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Harry Bouwman

Delta School of Business and Technology, w.a.g.a.bouwman@tudelft.nl

Schalk Staalman

Mark De Reuver

Delta School of Business and Technology, g.a.dereuver@tudelft.nl

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OVER THE TOP MOBILE TV: A FIELD TRIAL BY PUBLIC AND COMMERCIAL BROADCASTERS

Harry Bouwman, Åbo Akademi University, Turku, Finland, and Delft University of Technology

Mark de Reuver, Delft University of Technology

Schalk Stalman, Triple IT

Abstract

Mobile TV has been on the research agenda and promoted by Telecom operators as the killer app for their services for a long time. However with the emergence of Over The Top providers (OTT's) mobile Internet offers the opportunity to fulfil this unmet promise. In this paper we discuss the results of an empirical research collected in the trial phase of a mobile OTP services made available via smartphones and tablets. The data is based on log-data and secondary analyses of five surveys. In this paper we only present preliminary results. Our main findings show that users have to pass a threshold in order to make mobile TV a part of their daily life. Differences are found between active and background use of mobile TV. Active viewing correlates most strongly with overall satisfaction with the mobile TV application. Reinforcement effects for sports and news content are also linked to satisfaction.

Key words

Over the top providers

Mobile TV

Second screen

Public and Commercial broadcasters

Introduction

Mobile TV as offered by Mobile operators in collaboration with hardware providers, like Nokia and Ericsson, was not very successful. Although mobile TV brings together the better of two worlds, i.e. ubiquitous mobile telecommunication and access to media content, the market for mobile TV didn't emerge. Mobile TV in itself is rather ambiguous concept. Mobile TV is considered by some to be all video content available via mobile handsets, including user generated content, as well as content produced by movie companies and content of broadcasting organizations, while others have a more limited definition and consider only the availability of linear, real time broadcasted television made available via a mobile channels as mobile TV (Jarvenpaa & Loebbecke, 2009). We are more concerned with making professional produced content available via mobile channels, like smartphones or tablets. The market experiments with the latter type mobile TV, also labelled as migrated content, weren't very successful. Explanations for the failure of these experiments can be sought in the availability of the proper content, technological restrictions, lack of organizational cooperation between stakeholders, revenue models that were not crystallized due to conflicting business logics in the broadcasting and telecommunication industry, and lack of user experience and willingness to pay (Braet & Ballon, 2008). After the breakthrough of smart phones on the mass market, the prominence of You Tube, and the decreasing lack of interest in linear TV, the attention is again drawn by the possibilities that Mobile TV might become feasible and viable in the near future. Smartphones and tablets resolve most handset issues as nearly every smart-phone and tablet has a large screen and is capable of receiving and presenting data. Furthermore with the emergence of Over The Top Providers new concepts emerge. One of the possibilities is to provide OTT television program via the Internet, as for instance Netflix provides in the US. OTT providers make use of the (mobile) Internet instead of the mobile, terrestrial or cable network to provide new services, like communication services as WhatsApp. OTT providers like Netflix bypass the content owner, e.g. the broadcaster, as well as the distributor, e.g. cable or telecom provider. Regulation with regard to Net Neutrality hinders Mobile Operators to block traffic of OTT providers. In this paper we discuss the results of research related to a field trial of an OTT mobile TV service as offered by commercial and public broadcasters in Europe from a consumer perspective.

Academic Research on Mobile TV can be related to various technological (standards), commercial, social, political and regulatory factors (see for instance Orgad, 2006; Steen, 2009, 2014), however our focus is on adoption, acceptance and usage of OTT mobile TV by consumers. Research on adoption and acceptance of mobile applications has been quite extensive. Research on mobile TV focus on the consumer adoption of mobile TV in general; however no attention is paid to **actual usage**. Moreover most of research is perception-based and there are few studies that combine perceptions of adopters or users with actual behaviour. The current study makes use of both questionnaire data and usage data. This paper fills a gap in research with regard to the OTT adoption, acceptance and usage of mobile TV. We contribute to the insights derived from both actual usage data and from questionnaire data. The objective of this paper is: *to offer preliminary insights in substitution, replacement or reinforcement effects of OTT mobile TV*

This paper is structures as follows first we will give an update of existing literature on mobile TV. Bluntly put there hasn't been a lot of research being done in this area the last couple of years, so we rely partly on earlier reviews (De Reuver et al., 2011). In the literature review we will also pay attention to literature on substitution, replacement and reinforcement. Next we will discuss the OTP application, before we present the research methods. We will present both results from log data as well as questionnaire data; however we couldn't connect due to privacy issues, the two datasets. Finally we will discuss the results, offer conclusions, and present limitations

Literature review

Research in the domain of Mobile TV hasn't been very popular since the many filed trials of Mobile Telecom Operators. Literature hasn't been abundant the last 5 year. The number of publications is quite limited in quantity and focus. While Jarvenpaa & Loebbecke (2009) focus on use

value from a strategic and provider perspective, most studies focus on the experienced value. Buchinger et al (2009) offer a state of the art of research till 2009. The results of research are however not very coherent. According to Buchinger et al some studies expect mobile TV to be used to kill time, while other studies see mobile TV as an opportunity to overcome the constraints of a time – and place-bound experiences (Orgad, 2006). Orgad expects usage mainly when people are being mobile, while others see the home as the main application area (Schuurman et al, 2009a). Mobile television is seen as becoming private, individualized and personalized (Orgad, 2006), while other see potential in the community aspects of mobile TV by sharing experience over distance (Nikou et al, forthcoming). Cultural differences and cohort effects might explain these differences. Personalization, pricing and user motivation typically explain the intention to use mobile TV. Adoption research shows that it are the young, high educated, financial well to do youngsters that are the early adopters (Schuurman et al, 2009a). Orgad (2006) also see the young, but also the restless as a potential group of adopters. With regard to the mobile device, screen and phone size, battery and memory, visual quality, ease of use, sound control and headphones do matter. Content has to be developed specifically for the mobile phone while also interactivity has to be considered in more detail (Sørensen & Nicolajsen, 2010). According to Orgad (2006) personalization, interactivity, immediacy, interdependence across platforms and content snacking are key features to predict usage of mobile TV.

Schuurman et al (2009b) conclude, based on a meta-analysis of research on 35 mobile TV trials, expert and user survey that content suited to user demand is going to be the decisive factor for the acceptance of mobile television. Users want to share and modify content (Sørensen & Nicolajsen, 2010). User generated content and self-authored reality TV are seen as important enablers (Orgad, 2006). A specific issue is related to the availability of free content versus content that has to be paid for. Quality and originality are expected to be important criteria that will explain user's willingness to pay. Lee et al (2011) emphasis in a study on youngsters in Korea that entertainment content for mobile TV is far more important than information. Information need had a negative effect. Demographics and price for content were not relevant predictors, portability and perceived value were.

All studies reported so far have used small test groups as used in field trials to base their conclusions upon. Carlsson & Walden (2007) had a larger sample that had access to Mobile TV in a field trial (N = 500), however this sample is not representative for the Helsinki Metropolitan area where the trial took place. Their research shows that trial users wanted to watch TV on their Nokia 7710, and were willing to pay. About 20% of the respondents were prepared to pay 10 € per month. A fixed pricing model was preferred. Content preferences are related to traditional TV content as well as specific content for mobile settings. The average viewing time was 2,0 minutes a day. Like Schuurman et al (2009b), Carlsson & Walden found that viewing habits correlate with peak times, but that mobile TV was also used off-peak hours. The context of use was while travelling but also at home. The fact that home-viewing is mentioned in many trials as an important activity conflicts with the notion of flexibility as put forward by Orgad (2006). Motives were to relax and to catch up with news. In a follow up study after the trial (N = 160) the respondents were less positive, confirming the results of Kaasinen et al (2009) with regard to the same trial. In general the opinion about mobile TV was negative for females, younger age groups, and higher educated. Watching daily television didn't become part of daily routines. Explanations offered were that the content didn't fit use context and behaviour, and didn't meet technical quality criteria.

Most studies are however rather descriptive in nature. Yung et al. (2009) is one of the first more conceptual studies. Next to the core TAM concepts (perceived usefulness, perceived ease of use and behavioural intention), psychological flow, i.e. cognitive concentration, and media content that fit the user, are used as explanatory concepts. Content that fits users appeared to be a strong predictor of flow experience. Flow experience correlate positively with perceived usefulness. So content that really asks user attention and concentration has a positive effect on acceptance.

Mobile television studies mainly focus on the delivery of streaming video content to mobile devices without a clear interactive or social component (Evens et al. 2011; Lee et al. 2011; Schuurman et al. 2009). Personalization of mobile TV content is rarely studied (Jung, Perez-Mira & Wiley-Patton 2009). The personalized, social and interactive extensions of television have been studied in the community of social and interactive TV. These studies are also mainly focused on user acceptance in general (Buchinger et al. 2011; Mafé, Blas & Tavera-Mesías 2010; Pagani & Mirabello 2011) and

prototyping of specific applications (Chorianopoulos & Lekakos 2008; Harboe, Massey, et al. 2008; Harboe, Metcalf, et al. 2008). Most studies focus on niche services with very specific application areas, which have created a highly fragmented marketplace where services are difficult to find for end-users (Hess et al. 2012). In general TAM concepts are not very helpful in understanding why people make use of mobile applications, due to the fact that TAM doesn't discuss the technology at stake (for instance difference between underlying standards such as Digital Video Broadcasting-Handheld, DVB-Terrestrial, Digital Multimedia Broadcasting, or characteristics of the mobile screen), is based on perception data, behavioural intention and seldom related to actual behaviour. Also for methodological reasons TAM research has only limited validity.

Next to studies on acceptance of mobile TV, displacement (substitution) literature is prevalent in Mobile TV research. In this body of literature, it is argued that usage of one medium negatively influences the use of other media. Media scholars investigated this displacement effect by the advent of new technologies including television (Mendelsohn, 1964) and VCR (Henke and Donohue, 1989). It is even suggested that a revolution in the way people consume media, ultimately lead to the dissolution of traditional media (Coffey and Stipp, 1997). More recent studies have focused on displacement effects by the Internet on traditional media (Lee and Leung, 2008). Basic argumentation, regarding time displacement, is that people have limited amount of time to spend on the consumption of different media (Dutta-Bergman, 2004). Concerning the use of media, this leads to the assumption that a person can only use one medium at a time. In contrast to the dimension of time, the functional dimension predicts an increase use of other media in order to fulfil the needs. For instance, when people tend to have a high need for entertainment it is likely that they spend time viewing television, but also more often make use of second screen applications as accessible via tablets or mobile phones. Hence, in contrast to the displacement hypothesis, use and gratifications theory predicts that media is supplementary rather than competitive (Lin, 2001). A third alternative can be that the usage of new media encourages people to spend time with media in general, i.e. media use reinforcement. In general uses and gratifications research is based on perception data as well. TAM and uses and gratification share the more or less tautological nature of reasoning; if there is a need people will use a specific technology, media channel or a program format, with in our view limited explanatory power. Understanding real behaviour based on a mixed method research, combining log data and questionnaire data will lead to a new way of conceptualizing acceptance, adoption and use behaviour. The research at hand is therefore more explorative in nature than explanatory, although we have been engaged in developing alternative models based on mixed methods research in the field of mobile technology (De Reuver & Bouwman, forthcoming).

Nevertheless we have the impression that implementation of mobile TV beyond access to video content via browsers, as well as research on mobile TV did come to a standstill. However with the emergence of Over the Top Providers new avenues for mobile TV and for research on mobile TV open up.

The mobile OTT TV application

The application under study enabling real-time as well as delayed television viewing via mobile phones and tablets, is offered by a consortium of commercial and public broadcasting organizations. In this way the broadcasters developed a kind of hybrid system in which mainly the distributors of television and videos are bypassed in the value chain, in contrast with Netflix which also bypasses broadcasting organizations. The service is offered via the Internet and makes it possible to see broadcasting content with a delay of maximum 6 days. The strategic objective is twofold, i.e. by starting an own OTT service the broadcaster increases the entry barriers for other players, and next broadcasters directly compete with their service with Telecom and Cable Providers. By using the Internet no investment in infrastructure to distribute the content is required.

The service is enabled by the OTT platform Vinson as offered by the video distribution technology and rendering company Triple IT. Initially the platform was developed for internal and marketing purposes. An important part of the technology is (1) enabling Network PVR, i.e. streaming of programs that can start on any possible point in the program, and (2) an electronic program guide (EPG). Initially a beta product Rumble was developed, and further developed to a full application. The

application could not be marketed due to content right issues, but was tested in a closed domain (De Reuver et al, 2011).

An internal technical pilot was executed in 2010. Multiple technical trials followed with public broadcasting organizations. In 2012 commercial broadcasters joined. In 2012 a commercial provider in which the broadcasting organization participates was established. In 2013 a field trial was executed, due to extensive media attention about 90.000 consumers volunteered to participate. Only 10.000 people were actually selected to participate.

The architecture is provided in figure 1.

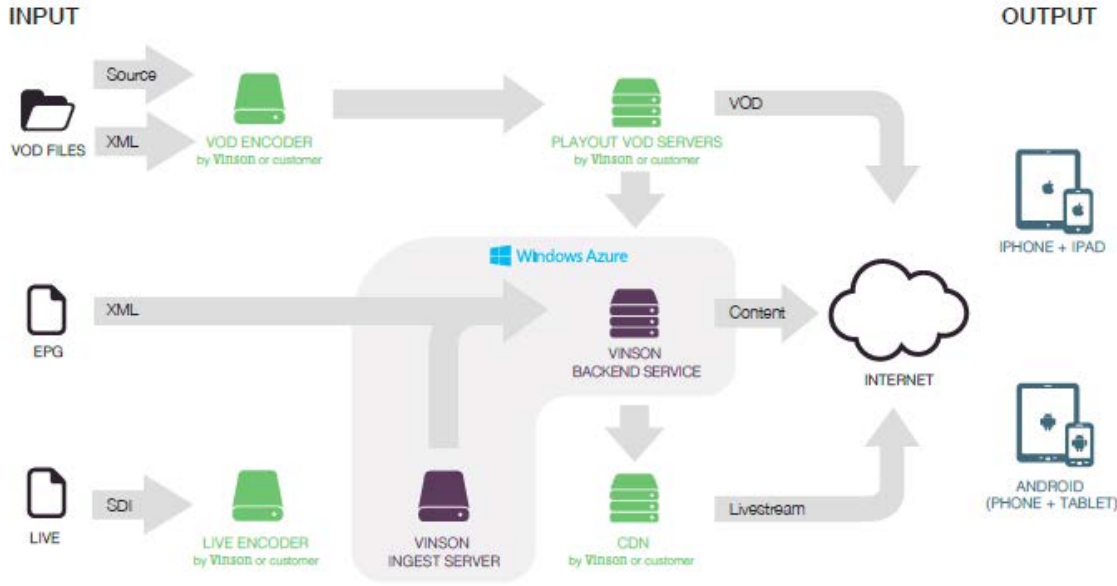


Figure 1: Architecture of the platform

The type of programs offered are the regular programs as also provided via regular television, either real-time or delayed, and for which the broadcasting organizations control the broadcasting rights.

Research Method

Log-data was collected during the period May 1 – November 30, 2013. Log-data are collected for 214 days by the platform provider. Questionnaire data was collected by a research agency in the period March-May 2013. Five subsequent questionnaires were held at different points in time. The unit of analysis is the individual user. Due to the fact that users voluntary listed themselves, the sample is not a random sample, but a convenience sample of actual users. However the sample was balanced in order to represent the population of the country in which the study was executed as good as possible. Table 1 provides the core sample characteristics for one of the questionnaires that is used in this paper.

The questionnaire for this part of the research contains questions on first impressions, willingness to pay, uses and gratifications, willingness to view advertisements, comparison to competing service concepts, and satisfaction and loyalty. However, in this paper we focus on explaining satisfaction through reinforcement effects, usage patterns and experience perceptions.

Table 1: Demographic variables sample (N=3693)

		Percentage
Gender	Male	50.0
	Female	50.0
Age groups	18-24	18.8
	25-34	26.1
	35-44	24.1
	44-54	16.0
	55-70	15.0
Social class	Low	35.0
	Medium	31.0
	High	34.0
Family situation	No kids	42.1
	Kids under 14 years old	41.0
	Kids over 14 years old	16.9
Device	iPad and iPhone	45.1
	Only iPhone	9.8
	Only iPad	45.1
Main preferred broadcaster	Public Broadcaster	33.3
	Commercial Broadcast (Nat)	33.3
	Commercial Broadcast (Internat)	33.3

Results

First we present log-data and next we will discuss the results based on one of the five questionnaires.

Logdata

The dataset contains 31.353 unique events and 16.372.776 sessions over 7 months. On average 522 sessions were initiated by users during this period, and on average users made use of the system for 16 days. Typically the modus is one, indicating that a large number of users tried the applications only once. However Figure 2 illustrates that if people tried the system more than 10 times the number of sessions rapidly increases. Clearly people try the applications a couple of time and then stop usage or get the hang of it and usage increase with about 100,000 sessions as the top. The graph as presented in figure 2 shows clearly that usage shows a nice bell curve (logarithmic scale).

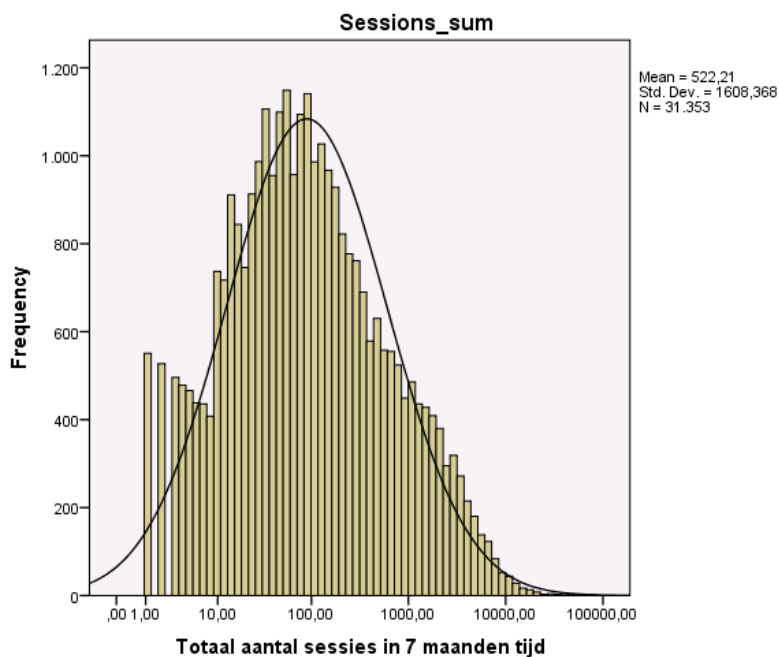


Figure 2 Total number of sessions during a period of 7 months

This trend is also reflected by the number of days the application was accessed (see figure 3). Again we see the pattern that people tried the application on a limited number of days, but that there is also a group of regular users. On average 76,508 sessions take place per day, while an average day there are 2,474 users. The max number of sessions was 391,140 and the maximum number of sessions on a day was 13,883.

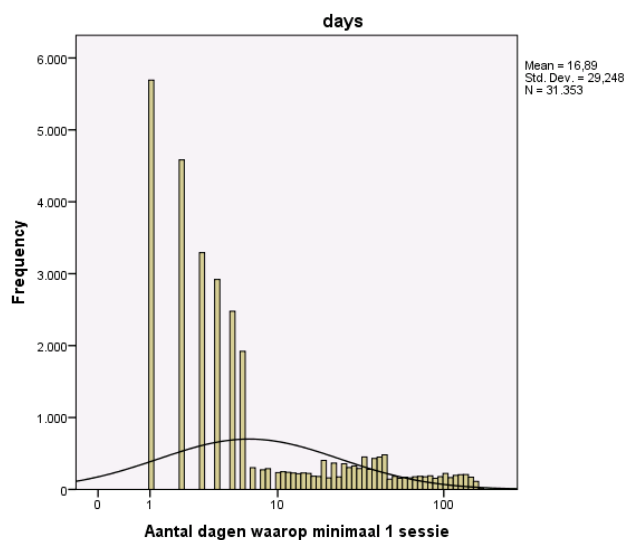


Figure 3 Number of days that the application is used.

Survey data

The survey data is used to explain the reported satisfaction with the applications made available via the OTT platform. Satisfaction is measured on a 10-point scale. Satisfaction is related to changed TV consumption, current use and perceptions innovativeness, enjoyment and experience.

Before doing so we did exploratory factor analyses to see what the impact on viewing behaviour for certain television program formats is according to the respondents. Table 2 shows reinforcement

effects for sports programs, a mixture of national productions and soaps, and reinforcement of viewing behaviour with regard to foreign content.

Table 2: Exploratory factor analysis on effects of the platform on TV consumption (Varimax rotation)

Now I use the platform, I watch more...	Reinforcement effects on Sports / News consumption	Reinforcement effects on National content consumption	Reinforcement effects on foreign content consumption
... sports programs	.811		
... news programs	.745		
... National TV shows		.786	
... National TV series		.850	
... foreign TV shows			.853
... foreign TV series			.866
... foreign films			.631
... soap operas		.699	

Watching TV can be done individually, actively and concentrated, or as a social activity with a group where the focus is not on the TV per se. Based on the exploratory factor analysis in Table 3 we see the same pattern when the platform is used.

Table 3: Exploratory factor analysis on current use (Varimax rotation)

Do you use the platform to watch...	Current use (Active viewing)	Current use (Background viewing)
active, concentrated, on the foreground (TV is the only activity)	.793	
TV at home	.721	
delayed TV	.657	
TV alone	.655	
TV passively, on the background (watching TV is not the main activity, e.g. while eating)		.695
live TV		.633
TV spontaneously, without wanting to view a specific program / film		.628
TV somewhere else		.567
TV together		.526

Next we looked into how the platform is perceived by respondents, see Table 4. Typically we observe that the platform is perceived as (1) new, innovative and unique, (2) easy, enjoyable and attractive, and (3) offering an intense continuous experience.

Table 4: Exploratory factor analysis on perceptions

The platform...	Perceived newness	Perceived enjoyment	Perceived experience
... is original	.740		
... is unique	.678		
... is different	.674		
... is novel	.624		
... is innovative	.601		
... makes watching TV easier		.658	
... is attractive		.641	
... is accessible		.606	
... offers high quality		.574	
... is fun		.564	
... represents the future's TV viewing		.507	
... delivers intense experiences			.682
... is popular (among friends, family, colleagues, etc.)			.651
... works without disruptions			.476

Next, we conduct linear regression analysis based on the saved factor scores (Table 5). We used the reinforcement scales for sports, national and international program, as well as active and background viewing and the three scales for the perception of innovativeness, perceived enjoyment and perceived experience as independent variables and satisfaction as dependent variables. We also included age as a predictor. The explained variance is not really strong, only 21%, and the betas also are quite low yet significant.

Table 5: Regression analysis explaining Satisfaction ($R^2 = .209$, $F(10) = 96.707^{***}$)

	B	Beta
Effects on Sports / news content consumption	.073	.051**
Effects on National content consumption	n.s.	n.s.
Effects on foreign content consumption	n.s.	n.s.
Current use (Active viewing)	.403	.283***
Current use (Background viewing)	.233	.164***
Perceived newness	.091	.063***
Perceived enjoyment	.150	.104***
Perceived experience	.253	.175***
Age	.007	.056**

The regression analysis shows that the most important predictors for satisfaction with the platform are current active viewing behaviour with an interest in sports and news. People who watch TV more actively, are more satisfied with the application. Perceived experience and perceived enjoyment also play a role. It can be expected that perceptions influence current use, which in turn affects satisfaction. Based on the current explorative analyses the next steps will be to develop a path model in combination with confirmatory factor analysis to arrive at a more sophisticated model.

Discussion, conclusion future research

In this paper we have presented the first explorative results of a field trial on the use of an OTT mobile TV platform. As can be concluded from the log-data usage potential users have to pass a certain threshold in order to make the usage a part of their daily routine. If people do so we can see based on survey data that viewing behaviour is reinforced. However reinforcement is only weakly connected to satisfaction. Only viewing more sports and news correlates with satisfaction. It can be speculated that this patterns relates to the active usage of mobile devices as a primary screens. Using the mobile TV as a second screen (background viewing) is less strongly correlated to satisfaction. So it may be assumed that mobile TV can be seen as a substitute for viewing via the main screen, at least respondents are more satisfied in that case. Next we can conclude that mobile TV as offered via this platform leads to a reinforcement of viewing certain programs. Clearly there are three main profiles viewing actual information on sports and news, and the more entertainment related programs. It would be interesting to know if reinforcement of viewing correlates with active viewing behaviour or viewing TV on the background.

Currently research with regard to the usage of second screen usage is still in its infancy. In an earlier unpublished research project we made use of log and survey data. We found very low usage levels for smart phones and tablets for TV watching. Although this research was executed in a comparable neighbour country - with a yet somewhat distinctive different culture - the current results on usage levels and the patterns on reinforcement of viewing and perceptions in relation to satisfaction are encouraging. However on a conceptual level there is considerable room for extending the current research, focusing on substitution, replacement and reinforcement patterns, more extensively for specific program formats, in relation to attitudes, perceptions beliefs as well as context of use. On a methodological level combining the log and survey data on the level of the individual user will yield more insights. On a practical level the results are showing the potential for OTT platforms for mobile TV.

The research as reported in this paper still has major limitations. The research is research in progress. More extensive analyses are possible. We have access to rich data sets with impressive numbers of observations both for the log data and for the five surveys. The sample for the questionnaires were varying. The questionnaire focused on the first impression of the app contains 3693 respondents. The interview conducted in May contains 2544 respondents. The questionnaire related to diary results contains 10133 respondents. The questionnaire focused on the business case contains 4005 respondents. The questionnaire as used for establishing price sensitivity contains 5576 responses. In this paper we mainly made use of the data as collected with regard to usage. We are aware that the data as made available for secondary analyses and as presented in this paper, only shows a part of the picture and that we not yet explored the data in more in detail. We not only have large number of respondents but also a lot of variables to look into. More detailed analyses will lead to deeper insights that can be used to counteract to current main theoretical orientations, like TAM, Uses and Gratifications and displacement research. Future research will show the flaws in that research traditions and will come with alternative theoretical explanations.

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