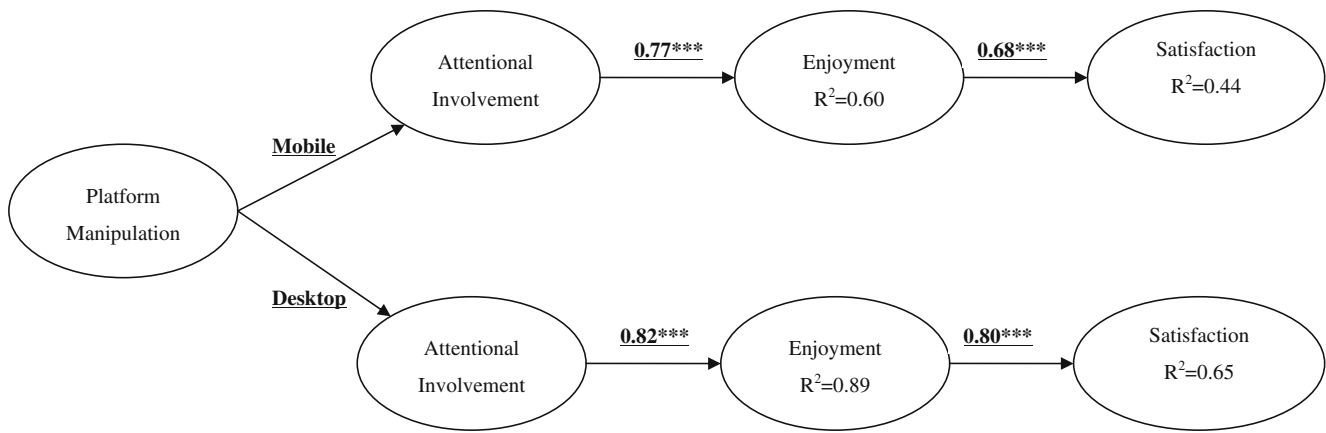
### 5 Discussion

We adapted the task–technology fit framework to the context of mobile video entertainment services and conducted an experiment to empirically test the model. The empirical results support most of our hypotheses. Two key findings are: (1) in the case of media convergence, the attentional constraint of the target media platform significantly influenced user experience during content delivery and the misfit between the content and the media may lead to the rejection of the converged media and (2) the duration of the content interacts with both the attentional constraint of the media platform and the type of interruptions from the

**Table 3** Measurement properties of latent variables

	Mean	SD	SAT	PE	AI
Satisfaction	4.05	1.51	(0.81)		
Perceived enjoyment	4.04	1.36	0.68	(0.82)	
Attentional involvement	4.10	1.41	0.79	0.80	(0.88)

Off-diagonal values are correlations and on-diagonal values are AVEs



**Fig. 3** Results of hypothesis testing: H1 and H2

environment in determining attentional involvement and emotional enjoyment. We discuss the theoretical contributions and practical implications of our findings.

5.1 Theoretical contributions

We make three key contributions to the literature on technology acceptance in general, and literature on digital media convergence in particular. First, we integrated different theoretical perspectives—technology acceptance, media psychology, and human–computer interaction, etc. under the theoretical framework of task–technology fit. Previous literature on digital convergence mainly focused on competing strategies, such as standardization and strategic alliance. Not much has been said about end users’ decision making regarding the converged media. Our research model provides insights into end users’ psychological process when faced with decisions related to digital media convergence.

Second, we went beyond traditional determinants of technology acceptance (i.e., perceived usefulness and perceived ease of use) and proposed different determinants (i.e., attentional involvement and emotional enjoyment) of user acceptance of media convergence. TAM is one of the

dominant models in IS research. It is no wonder why in the study of new applications in the mobile context, technology acceptance model has been widely adopted. Our study took a different approach by focusing on the key fact that digital media convergence involves the transfer of content from the original media platform to the new one. We incorporated attentional involvement and emotional enjoyment to characterize the changes resulting from media convergence and to predict 3G mobile video entertainment acceptance, which provides a new and different theoretical perspective.

Finally, we incorporated characteristics of the IT artifact, i.e., platform–application dichotomy (e.g., Orlikowski and Iacono 2001) into the model, which provides insights into the mechanism underlying end users’ technology acceptance decision regarding media convergence. Particularly, the fit between the content and the media platform is proposed and tested as the key factor that leads to end user acceptance or rejection of media convergence. The results from the empirical study supported our core ideas and thus provide answers to the focal research questions. Mobile video services may not be the killer application for 3G mobile Internet because not all types of video content fits the mobile media platform and such fit is an important topic for further inquiry and also for businesses seeking to exploit media convergence.

**Table 4** Mean levels of satisfaction and enjoyment

	Mobile platform		Desktop platform			Plat. effect			
Plat.									
Satisfaction	3.48			4.13			**		
Enjoyment	3.76			4.20			**		
Plat. × Dur.									
Long	3.89			4.26			*		
Short	3.64			4.14			*		
Dur. effect	*			n.s.					
Plat. × Dur. × Int.									
Long	3.46 <sup>a</sup>	3.86 <sup>b</sup>	4.34 <sup>c</sup>	3.95 <sup>a</sup>	4.29 <sup>b</sup>	4.55 <sup>c</sup>	** <sup>a</sup>	* <sup>b</sup>	n.s. <sup>c</sup>
Short	3.70 <sup>a</sup>	3.71 <sup>b</sup>	3.50 <sup>c</sup>	3.91 <sup>a</sup>	4.10 <sup>b</sup>	4.41 <sup>c</sup>	n.s. <sup>a</sup>	n.s. <sup>b</sup>	*** <sup>c</sup>
Dur. effect	n.s. <sup>a</sup>	n.s. <sup>b</sup>	*** <sup>c</sup>	n.s. <sup>a</sup>	n.s. <sup>b</sup>	n.s. <sup>c</sup>			

Plat. Platform (mobile vs. desktop), Dur: duration (2 min vs. 5 min), Int. interruption (Active vs. Silent vs. no interruption) \*P-value<0.10; \*\*P-Value<0.05; \*\*\*P-Value<0.01

<sup>a</sup> Active interruption

<sup>b</sup> Silent interruption

<sup>c</sup> No interruption



**Table 5** Mean levels of attentional involvement

	Mobile platform		Desktop platform			Plat. effect			
Plat.									
Attention	3.89		4.49			***			
Plat. × Dur.									
Long	3.90		4.53			***			
Short	3.87		4.44			**			
Dur. effect	n.s.		n.s.			Interaction: n.s.			
Plat. × Dur. × Int.									
Long	3.59 <sup>a</sup>	3.85 <sup>b</sup>	4.27 <sup>c</sup>	4.36 <sup>a</sup>	4.55 <sup>b</sup>	4.70 <sup>c</sup>	* <sup>a</sup>	* <sup>b</sup>	** <sup>c</sup>
Short	3.78 <sup>a</sup>	3.84 <sup>b</sup>	3.98 <sup>c</sup>	4.29 <sup>a</sup>	4.31 <sup>b</sup>	4.71 <sup>c</sup>	*** <sup>a</sup>	*** <sup>b</sup>	* <sup>c</sup>
Dur. Effect	n.s. <sup>a</sup>	n.s. <sup>b</sup>	n.s. <sup>c</sup>	n.s. <sup>a</sup>	n.s. <sup>b</sup>	n.s. <sup>c</sup>			

Plat. Platform (mobile vs. desktop), Dur. duration (2 min vs. 5 min), Int. interruption (Active vs. Silent vs. no interruption)

\*P-value<0.10; \*\*P-Value<0.05; \*\*\*P-Value<0.01

<sup>a</sup> Active interruption

<sup>b</sup> Silent interruption

<sup>c</sup> No interruption

**6 Limitations and future research directions**

A few limitations of the current study and future research directions should be noted. First, we have a small sample of 32 participants. This limited us to a within-subjects experiment design. Future research should use a larger sample and conduct a between-subjects experiment as well in order to complement the current work and also to increase the power of statistical tests. Also, we invited undergraduate students to participate in the experiment. This may limit the generalizability of the results. Future research should consider conducting a field experiment to enhance the generalizability of the findings from the current work. Second, we only focused on movie clips in the current study and did not vary the configuration of the mobile phone in the experiment. To further improve the generalizability, future research should include more content types, such as music, video and multimedia messages. Also, the variety of mobile device configurations, such as screen size, may also be an important factor that deserves study in future research. Third, this paper focuses on mobile entertainment with 3G video as an anecdotal case. In future research, our theoretical framework can be readily extended to the general digital convergence, i.e., other types of media and applications, such as nonlinear and interactive media, video phone call, and gaming. This extension can be achieved by including all dimensions of pleasure in the enjoyment construct. For instance, the social emotional response corresponds to video communications, while the pleasure from using wits can represent enjoyment from playing games. Fourth, attentional involvement was highly correlated with enjoyment and satisfaction. While our analysis suggested no serious problem of common method variance, future research should use multiple methods for data collection—e.g., survey and objective data based on behavioral performance. Finally, our current model focuses on the experiential constraint aspect of the media platform, but neglects the positive side—i.e., benefits provided by the new platform (e.g., mobility). Whether and when users make trade-offs between the benefits and the constraints

needs further theorizing. Another possible theoretical extension is to consider the segmentation of end users. Continuous partial attention is a common character of post-multitasking users who tend to shift their attention to the environment several times during the delivery of the content. Therefore, users customized to the situation where attention continuously switches between the mobile device and the environment may find it easier to adopt or accept the interruptions associated with mobile media platform. Users unaccustomed to such environments, in contrast, may find it extremely frustrating and hence, forego the use of mobile entertainment media altogether.

**6.1 Practical implications**

Digital convergence is a pervasive phenomenon in the ICT industry (Yoffie 1997). In the mobile computing and communication sector, this issue is of paramount importance because it involves a huge amount of investment on infrastructure and thus determines the survival and growth of the entire business sector. Our research provides both strategic and design implications for players in the value chain, especially for content integrators (e.g., mobile carriers) and content developers. Mobile carriers currently transmit video over the same network that transmits calls. These include bits and pieces of news, movie trailers, programs from popular TV channels, and full-length movies. Our findings suggest that they seem to fall into another trap of “providing more is better.” It is, therefore, more important for firms to wisely allocate their resources on finding, adapting, or inventing content that fits the mobile platform, instead of adopting a strategy that simply transfers everything elsewhere to mobile handsets.

Our model also suggests that content developers should pay more attention to user experiences during content and information delivery. It is not enough just to design an elegant user interface and to provide as many functionalities as possible. Users’ processing of information and content should be another important consideration to leverage media convergence. To achieve the optimal fit between

the content and the media platform, developers may consider the following options:

1. Careful selection of existing media for convergence: To choose the right media for their convergence strategy, practitioners should follow the basic principle of selecting entertainment content that fits the attentional constraints of the new platform. Recently, some mobile carriers have announced the introduction of full-length movies and long TV programs as new services. Our model casts doubts on the success of these initiatives because most mobile users cannot concentrate as long as a typical movie or TV program runs. The only possible outcome for users who try these services will be frustration as described in the case of mobile music videos. In contrast, content that can create arousal in a short burst may be more acceptable to mobile users. For instance, movie trailers and short clips for exciting moments in sporting events, such as goals scored in football matches or an exceptional round of game of tennis between leading players in the world.
2. Transformation of existing media for optimal user experience: Content developers may take into account the attentional constraints of the mobile platform when they design new offerings. Some design tactics have already been suggested by researchers (e.g., Holbrook and Hirschman 1982). For example, chopping content into short clips and providing more controls during the content delivery, such as postponing, delaying, restarting and interrupting. However, the transformation must be done with the goal of user enjoyment. For instance, although movies can be chopped into short clips by 5 min to fit the short attention span of mobile users, this may not lead to optimal user experiences. The reason is that movies are edited by natural scenes as represented by changes of camera angle or changes of context and/or time. Naïve and simple segmenting may break the flow of these scenes that results in negative user experiences. Instead, movies should be cut into clips of short but also variable length based on film editing principles for the optimal level of emotional enjoyment.
3. Design for the new media platform: Finally, practitioners can also consider offering new forms of content that are “made for mobile.” These forms of entertainment are designed from the very beginning to fit the new media platform. For instance, recently Vodafone launched “24: Conspiracy,” a new made-for-mobile drama inspired by the blockbuster Fox TV series “24”. These “mobisodes” consist of a series of 1-min video clips that has its own style, its own stars and possibly award categories in acting, writing, directing and editing. As the original “24” fills each 60-min episode with a precise hour of action, the “24: CONSPIRACY”

fills each 60-s mobisode with a parallel slice of a cliff-hanging narrative.

## 7 Conclusion

In this paper, we proposed and empirically tested a model of user acceptance of digital media convergence by integrating information system research, particularly the paradigm of task–technology fit and the platform–application dichotomy, and theories from media psychology and human–computer interaction literature. Our key hypothesis was that the fit between the content and the media technology plays an important role in user evaluation and acceptance of digital media convergence. Particularly, we found that in the case of mobile video entertainment services, the fit between the duration of the video content and the mobile handset and context determined users’ attentional involvement in the video content that in turn influenced users’ emotional enjoyment and satisfaction with the mobile video entertainment service. Thus, our research provided answers to the issue raised at the beginning of the paper—mobile video service may not be the killer application for 3G mobile Internet because not all types of video content fits the mobile media platform.

## Appendix: Measurement scales

### 1. Perceived enjoyment (Ghani and Deshpande 1994)

Please describe your feelings about usage experience when watching the previous six movie clips:

1. Interesting   1   :   2   :   3   :   4   :   5   :   6   :   7   Uninteresting
2. Fun   1   :   2   :   3   :   4   :   5   :   6   :   7   Not Fun
3. Exciting   1   :   2   :   3   :   4   :   5   :   6   :   7   Dull
4. Enjoyable   1   :   2   :   3   :   4   :   5   :   6   :   7   Not Enjoyable

### 2. Attentional involvement (Ghani and Deshpande 1994)

1. I am deeply engrossed   1   :   2   :   3   :   4   :   5   :   6   :   7   Not deeply engrossed
2. I am absorbed intensely   1   :   2   :   3   :   4   :   5   :   6   :   7   Not absorbed intensely
3. My attention is focused   1   :   2   :   3   :   4   :   5   :   6   :   7   Not focused
4. I concentrate fully   1   :   2   :   3   :   4   :   5   :   6   :   7   Not fully

### 3. Satisfaction (Bhattacharjee 2001)

Please describe your overall satisfaction when watching the previous six movie clips:

1. Very dissatisfied   1   :   2   :   3   :   4   :   5   :   6   :   7   Very satisfied
2. Very displeased   1   :   2   :   3   :   4   :   5   :   6   :   7   Very pleased

3. Very frustrated \_1\_: \_2\_: \_3\_: \_4\_: \_5\_: \_6\_: \_7\_ Very contented
4. Terrible \_1\_: \_2\_: \_3\_: \_4\_: \_5\_: \_6\_: \_7\_ Very delighted

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