Nóra Nyirő

ACCEPTANCE AND DIFFUSION OF MEDIA TECHNOLOGY INNOVATIONS

Media, Marketingcommunication and Telecommunication Department

Supervisor: Dóra Horváth, Ph.D.

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Corvinus University of Budapest Business Administration Doctoral School

ACCEPTANCE AND DIFFUSION OF MEDIA TECHNOLOGY INNOVATIONS

Ph.D. dissertation

Nóra Nyirő Budapest, 2011

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ACKNOWLEDGEMENT

I have to say thank you for many people when I think on the preparation of my Ph.D. dissertation. I have to thank for Mihály Gálik the confidence in me to start my university and so scientific carrier and the support during my work. I also thank to my supervisor, Dóra Horváth the continuous reassuring advises and to my opponents of my dissertation plan, József Berács, Ádám Babocsay and Árpád Papp-Váry the positive critics at the early stage of my dissertation. I am grateful to Ágnes Urbán, who supported me to find the topic of my dissertation and gave orientations in my researches. as well as to Ágnes Neulinger for her methodological support. I have to thank to all of my colleagues at my department and institute to helping me by the discussions, recommendations and advises

I am also thankful for my husband, my family and my friends for their insistent encouragement and patience which accompanied my constitutive working process.

AIMS AND STRUCTURE OF THE DISSERTATION

The understaing of the functioning of the economy as well as the use of media and primarily mass media technologies for marketing purposes could be defined as the dissertation's starting points. The importance of mass media and thus television lies in the fact that it is a channel of communication with extremely high coverage that to some extent reaches every member of society (McQuail, 2003). Communication theory and research include the research on the sources and the receivers of communication and the message itself, on the functions and goals of the channels, on the content and the types of information and the research on the effects of the whole process of communication. Among the diversified and multidisciplinar approaches of communication theory and within it, the four models of communication proposed by McQuail (2003) our view is determined by the publicity model characterized by the competitive display and the attention-giving spectatorship as this model highlights the economic importance of technological innovation and of its effects. This approach is closely related to the field of media economics which studies the business models adopted by market-oriented media enterprises the revenues of which come mainly from advertinsing revenues along with consumer purchases (Gálik-Urbán, 2008). Along with these, the subject of this dissertation is equally related to the fields of marketing and marketing communications seeing that these fields put a critical emphasis on the discovery and understanding of consumer (in our case, viewer) behavior for the development of an effective marketing communications planning and advertising strategy (Bauer–Berács, 2006; Sándor, 1999)

The approach of the thesis integrates the views undertaken by the media and communication sciences in audience measurement and understanding as well as that of the role of the adoption of innovation. Its main goal is to present a process of consumer media technology adoption and use of innovation, to identify factors determining and influencing the usage and to identify the user groups and their proprieties in the case of television, a mass medium consumed as an habitual and daily activity, predetermining a characteristically passive role to the viewer.

The scientific importance of the thesis is given by the exploration of the changes in the patters of media consumption and media technology usage. The study of innovation acceptance is all the more interesting and valuable in an environment which can hardly be characterized by activity and innovativity in terms of consumption. For the consumer television viewing is more of an easily accessible activity based on routine that requires a minimal effort. At the same time technological and media convergence, the appearance of digital technologies offers a new range of possibilities to consumers that might be able to influence and change on a large scale. The theoretical background of the thesis stems from the theories on the diffusion of innovation and from those of technology acceptance. Thus alongside the aim to explore consumer attitudes and perceptions, another goal of the thesis is to reveal attitudes and behaviors of technology usage. As Rushkoff (1999) says the "do it yourself" attitude has also reached media and television technologies and transforms the role of consumer to a role of active participant.

A practical interest of the thesis and the related research is its ability to supply information to the actors on the media and marketing communications markets on potential users of these new technologies and the factors affecting the acceptance of them. Thus it makes possible to content providers (television channels and broadcasters) to get a better understanding of their consumers and clients. It also delivers useful information to advertisers and media agencies to improve the effectiveness of their marketing communications campaigns.

The dissertation begins with the presentation of the importance of television and argues in favor of the thesis putting the study of this mass medium and its viewers into its focal point. In this part (Chapter 1) we also present the most important notions relating to the subject. After this we give a review on the theories and approaches relating to the diffusion of innovation and to technology acceptance (Chapter 2). In the next section (Chapter 3) we examine digital television and the relating new technology, the digital video recorder (DVR) as an innovation relating it to the theories on the diffusion of innovation presented beforehand. Then we summarize the studies on the viewer and usage behavior concerning the televisual content recording technologies within households (Chapter 4). In Chapter 5 we present our research questions and the formulated hypotheses, as well as the methodological and implementation planning of our empirical study followed by a summary of the findings of the research phases. Discussion and conclusions are presented in Chapter 6.

1. THE IMPORTANCE OF TELEVISION AS A MASS MEDIUM AND THE APPEARANCE OF THE PERSONAL VIDEO RECORDER

McLuhan (1962) declared the invention of television as important a milestone of media history as the invention of writing or that of high-speed printing press. Barwise and Ehrenberg (1996) gave the first chapter in their book entitled "Television and its audience" the name: "The Giant Medium", that suggests that anywhere one measures it in the world, television accounts for a giant within media. Time people devote to it makes television almighty (Barwise–Ehrenberg, 1994).

1.1. THE PENETRATION OF TELEVISION, VIEWING TIME AND ADVERTISING EXPENDITURES

In the developed countries television viewing per capita in the 1990's reaches if not exceeded 20 to 30 hours a week and the share of households equipped with at least one television set exceeds 95 per cent (Barwise–Ehrenberg, 1994 (first edition 1988)). Even though nearly 20 years have passed since the 1980-1990's, the number of hours spent watching television hasn't decreased. In Hungary, an average adult watched television 32 hours and 54 minutes a week in 2009 (AGB Nielsen, 2010a). The European average is 26 hours and 28 minutes similarly to the Japanese average (IP Network, 2009) while the average television-viewing time of each person older than 2 years is 35 hours and 34 minutes a week in the United States (Nielsen, 2010) and 22 hours and 24 minutes in the world (Braun, 2010)

The appearance of television had a great influence on people's lifestyle. In the United States television changed dramatically a number of habits, for example that of eating, the time and manner of supper, it reduced the appeal of late evening driving and thus reduced oil consumption whereas moving television into the living room made it uneasy to teenagers to use it as a location for wooing, making the car become a sort of mobile lounge (Levitt, 1962).

Practically everyone is a television viewer in the developed world where television penetration rate is close to 100 per cent and we spend a considerable amount of our time watching television. A typical viewer spends about two months of their year watching television counting with full, 24-hour days. Television is the fastest and broadest message broadcasting technology: it would have taken 9000 years reaching the crowd of the viewers of the transmission of only one Pavarotti–Domingo–Carreras concert during the 1994 World Cup, had they performed only in theaters (Mullan, 1997).

If we examine the television viewing time, we can identify several viewing tendencies: women usually watch more television than men, people living in bigger households watch less television on the average than those living in smaller households. At the same time demographic variables like sex or revenue do not determine unequivocally how much time an individual spends watching television. There is no high correlation between viewing time and psychographic or lifestyle variables. This proves that television is a veritable mass medium with a broad coverage and a general and mass consumption scheme: it cannot be attached to a specific group or demographic or psychographic attributes (Barwise–Ehrenberg, 1994). Notwithstanding this, different groups and individuals can be characterized by different amounts and frequencies of consumption, by different program choices and different channel preferences. However we can undeniably state that television is a decisive mass medium that occupies a distinguished place among leisure activities.

According to AGB Nielsen's¹ data in Hungary in 2009 the each member of the population over 4 spent 265 minutes i.e. 4 hours and 25 minutes, those with a diploma 3 hours and 47 minutes, the active main wage-earners 4 hours and 14 minutes, those in possession of a personal computer 3 hours and 45 minutes watching television per day (AGB Nielsen, 2010b). We generally watch more television on weekends and holidays, in summer the average time spent in front of the television usually slightly draws back. Not either this seasonal fallback of around 10 per cent is dramatic. In this period of vacation, viewing by children and teenagers stretches out far into the evening whereas in school time a slight raise of audition can be noted before the morning departure time. Concerning the viewing schedules, in each country and viewer group a concentrated viewing peak can be observed at the evening primetime. During evening prime time program broadcasting the number of potentially reachable viewers raises as people arrive home after work, school or any other daytime activity and do not go to sleep yet. Television channel diffuse their more valued programs, Hollywood movies or successful series and talk-shows². The

¹ AGB Italia group founded AGB Hungary in 1992. At present the subsidiary is 100% owned by the international group, The Nielsen Company. Currently AGB Nielsen conducts electronic television audience measurement in Hungary for the actors and stakeholders of the Hungarian televisual market. The number of households participating in the audience measurement is 1040, as of June 1., 2009.

 $^{^{2}}$ In the heroic age of radio, before the diffusion of television, this same evening period attracted the most listeners.

prime time audience has not decreased through the 1990's even with the improvement of the daytime programs' quality or the appearance of analog video recorders (Barwise–Ehrenberg, 1994).

From the viewpoint of consumers' television viewing is an unexpensive, light and entertaining spare time activity that nowadays is accessible to everyone thanks to the *free* to air business model, just like listening to radio. Research in the theory of uses and gratifications being equally a sub-genre of active audience theory within the field of study of media effects (McQuail, 2003) showed that people watch television for distraction, to pass time or to escape their anguish. But television also has societal effects: those who live alone, are alone mention not to be alone as a reason for watching television. Television has become a kind of companion. In addition television is also an important source of information, it is where we get to know what happens in the world (Barwise-Ehrenberg, 1994). Thus television viewing is not only a leisure activity but often carries a higher value to its viewer. Although today the consumption of audiovisual contents is possible through a number of platforms, primarily on a personal computer thanks to downloaded or streamed content on the internet, but mobile phones also offer the possibility to play videos and an increasing number also has access to the internet, television remains the dominant platform for consuming video content. As we saw before, in Hungary the members of households with a personal computer spend on average 3 hours and 45 minutes watching television a day and the age group of 4 to 17 years having a computer also watches 2 hours and 47 minutes of television a day (AGB, 2010b). According to data from Nielsen (2010) in the United States 36,6 per cent of households own a digital video recorder, which corresponds to a 51 per cent increase versus the first quarter of 2008. At the same time an average American past the age of 2 watches 2 hours and 9 minutes of delayed television (corresponding to a 18 per cent increase versus the same period of 2009) and watches only 20 minutes of video online.

In the respect of marketing communication and advertising market television is the most effective medium (Schreiber, 2008). In case of a nationwide advertising campaign television is almost always the primary medium. Within the media-mix of an average nationwide advertiser television accounts for 60 per cent and 40 per cent remain for the other media. The shorter the purchase cycle is the more television is used (e.g. Coca-Cola) and car manufacturers turn to television in 58 per cent of the cases if they want to advertise. Television is the most effective medium to reach extensive communication goals and to generate sales: it offers a high reach under a relatively short period of time

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and keeps one's attention as it is capable of sending various advertising stimuli (picture, color, movement, sound, written message) at one time (Goldenberg et al., 2002).

Also in regard to advertising expenditure television is a decisive medium. Although it coexists in a changing environment with new and emerging promotional media like the internet, for the time being television attracts the majority of advertising expenditures as shown in Tables 1.1 and 1.2.

Table 1.1. Advertising Spending in the World (2007-2010). Source: ZenithOptimedia (2011)

	2007 (%)	2008 (%)	2009 (%)	2010 (%)	2010 ratecard price (million US dollar)
Television	37,3%	37,6%	39,1%	40,4%	165,50
Press	39,3%	37,5%	33,4%	31,2%	141,28
Radio	8,0%	7,8%	7,5%	7,2%	31,67
Outdoor	6,2%	6,4%	6,7%	6,6%	29,46
Internet	8,6%	10,2%	12,8%	14,1%	54,23
Cinema	0,5%	0,5%	0,5%	0,5%	2,09
Total	100,0%	100,0%	100,0%	100,0%	422,96

Table 1.2. Estimated Total Net Advertising Spending by Medium in Hungary (2007-2010). Source: MRSZ - Magyar Reklám Szövetség [Hungarian Advertising Association] (2011)

	2007 (%)	2008 (%)	2009 (%)	2010 (%)*	2010 net amound (milliard HUF)
Television	40,1%	39,0%	40,4%	40,0%	68,60
Press	36,2%	34,5%	30,9%	27,2%	43,70
Radio	5,1%	5,8%	5,1%	4,2%	7,14
Outdoor**	10,7%	10,2%	8,9%	12,4%	16,85
Internet	7,5%	10,0%	14,4%	15,9%	27,27
Cinema	0,4%	0,4%	0,5%	0,5%	0,70
Összesen	100,0%	100,0%	100,0%	100,0%	161,71

*methodology changed

** Including Ambient media expenditure in 2010

We can see that even though the global economic crisis had a serious effect on the advertising market as well on a worldwide scale as in Hungary itself, television still holds an incontestable position among media as well in weight as in proportion.

1.2 THE CHANGE OF THE ENVIRONMENT OF TELEVISION MARKET

Content providers on the television market exert their influence through the packaging of pieces of individual content (shows, films, series, etc.) and content within and around these (e.g. commercials, trailers). Through this sorting, selection and packaging of content, providers deliver a continuous quality control and thus build up their own brand, create a brand value for their channels. Watching over the history of television, in its first stage there was only a restricted offer characterized by an oligopolistic market and oligopolistic processes. For viewers this meant that everyone watched everything. In Hungary, for example, almost the whole country was watching altogether each coverage on a figure skating championship or each episode of soap operas like Dallas or the Hungarian Szomszédok [Neighbors]. In this stage of television's history, analog video recorders allowed to reinforce individual preferences. Beside recording from the restricted quantity of available content, these machines were used to watching prerecorded video tapes or to other, non televisual purposes like watching family videos.

In the age of multichannel television in the analog world mass audience breaks up (McQuail, 2003) and individual preferences are served by numerous thematic channels. This era starts in the 1970-1980's on the American and European markets (Gálik–Urbán, 2008). Content offer grows at the same time as grows the offer of channels and a fragmentation and polarization of the audience get under way. The role of the analog video recorder increases as the recording of parallel programs can be used as a means to lower the pressure of choice. Meantime the constraint of time available to reviewing the recorded content appears and a number of cassettes and films are never watched. Even with a broadening offer on the televisual market, there is strengthening consumption of home video with a growing retail and rental market of prerecorded home videos (Noam, 1991; Gálik-Urbán, 2008). When examining the diffusion of technological innovations it is important to notice that in most of the cases penetration rate of the affected devices will never reach 100 per cent. Analog radio or color television have reached this rate so far, although none of these are based on one single and identical technology: there are numerous types of mobile communication devices with differing functions just like there are various types of color television sets (lcd, plasma screens or screens with the traditional, cathode ray tube; sets capable or incapable of receiving digital signals; etc.) and an ensemble of different types of technology give up these considerable penetration

rates. The penetration rate of analog video recorders peaked at around 75 per cent in the developed countries (Gálik–Urbán, 2008).

The digitalization of the multichannel model allowed access to an ever broader range of channels. More and more content is available although generally still at a definite moment. The entry of digital technology into the televisual market brought computer hardware and many television-related applications, like recording video upon a hard disk by means of a digital video recorder which is capable of storing recorded content (in order to be viewed subsequently), as well as recording just running programs without the need of an additional storage device (cassette, disk, etc.).

Negroponte (1995) in his forecast about digitized media consumption argues that the future of television is in on-demand video and that beside each viewer's own channels which are playlists of content compiled by the very users, traditional television viewing loses all its sense and time shifting would disappear as by reaching content producers, be they professionals or civilians (web 2.0) directly, this very phenomenon would only apply for live broadcasts. At the same time the conception of "My channel" has remained a dim idea for now as the cost of individual, viewer research cost is very high as creating an own flow (by selecting, editing, rating, compiling through numerous available programs) would require a considerable effort from the user, even more that viewers are far from being perfectly informed concerning each program and on that account viewers leave program editing to the channels' programming divisions.

The question is which consumer needs the personal video recorder is able to fulfill a preceding technology could not. Is this technology user-friendly and easy-to-use enough in order for it to be able to allow the actual detachment from the television channels' flows and do users actually require it? Is there by chance a user group among the innovator and early adopter users that has never been in possession of the preceding technologies (analog video recorder, dvd-recorder)? It is perceivable that this technology which does not represent a radical change in itself, although flexible and easy-to-use in users' and viewers' point of view, will lead to a breakthrough that would attract the remaining viewers not having formerly used any recording device into the category of users, thus leading to the realization of the "leapfrog effect" as described by Goldenberg and Oreg (2007).

Goldenberg and Oreg (2007) in their study of the owners of music player technologies argue that the 10 per cent leapfroggers (those that change from a walkman to an MP3-player or an iPod) who accounted for laggards in the case of cd-players and

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maybe late adopters in the case of walkmans, can bring an 89 per cent higher profit to the given company than if they only calculated with the innovators and the early adopters. Thus they believe that finding and persuading the segment of a former technology's laggard, non-adopter group of users who are likely to become a new technology's innovators is a key issue.

1.3. HOME VIDEO RECORDING TECHNOLOGIES: THE APPEARANCE OF THE DIGITAL VIDEO RECORDER

Following the industrial usage of the technology, the first video recorder designed for households had been first marketed in 1965-ben. Philips designed its first video recorder in 1970 and started to sell it from 1972 in the United Kingdom. The device was fairly expensive and had a moderate reception. Television sets with integrated video recorders marketed at that time had also a limited success. Home video recording's success and real entry into the mass market can be dated from the beginning of the 1970's when VHS came out victorious from the videotape format war that opposed VHS and Betamax3 and spread worldwide (Gray–Doors, 1987, Daniel et al, 1998). The 1980's can be characterized by the augmenting number of the multi set homes, when children could watch television in their own rooms while parents watched their favorite series in the living room or followed the afternoon show from the kitchen. This was the time when the technology of video recording came into existence and first made it possible to move from linear programming and to extend the usage of the television screen for other purposes than watching television, e.g. playing video games, watching home videos and self-made videos. Television has colonized the living rooms and conquered spare time (Mullan, 1997).

The first digital video recording devices appeared in the United States in the 1990's but today several of them are available even in Europe. Contrarily to the traditional video recorder or the DVD-recorder this device offers a full time-shifting feature and is capable of restructuring the viewing time. The advantages of digital technology do not only appear in the storage capacity, the device's programmability is

³ Sony came out with Betamax while JVC with VHS in the middle of the 1970's. While Betamax's introduction to the market preceded VHS's by one year and had been said to have better technical qualities, users did not perceive this advantage. Betamax had also the disadvantage that it required a separate timer and it was only able to record an hour worth of content. VHS offered 2 and 4 hours of recording time from the beginning, which became a decisive advantage and brought VHS a market dominance simply from overwhelming costumer purchases.

almost as important: it can be programmed to record not only one but several programs (e.g. all episodes of a series). If a device contains an electronic program guide (EPG) as well, the recording can not only be set by the program's schedule but also by its name making the device fully user-friendly. It does not require any external data storage devices (video cassettes, recordable dvd) the user consequently does not have to store. At last but not the least it records the flow currently watched, the given program can therefore be stopped or rewinded even in case one did not intentionally record it, and one can also decide to record the ongoing program from its past beginning without any data loss.

The use of the term "time-shifting" has gained a broader acceptance in the past years even though the possibility to record and playback a television program has a longer history: recording and time-shifted viewing was already available in the 1980's thanks to the traditional video cassette recorder (VCR). This obviously was carried out by a traditional analog device with all of its inconveniences: video cassettes with a limited capacity of only 3 or 4 hours had to be purchased previous to the recording, after multiple recording the quality of the tape and thus of the recorded material deteriorated significantly. Nonetheless the VCR made it possible for the viewer to record and later play back, even several times if they wanted, programs they considered promising or especially interesting and this even though the video recorder had also other fields of use (viewing family videos and purchased or loaned home video cassettes).

Concerning our study we find it important to narrow our focus to the sole televisual platform thus the consumption of audiovisual content over the internet or the viewing of televisual content on other platforms (personal computers, mobile phones) do not constitute the object of our study. The mail goal of the dissertation is to analyze the acceptance and use of a new digital technology, the digital video recorder and through this to present a category of time-shifting as a new kind of behavior during television viewing.

At the age of digital media and the internet the meaning and domain of time shifting becomes much more complex. Television channels can upload their programs onto their websites following the programs' first broadcasting for example where viewers can later watch these by downloading or streaming them. There are also cases when a channel broadcasts its flow through its website with one hour of delay compared to its original broadcast time (e.g. the Hungarian news and information channel, Hír TV). In an even broader context, illegal downloads of torrents can also be accounted for time shifted views. Thanks to the technology of digital television, viewers through their set-top boxes have also access to video on demand, where broadcasters can make their programs available for later viewing following their initial broadcast times. However the new technology is also able to give access to an automatic content recording function capable of giving another time-shifted viewing opportunity according to the viewers own preferences through the *digital or personal video recorder* (DVR/PVR⁴) device which is capable of continually recording the just-viewed (or not viewed). For this, the device does not require any additional storage device (e.g. cassette, recordable dvd-disc). There exists an increasing number of set-top boxes, initially serving as a decoder device for the television of the digital input signals that, extended with an internal memory, offer a time shifted view function. The recorded content is stored on the device's hard disk therefore one can play, pause, rewind or replay it at any time. A decisive user activity related to this device is thus the time-shifted view of television programs when viewers watch their recorded content delayed from its original air time.

The first two devices with a broad acknowledgment and use, the TiVo and the ReplayTV both appeared in 1999 in the United States. Many expected that these will change the television market radically, the viewers would decide what and when to watch themselves. It is the end of the traditional era of television when content providers' programming influenced what viewers could watch. As with railways, the service offered and its schedule is determined to an exact day and hour, consumers decide whether to use the service (get on the train, turn on the television) or not. The digital video recorder can nevertheless change this handing over the control to the consumer (Carlson, 2006).

ReplayTV was purchased by the satellite services provider DirectTV in 2007 and the brand disappeared from the market. TiVo on the other hand exists up to this day but it is offered as a subscription-based service: in order to continually upgrade the device's software and to keep the EPG up-to-date, the device is connected to the network in lack of which it fails to function. At the moment of elaboration of the hereby study, in April 2010, there were 2.6 million subscriptions to the service but with a strongly decreasing tendency (TiVo, 2010). A possible reason to this is that a DVR is increasingly hard to sell as a standalone product, instead in the United States as in the whole world, it became an attractive function of the rapidly spreading digital television (DTV). DTV service providers differentiate their packages not only through the number of channels offered but

⁴ DVR and PVR have essentially the same significance. Within academic literature the term DVR is more widespread and therefore we as well refer to it as DVR hereafter. As international literature is permissive regarding abbreviations for as much as using them within titles of journals we as well seize the opportunity to use them.

also through the additional services provided with the subscription e.g. whether the set-top box provided with the subscription contains a DVR i.e. video recording function.

The first DVR service In Europe was offered by the British satellite television broadcaster BSkyB under the name Sky+. This also indicates the direction the market heads to in Europe: TiVo or any other company offering devices and services with the sole DVR function hadn't made its appearance, DTV operators entered the market instead. Advanced models of the digital decoders necessary for the reception of digital signals (the so-called set-top boxes) also enclose a hard drive in Europe as well, the consumers can – for a higher fee – subscribe to a DVR service. Sky+ currently allows the recording of some 185 hours of programs which in this way can be played, stopped, fast forwarded or rewinded at any time. One can also control the device through a mobil phone or over the internet which is especially useful if one's plans chage during the day and will not arrive home to the beginning of the desired program and can however record it this way. The number of Sky+ subscribers grows rapidly, at the end of 2009 there were 6.5 million households using the service (Sky, 2010).

BSkyB's move was followed by several other competitors. On Freeview's digital terrestrial platform a DVR services is available since May 2007 (previously called Freeview Playback, now Freeview+). In this case there is no subscription fee following the purchase of the device. Virgin, another provider of television also started its DVR service under the name V+. According to data of the British regulatory authority, the Office of Communication (Ofcom) (2009) 27 per cent of British households now own some sort of DVR device.

In Hungary, viewers usually use the integrated recording functionality of their settop boxes. The first service offer of the kind was within the IPTV package of T-Group, under the name T-Home in November 2006 (MKM - Média Kábel Műhold, 2006). Since then service provider UPC offers digital cable and satellite subscriptions to consumers with integrated storage capacity, broadban providers Invitel and EnterNet on their side offer specifically IPTV subscriptions (MKM - Média Kábel Műhold, 2008, 2009). The development of the Hungarian market shows the same characteristics as the rest of Europe: there is no exclusively DVR service available but the main digital providers include the possibility of recording programs through their set-top boxes. Magyar Telekom's IPTV and UPC's digital cable and satellite offers equally include the DVR function and the number of households with a subscription to this service exceeds 150 thousand according to estimates (companies do not publish the repartition of their subscribers among their different offers thus no exact data is available).

At the appearance of DVR advertisers and television channels feared that the traditional, advertisement-based business model would be in danger. Their fears have not proved true on a short term as the diffusion of the DVR is slower than expected, but the long term effects remain to be analyzed. It can nevertheless already be suspected that the transformation of the viewing preferences and the arrival of the early majority beside the group of innovators and early adopters as a market segment with a considerable number of viewers, television viewing could be subjected to a radical change.

Hereafter we refer to the terminology on the technologies of home recording of televisual content as follows:

- DVR digital video recorder
- STB set-top-box, the decoder device capable of receiving digital television signals and can be equipped with a digital video recorder,
- VCR video recorder, commonly referred to as 'video'. The term always refers to the analog device. In the case of its digital counterpart, we always use the term DVR.
- video, video recorder see VCR.
- EPG electronic program guide.

2. THE DIFFUSION AND ACCEPTANCE OF TECHNOLOGICAL INNOVATIONS

2.1 THE THEORY OF THE DIFFUSION OF INNOVATION

2.1.1. The notions of innovation and diffusion of innovation

The lexical definition of innovation includes the processes of renewing, changing or creating something new. In every case the concept of innovation carries a positive connotation. According to the synthesizing definition by Vágási et al. (2006:17), "we understand under innovation new knowledge, ideas, methods, processes, institutions, strategies, markets, products and services – and the creation thereof".

It is important to make a distinction between invention and innovation. Invention is a new idea, product or process, while innovation is the first appearance in practice of the invention. It occurs sometimes that the two concepts go closely with one another and follow each other in time, but there can also be cases when decades pass between the actual invention and the marketing of the innovation. The distinction of the concepts can be traced back to Schumpeter's (1954) book where he states that the essential function and activity of the entrepreneur is clearly distinct from that of the inventor. An additional difference between the two concepts is that while invention can appear everywhere (at universities, research centers, etc.) innovations specifically appear in business or in some cases in other institutions, e.g. public hospitals (Rogers, 1995). An important conclusion of the aforementioned definition concerning our study is that from business and marketing point of view innovation is the core feature to be analyzed as opposed to inventions having the role to prepare later innovations.

Schumpeter already stated in as early as 1939 that innovations tend to accumulate in certain industries and periods of time which then shape business cycles and long waves in world economy. In Schumpeter and Fels's (1939) view innovation leads the qualitative changes that are a major driver of the economy. Schumpeter (1954) distinguishes five types of innovation: new product, new method of production, the capture of new sources of supply, the breaking into a new market and the new organization of industry.

An essential differentiating criterion within innovation is the inherent difference between product innovation and process innovation. For example, a new device capable of recording video material, like the digital video recorder is a product innovation. Process innovation on the other hand is the development of content providing services related to the given device.

Innovation can also be classified as technological process innovation or institutional process innovation. Another differentiating criterion that can be traced back to Schumpeter's work is to estimate how radical the innovation is compared to current technology. From this perspective, innovation can be characterized into incremental innovation, radical innovation (e.g. the introduction of a totally new type of machinery) and technological revolution, a cluster of innovation with great consequences (Fagerberg, 2006).

Concerning the process and dynamics of development, innovation can be continuous, dynamic or discontinuous (i.e. non coherent with continuity) (Robertson, 1967). For the latter, Rekettye (1997) proposes the term "revolutionary innovation".

In addition to the proprieties of innovation stated above, it is a continuous process and cannot be viewed as a well-determined, homogenous event that occurs in a given moment. Innovations are subject to continual and often considerable changes transforming subsequently their economic importance. Change underwent following market introduction is often more important than innovation in its first and original material form. Who and what can be considered an innovation at the end: only A, that introduces a given innovation or B as well who employs the same innovation in a new context or environment, or this latter is simply an imitation or a transfer of technology? Some researchers argue that one can equally refer to this latter as innovation since a number of economic innovation happened at the moment a product or process had already started to diffuse (Klein–Rosenberg, 1986, *in* Fagerberg, 2006). The novelty of an innovation can be absolute or relative according to the intensity and degree of the novelty (Vágási et al., 2006).

Economic innovation theory stems from the schumpeterian (1954) definition while in a management perspective we can cite Drucker (1998) who defines innovation as an organized and planned activity during which businesses create new and distinct value and fulfill new and ditinct needs.

Following this brief description of innovation we will accept the following, broad definition proposed by the Oxford Handbook of Innovation (Fagerberg et al., 2006): the function of innovation is to bring novelty into the economic sphere. Innovation tends to accumulate in certain industries and economic sectors which thus grow more rapidly than

the rest of the economy. Additionally, innovation is a strong explanatory factor behind differences in performance of businesses, regions and countries.

The diffusion of innovation is "the process in time during which a new product becomes gradually accepted on its target market by the potential consumers and society as a whole". Dacko (2008) defines the adoption of innovation in his book *The advanced dictionary of marketing* as follows. Theories on the adoption of innovations include approaches that try to understand, describe and forecast how, why and to what extent will individuals and institutions adopt and purchase new offerings. These theories recognize the role of numerous factors that influence the adoption of products or services, e.g. the perceived value of innovation, the communication of the innovation and the knowledge and experience about the new product. In the next chapter we present the theories on the diffusion of innovations.

2.1.2. The diffusion of innovations

The models of diffusion of innovations and the study of novelty adoption can be related to two decisive researchers who elaborated a comprehensive and tractable framework, namely Rogers (1995, first edition: 1962) and Bass (1969). Bass's empirical research was inspired by Rogers's theory who elaborated a marketing model on the diffusion of innovations continually updated and employed until today. Literature on the diffusion of innovations is extensive the subject being addressed by several areas of sciences. The present thesis studies theories considered relevant for the diffusion and adoption of digital television and the related technologies in order to establish a theoretical and research framework and eventually formulate hypotheses for our own empirical research.

In the study of the diffusion of innovations we shall mention Rosenber's (1972) opinion according to which the diffusion of innovation can be characterized by two decisive but ambivalent factors: on one hand, an overwhelming slowness and on the other, the great diversity concerning the adoption and thus the speed of diffusion of certain innovations. Today it is no different, the subject of diffusion of innovations is a matter of continuous study: what influences the diffusion of innvations and the speed thereof and how and to what extent, which of these factors are worthwhile to study and with what approach? The models of diffusion of innovation can be characterized into two main groups alongside the manner of approach, be they from the point of view of marketing or from that of economic theory. The first group contains the models of diffusion with a

classic S curve (e.g. Rogers's) where the cost of a product does not increase in time but stagnates or decreases and the user's utility is average. The other group contains the epidemic models (eg. Bass's) more characteristic of the marketing literature and sociological theories. According to the latter, consumer may have a similar taste and the price of the product or service may be constant or decreasing in time but as customers do not learn about the new technology at the same time, the adoption of innovation will accelerate with time and the diffusion of information. In the end, this too leads to an S curve although the shapes of the S are different. The model on the diffusion of information strengthens the S shape of the curve.

Marketing literature on the diffusion of innovation focuses primarily on to questions: How to encourage consumers and customers to adopt new technologies and products and how to forecast a market success. Thus they put the emphasis on factors like media information, actors facilitating change, the role of social networks or product attributes and less on attributes of individual adopters like their levels of qualification or revenue or other socio-demographic and lifestyle variables (Hall, 2006).

In our present thesis we will review several theories on the diffusion of innovation which will serve as a theoretical framework for the following chapters about the diffusion of digital television and the relating technologies. We will review Roger's (1995) theory based partly on sociological and institutional theory, Bass's (1969) diffusion model and Hall's (2006) and Gatignon and Robertson's (1985) seminal review article. Next we will elaborate on Christensen's (1997) theory about disruptive technologies and on the model proposed by Ortt and Schoormans (2004) with three phases to describe the process of diffusion of information and communications technology. We will present Rogers's (1989) approach on the diffusion of communications technologies then we will cite Davis's (1989) technology acceptance model and its extensions, which discusses specifically the user acceptance of technological innovations. On the subject of the entry and diffusion of innovations to households we will review the domestication theory of media technologies according to Haddon (2006).

2.1.3. DIFFUSION OF INNOVATIONS THEORY BY ROGERS

Everett M. Rogers's book, first published in 1962 and now through several editions is a decisive work in the field of diffusion of innovations. According to Rogers (1995) a wide framework is needed in order to be able to evaluate the success or fail of innovations hence he outlines those external and social factors that can accelerate or

hinder the diffusion of innovations. He distinguishes five categories of variables determining the rate of adoption, summarized on Figure 2.1. A determining variable is the type of innovation decision, whether the decision was made on an optional, collective or authoritarian level. The communication channel reporting information on innovations is also decisive, be it interpersonal communication or mass media. The nature of the social system also has an effect on innovation adoption as it determines the norms and social embeddedness of potential adopters. We can not overlook the sales promotion efforts made by change agents (e.g. promoters, developing agencies, etc.) either. Still, among the five categories the most decisive is that of the perceived attributes of innovations which explains for 87 per cent the rate of adoption of innovations (Rogers, 1995).

Figure 2.1. Variables Determining the Adoption of Innovations. Source: Rogers (1995, p. 207.).



Rogers (1995) identifies five factors that influences potential adopters on an individual level and thus has an influence on the diffusion of innovation:

- Relative advantage shows to what extent benefits, utility are perceptible to consumers compared to preceding products, technologies, services. In addition to economic factors, the perception of utility can be influenced by factors like social prestige, convenience or satisfaction.
- Compatibility: Innovation must be consistent with past experience and must be compatible with users' current lifestyle, values and social norms. The more this attribute is characteristic to innovation the less uncertainty users will have to bear and the smoother the diffusion of the technology, product or service will be.

- Complexity: From a consumer's point of view it is crucial to what degree potential users perceive difficult to understand an innovation and its use. New technologies that are simpler to understand are obviously adopted but more importantly learned more easily than more complex innovation.
- Trialability: If there exist a way and opportunity to try an innovation and acquire personal experiences, it will notably decrease consumer mistrust towards that innovation. Through trialability users gradually get to know the functionalities, properties and novelties of the technology, product or service.
- Observability: If the result of an innovation is clearly visible, observable to others than it is more likely consumers will try that innovation.

We believe that it is appropriate to add to the preceding extended framework Roseberg's (1972) statement, namely that not only new technology progresses with user experience and feedback but also old technology can commence a "last gasp" improvement due to the new technology's competitive pressure which can retard the diffusion of innovations. According to Rosenberg (1972) the diffusion of new technologies is primarily influenced by the following factors: the continuity of the innovation process, the improvement made on the innovation after its first marketing, the improvement of users' technological skills, the improvement of the products manufacturing capabilities, the existence and improvement of complementary products or services and the improvement or the current or "old" technology, this latter retarding the diffusion of innovations.

Rogers characterized consumers into five categories with the following proportions: innovators (2.5 per cent), early adopters (13.5 per cent), early majority (34.0 per cent), late majority (34.0 per cent) and laggards (16.0 per cent). In his theory, adoption, i.e. the diffusion of innovations curve follows a normal distribution, is linear in time and the velocity of the diffusion is constant. Thus the range of adopters as well as the phases in the diffusion of the product can easily be identified.

Rogers was not exempt of critics in academic literature either. Peterson (1973) raised doubts about the condition that all products follow a normal distribution curve. Mahajan et al. (1990b) questioned the given proportions of the user categories, asking why the proportion of innovators could not be larger for certain product categories.

Rink and Swan (1979) stated that there are a number of products with a notably different product life cycle than the normal distribution curve. In spite of these criticisms

we can assert that in the majority of cases the famous S curve is well fit to represent the diffusion of innovations.

Research focuses most frequently on Rogers's group of innovators and less on the other four categories and these are the innovators' attributes that it tries most often to identify (Martinez et al., 1998). According to Rogers (1995) innovators tend to have higher qualification, social status, revenue and are more likely to be socially active than the non-innovator consumer groups. Researchers are however divided on another frequently cited attribute, the age group difference, i.e. that innovators tend to be younger. Rogers now rejects this attribute while Mahajan et al. (1990b) and Dickerson and Gentry (1983) do identify it.

2.1.4. BASS DIFFUSION MODEL

Diffusion of innovation theories first appeared in marketing literature in the 1960's (Bass, 1969, Mansfield, 1961). Research on consumer behavior also attempted to integrate diffusion theories (Gatignon-Robertson, 1985). Bass's (1969) model is one of the most influential of marketing approaches of the diffusion of innovations. The model was inspired by Rogers's (1995) theory and outlines that in the first phase of the diffusion of innovations mass media have a crucial role whereas during the ensuing phases interpersonal communications emerge as the decisive channel of communication. The model's main statement is that the first act of purchase is highly influenced by the number of preceding purchases. The model characterizes consumers into two categories according to their behavior: innovators and imitators. Innovators are not influenced by the number of other users when buying a new product. Their main sources of information are mass media and corporate communications. Imitators on the other hand depend on the number of prior purchasers. Members of this group do "learn" this behavior in a sense from the preceding users, thus the information received from the innovators (i.e. word-of-mouth) greatly influences their behavior and decisions. The model's core is that the probability of the first purchase (i.e. a purchase not preceded by any purchase of the same product by the given individual) is a linear function of preceding purchases by other persons. At first the role of innovators is decisive in the diffusion as they constitute the group of first adopters but eventually their role decreases with time as (like for other epidemic models) information about the product commences to spread through interpersonal communication and information exchange, these latter being a driving force behind facilitating purchases

and consumer acceptance. Hence as a result of the increase of adoption and the quantity of purchases the diffusion of innovation is achieved on a macro level. In Bass's model, in each period of time a given number of consumers become purchasers and the number of potential adopters decreases parallelly to the number of preceding purchases (adoptions).

A distinguishing characteristic of the model is that it forecasts an exponential growth until a given point following which the growth rate begins to decline. We should point out in our theme of research that the first long-term forecast as well as the model's first tryout had been carried out by the author on the diffusion of color television. In this test he acquired data which largely understated original market forecasts (Bass, 1969). According to sales data, Bass's estimates proved to be more realistic in the long term in contrast to more optimistic manufacturer expectations.

Several works examined the possibilities of extension of Bass's model with the elements of marketing-mix. Robinson and Lakhani (1975) or Kalish (1983) studied price as a variable, Horsky and Simon (1983), Teng and Thompson (1983) incorporated promotion, Srivastava et al. (1985) did so with product attributes, while Kalish (1985) and Parker and Gatignon (1994) combined the previous variables. Reworking Bass's model, beside the first purchase of a new product, the replacement of an old product to a new one also has been incorporated to the model (Norton–Bass, 1987). An extensive work on the model's further extension possibilities was published in 1990. The authors highlight five areas of study that need to be incorporated into the Bass model, consumer expectations, consumer judgment of the given innovation and the micro-level understanding of the diffusion process, among others (Mahajan et al., 1990a).

Parker and Gatignon (1994) examine the differences on a brand level in relation with the models of diffusion and state that diffusion within brands can also be different even within categories of products.

Bass himself proposed an extension to his model, with the introduction of a separate variable to measure current marketing effort (Bass et al., 1994). In the generalized Bass model (GBM) the authors argue that no further extension (e.g. with variables like price and promotion) is needed. The generalized Bass model includes the decision variables within one variable and includes a time dimension as well (Bass et al., 1994).

Bass (2004) in his summary article corrects the original title "A new product growth for model consumer durables" to "A new product growth model for consumer durables" and points out that the title artificially restricts the area of application of the model to consumer durables although it is widely applicable to services or a business-tobusiness market as well, as shown by the research papers following and based on the original model. Bass extends the model to succesive generations of technology as well, taking also into account the number of adopters of preceding technologies.

2.1.5. An integration of the Bass diffusion model and Rogers's theory

Mahajan et al. (1990b) form new user categories using Bass's model thus questioning (though utilizing) Rogers's categorization of adopters. In this manner, combining the two theories they establish a flexible diffusion model in which the extent of adopter groups can differ (with certain bounds) according to the diffusion of the product (Piré-Lechelard, 2004). The advantage of Rogers's classification is that it is easy to use, and results of different empirical studies can easily be compared thanks to it. Being a normal distribution curve we can forecast the continuous rate of adoption and assign the adopter groups accordingly. Although on one hand, in reality, not all diffusion curves follow a normal distribution as statet by Peterson (1973) and Rink and Swan (1979). On the other hand, Rogers does not provide an empirical validation concerning the size of his groups of adopters: why would laggards account for 16 per cent or early adopters for 13,3 per cent of all customers?

The Bass model originally distinguishes only two groups of potential users, innovators and imitators, where the number of imitators is a function of the diffusion of information through the effects of corporate communication. Innovators had been estimated to represent between 2.0 and 2.8 per cent of all consumers, which is comparable to the number of innovators in Rogers's categorization. The model also notably differs from Rogers's categorization in the sense that within the group of innovators, the proportion of early adopters, early majority and late majority is given according to external influence (i.e. promotion) and internal influence. The range of the different user categories is shown on Figure 2.2. Innovators represent 0.2 to 2.8 per cent of users, early adopters represent 9.5 to 20.0 per cent, early majority 29.1 to 32.1 per cent, late majority 29.1 to 32.1 per cent, while laggards account for 21.4 to 23.5 per cent of adopters.





When comparing adopter categories, it can be stated that early adopters have higher levels of income, higher qualifications, they hold higher positions and are younger than the remaining categories (Mahajan et al., 1990b). This demographical difference was also confirmed by an empirical study on the adopters and non-adopters of personal computers (Dickerson–Gentry, 1983).

Other studies found that variables relating to perceived usefulness can better forecast the adoption of innovation than standard demographic, psychographic variables generally accepted by the literature (McDonald et al., 2003). However, we should also mention that according to Goldenberg et al. (2002), the model on adopter categories of innovations proposed by Mahajan et al. (1990b) does not work in more than 30 per cent of the cases.

2.1.6. Synthesizing theories on the models of diffusion of innovations

The role of consumers cannot be overemphasized in the case of technology acceptance. Although the success of a technology is in part due to the technology itself still market success ensures the other part which highly depends on consumer attitudes and on consumer reception of the given technology(Albarran, 2006). In a consumer's point of view the most crucial point about the diffusion of innovations in not whether to adopt or not to adopt them but whether to adopt it immediately or later. Process and method innovations are characterized by fast diffusions and disappearance (e.g. a new diet or a new business process method) as here adopters "only" loose the time and energy invested in the adoption while in the case of physical products, they loose the actual sum

of money spent on the product when abandoning it to a new one. It can be said that relatively small sunk costs and uncertain utilities lead to a faster adaptation. A good example to this is the fashion industry exhibiting new innovations to consumer masses each season (Hall, 2006).

According to Hall's (2006) summary, the factors influencing the speed of diffusion of innovations can be identified as follows:

• Utility and advantage offered by new technology: does an older substitute technology exist and compared to it, to what extent can the new technology offer any advantage, according to Rogers's factor of relative advantage.

• Network effect: the value of an innovation can be influenced by the extent of other users that have adopted a new technology (e.g.: mobile phones, internet, ATM's).

• Costs of adopting a new technology: which includes the cost of purchase, the cost of substitute investment and the cost of training.

• Available information and uncertainty: available information and knowledge can considerably reduce uncertainty. A firm can do much by providing information e.g. through promotion although this raises the product's or service's price. Interpersonal communications channels are important as well, be they a close source or anyone one is in a relationship of any kind with. Studies on consumer durables showed that interpersonal communication has a far greater effect on the diffusion of innovation than media (Rogers, 1995). Uncertainty related to prospective benefits and costs and to life-cylce can however delay innovation adoption.

• Market size, industry environment and market structure: there are a number of markets where innovation diffusion relies on firms but on some markets decision is up to consumers, e.g. which technology of recording motion picture to use (VCR, Beta cassette, DVD-recorder or DVR).

• Cultural and social factors: attitudes and propensity to taking risks in connection with innovation acceptance on a social level on one hand, and on an individual level on the other. Tellis et al. (2003) found that in European countries variables like sex, cultural attitude or religion have a slightly limited predictive power for consumer durables.

Gatignon and Robertson's (1985) sythesizing diagram gives a clear picture about the different fields of study related to the diffusion of innovation and displays these in an approach relevant to the study of consumers and consumer markets. The model includes

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in an integrative way the individual and social factors relative to the diffusion of innovations, together with the framework defining the context with the effects and countereffects between determinants present on markets.



Figure 2.3.: A Model of the Diffusion Process. Source: Gatignon–Robertson (1985:850)

2.1.7. DISRUPTIVE TECHNOLOGY THEORY BY CHRISTENSEN

Clayton M. Christensen (1997) introduced the term "disruptive technologies". Christensen uses the concept of technology in a broad and comprehensive sense, and includes every process through which an institution transforms labor, raw materials or information into a product or service with a higher added value and considers the evolution of these technologies as innovation as well. Although he examined several markets, he based his theory primarily upon the study of disk drive industry, an industry prone to rapid changes and a rapid history compared to other industries. In contrast to disruptive technologies, he defines "sustaining technologies". These can be discontinuous, radical or incremental as well, but they all are extant technologies, improving extant products' performance according to mainstream customers' evaluations.

Disruptive technologies tend to perform more poorly at least on the short term. They introduce an entirely new value proposition to the market in contrast to products and services previously available. These technologies underperform previous technologies at first but carry attributes that attract several (and generally new) customers. Products based upon disruptive technologies tend to be cheaper, simpler and easier to use. Personal computers, scooters (in contrast to Harley Davidson motorcycles), health centers (in contast to traditional healthcare), internet applications or the electric car are some examples to disruptive technologies.

Disruptive technologies ofter provide ground to forming new markets. Firms that enter these markets gain considerable advantage on their respective markets then by outgrowing them they are less and less likely to enter new, smaller but growing markets with facility. Disruptive technology, though only likely to appear on secondary markets at first, on the verge of mainstream markets, are dubbed "disruptive" for they emerge to be marketable on mainstream markets and competitive with well extant products as well.

The question remains how to identify disruptive technologies and the related new, evolving markets. According to Christensen these markets cannot be studied and analyzed for not only these markets are unknown, but they are unrecognizable, thus customers and suppliers are to discover them jointly. On these markets plans on learning and exploring the market prevail over application plans. The most important conclusion is that in the case of disruptive technology it is impossible to predict market figures, the fields of use of the products or the market size. On these markets, it is essential for the firm to acquire a most flexible adaptability, a capacity for self-revision and the ability to learn jointly with its customers. Christensen outlines that in the case of disruptive technologies it often works better to observe how people use the product or service than to actually ask their opinion and listen to what they say. This approach is referred to as "agnostic marketing" for neither the firm nor consumers know how, in what quantities they will use the given disruptive technology and wheter they will use it at all, until they have actually tried and experienced it.

Christensen (1997) resumes in seven points the main characteristics of disruptive technologies and their market environment.

- As market demand can differ from change induced by an innovation, i.e. what today is not attractive to consumers could be attractive and useful tomorrow. Thus innovator firms cannot base themselves upon current consumer demand. Contrarily, in the case of evolutionary innovations that support extant technologies, it is important for firms to follow their consumers which on the other hand can be misleading in the case of disruptive innovations.
- 2. As a considerable part of profits originates from developing to and sustaining on mass markets, it is relatively hard to raise funds for a disruptive technology.
- 3. Another issue is to find a market for a disruptive technology. Disruptive technologies generally perform poorly on existing markets, having to satisfy
existing demand. Thus it has to find new markets where consumers the attributes and advantages of the innovation. *Consequently disruptive technology is rather a marketing and business challenge rather than technological.*

- 4. Disruptive technology and its market reqire from firms a new concepts of value chains, attributes and competences that differ considerably from the extant markets.
- 5. A set of detailed and comprehensive information necessary to a larger investment is generally not available for a disruptive technology. There is an important chance that one or more attributes of the technology will have a mixed reception and will not stand the test of the market. In the case of a disruptive technology market success may be reached through a process of trial and error and learning. Although "mortality rate" is high among the disruptive ideas and technologies, creating markets for disruptive technologies is not an excessively risky challenge. Those firms that are able to abandon their ivory towers and are willing to try, fail, learn quickly and retry, can also successfully understand the potential consumers of disruptive technologies.
- 6. Contrarily to evolutionary technologies where firms may well adopt the role of followers, in the case of disruptive technologies, the role of market leader is a crucial factor of success.
- 7. Access and mobility barriers well defined by economic literature that firms face in connection with a market can be factors of motivation for smaller firms and new entrants to form design and build new markets with disruptive ideas.

Christensen and Raynor (2003) distinguish between "low-end disruption" which targets customers who do not need the performance valued by customers at the high end of the market and "new-market disruption" which targets customers and needs that were not served by existing actors.





In the case of targeting the low end of the market, the performance of the technology exceeds the actual demand of mass market. Thus the disruptive technology can enter the market with a product or service with poorer performance which outperforms though the demands of several segments, and can in this way establish itself on the market. Christen's main contribution to marketing literature is attracting the attention to currently underperforming technologies as well and thus broadening the focus of study from the sole extant customers (Tellis, 2006).

Whether digital television is a disruptive technology and whether it will change the current value and supply chains remains a question as of today. There is no unequivocal answer given by the academic literature, though the relating technologies such as DVR's or the even broader interactivity offered by IPTV services raise the possibility of a disruptive breakthrough.

Christensen's disruptive technology theory raised criticism as well, among which Danneels (2004) pleads for a more concrete expression of the whole theory and its framework. He points out that there is a lack of clear and explicit terminology and set of attributes following which a clear distinction could be made between disruptive and sustaining innovations. Another question is whether disruptive technological innovation is disruptive under any circumstances or its disruptiveness is only a function of context. Danneels (2004) proposes a definition, according to which a disruptive technology is a technology that changes the standards of measurement and therefore the foundations of competition.

Christensen's work has often been cited as an argument .against consumer orientation (Day, 1999; Slater–Narver, 1998) as he suggests that if firms do follow their customers' needs then they reject potentially disruptive technologies that won't serve the mass market's current demand. At the same time Danneels (2004) argues that the previous interpretation contains an oversimplification in the case it is believed that Christensen concludes that firms should not be consumer-oriented. On one hand, one has to distinguish between current and future customers and one should not solely focus on exploring current customers and allocate the totality of resources to satisfy their needs. On the other hand, one has to avoid an artificial understanding and ought to endeavour to prospect markets and customers thoroughly and in detail (Danneels, 2004; Paap–Katz, 2004). Thus Christensen only rejects myopia and narrow-mindedness in the field of customer orientation (Danneels, 2004; Slater–Narver, 1998).

Paap and Katz (2004) observe in their study that technology alone is not disruptive, but the market effect of technological innovation and the accompanying conditions make a technology disruptive. Firms ought to be capable of operating sustaining and disruptive technologies jointly.

Utterback and Acee (2005) study whether new technology reaches a higher or lower level compared to existing technology along the dimensions of cost, traditional performance and ancillary performance. According to their results in all three dimensions there both exist disruptive technologies with lower and higher cost or performance.

According to Utterback (1996) the majority of disruptive technologies come into being as a result of technologies originating from outside the given field of industry. In contrast, Tellis (2006) argues that several examples are available to technologies originating both from the outside than from the inside of the market or developed inside the firm.

Criticism also affects the set of empirical proof behind Christensen's (1997) theory as the sample is rather selective and focuses on particular industries (Danneels, 2004; Tellis, 2006), which is adequate for building theory through induction, but open to criticism for testing theory through deduction (Tellis, 2006).

According to .Markides (2006) one has to distinguish between disruptive innovations. A disruptive technological innovation differs considerably from a disruptive business model innovation or from a new-to-the-world product. Radical product

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innovations (such as television, VCR's or mobile phones) are disruptive for customers for they change considerably their previous consumer behavior. They are also disruptive for manufacturers and service providers for they "undermine" and radically change previous market rules and sources of market advantage. As they are disruptive for both the customers and the manufacturers, they are seldom demand-oriented and are more likely to be the effect of supply processes and are push-oriented.

Christensen (2006) reacts in his article to comments and criticism in reference to disruptive technology theory and rejects. Danneels's (2004) and Tellis's (2006) criticism about disruptive character being defined *post hoc* and meaning only an executive missing a technology that subsequently becomes successful. Christensen admits that data used to inductively build theory are from the past but irrespective of the outcome of these, the category of disruptive technology does exist. He states that disruption is a relative phenomenon, i.e. not a question of technology but a business issue. He considers that an error had been made in the naming of the phenomenon as what really is disruptive is the business model and technology hinders market leaders.

2.1.8. THE DIFFUSION OF INFORMATION AND MEDIA TECHNOLOGIES

The diffusion curve of most communication technologies such as telephone or television follows a classic S shape, i.e. counting with a constant rate of diffusion, future sales can well be forecast. The diffusion of other disruptive technologies on another hand, like that of interactive television, video messaging or broadband mobile internet is a lot more casual and follows a less regular pattern which can result in the premature phasing out of the technology from the market because of the initial lack of success (Ortt–Schoormans, 2004).

The diffusion of these new communication technologies cannot be apprehended using the classic S curve (Easingwood–Lunn, 1992). Often decades can pass between an actual invention, its marketing as an innovation and its diffusion. Thus the S curve describing the diffusion becomes widely elongated. Ortt and Schoormans (2004) argue that the diffusion of these disruptive communication technologies can be characterized into three phases. In the first phase of innovation elongated in time, the invention is shaped to become ready to marketing. The second phase corresponds to market acceptance and adaptation, counting from the first introduction of the product to the market. In this phase, the shape of the diffusion curve is also generally shattered and irregular though follows, on the whole, an S curve. Innovation and the market share and market potential of a new product can hardly be predicted. Forecasts for these disruptive technologies using conventional market analysis tools, consumer and market data are generally approximate and unreliable. In these cases, firms ought to use other approaches to studying customers as in the lack of own experience with the new product customers are unlikely to comprehend and evaluate the advantages of the new technology and its effects to their everyday life (Ortt–Schoormans, 2004). These conclusions are in conformity with Christensen's (1997) disruptive technology theory. The third phase corresponds to maket stabilization, when product design becomes crucial and the product has a decisive market share with a constant growth, until sales begin to decrease at the arrivel of a new technology technology to the market and the current technology is taken over by another innovation (Ortt–Schoormans, 2004).

In a study, the relationship between the time dimension and innovation acceptance in the case of HD (*High Definition*) television was analyzed. Results show that customers give a different evaluation to innovations over time and the moment of adoption influences customer preferences of the various technologies. Customers under-evaluate current technologies while over-evaluating future technologies and thus have positive expectation towards these technologies (Sultan, 1999).

Von Hippel et al. (1999), in connection with the diffusion of innovations, argue in favor of the S curve and that lead users (i.e. early adopters) ought to be queried and observed for they provide the applications for the future.Lead users develop a need for a new product or idea much sooner, though they characteristically represent a small proportions of customers within the overall population.

The two most studied fields within the diffusion of new communication technologies correspond to how they are adopted, and how they are implemented and what effects new technologies have after having been adopted (Rogers, 1986).

According to Rogers (1986) though, the diffusion of communication and new media technologies differs from "general" innovation diffusion theories. He defines three main dimensions as idiosyncratic to the diffusion of new media technologies.

First, critical mass. For the adoption of an interactive communication technology it is necessary to reach a certain number of adopters in order for the novelty to be valuable and useful to its customers. This phenomenon is referred to as *network externality* (Hall, 2006) which indicates that these technologies only have a *raison d'être* if others use them as well (e.g. telephone, mobile telephone, e-mail, chat, etc.).

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The second idiosyncratic dimension of new media technologies is that these are *tool technologies* which means that depending on the situation they can be used in different ways. A good example to this dimension is the apparition and multi-use ability of personal computers or mobile telephones. The fact that the adoption of new media and communication technologies does not simply come along with the aquirement of a "push and click" routine cannot be ignored. The adoption of an innovation of this sort generally implies a great amount of implication from the users and the term "*adoption*" itself symbolizes best this behavior than the simple "*acceptance*" of the innovation.

The third characteristic of new media technology diffusion is the level and depth of use. Early studies on innovation diffusion simply identified adoption as the positive decision about the use of an innovation. Thus if someone declared that they will indeed use or purchase the given product in the future, they were considered as adopters. In the 1970's with the spread of innovation diffusion research to firms' adoption behavior, researchers were confronted by the extensive complexity of this very context compared to individual adoption of innovations. They observed that the phases of decision on adopting a given innovation and the actual implementation of the given innovation were notably differentiated. The *implementation and use* thus became a new independent variable (Rogers, 1986).

First adopters of communication and new media technologies that account for 5 to 10 per cent of the market can be referred to as the "*hot market*". Super innovators of communication technology though may not be identical to those innovators that early adopt other innovations. Innovativeness seems to differ according to larger innovation clusters and openness to new communication and media technologies might be one of these. The question is wheter if such an innovation cluster does exist, what is the trigger innovation i.e. the adoption of a new media technology that has an effect on the adoption of the others (Rogers, 1986).

According to Rogers (1986), the adopters of new media technologies are generally of a higher socioeconomic status (i.e. can afford the cost related to the purchase and use of new media technologies), have higher levels of qualification and because of their higher professional status they feel the need to be a part of developing information society. Early adopters tend to be more cosmopolitan, to have a greater mass media consumption. At the same time, their interpersonal relationships are more prevalent as well, they are members of several webs of connections, are more likely to have access to scientific and technological sources of information. According to Rogers, early adopters also differ from

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late adopters in several traits of personality: they are more empathetic, less dogmatic, more rational and are more likely to be able to manage higher levels of abstraction. On the whole, Rogers identifies the main differences between early and late adopters in theire socioeconomic status, communicating behavior and personality traits, complemented with the demographic variables of age and sex.

Figure 2.5.: The Main Categories of Variables in the Study of Adoption, Use and Social Effects of New Communication Technologies. Source: Rogers (1986:148)



One also has to consider the social effects and consequences when drawing a model of new communication and media technologies. The desired and undesired effects are included within the effects of the adoption of innovations. The desired effects are those that support individuals or the whole system in being more efficient while the undesired effect are those that lead to dysfunction. There also are direct and indirect effects, as well as foreseeable and unforeseeable effects. Foreseeable effects are those that are expected and observable while unforeseeable effects cannot be expected and might not be recognized in time. Direct effects are likely to be both expected and intended while indirect effects are more likely to be unintended and unexpected.

In the second chapter, we gave a review of the theories of innovation and diffusion of technological innovation. At the same time, on a micro level, the adopting behavior of individuals (or institutions) are the unit and trigger to the process of diffusion observable on a macro level of a product, process, concept or an innovation. As mentioned in the definition of diffusion, diffusion is induced by becoming adopted. Thus adoption on an individual (nstitutional, household) level eventuates diffusion on a societal level. In order to understand the diffusion of a technological innovation one must examine the individual adopter behaviors relating to the given technological innovation. Adoption as a behavior can also have several interpretations. In a marketing point of view, as cited before, it generally refers to the act of purchase (e.g. Bass, 1969; Vágási et al., 2006). At the same time, in the case of technological innovations as well as the specific communication technologies, the very use of technology or the product itself correspond to adoption (Rogers, 1986) thus making this use the main attribute and behavior for the researcher to understand. Hereafter we present the technology acceptance model designed expressly for the study of individual adoption behavior, and regard the usage and the intention to use of technology as the adoption behavior.

2.2. TECHNOLOGY ACCEPTANCE MODEL

2.2.1. The design and applications of the technology acceptance model

The Technology Acceptance Model (TAM) (see Figure 2.6.) is the most widely used theoretical framework for the study of technology acceptance. The foundations and the first model were developed by Davis (1989) as an extension of Ajzen and Fishbein's (1975) "Theory of Reasoned Action" specifically for the study of the user adoption of information technology and information systems. The technology acceptance model was originally designed to reveal and understand the use and acceptance of personal computers and software in a work environment. According to Davis's (1989) theory, the perceived usefulness (PU) and the perceived ease of use (PEOU) are two decisive criteria in the user acceptance and they directly affect the user attitude, which in turn determines the intention to use (see Table 2.1., Row 1.). Davis et al. (1989) modify the model of technology acceptance by finding that the mediating effect of attitude is negligible. Hence, they remove the latter variable from the model and propose the usage of the simpler technology acceptance model based on three main variables: perceived usefulness, perceived ease of use, intention to use. This model has been empirically validated several times by subsequent studies all of which have focused on the three variables of perceived usefulness, perceived ease of use and intention to use (Szajna, 1996; Venkatesh, 2000; Venkatesh–Davis, 1996, 2000; Venkatesh–Morris–Davis 2003). The model's main assumption is that people are usually rational and use information that is available to them hence before deciding on something they study the potential consequences of their acts. As most social activities are under cognitive control the theory regards the individual's intention to perform the behaior, to act or achieve (or not to achieve) as direct determinants of the actual action. The model assumes that the individual will behave according to their intention to perform the behavior. Behavioral intention is dependent of the individual's positive or negative attitude, i.e. the attitude toward the behavior as an internal factor, and of social pressure and expectations as an external factor. This external factor was included into the Extended Technology Acceptance Model as the "subjective norms" (Venkatesh-Davis, 2000) according to Ajzen and Fishbein's (1975) original approach. The original measurement scale by Davis (1989) has also been developed thus apart from the original scale, the scales by Venkatesh (2000), Venkatesh and Davis (2000), Venkatesh and Bala (2008) have also gained wider

reputation. Venkatesh and Bala (2008) introduced their scale development proposal as the "Technology Acceptance Model 3".

Figure 2.6. Technology Acceptance Model. Source: Own figure based on Davis (1989)



Appendixes 1. and 2. resume the development of technology acceptance model over time (on grey background) and its application to media and information and communications technologies in chronological order while the most important ones are summarized in Table 2.1. and 2.2. counting all together 46 articles. The most important findings of these articles for the present thesis are presented in Tables 2.1. and 2.2. Table 2.1. resumes the application of technology acceptance model, the results of research and the applied methodology while Table 2.2. includes the background of empirical research (sample size, relation between sample and technology, used scale, number of data collection instances, query type, method of usage metrics).

Although the model was primarily designed for the study of worklapce acceptance of information technologies, as can be seen in our chronological review, the model has been subject to several improvements and extensions (Venkatesh, 2000; Venkatesh– Davis, 2000; Venkatesh et al., 2003; Venkatesh–Bala, 2008). Even during the development of the original model, a need to include the recreational, entertainment and gaming functions of computers into the model occurred (Venkatesh, 2000). Van der Heijden (2004) in his study about hedonic information technologies emphasized the perceived playfulness or pleasure as a distinct factor influencing intention behavior.

In the application of the model to media and information and communications technologies, the playfulness, pleasure, entertainment factor represents an important component as these technologies contrary to the original TAM do not apply in the context of workplaces and/or computing devices, but instead, in a household or any other non-working context with an intention of leisure and entertainment. Media-oriented approaches further developed the model with other factors relevant to a given technology:

internet usage (Porter–Donthue, 2006), IPTV (Shin, 2007, Ha–Yook, 2009), SMS advertising (Zhang–Mao, 2008), mobile internet (Tan–Chou, 2008), MMS (Lo–Fang, 2008), mobile television (Choi, 2009, Jung – Perez-Mira – Wiley-Patton, 2009). Purkayashta (2009) proposed a further and wider extension of the model towards a service acceptance model which supplements the original model with the access to services and the influencing factors of this access, and with the post-purchase effects of services.

Several meta-analyses were carried out in the literature (see Appendix 1. and 2.) in order to assess and confirm the technology acceptance model from various aspects (Legris – Ingham – Collerette, 2003; King – He, 2006; Burton-Jones – Straub, 2006; Schepers – Wetzels, 2007; Sharma – Yetton – Crawford, 2009; Turner et al., 2010). These metaanalyses essentially confirm the applicability and relevance of the technology acceptance model but also formulate several directions and factors to the consideration of the scientific community. We find it important to point out the fact that the empirical studies applying or basing themselves upon the technology acceptance model originate from the most diverse fields of science and hence the model today is in no way particular and only relevant to the domain of information technology. The 46 articles presented in the summary tables (Table 2.1. and 2.2.) and the appendixes (Appendix 1. and 2.) demonstrate the wide scope of application and reliability of the technology acceptance model. When rewieving the sources of the articles, apart from information sciences, closely related to the basic model (MIS Quaterly: Davis, 1989; Venkatesh et al., 2003), we can find applications of the technology acceptance model as a suitable framework and research model in the fields of **decision theory** (Decision Sciences: Venkatesh – Davis, 1996; Venkatesh – Bala, 2008), management sciences (Management Sciences: Szajna, 1996; Venkates – Davis, 2000; Information and Management: King – He, 2006), **commerce and marketing** (Marketing Management Journal: Elliott – Fu, 2008; Journal of Electronic Commerce Research: Bauer et al., 2005) or even the fields of behavioral sciences (Journal of Consumer Behaviour: Bosnjak et al., 2006; Wang et al., 2008; Psychology & Marketing: Lin et al., 2007; Stern et al., 2008; Computers in Human Behavior: Jung et al., 2009) and business research (Journal of Business Research: Porter – Donthu, 2006; Journal of Management Research: Purkayastha, 2009). Following a thorough literature review on technology acceptance model we believe that the use of the model in the study of a non-working environment will also supply a valid result. Criticism about technology acceptance model and reflections about the model upon our study will be discussed in chapter 2.2. of our thesis.

Table 2.1. The Development of Technology Acceptance Model and Its Usage for Media and Information and Communications Technologies Source: Own collection (on a grey background: research on basic TAM model; on white: applications in the fields of media and information and communications technologies)

Author(s)	Year	Field of research	TAM and extension	Result / Proposition	Model
Davis	1989	Information technology acceptance	TAM: PU, PEOU scale validation	TAM launch: self reported actual use and intention to use in correlation with PU and PEOU; Attitud is not mediating fully the relationship between plannded usage and perceived featurs.	Perceived Uchilines External Vanables Perceived Using (A) Perceived Using (A) Perceived Using (A) Perceived (B) Pe
Davis et al.	1989	Computer technology acceptance	Renewed technology acceptance model	Mediating effect of attitude is not significant, no effect of subjective norms is identified, the three variables in TAM is recommended (PU, PEOU, BI)	Perceived Usefulness (U) Perceived Ease of Use (BOU) Pre-Implementation Version Pre-Implementation Version Pre-Implementation Version Pre-Implementation Version
Venkatesh	2000	softvare usage and acceptance	Extended TAM; focus on PEOU	Identification of the determining factors of PEOU, scale development	Self Efficacy External Control Playfulness PEOU Perceived Enjoyment Objective Usability

Venkatesh and Davis	2000	TAM develeopment	Extended TAM, focus on PU	Identification of the determining factors of PU, scale development	Experience Voluntariness Subjective Perceived Norm Perceived Image Usefulness Job Intention Relevance Volumetric Output Perceived Quality Technology Acceptance Model Result Perceived
Koufaris	2002	e-commerce acceptance	TAM and Flow theory unification, extended TAM by shopping enjoyment, web skills, product involment	TAM provided suitable theoretical framework for online e-purchase acceptance	Product Involvement Web Skills Value-Added Search Mechanisms Challenges Perceived Control UNPLANNED PURCHASES Concentration Perceived Usefulness Perceived Ease of Use
Venkatesh, Morris and Davis	2003	Users' IT acceptance	Test of 8 extended TAM, and unified proposal. Goal was to understand the role of usage as independent variable and the behavioral intention as predictor of use.	United Theory of Acceptance and Use of Technology - UTAUT	Individual reactions to using information technology Intentions to use information technology Figure 1. Basic Concept Underlying User Acceptance Models Performance Expectancy Effort Expectancy Gender Age Experience Voluntariness of Use

Van der Heijden	2004	Hedonic information systems.	Integration of perceived enjoyment in TAM as predictor of behavioral intetntion to use	PU loses its predictor weight compared to PE.	Perceived UserLiness 48 9 Perceived 32 Ease of Use 59 25 25 25 25 25 25 25
Bruner and Kumar	2005	Mobile internet devices	Extended TAM: Fun and technology relevant independent variables	PU is important but also hedonic factors play crutial role. The higher visual orientation people had better acceptance.	External Variables Visual Orientation Hoternet Device • PC • Weekes phone • PCA
Porter and Donthue	2006	internet users differences and description explained by TAM including demographic, attitude variables.	Extended TAM: perceived access barrier, AB and demographics as external variables.	Different user and consumer segments (different demographics) has different technology perception.	Age -36 -36 -36 -36 -36 -36 -36 -36
Shin	2007	IPTV acceptance	Extended TAM: entertainment, internal and external motivators	Based on logistic regression internal (on demand, special functions, individualized content) and external (interactivity, extra services, compatibility) are explaining 50 % of total variance of acceptance.	

Venkatesh and Bala	2008	IT acceptance	TAM3 development	Complex and unified model, PU and PEOU are mediated by experience.	Experime Volmarment Subjective Norm Volmarment Image Job Relevance Job Relevance Preceived Origina Quality Preceived Originary Bahavioral Originary Bahavioral Completer Elevance Completer Preceived Elevance Use Completer Elevance Completer Elevance Completer Elevance Completer Elevance Completer Elevance Originary Frechnology Acceptioner Model (TAM) Originary Originary
Zhang and Mao	2008	Mobil SMS advertising acceptance of young consumers: advertising reading and reactions	Modified TAM: trust (sms ads) and subjective norms are integrated, PU is extended with information, entertainment and social usefulness.	PU and PEOU are good predictors of SMS advertising acceptance and use. Role of trust and subjective norms is also supported.	Perceived information usefulness Perceived sociality usefulness Perceived sociality usefulness Perceived sociality usefulness H2 H2 H2 H2 H2 H2 H2 H2 H2 H2
Wang, Lo and Fang	2008	Mobil telecommunication services acceptance, MMS use	TAM extended by network externalities	TAM provides good theoretical framework, the model is supported.	Technology-Specific Valuation Number of Users Number of Users Perceived Ease of Use

Hsu and Lin	2008	Blog acceptance (blog writing)	TAM extended by blog relevant factors (eg. altruism, reputation)	TAM provides a good explanation of blog usage.	Technology acceptance factors Figuificant path (p=0.85) Perceived unerfulness → Perceived ange/ment 0.20 0:1 0:1 Knowledge sharing factors 0.14 Altruism 0.14 Expected reciprocal bese fat 0.16 Reputation 0.16 Social norms 0.22 *** Social norms 0.22 ***
Tan and Chou	2008	Mobil internet usage and perceived playfulness.	TAM extended by Perceived playfulness	PU, PEOU, personalization were the most determining factors of perceived playfulness	Mobile Service Quality H1 H3b Perceived Technology Compatibility
Kwong and Park	2008	Digital music services acceptance	TAM and its extention by perceived service quality and behavioral control	Factors identified due to TAM play determinant role in digital music subscription, mainly the perceived service quality.	Perceived ease of use Perceived undiness Perceived undiness Perceived undiness Perceived undiness Perceived undiness Perceived undiness Perceived undiness Perceived undiness Perceived undiness Perceived undiness Perceived Perceived undiness Perceived
Stern et al.	2008	Acceptance of online markets and auctions	TAM extended by three consumer oriented variables: computer affinity, impulsivity and risk tolerance.	TAM provide a stable model for different context and due to the new variables is able to explaine consumers' acceptance.	AFFIN-C PEOU RISK IMPULS

Choi	2009	Mobil TV acceptance and cultural differences	TAM extention by individual variables: USA and Corea cultural differences based on personality.	TAM is a stable model independently from cultural context: the relationships of initial TAM were supported in both countries.	Ease of use Interdepen dent self Usefulness Independe nt self S. Norm
Jung, Perez- Mira, Wiley- Patton	2009	Mobil TV acceptance: cognitive processes and content examination.	Extended TAM used in case of entertainment techonology.	Cognitive concentration and media content have significant influenc on hedonic, entertainment info-technology use. Extended TAM is relevant in case of entertaining informationtechnologies.	Content H6 H6 H4 Cognitive concentration H5 Perceived H3 Perceived usefulness H3 Intention to use mobile TV H2
Ha and Yook	2009	IPTV acceptance: technology and gratification aspects	Extended TAM ba gratifications and psychological factors and media consumption.	Perceived affective gratifications and internet usage are key elements in IPTV adoption.	TV viewing habit Internet using habit Perceived H6 Affective Gratification H4 Perceived H3 Cognitive Gratification H5 Perceived H2
Turner et al.	2010	Meta analysis	TAM and actual use examination (prediction of TAM)		Difference in objective and subjective (self reported) data models \rightarrow objective measurement is recommended. BI predicts best the technology use. More detailed technology description and sample description is recommended for better understanding.
Lee and Chang	2011	Online mass costumization: online co-design	TAM and individual factors as predictors	TAM is efficitent and relevant theoretical framwork for describing consumers' answers on online co-design.	Hard Hard Hard Hard Hard Hard Hard Hard

Author(s)	Year	Field of study	Sample size	Novelty of	PU and PEOU	Measurement of	Method of data
D :	1000	T C /·	110 . 40	technology	scale, other scales	technology use	collection
Davis	1989	Information technology acceptance	students	One hour presentation and trial usage	Davis (1989) scale development	Self-reported data	On point
Davis et al.	1989	Computer technology acceptance	107 MBA students	Usage after presentation and after 14 weeks of usage.	Davis (1989)	Self-reported data	Two points
Venkatesh	2000	softvare usage and acceptance	3 companies' employees: 58 pers, 145 pers, 43 pers	All softvare users	Davis (1989) + other scales+ own (p. 360)	Only behavioral intention measured	Three points: during 3 months: after training, 1 month and 3 months usage.
Venkatesh and Davis	2000	TAM develeopment	4 companies with 156 employees	New IT system users (5 months longitudinal studies)	Davis (1989) scales + own scales	Self reported data	Three points: during 3 months: after training, 1 month and 3 months usage.
Koufaris	2002	e-commerce acceptance	280 internet users	könyvvásárlási honlap új felhasználói	TAM scale (Venkatesh and Davis 1996), + other scales (p. 220.).	Self reported data of online shopping	One point
Venkatesh, Morris and Davis	2003	Users' IT acceptance	4 companies total 215 persons	New IT system users (5 months longitudinal studies)	Davis (1989) + other scales (p. 446-449.)	Self reported data	Three points: during 3 months: after training, 1 month and 3 months usage.
Van der Heijden	2004	Hedonic information systems.	1144 users	registered users	TAM2 (Venkatesh and Davis 2000), enjoyment scale (Igbaria, és et al., 1995)	Only behavioral intention measured	One point
Bruner and Kumar	2005	Mobile internet devices	212 studenst	3 devices simulation (PC, PDA, mobile phones)	Multi source scales (Lund, 1999), (p. 558.)	Only behavioral intention measured	One point
Porter and Donthue	2006	internet users differences	539 studens	Mixed users non-users	Davis (1989) an other sources	Self reported data	One point
Shin	2007	IPTV acceptance	452 Coreans	Non users	n.a.	Only behavioral intention measured	One point, telephone interviews
Zhang and Mao	2008	IT acceptance	282 pers	Mobile phone users	Multi source scales	Only behavioral intention measured	One point
	2008	Mobil SMS	149 students	Mobil internet users	Multi source scale	Perception is measured	One point online data

Table 2.2. Scales, Sample Sizes, Methods of Data Collection in Studies Utilizing the Technology Acceptance Model. Source: Own collection.

Tan and Chou		advertising acceptance of young consumers.			usage (p. 658.)		collection
Venkatesh and Bala	2008	Mobil telecommunication services acceptance	4 companies total 156 employees	New IT system users (5 months longitude. studies)	Davis (1989) scales + owns scales	Self reported data	Four points longitudinal data collection
Wang, Lo and Fang	2008	Blog acceptance (blog writing)	165 pers	23 % used already MMS, 77 % nevers	PU, PEOU and ITU based onVenkatesh and Davis (2000), others own scale	Only behavioral intention measured	One point online data collection
Hsu and Lin	2008	Mobil internet usage and perceived playfulness.	212 blog users	blog users	Multi source scale usage (p. 63.)	Only behavioral intention measured	One point online data collection
Kwong and Park	2008	Digital music services acceptance	217 students	internet users bot not all music service user	Multi source scale usage (1473. o.) PEOU from Davis (1989)	Only behavioral intention measured	One point online data collection
Stern et al.	2008	Acceptance of online markets and auctions	329 students	internet users bot not all online buyers	TAM from Venkatesh and Davis (1996) + multi source scales	Only behavioral intention measured	One point data collection
Choi	2009	Mobil TV acceptance and cultural diff.	834 students	n.a.	n.a.	n.a.	n.a.
Jung, Perez- Mira, Wiley- Patton	2009	Mobil TV acceptance: cognitive processes and content examination.	208 pers	mobil tv users	Multi source scale usage, PEOU from Davis (1989)	Only behavioral intention measured	One point online data collection
Ha and Yook	2009	IPTV acceptance: technology and gratification aspects	150 pers	non users	Multi source scale usage	Only behavioral intention measured	One point online data collection
Lee and Chang	2011	Online mass costumization	749 students	Online buyers, but not this app. user	Davis (1989) scales modified usage	Buying intention and recommendation measured	One point online data collection

2.2.2. CRITICISM OF TECHNOLOGY ACCEPTANCE MODEL

Critics of the technology acceptance model ofter outline the trait of the research design according to which in most cases researchers of the area work with self-reported data and the model thus is not supported by longitudinal, multiple-instance data collection (Salovaara – Tamminen (2007). Still, in the majority of cases, access to electronic audience data is beyond possibility, as it is in our present research about digital video recorders, because of market circumstances, i.e. regulation on data protection, the restricted access to recorded information and the lack of authorization from the surveyed persons. Furthermore, data gained from electronic measurement through set-top-boxes supply data concerning overall usage of a household while our study mainly focuses on individual acceptance. Hence self-reported evaluation remains an acceptable compromise alternative for data collection and data source for our empirical research.

A second wave of criticism pertains to the measurement method of usage of a system i.e. how usage is defined (through frequency, quantity, time spent, etc.), and argue that the measurement of the sole quantity of usage is insufficient. Burton-Jones and Straub (2006) propose a two-step approach in which researchers first have to determine the usage of what system they aim to evaluate exactly, then they have to consider the measurement standards adequate to the measurement of this latter. In the present dissertation, within the field of digital television technology, among the systems to which set-top-boxes are available, we aim to measure the usage of digital video recorders in connection with two particular functions: the possibility for the user to intervene on broadcasted content watched in real-time (pausing, rewinding, fast forwarding, recording) and the programmed recording function. We aim to measure the acceptance and usage of this technology by several measurement instruments: the frequency of use of the two functions, time spent with the usage of the two functions, the proportion of delayed television viewing (less-than-one-hour and over-an-hour delay), the frequency of pausing, rewinding and fast-forwarding.

Context-sensitivity is another area of criticism of the model. In other words, the model does not consider the possibility that after an initial adoption of a technology it will eventually end up being abandoned, and vice versa. Hence TAM models are sensitive to changes or fluctuations in usage (Salovaara – Tamminen, 2007). Nevertheless, various proposals on extending the technology acceptance model to various technologies and technology environments are available. For example, Schepers and Wetzels (2007)

distinguish four categories in their meta-analysis: special software applications (e.g. usage of Word), technologies related to the internet (e.g. search engines), microcomputers (.e.g. personal computers), communication technologies (e.g., e-mail). We believe that applications related to media technologies could also form a fifth characteristic dimension (e.g. IPTV, mobile telephones).

The approach of the model using perceived usefulness and perceived received ability to use as primary and decisive factors received criticism as well. Segars and Grover (1993) studied the constructs with a confirmatory factor analysis and established that perceived usefulness and ability to use can differ among user categories and among technologies and there is no absolute standard of measurement for these. Hence they draw the attention to the need for extending Davis's (1989) original concept. It is not by accident that in the study about hedonic information technologies (van der Heijden,2004) the model was further extended with a number of factors: internet usage (Porter–Donthue, 2006), IPTV (Shin, 2007, Ha–Yook, 2009), SMS advertising (Zhang–Mao, 2008), mobile internet (Tan–Chou, 2008), MMS (Lo–Fang, 2008), mobile television (Choi, 2009, Jung – Perez-Mira – Wiley-Patton, 2009).

Although Salovaara and Tamminen (2007) argue that the technology acceptance model does not take into consideration the fact that customers can not only accept the product but also can also use it to new functions, in ways and to goals differing from the original, appropriate usage. In the case of digital video recorders though, the technology does not allow an alternative usage, as have showed our qualitative deep interviews and focus group studies.

Salovaara and Tamminen (2007) also draw the attention to the fact that the basic TAM approaches do not consider that each user has a different appreciation and evaluation about a technology: they have different motives to use it and satisfy different kinds of demand with them. Thus it is necessary that researchers include in their survey about technology acceptance the potential orientations of customers and the different functions the given technology would fulfil for them. The authors propose that beside regular scale items, researchers use sentence completion techniques in their questionnaires where respondents can formulate the goals of their technology usage with their own words. In our study we also aimed to elicit this question as well during our qualitative deep interviews as in our questionnaire in which we included several open sentences.

2.3. THE APPEARANCE AND USAGE OF NEW TECHNOLOGIES IN HOUSEHOLDS

Research on technology domestication develops innovation diffusion theory in a clear way. Diffusionism studies the adoption by individual or other decision units of (technological) innovations on a micro level, and the diffusion of innovations in a social system, on a macro level (Berker et al., 2006). Adoption (i.e. first purchase) is generally considered a rational decision process. Contrarily to this, domestication theory goes beyond this oversimplification and puts the emphasis on a cultural and social approach. While diffusion theories put forward the technological aspects, domestication theory tries to capture the underlying symbolic significance, usage and media aspects as well. The theory studies media and technology usage in their context, within individuals' everyday routine and tries also to explore the dimensions of social embeddedness. Thus, for example the notion of active technology user (or active television viewer) has been extended to that of active media consumer, moving from text to context. This shift in emphasis also points out the influence of qualitative and ethnographic research methods in the research of everyday consumption and usage of media and information and communications technologies (Berker et al., 2006).

The diffusion of technological innovation is closely related to the equipment of households with the joint new solutions and devices: how, in what ways members of the household "domesticate" technology, how do they use them, what role and place a given technology has in the everyday life of the household. Domestication research that focuses on these criteria contribute to an overall understanding of the role a given technology (e.g. washing machines, television or personal computers) has in everyday life. We believe that consumer acceptance and thus future market potential of digital television and along with it, that of digital video recorders and set-top-boxes can truly be unveiled by equally observing household usage, recording and analyzing it some way, as Christensen (1997) proposes for the case of potentially disruptive technologies. The diffusion of digital video recording technology (in Hugary, for instance) did not bring any market success and additional market share for broadcasters, at least durint the first two years. Thus exploring actual usage might be able to discover the possible reasons behind the initial slowness of diffusion.

Domestication theory as a conceptual framework greatly draws from anthropology, consumerist theory but also research in media theory that mainly focuses on the adoption and usage of information and communications technologies (ICT's) (Haddon, 2006).

The first example on the use of domestication theory in the field of media usage and media technologies is an article by Hobson (1980, cited in Haddon, 2006) on the study of the role and meaning of television in housewife's lives. Morley's (1986) research and results on media consumption as a collective process within households helped to improve domestication theory. To the end of the 1980's, an abundance of international and ethnographic studies had came into being (Lull, 1990). Apart from the comprehensive research on ICT's and devices available in households, there exist a number of studies focusing on distinct technologies, for example on the consumption of cable television (Silverstone – Haddon, 1996).

Time factor is crucial in the diffusion and usage of technologies. Structures and boundaries of people's schedules thus are an important subject to research (Silverstone, 1994, 2005). In the context of ICT's and media technologies this not only corresponds to the available spare time but also time management and the subjective, qualitative aspect of this time (Haddon, 2004). Apart from the dimension of time, spacing is another crucial element of research on domestication as well as each technology (television, telephone, personal computer) started from being a part of the household's common spaces (e.g. living rooms) but the appearance of a second and third device of the same technology changed this position.

Parallel to adoption, reactions and usage of technology, research on domestication theory also studied changes induced by new technologies in people's lives, i.e. what improvements or defects they sense since they have their given devices. This matter is also substantial on a social level: are people and do they feel growingly dependent on technology and are people and do they feel growingly affectionate for and attached to media and information and communications technologies (Haddon, 2006).

Consequently, domestication studies focus in detail on understanding what it is like to be empowered by technologies, how innovations enter households, what functionality, usage and symbolic value they are vested with, how they are used or on the contrary why do they remain unused. Domestication theory thus concentrates on the phase following the diffusion of innovations and the social shaping of technologies, when media and information and communications technologies are already adopted by households (Haddon, 2007).

Venkatesh and Nicosia (1997) elaborated a complex theoretical model for the study of media and ICT's, but also that of every household technology. The basis of their concept is that it is worthwhile to study available technologies and their role within a household as a whole, instead of solely taking out one particular technology from of its entire context. This can lead to a better understanding of adoption of new technologies by households and therefore to that of these technologies' diffusion. The authors divide the structure of households and their usage of technology into a social space and a technological space through which technology usage and the inlying interactions can be retraced. Venkatesh and Nicosia's (1997) model can be seen on Figure 2.5.

The first component (A.1) assumes that demographic and other attributes of household members are decisive in technology adoption and usage patterns. The second component (A.2) consists of the subenvironments of use (see Figure 2.7. for more detail). The third component (A.3) consisting of housegold activities assumes that these activities are closely related to the use of one or more technologies (see Figure 2.7 for more detail).

Figure 2.7. Household Structure and Technology Use. Source: Venkatesh – Nicosia (1997:525).



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	A.2 Sub-environments						
	Food Management	Household Maintenance Finance	Leisure / Recreation Entertainment	Social / Family Communication	Work / Employment	Family / Development / Well-being	
A.1 Family Members (As Adopters & users of technology)	Primarily parents	Primarily adults	Whole Family	Whole Family	Primarily adults	Children and adults	
A.3 Household Activities Targeted for Technology Use	Meal Preparation & Consumption Washing Dishes etc., Grocery Shopping	Family Shopping Cleaning Tax Preparation Family Budget	Watching TV Holiday Travel Movies Games	Telephone Conversations Family Communication Holiday Reunion Correspondance	Job-related Activities Telecom- muting	Children's Education Adult Education Family Fitness Dieting Holiday Gathering	
B.1 Configuration of Household Technologies	Kitchen Appliances Automobile ATM Machine Computer Home- shopping (On-Line)	Washer, Dryer Automobile ATM Machine Computer On-line Home- banking	TV, VCR, Stereo Automobile Computer Multi-media On-Line Services	Telephone Answering Machine Fax Computer / email Internet On-Line Services	Telephone Answering Machine Fax Automobile Computer Internet	Typewriter VCR Telephone Computer Internet	

Table 2.7. Internal Structure of the Household-Technology Interaction. Source: Venkatesh – Nicosia (1997:526).

It is important to outline that even though a technology belongs to more than one sub-environment, it does not inevitably fill in a greater role than other technologies. Venkatesh and Nicosia (1997) elaborated and used their model for understanding the use of personal computers. They precise that the model helps not the technological but the household behavior understanding and hence it is a consumer (household)-oriented model. At the same time it allows a study alongside other technologies and subsequently to perform ethnographic studies which would be impossible with the use of other methods focusing on one sigle technology (e.g. focusing to personal computers only). Thus we can assess the adoption and use of media and information and communications technologies in the context of other household technologies.

2.4. Researching technology related to television content CONSUMPTION

In the preceding chapters we presented a thorough and relevant theoretical background in order to assess the theme of our research from the side of technology acceptance. At the same time, in the case of televisual content consumption we need to consider a media (content) consumption and acceptance approach as well. Thus studying digital video recorders in not only a question of applied technology and of its use, as these are closely related to a role of media platform and to content accessed through them. In the following we will review the studies on the relation between television and its audience, and among these, the uses and gratifications theory, selected as a relevant approach for our study.

The question of *why* does the audience choose television viewing serves as a fundamental and permanent question to academic research and it is even more important in the context of today's convergent environment that leads to an every more fragmented audience (internet, DVR, etc.). The study of media choice and use is concentrated around two main theoretical directions. The first is uses and gratifications theory (e.g. Rubin, 1983; Katz et al., 1973). The second approach focuses on structurally deterministic aspects as audience reach, accessibility and the hour of programs (e.g. Berrett, 1999; Cooper, 1993; Webster – Wakshlag, 1983; Webster – Wang, 1992).

Cooper and Tang (2009) propose an integrated model of the two preceding approaches of audience analysis, namely individuals' motives and attributes (uses and gratifications theory) and the structural attributes of the audience (reach, accessibility) as well as the competition and/or complementarity with other media and new media, present in both approaches.

Figure 2.8. An Integrated Model of Audience Exposure. Source: Cooper – Tang (2009:403)



After examining the model in the perspective of DVR technology, we can state that structural factors can be excluded from the study as the audience availability does not matter as the recording of a program can be set previously and/or remotely (in the case of IPTV), and viewers can decide recording a program in progress in order to finish watching it later. In Hungary, access to DVR technology mostly is achieved through set-top-boxes' built-in DVR functions. Thus, DVR-households are likely to have both a television set and a multichannel television access. As domestication theory also suggested (Venkatesh – Nicosia, 1997), the uses and gratifications theory seems still an adequate theoretical background to study of decision-making in television content viewing and competing media an adequate context. The question remains though whether individuals living in the household are indeed users of their DVR device and whether they employ its convenience functions (Cooper – Tang, 2009).

Consequently, in our final theoretical framework as well as in our research model (to be presented subsequently) we aim to employ uses and gratifications (U&G) theory as well. The five principles of U&G theory were first formulated by Rubin (1973) thus initiating the theory on active audience. Rubin also designed the Television Viewing Motives Scale that has subsequently been used and extended in numerous studies (Haridakis – Whitmore, 2006). We present the five principal points of U&G theory according to Katz et al (1973).

- First, audience is defined as an active contributor, the use of media is thus goaloriented.
- In the process of mass communication the initiative that joins users' gratification and media usage depends on members of the audience, i.e. it is the audience that uses television instead of television using its audience.
- Media is in competition with other sources to satisfy the audience's demand and media can only satisfy a small portion of human needs. In a methodological perspective we can state that the causes of the use of mass media can be studied from data collected from its individual users, and that individuals are self-aware enough to declare about their interests and motivations.
- From methodological point of view we can state that the cause of mass media use can be deducted from the audience studies' data and the individuals are self contious enough to describe their interests and motivations.

• Last but not least, in an audience-oriented study, value judgments on the cultural aspects and significance of mass media need to be put aside. According to the authors (Katz et al., 1973), media researchers need to study human needs in order to reveal to what extent a given medium is able (or unable) to create or satisfy needs.

Rubin and Bantz (1987) apply the uses and gratifications theory for their study of analog video recorders. In the study of audience activity, analyzing video use is highly relevant, as is that of its utility dimension, i.e. whether video is used or planned to be used with a social or psychological intention. According to the authors, VCR is not a revolution but a developing media, that allows a more active involvment in the communication process. VCR technology extends the market of traditional media contents, offers an alternative to live broadcasted content, an alternative context, complements, extends the world of media. These functions thus offer a greater utility, selectivity, attention, involvment and bring a greater intentionality into the world of mediatized communications. Rubin and Bantz (1987) with the use of U&G theory as a framework attempt to identify the motives of individuals' use of the studied device. The authors find eleven different purposes of use which they further categorize into five categories according to their relevance, using factor analysis: delayed view; recording with the intention to watch later; building of a collection, on a long term; recording to be able to watch another program; view of renteal cassettes. As a whole, Rubin and Bantz's (1987) study verifies the results of previous studies according to which the main motives to use VCR's are delayed view and convenience. They state that VCR-users form active and self-aware communities, and that the utility of VCR's is greatly determined by users' age and sex. VCR users also appear in a role of interpersonal communicators as through delayed view, used with the intention of a collectice view, they assist in the compliance of interpersonal communication and mass media processes. VCR users extend and complement television viewing. Even though they can be characterized by similar motivational structures, they are significantly more goal-oriented, as the technology offer a greater control over the moment and place of viewing a content and on the very type of the viewed content.

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2.5. THEORETICAL BACKGROUND OF THE DISSERTATION

2.5.1. Summary of the theoretical background

In the first subsections of this chapter we reviewed among the innovation diffusion theories the theories on diffusion, its relevant details in the study of media technologies as well as the technology acceptance model and its extensions. As a result we can affirm that the diffusion of innovations, the speed of the diffusion are directly related to the decision of consumers to adopt or on the contrary, deny the given technology. The decision of consumers itself is determined by a number of factors. That is why it is of great importance to discover the consumer expectations, attitudes, perceptions towards an innovation, the factors affecting the adoption. Thus, referring back to Gatignon and Robertson's (1985) diffusion model, we analyze the parts in connection with acceptance.

The conceptual framework of our empirical research is given by the combination of the aforementioned theories. In our framework we endeavor to merge theory on innovation diffusion and the technology acceptance model, by presenting the common characteristics of these. We also attempt to identify additional elements relevant to our study.

The individual acceptance of new technologies and technological innovations can be examined using several theoretical approaches. One of these is the Theory of reasoned actions (TRA) presented beforehand, which served as a basis for Davis's (1989) Technology Acceptance Model (TAM). Another theoretical approach is given by Diffusion of Innovations Theory (DOI) or the Social Cognitive Theory" (SCT), both of which concentrate on the acceptance of information technology (Agarwal, 2000). After a thorough review of approaches on individual technology acceptance, the two most relevant and most used theories in the study of media and information and communications technologies are the diffusion of innovations theory and the technology acceptance model. Hence in our presentation of the empirical background of our study we also focused on these two fields and the sythesis of these two fields will also serve as a basis to our research model to be presented further on.

The technological acceptance model focuses on the actual use as an independent variable. The diffusion of innovations theory on the other hand handles several possible outcomes (decision on adopting, using an innovation, the actual use of the innovation, the future use of the innovation), though Rogers (1986) outlines that the actual use as an independent variable is crucial in the case of communications and media technologies as

this latter corresponds to *de facto* adoption. As a synthesis of the two approaches we intend to measure both the actual use of the given technology and the intention to use in the future, as we consider that the intention to use in the future is influenced by the rate of actual users and the experience gathered from it. By so doing we gain an opportunity to put technology acceptance into a wider context in time which we believe is particularly suitable for the analysis of the induced change of behavior related to the consumption of a daily medium on a long term.

The framework for studying innovation adoption described by Rogers (1986) is largely coherent with that of the technology acceptance model, as both have technology use as the most important independent variable. Technology use is influenced by the decision to adopt (Rogers, 1986), i.e. by the intention to act in the technology acceptance model (Davis, 1989). Individual attributes or future impace from Rogers's approach can easily be suited into the technology acceptance model as moderating variables, or the future intention to use on an individual level.

Factors of technology acceptance of a given product or technology appearing in Rogers's (1995), Hall's (2006) or generally in every framework in relation to innovation diffusion theory also have much in common with the technology acceptance model.

perceived advantage or benefit (Rogers, 1995; Hall, 2006) may well be suited to perceived usefulness (PU) (Davis, 1989), complexity (Rogers, 1995) to perceived ease-ofuse (PEOU) or compatibility (Rogers, 1995) to an often appearing element of perceived usefulness (PU) in the technology acceptance model, and thus can be integrated as common factors from the two frameworks. Even though trialability and observability (Rogers, 1995) do not appear in the technology acceptance models, these neither cannot be stated as relevant by dint of the different focus and methodology of the approach as these either focus on the study of actual users, or in case of non-users, they assume the presence of some kind of trialability and observability for the technology to be studied. In our study we focus on actual users of technology as well.

In our study, we examine how and from what sources technology users/adopters gather information about given possibilities following Bass's (1969) innovation diffusion model with the presupposition that though a group of early adopters constitute the focus of our study, even among them the first adopters, entrants will be those that will gain knowledge of the innovation mainly from corporate information and advertising appearing in mass media.

As Christensen (1997) does not study individual acceptance of disruptive technologies in detail, we will further elaborate on the tehenological and market aspects of the theory in the following chapter while analyzing digital television and the digital video recorder as an innovation, among others, in the perspective of disruptive technologies.

We can formulate a strong criticism of the applications presented beforehand of the technology acceptance model to media technologies, and more narrowly, to television (mobile television [Shin, 2007; Choi, 2009, Jung – Perez-Mira – Wiley-Patton, 2009], IPTV [Ha – Yook, 2009]) as technology acceptance in these cases is characterized by a complex and underlying environment that cannot be simplified to the acceptance and use of one sole technology.

Both mobile television and IPTV comprise the acceptance and possibility of use of a number of technologies (that of mobile communications, digital television, digital video recording, electronic program guide, etc.), several new content services (video-ondemand, mobile broadcasting content, the notion of electronic program guide), thus consumer decision to purchase and the purchase itself lead to the use of a bundle of technology extended with content. As such, adoption is also presumably influenced by the price of this service, the cost of subscription to the service, the image and communicating efforts of the service provider and that of ites competitors, the availability of the service, to mention only a few potential influence factors. Thus we believe that it is an oversimplification, in the case of acceptance of mobile television and IPTV to only use the framework of the technology acceptance model without any extensions. The present dissertation intently focuses on the use and acceptance of the specific technology of digital video recording, using both the technology acceptance model and innovation diffusion theory as a framework. Thereby we can abstain from considering factors involving the elements that determine the use and acceptance of a subscription to digital television (subscription fee, access provider, accessibility, customer service, etc.) as our study's base statistical population is composed by individuals that already are subscribers of the aforementioned service and already possess the related technologies in their households. The main question remains whether they actually use the technology, if yes, to what extent, what are the determining factors of their using it, and who are the lead users.

We aim to analyze the process, extent of the integration of digital video recorders into the everyday life and television viewing habits of users, according to technological domestication theory, and, according to Venkatesh and Nicosia's (1997) comments, we endeavor to explore the wider technological environment and profil of the consumtion, in our case, of content consumption platforms.

Hence, we base our study upon the technology acceptance model, with its extension to entertainment technologies, in which we merge elements from innovation diffusion theory that are partly in accordance with elements of the technology acceptance model and partly have a complementary function. In order to assess the effects of the context of the studied technology, we use elements of domestication theory, (because of the questionnaire's physical boundaries and favoring a quality response) concentrating on close competing platforms. We understand under technology acceptance the actual use of the given technology, as suggested by Rogers (1986) for communications technologies, instead of the sole purchase of the technological device, its presence within the household or the existence of a subscription to the service. By means of this, we concentrate upon individual acceptance instead of households'.

Technology Acceptance Model constitutes the most important theoretical background to our study, as can be seen in the theoretical construct in the detailed description of the study's empirical model in Chapter 5. Our aim is to design and firstly test a Media Technology Acceptance Model (MTAM), i.e. a model fit to describe media technology and likely to be used in a wide range. We will employ the view, variables and connections of the technology acceptance model in the case of a media technology acceptance and use with theories on media use and choice, as in our case, in the context of consumers (here: viewers) content consumption, the demand satisflying function of media as a whole and the acceptance and use of the related technology cannot be studied separately. Consequently, the main goal is to identify determining independent variables relevant and specific to the case of media technology innovations within the technology acceptance model. We believe that for the study of media technologies we can employ the technology acceptance model by incorporating elements of gratification theory and by taking the theory of innovation diffusion into consideration.

Even though our approach relies upon a number of theoretical backgrounds and thus is considerably complex, it concords with the approach of Wirth et al. (2008) who

state that the study of media technologies is mostly aided by models that integrate several theoretical backgrounds. In their study of mobile telephones, they use a complex model that is based on diffusion theory with a quantitative background, but has recourse to qualitative appropriation paradigms (cultural studies, frame analysis) essential to the study of a device as personal as the mobile telephones, and to U&G theory, aiding both sides.

We considered during the planning of our research model the critics of technology acceptance model. Unfortunately we could not avoid using self-reported data of technology use, as we do not have access to DVR or other technology recorded consumption data. The other reason to using self-reported data on use that DVR audience measurement data can provide houshold level usage data and in our research we focuse on individual acceptance, use, so we need individual level data

The second main critic was the measurement of usage data in case of self reported data. That is why we used in the exploratory and the final study as well more questions exploring technology use, intensity, beside behavioral intention to use of the DVR technology. The critic against TAM that it can not reflect the non traditional use of the given technology did not mean a problem in our research as the DVR technology does not allow individuals to use it for other purposes (eg. mobilephone used for gaming not only for calls).

We have also aimed after the TAM critics to collect deeper information about motivations for using DVR, the satisfaction function of it during the qualitative phases and with an open question in the questionnaire of the final quantitative phase.

3. DIGITAL TELEVISION AND THE DIGITAL VIDEO RECEIVER AS INNOVATIONS

Research on innovation diffusion often studies, among other consumer durables and household technologies, the use of television sets and video recorders as a diffusion of (media) technology innovations into household use (Bass, 1969; Dodds, 1973; Golder – Tellis, 1997; Martinez et al., 1998; Kim et al., 1999; Ortt – Schoormans, 2004; Horsky, 1990; Jiang et al., 2006; Montaguti et al., 2002).

The television industry and the related technologies as innovations thus aroused ample interest among researchers and studies on innovation acceptance, household integration and consumer expectations in this industry are continuous.

3.1. DVR TECHNOLOGY AND DIGITAL TELEVISION PLATFORMS

Our thesis focuses on the study of digital recording technology related to digital television as an innovation with an effect on the televisual market. Digital television brought considerable novelty and new potential to both consumers and service providers by offering multiple levels of viewer interactivity. In his book entitled "Innovation in marketing", Levitt (1962) already cites the possibility of interaction in the televisual market by presenting a teleshopping solution by the TelePrompTer company. Even though this interactivity is related to a marketing technique, it illustrates well how far the notion of interactivity and active influence within the scope of televisual media can be traced back in time.

The possibilities of customer interaction as such, offered by digital television are hard to assess. Thus it is important to clarify on the possibilities for viewers, users related to digital television upon the various available platforms. Table 3.1. gives a summary of these characteristics, presenting the opportunities to interaction on the different platforms, with the strenghts and weaknesses of each. We can see that each platform offeres different services to consumers, they differ in their capacity, and according to their method of data transition, they offer the whole spectrum of digtal services, starting from the digital terrestrial trasmission, without any available return feed to IPTV offering high interactivity. In fall 2009, at the drafting of the first theoretical background and of our dissertation proposal, we had to state that in the case of 3G mobile transmission and mobile broadcasting, data storage was impossible upon receiver devices. In the second half of 2010, in the United States, access providers AT&T and Verizon Wireless already marketed devices capable of receiving digital mobile broadcasts and had a built-in DVR function (Origo, 2010), i.e. are capable of storing data. Thus we can say that apart from 3G mobile, the study of consumer use of digital video recording technology is relevant for every other digital platform. With these technologies, the audience is enabled by each broadcasting technology to restructure their viewing habits, construct their own or at least have a control over flow thanks to the built-in memories of set-top-boxes or digital video recorders available as separate devices. Thus the use of this technology can be studied irrespective of the used plaform as the changes induced to television channels, content providers, broadcasters and to the advertising market are uniform. In this case, user interactivity cannot be used in its strictest sense as users do not necessarily give direct feedback to broadcasters or television channels, but they record programs, review, pause them. Thus, speaking "simply" of user activity is more accurate, although a crucial 58

element of this dimension of intervention is that it can substantiate irrespective of the used platform of broadcasting.

Table 3.1. Characteristics of Digital Television Platforms. Source: Cave – Nakamura (2006:3-4)

Platform	Services	Approximate capacity to home	Interactivity	Strengths	Weaknesses
Digital cable	TV, radio, PPV, interactive services	Equivalent to about 800 TV channels	Good scope – integrated return path	Large bandwidth Integrated return path	Limited return path capacity Fragmented networks add to costs
Digital terrestrial transmission	TV, radio, interactive services	4–6 times analogue capacity (say 40–80 channels)	Limited scope and no return path	Large bandwidth Mobile and portable indoor use (theoretically) Local differentiation possible	No integrated return path Expensive way to achieve universal coverage
Digital satellite	TV, radio, PPV, interactive services	Equivalent to 600–1000 TV channels	Good scope but lacks integrated return path	Large bandwidth National coverage from one satellite Fast roll-out of innovations is possible, for example, personal video recorders and high definition TV	No indoor reception No integrated return path Long transit time doesn't suit all interactive services
DSL based on telephone network	TV, radio, VOD, interactive services, Internet	Unlimited (video on demand)	Excellent – integrated high-speed return path	Large bandwidth Near universal coverage	Bandwidth available drops with distance from the exchange
Powerline, based on electricity network	Internet	(as for DSL)	Excellent – integrated high-speed return path	Ubiquitous access extends throughout houses	Not yet rolled out Interference problems still to be resolved
Wide area wireless broadband	Internet	Up to 1 Mbps at present	Good	Extends the reach of fixed broadband platforms	Coverage varies within home
Mobile broadcasting DVB-H	TV, radio, interactive services	30–80 channels per multiplex	Good – uses 2G/3G return path	Suited to mobile TV and other multimedia services Backed by major handset vendors	Not mature yet Needs spectrum opportunities
3G mobile	Voice, Messaging, Audiovisual stream/ download, interactive services,	No live TV at present Typically ~384 kbps	Good	Good for Internet access Fast roll-out within covered areas	Coverage variability

Barwise and Ehrenberg in their 1996 book forecast that devices with built-in digital memory capacity will diffuse as of 2020 and might shift television prime time from the evening to the middle of the night thus it is important to understand the notion of time shifting in detail

3.2. THE DIGITAL VIDEO RECORDER AS AN INNOVATION

The study of digital video receivers as an uses two separate approaches. The first approach considers the device as a hadware innovation that affects primarily the consumer side by offering them a control over broadcast content (Ferguson –Perse, 2004). The second approach considers the technology a service innovation touching primarily the supply side, viewing the key to the diffusion of the technology in it being an alternative to broadcast content (von Rimscha, 2006).

Ferguson and Perse (2004) surveyed users of TiVo and Replay TV services through an online questionnaire. Their results show that those equipped with DVR's derived comparatively greater pleasure from television viewing, exerced greater control over television viewing and actively used the recording and rewinding functions. The authors unequivocally view DVR's as a technological continuation of analog VCR technology and thus it being completely substitutable to VCR, with an imporved facility of use, the lack of need of auxiliary data storage media, the assistance of the electronic and interactive program guides in program choice, the possibility to record a currently broadcast program and the possibility to watch and record a second program parallelly. The attribute causing the highest consumer satisfaction was the possibility of time-shifting. The authors forecast that the rising use of time-shifting will accelerate the transition from VCR to DVR technology. In this perspective, DVR appears as a device on its own, and as such, focuses on the attributes perceived by consumers and accounts for 87 per cent of the variance explained of the diffusion of innovation (Rogers, 1995).

Among the relative advantages of using a DVR instead of a VCR is the lack of need of an auxiliary data storage media, the facility to program the device for recording content, the lack of need to further programming, and the auxiliary functions intensify the possibility of user control over linear broadcast content (von Rimscha, 2006).

It is mainly by lack of information that potential adopters do not perceive the relative advantages of digital broadcasting and DVR, even though research on household already owning these devices (Carlson, 2006; Ferguson – Perse, 2004; Smith – Krugman, 2009; Schreiber, 2008) clearly shows that user satisfaction among those who have already adopted the technology is paramount. DVR in itself does not hold a pronounced social prestige value, as in most developed countries where the technology has been introduced, the access to services coming with these devices is affordable to households with average levels of income and thus is competing in price with other entertainment services and offers.
In terms of compatibility, DVR technology is compatible in its functionality both with the preceding technology (video recorder) and with personal computers, but also more generally with television viewing as a leisure activity. However, von Rimscha (2006) outlines that the fact that DVR's are unable to play VCR cassettes and DVD discs might be a barrier to the technology. At the same time, integrated devices serving both as a DVD/video cassette player and a DVR might overcome this barrier.

Concerning complexity, a crucial question is to what extent digital television and the related technologies are perceived by users as complicated to use. The question emerges whether this perception is related to the whole technology (digital television) or to their own perspective as a user. DVR technology is both more and less complex than VCR: recording a program is slightly easier, although if we consider the totality of a DVR's functions, the use will become a lot more complex (von Rimscha, 2006).

Trialability is limited both in the case of digital broadcasting and DVR technology. Users can try the technology at their neighbors', friends', in other households, still the full functionality of the technology, its perceived advantages for the given user and the ways they can adopt the technology into their viewing habits and leisure activities, will only be unveiled to them once they have access to the technology (i.e. subscribed to it) in their own homes and actually become a user. Von Rimscha (2006) signals that this is a cause for the problematic marketing of the service and mentions the TiVo's 30-day payback guarantee (i.e. a month during which users can try the service in their own homes without risk) as a means to overcome this problem.

Visibility is low both for digital television and DVR, as individuals that are not equipped with the devices are only able to experience the benefits of the new technology (e.g. restructuring viewing time, possibility of recording full series, avoiding commercial breaks) when viewing television along with members of other households. Visibility is thus restricted to advertisement viewed in television, and to the individuals' private sphere (encounter with the technology in friends', neighbors' homes).

Recognizing this barrier to the diffusion of DVR's, in August 2009 Hungary's UPC organized special events in shopping malls of five major provincial towns in order to promote the technology and attract attention to the complete set of attributes of and the novelties brought to digital television viewing by DVR devices. For one week, a "movie installation" consisting of a plasma screen and movie seats was set up in each mall and visitors showing an interest to the device were explained the uses and functionalities of

DVR's. To accompany the marketing events, UPC opened the www.dvr.hu website where they shared information and tutorials destined to facilitate the adoption of the technology (Mediainfo, 2009).

Continuing the study of digital broadcasting and digital video recorders in Rogers's (1995) theoretical perspective, the decision is made on an individual or on a household level, depending on the size of the household. Both the advertising activity of service providers and the individual's personal communications affect the diffusion. In Hungary, an advertising campaign exclusively dedicated to the digital video recorder or the set-top-box's built-in content storage capacity appeared during the introduction of the IPTV technology ("Apakezdődik,apakezdődik …" spot, see attached CD-ROM), followed, in Spring 2010 by UPC putting this function into the focus of its communication ("Magdi anyus legurult a lépcsőn…." spot, see attached CD-ROM). Parallelly, the communication of the DVR as an auxiliary function also appeared in content providers' list of services.

We believe that there exist no barriers to the diffusion of the studied technology as for its social embeddedness. The development of previous technologies (video recorder, DVD-recorder) was incremental as well, no technological revolution is present from an older technology that would negatively affect the diffusion of DVR.

According to von Rimscha (2006), based on the factors presented above, it is no surprise that DVR as a consumer innovation has not prevailed, as it is difficult to present the technology, show its advantages. In addition, it is not fully compatible with the preceding technology (as it is unable to record onto and play from an external storage medium). Thus in his opinion, the perspectives of DVR's are far from reassuring.

Von Rimscha (2006) considers the supply side as a driving force behind the potential diffusion of DVR technology, with the subscription offers to digital television and set-top-boxes with integrated DVR capabilities. In this case the adoption decision moves from an individual level to that of the service provider thus inducing a change in the use of communications channels, and the entry of the DVR into households is related to their subscribing to digital television. This is the case in Hungary, instead of the adoption of the devices alone.

From the service providers' side, the advantages of DVR's are far from evident, the actors of the television supply chain (Figure 3.1) do not equally gain from the innovation. Content providers might need to bear decreasing profits from the reinforced advertising avoidance, while distributors might face higher levels of client service (due to the technological aspects of the new services) that would lead to greater consumer loyalty and profits. Compatibility is high in the case of the concerned technologies, a recording facility can easily be integrated into set-top-boxes, which itself is necessary to the reception of the digitally broadcasted signal. In this context, DVR is a device joint with a service that can be related to digital-television subscriber services. Its complexity (which in this case corresponds to the servicing of the device), remains high, while the trialability and visibility, that are significantly better in this case, might compensate for its relative complexity.

Figure 3.1. Value Chain of Television in the Case of Conditional Access. Source: based on Gálik – Urbán (2008:146)



Thus, for content producers, DVR technology is more of a threat, while for content distributors it is more of an opportunity (von Rimscha, 2006). This duality is characteristic for disruptive technologies (Christensen, 1997), that on a long term lead to a transformation of the established supply chain and business processes.

Von Rimscha (2006) in his study advances a novel perspective in analyzing the potential effects of DVR technology on television industry's supply chain. The possibility of time-shifting enables viewers to dissociate their viewing from broadcasters' programming, and similarly to the "one TV" model anticipated by Wirtz and Schwarz (2001), enables them to watch the program they like, when they like, thus transforming broadcasters into content producers and content providers. At the same time DVR technology introduces a new dimension, that of time among consumer decisions. Not only users have to decide what to watch and on what channel, but also when. Thus

broadcasters are not only in competition with each other's parallel programming but esentially with every program ever broadcast (von Rimscha, 2006)

DVR-equipped households watch a significantly wider mix of channels thus reducing their loyalty to channels and moving their loyalty towards program types and genres. The electronic program guide, and, perchance in the near future, extended with a collaborative filtering, that content providers also can offer, is a potential complementary source of income and, used as a surface for advertising, content providers can also acquire incomes from the advertising market (von Rimscha, 2006)..

Time-shifting and thus the fast-forwarding of advertising, i.e. advertising avoidance can lead to a decrease in television channels' and content providers' incomes, by which users would have to take a greater part in financing and sustaining the assortment of programs and television channels. As television will remain an effective means of reaching a mass audience, advertisers may turn more to alternative methods of advertising on these surfaces like product placement or sponsored programs.

Figure 3.2. The Impact of Advertising Avoidance on the Television Value Chain. Source: von Rimscha (2006:120)



As can be seen Figure 3.2., content distributors the knowledge of viewers (subscribers) and thus the ability to offer a targeted and effective means for marketing communications is a competitive advantage. Service providers have detailed information of their clients, their habits, viewing preferences, thus can provide an effective channel of communication between advertisers and their target groups. As for content production, the possibilities of product placement and sponsorship can have an effect on the transformation in the structure of advertising expenditures (von Rimscha, 2006).

A supplementary source of income related DVR technology lies in the rights related to the viewing of films and other video content (Figure 3.3). In the case of DVR's, content is provided in a downloadable format (*Video On Demand, VOD*) which does not require a physical distribution channel unlike prerecorded home video cassettes or DVD's. Considering the observations on pay-per-view offers, where demand follows a Pareto distribution (top 20 titles accounting for 80 per cent of orders), the capacity of DVR technology in the case of this type of service is clearly competitive.

Figure 3.3. Place and Role of DVR on the Exploitation Chain of Motion Picture Rights. Source: von Rimscha (2006:122)



As a whole, von Rimscha gives a positive outlook on DVR technology as an innvation, in spite of its slow debut. He sees in the technology a new profit opportunity that would enable content distributors, winners on the supply side of the advent of the technology, to become the driving force behind its diffusion (von Rimscha, 2006).

The preceding perspective is also true in the case of Hungary, as DVR's are generally adopted by households through subscibing to digital television thus through the offers and services of content distributors. Apart from distributors on the supply side, viewers and consumers are also winners of DVR technology, as shown in the studies on DVR-usage. Thus it remains crucial to be aware of user perceptions of the new technology, of their patterns of use and of its effect on their television viewing habits. It is evident that content distributors have an important role in promting and stimulating the technology's diffusion. After the innovator and early adopter groups it might be up to distributors to produce an impulse in order for the technology to diffuse on the mass market. Interpersonal communications among users, visibility in a close circle of friends and acquaintances and trialability might also contribute to wider diffusion. On a long term, building a loyal subscriber base is only possible if users really perceive an added value in the new technology.

Tellis (2006) characterizes technological innovations in three groups according to their attributes: platform innovations, component innovations and design innovations. The first group contains innovations that offer a whole new solution to a problem. For example, the CD used a new method of writing and reading data (laser optics) compared to the preceding technology of video cassettes (VHS) that used magnetization. Component innovations use different components or materials within a same platform, e.g. magnetic cassettes or floppy disks.Design innovation is when the linkage between components or their design is changed, within a same platform, e.g. the different sizes of floppy disks. In this method of classification, DVR technology accounts for a platform innovation as instead of using the preceding technology for the recording of audiovisual content (magnetic recording for VHS, and laser recording for DVD) DVR uses a new technology, the recording of digital signals onto a hard disk.

We can also identify several elements from Christensen's (1997) disruptive technology theory in connection with the DVR technology. For example, the slow initial diffusion, during which a limited numer of consumers seem to find the technology interesting. Another element that concords with disruptive theory is the difficulty to define the technology itself, and users also learn and experience its advantages and added value during their use of it. However, we believe that digital video recording cannot be classified among disruptive technologies. Instead, we consider it more as a transitional technology that corresponds to a subsequent step of home video recording following the analog video recorder and the DVD-recorder and completing the functions of these with that of the possibility to pause and rewind an actual broadcast. At the same time, the technology does not radically transform the television industry, neither from content distributors', nor from content providers' point of view. We believe that we would be able to answer the question wheter digital video recording is (or is not) a disruptive technology on a long term, with the study of whether the emergence of this technology would be able to transform the television industry's value chain and its business models, as von Rimscha (2006) forecast.

Chorianopoulos and Spinellis (2007) also see a new business opportunity in DVR technology especially through the taking advantage of its network potential. In their opinion, virtual television channels, targeted advertisement, video archives and content

for niche markets are at the origin of new business opportunities for content distributors. They suggest for content providers an online distribution of their content and the use of audience metadata as a source of competitive advantage on the advertising market.

Table 3.2. presents the impact of innovation diffusion in the case of DVR on television value chain based on Rogers (1986). The factors presented in the table have been identified based on our theoretical framework and our empirical studies (to be presented subsequently). We believe that the technology bears more positive than negative externalities, because of the increasing user satisfaction and loyalty, and the additional business opportunities and user loyalty for content distributors. It is likely that commercial television channels will anticipate well in time the potential threat of decreasing incomes from advertising, and in order to counterweigh its effects channels will reevaluate their pricing strategy, valorizing content more likely to be watched live (news programs, sports events) and alternative sources of income (product placement, sponsorship).

Table 3.2. Impacts of the Diffusion of DVR Technology on Television Value Chain and Television Viewing. Source: own collection, based on Rogers (1986: 164)

Innovation acceptance	Direct effects, that are mainly desired and anticipated	Indirect effects, that are mainly undesired and unanticipated		
		Primary effects	Secondary effects	
DVR within households	New products - DVR, set-top-boksz with DVR	Zapping of advertising	?Loss of income at content providers, tv-channels (decreasing income from advertising)	
	Increasing pleasure from television viewing	Rescheduling of viewing of content by	?Increasing income at content producers (product placement)	
	Increasing satisfaction with content/service provider → increasing loyalty	viewers (threat to prime time)	?Appearance of new solutions for marketing communications	
	Dependence from tv channel's schedules disappears		?Appearance of connected DVR applications (new types of content, collaborative filtering, etc.)	
	New sources of income within the value chain: - extra monthly subscription fee (in case of set-top-boxes with DVR) - device sales (separate DVR's)			

Therefore, DVR technolgy for content providers is more of a threat while for distributors, an opportunity (von Rimscha, 2006). This duality is characteristic to disruptive technologies (Christensen, 1997), which then leads to a reevaluation of the industry's value chain and business processes. An open question remains whether DVR technology and digital television as a whole do account for disruptive technologies. Authors considered that technology that preceeded DVR's had a low level of disruptiveness, but a higher level of radicalness (Govindarajan és Kopalle, 2006). The diffusion of certain products and technologies might take up to even 10-12 years, even though there are considerable differences between products and market success is not necessarily carried out by the initial usage or function of a technology. Analog video recorders took a decade to diffuse on a large scale, and storage capacity was the first positioning criterion instead of the replay capabilities (Montaguti et al., 2002). DVR technology first appeared some 11 years ago; based on the diffusion process of its predecessor, we ought to experience a disruption and an important growth in the case of DVR technology.

4. THE USE AND AUDIENCE OF CONTENT RECORDING TECHNOLOGIES

4.1. Use and audience of the analog video recorder

A 1994 survey by ITC (Independent Television Comission) showed that young age groups (16-24 and 25-44 years) were more likely to own a VCR set along with any media technology devices, e.g. CD-players or PC's than older age groups. Four out of five television viewer reported that their household was equipped with a VCR, and one out of five reported more than one VCR in their household. Households with teenage children and the 16-24 age group was most likely to own more than one device. Households with cable television also had above-average equipment rates of media technologies (VCR, television set with teletext, personal computer, CD-player, video games, video camera) (Mullan, 1997).

In 1997, half of the households in the studied countries were equipped with VCR devices. Consumers in the United States, the United Kingdom, iJapan and Canada spent a weekly average of 5 hours watching video, and 40 hours watching real-time broadcast. 60 to 70 per cent of the 5 hours of video watching accounted for time-shifted consumption of content and the rest for viewing rental/retail or home videos (Mullan, 1997). At the beginning, households used VCR's mainly to time-shifted viewing (Levy, 1980; Levy, 1987), then the market of prerecorded content became an important factor of VCR use and viewing as well. The notion of time-shifting also appeared in academic literature during the same period (Levy, 1980; Levy, 1987; Harvey – Rothe, 1986; Potter et al., 1988; van den Bulck, 1999).

A sociological study of video recorder use in lower-class households showed that women tend less to use the technology, hardly possess any cassettes with their own recorded programs, they are more likely to watch real-time broadcast. They tend to feel less guilty passing their time watching television than watching video, as in the latter case, they purposefully turn the device on in order to watch a recorded content (Grey, 1992, cited in Mullan, 1997). Studies conducted in the United States also show that both video recorders and personal computers have a strong masculine aspect and women use these devices significantly less. Children on another hand familiarize remarkably easily with the device, and fast forward their less preferred parts and replay several times their preferred parts of their favorite recorded programs (Mullan, 1997).

Users referred to watching video as a pleasant leisure activity spent among family or friends (Gunter - Levy, 1987). The aforementioned ICT study showed that three quarters of VCR owners used their devices to time-shifted viewing and one quarter for rental or retail home video viewing. The most appealing attribute they mentioned was that they were free to watch what they want, when they want. The second most important attribute was that they could watch everything, as they can parallelly record a program and watch another, even though 60 per cent stated that they found little time to watch each program they recorded previously. Although they mentioned advertising avoidance as an advantage of the technology, the remote control device (RCD) already made this possible as users could zip television commercials by switching channels during a commercial break. The RCD originates from the United States as well. The first devices were only able to control the volume: upon pressing a button, one could mute their television set while the picture remained, thus they knew when an unwanted part was over to then turn back the volume. In the 1980's though, remote controls were able to switch among the multiple available channels, to handle broadcast teletext. In the 1980's, prospects for the future included that in the 1990's one would live in households equipped with voice-controlled video recorders and remote controls. The apparition of the remote control brought a considerable change to television viewing, with slightly negative externalities to advertisers, audience research and business markets. 40 per cent of viewers on the US market of the 1980's zipped in the middle of the commercial breaks. By this time, 70 per cent of the households were equipped with television sets with remote controls, which is a considerable part of the audience (Mullan, 1997). It is not unimaginable that DVR technology could have a comparable effect on the television market: even though the remote control did not destroy business models based on advertising revenues, but it brought a considerable and noticeable change in the audiences of commercial breaks and other broadcast programs.

In the ITC survey from 1994, respondents mostly turned to teletext in oder to look up television schedules (Mullan, 1997). This factor could give a forecast as for the use of the electronic program guide (EPG) available in the digital devices, with the ability to easily and instantaneously access television schedule and the details about a given program.

A study by Levy (1980) based on a diary survey showed that the most recorded genres were movies, soap operas and talk-shows, while the recording of short series'

episodes and sports events was much less common. Specialized recording habits were born, when users recorded only one given type of program. VCR use can be identified as complementary to existing television viewing habits, and it seems that first VCR-adopters used their devices to record programs. They were refined and selective in their use of the device, although they did not differ significantly in their content consumption from mass audience (Levy, 1980).

Wachter and Kelly (1998) studied the patterns of VCR use with their diary survey. Participants filled a television and video diary during a week. The aim of their research was to identify the motives of use of VCR's, to examine how households use the device, and whether they derive any utility and satisfaction from their media content consumption and leisure activities. According to their results, a little more than half (52 per cent) of the recorded content had been watched individually, the lesser half (48 per cent) in company by the surveyed individuals. Among the main motives to watch video appeared entertainment, relaxation, i.e. video served primarily as a movie player in the lives of the studied households. In 55 per cent of the recording events, surveyed people were out of home, in the rest of the cases they either watched another program at the moment of the recording or they had other occupations (work, learning, domestic work). A main motive to time-shifted viewing was the interference of the selected program with another family or other personal activity and the possibility of watching a program irrespective of its original broadcast time appeared as a decisive advantage of the VCR. The device became a key element of individuals' leisure activities, thus increasing the experience of television viewing. At the same time, the authors only found little correlation between VCR use and satisfaction with television viewing, that could be explained by the fact that individuals considered their VCR as a movie recording and playing device and thus related their viewing experience to this notion, while television viewing was a lot more diverse activity, which included the viewing of various genres, like news programs, shows, live broadcasts, quizzes, sports events, etc. Wachter and Kelly (1998) found that VCR use did not change users' lifestyles, viewing habits, instead, it further consolidated their existing habits.

According to Van den Bulck (1999) who examined the connection between timeshifted television viewing and VCR's, the technology did not serve as a means of reducing the runtime of a program (e.g. by fast-forwarding commercial breaks), instead it had a time-filling function. Therefore he positioned video recorders as a separate and competing channel.

To recapitulate, we can state that the study of VCR technology has already pointed out that the main causes behind changes on the consumer side related to the recording of televisual content and thus leading to a time-shifted use were the flexibility of the channel, a greater user control and a greater selectivity of content. However, in a second phase, the video recorder became much more a device destined to play prerecorded home videos and thus a driving force behind rental and retail industries specialized in home video. VCR on another hand appeared much less as a technology to revolutionize television viewing (van den Bulck, 1999; Barwise – Ehrenberg, 1996; Greenberg – Heeter, 1987).

4.2. Use of the digital video recorder

According to a survey conducted in the United Kingdom, households that are equipped with a device capable of offering time-shifted functions, self-reportedly use this function regularly (Olswang, 2006).

If we examine the consumer side, the technological progress is obvious, the number of households equipped with a video recorder decreases while the penetration rate of DVR technology increases. Data on Sky+ subscribers (and thus users of DVR technology) shows that patterns in television viewing time and in the ways of consumption are comparable to households' equipped with a VCR, although the rate of time-shifted viewing is significantly higher in households with a DVR (Syfret, 2007).

According to BARB⁵ data from 2005, 14 per cent of the total view of households subscribing to Sky+ and thus having access to DVR was time-shifted, compared to the 2 per cent time-shifted view of household only owning a video recorder. For both VCR and DVR, consumers watched a large part of their recorded content (40 per cent) the very day of the recording. In households with a Sky+ subscription, among content that was watched within a week following the recording, 18 per cent was watched later than three days following the recording (Wearn, 2007).

 $^{^5}$ BARB (Broadcasters Audience Research Board) is the organisation that compiles television ratings in the United Kingdom.

Rate of time-shifted view (%)	VCR (no DVR) % of households	Sky+ (DVR) % of households
No time-shifting	70	7,8
0-10	25,7	46,7
10-20	3,2	17,6
20+	1.1	27.9

Table 4.1. Ratio of time-shifted viewing of DVR and VCR owner housholds in a period of 7 days. Source: Wearn (2007:10)

Pearson and Barwise (2007) aimed to a deeper understanding of time-shifted view through a qualitative study, in which they used the method of video ethnography⁶ to examine the behavior of DVR-users. The authors focused on the four following points: presence, attention, behavior, interactions. In addition to recording the viewers, the researchers recorded, using a picture-in-picture function, the program that viewers watched. In this manner they could easily examine the relationship between the events happening on the television screen and viewers reactions. Observation and analysis here showed, that television viewing follows a routine, and users mainly watched programs broadcast in real time. There was only one exception, who during the week watched timeshifted content and during the week-end watched television in real time. The following interviews supported that users derive an important value from the time-shifting functions (Pearson, 2007; Pearson – Barwise, 2007). Within the 16 persons of 3 households taking part in the study, 7 never used the time-shifting function, whereas the remaining subjects overestimated on every occasion their time spent watching time-shifted content, and though that they zapped each advertising block even though in reality that was not the case. Within families, children also used often and confidently the time-shifting function, whereas the buyer of the DVR was not necessarily the most expert user though they usually bought the devices expressly for a family use instead of personal preferences (Pearson és Barwise, 2007).

Recording a program and starting watching it 15-20 minutes after its live beginning to then by fast-forwarding commercials, catch up with the live feed is a typical behavior among DVR-owner households. Their goal is to spare the time they would normally spend watching advertising (Lyra Research, 2004).

⁶ They followed television viewers during their viewing activity by recording them on video. Following the study, they completed the footage with structured surveys and interviews. They coded user behavior during television viewing along a code system defined previously to the study.

4.2.1. The reception of the DVR and the time-shifting function

According to a consumer survey conducted in 2006, the main advantage of the new technology, similarly to the VCR, is that viewers can detach themselves from the linear schedule and watch their favorite series when they please (Ofcom -Office of Communication, 2006).VCR technology already incorporated this function decades ago, although user-friendliness was less notable, with the users having to buy a video cassette before being able to record, insert a cassette into the VCR in order to record a program, program the recording, label and store the cassettes. Opposite to this, the use of DVR is easier and more convenient and seems to break even where VCR has failed.

Even though DVR devices are likely to include several convenience functions, their core capability is to record a program and play it back later. The time-shifting function can be used by anyone, on occasions or often, according to their different personal motives. Along the most common "not at home" situation, the increasing program choice is also an influential factor: ussers are more and more often confronted to a dilemma when they have to chose between two (or more) equally interesting programs broadcast at the same time. This dilemma is intensified by the differing viewing habits within the family as well, thus a situation of conflict often can only be avoided by watching one program on schedule while recording another.

According to the study based on BARB data, during a one-week period of observation, 30 per cent of VCR-owning households used time-shifting, while this rate was 92 per cent for DVR-owning households. When time-shifting, VCR households usually time-shifted 10 per cent of their total viewing time at the most, and while in absolute terms, there are a lot more time-shifters among DVR households, they also characteristically viewed time-shifted material in less than 10 per cent of their total viewing time (Wearn, 2007).

On a consumer side, the reception of the DVR devices was unequivocally positive, viewers appreciate and value the control over television flow, enabled by their DVR. Users like that they can easily choose their favorite programs, record, fast-forward programs and commercials (Carlson, 2006, Ferguson – Perse, 2004, Smith – Krugman, 2009). Today, one fifth of US-households are equipped with digital video recorders, and even though TiVo did not succeed as a blockbuster, it is proved that users are more satisfied with and involved in television viewing than before (Schreiber, 2008). DVR owners find television viewing more entertaining since they possess a DVR, and 86 per

cent of DVR purchasers are satisfied or extremely satisfied with television viewing opposite to 46 per cent before the DVR (Lyra Research, 2004). Data seem to show that television viewing and advertising avoidance has an effect on television market through DVR's (Calder, 2008).

Today, it is still a question how much utility the masses of consumers attribute to DVR technology and how often and in what context they will use it. Unlike on-demand content services, technology in this case does not have any effect on the composition of content, freedom is only offered to users in scheduling. Van den Broeck et al. (2007) resuming the results of a Belgian focus group study argue that time shifting does not radically change viewing habits (time passed viewing television, the composition of selected content to watch), it only shifts the daily viewing of programs by several hours. On the other hand, a study by Brown and Barkhuus (2006) shows users equipped with a time-shifting function (Sky+) do effectively and intensively use it, and television viewing basically means the viewing of recorded content.

Smith and Krugman (2009) studied DVR households in their homes during technology usage (viewing of recorded content). They completed their observations with in-depth interviews preceding the study. The aim of their study was to identify the role DVR has in households, program choice, the activities that precede television viewing, and the attention devoted to the device and the auxiliary activities during usage. Results show that viewers paid attention to the viewing of programs but were a lot less attentive as for advertising. The researchers recorded a wide range of auxiliary activities during use, from a total deviation of attention (reading, leaving the room, PC use, making phone calls, etc.) through talking about the viewed program, to activities not having an effect on attention (e.g. eating, drinking, smoking). As for preparations to viewing, surveyees reported that with DVR there is no pression of a program about to begin, DVR "can wait" as the program can be rewinded. DVR's had a role in the choice of programs through its electronic program guide function, enabling them to choose their programs more freely. As for the role of DVR as a whole, the researchers distinguished three determining categories: first, DVR as a synonym of television, second, DVR increasing control over television and third, DVR helping optimal time-management. DVR-use is thus as if they were watching television. Control is assured by the possibility to rewind and pause the program. Users reported positive experience of the time spent watching television, which they were able to adjust to their own needs, instead of previously occasionnaly having to rush or watch television with a feeling of guilt.

4.2.2. TIME-SHIFTING AND PROGRAM GENRES

Time-shifting shows significant differences according to the genres of recorded programs: a general trend is that programs with a topical value, such as news programs and sports events, where live vieweing has a considerable added value to consumers and these programs lose their relevance with time. However, in the case of series, where the viewing of every episode is more unlikely to fit well into the daily routine of viewers, or it is at least inconvenient to adjust one's schedule to them, time-shifting is more widespread (30,6 per cent; Table 4.2). This is also true for documentaries, soap operas and in a lesser extent to movies (Wearn, 2007). The topicality of these programs does not decrease seriously with time, thus they can be viewed later.

Т	Table 4.2.	The ratio of	Time-Shifted	View	According t	o the Genre	of the l	Program.
Source:	Wearn (2	007:10)						

Genre	VCR – time- shifting (%)	Sky+ – time- shifting (%)
Series	4.9	30.6
Documentaries	2.6	25.5
Soap operas	2.7	20
Movies	2.2	12.5
All genres	1.6	13.8
Sports programs	0.8	6.5
Childrens' programs	0.4	6.7
News/weather programs	0.1	3

Ofcom's (Ofcom - Office of Communication, 2006) study of the relationship between the type of programs and time-shifting shows similar results. Here, movies, series and documentaries were the most time-shifted programs, while childrens' programs, sports, news and music programs were the less time-shifted genres among DVR households. Differing viewing habits according to genre give an important indication to advertisers on advertising value. Genres that viewers follow on a live basis and thus where advertisement is more unlikely to be zapped, are likely to gain value to advertisers. At the same time, advertisers, when appearing in commercials near programs that are more prone to time-shifting have to consider a longer topicality for their messages (e.g. in case of a seasonal promotion, an open weekend, a movie premiere, etc. the message might lose its relevance when viewed a few days following its original air date and might even provoke negative reactions).

4.2.3. TIME-SHIFTING AND PRIMETIME AUDIENCE

According to data published in February 2007 by Sky+, time-shifting accounted for 12.2 per cent of all viewing time. This rate was 22 per cent for programs originally scheduled between 9 and 10 p.m., and 17 per cent for programs between 10 and 11 p.m. (Ofcom -Office of Communication, 2007). Time-shifting is significantly higher in the evening, the time of which can be used by families to be together and with their children and whereas families in the past missed these programs out, now they can record and view them later.

Data from the United States show that advertisers do not have to fear audience decline in prime time yet. The cumulated reach⁷ of the most active and most important category for advertisers, that of the 18-49 age group shows no dramatic change in live-view ratings: 96.17 per cent in 2002 compared to 96.72 per cent in 2007 (Magna Insights, 2008).

Daily audience until now has been built by channels as a result of a deliberate programming activity, reaching their peak in prime time audience, gradually, through the whole day, program by program, to then broadcast movies, series and that would attract the most viewers and thus the highest audience. Prime time is also the most valuable and thus most expensive period for advertisers, making up a critical part of television channels' revenues. Thus the shaping of prime time audience is crucial to broadcasters. Research data until today shows two considerable effects. First, time-shiting is growing for primetime programs, i.e. people watch less evening programs and thus advertisement during their original time of broadcast. Parallelly to this phenomenon, time-shifting of primetime programs to later hours drains further audiences from real-time broadcasts. It is certain that primetime time-shifting is the most compelling transformation on the television market.

4.2.4. The rate of advertisement zapping

A determining factor in technology use, and thus in the prevalence of time-shifting and advertisement zapping is the duration of a household being equipped with a DVR device: there was a difference of 14 percentage points between the zapping rate of

⁷ 18-49 age group, on a minute to minute basis, USA, 2007

housholds users of a DVR since more than two years (84 per cent) and that of households having their DVR for no longer than 6 months (72 per cent) (Macklin, 2005). It seems that zapping can be a form of learned behavior, that evolves after a longer period of time in the case of a numer of users.

In the aforementioned video ethnographic study, Barwise and Pearson recorded a total of 3480 advertising spots (including multiple broadcasts of the same spot). Surveyees watched 70 per cent of these in real time while the rest, time-shifted⁸. Figure 4.2 shows the distribution of viewing rime. 32 per cent of time-shifted advertisement views were in normal speed. This means that live advertising view and time-shifted full view together account for 80 per cent of total advertising exposure. The same rate for program trailers is 87 per cent. Surveyees thus fast forwarded approximately 20 per cent of advertisements (Pearson, 2007; Pearson – Barwise, 2007).

Observations and the ensuing interviews clearly showed that fast forwarding requires greater attention from the viewer (e.g. they need to observe when the viewed content resumes) thus fast-forwarded advertisement is also viewed with a greater attention, moreover one observee also commented the fast-forwarded commercials (Pearson, 2007; Pearson – Barwise, 2007).

This qualitative study thus showed that live view is still dominant in the observed British households, and also revealed that time-shifting does not in every case involve zapping of advertisement, as in one third of the cases, observees watched commercials at normal speed as well. The study also draws the attention on the fact that the level of viewer attention might also increase in some cases during the fast forwarding of commercials.



Figure 4.2. Number of Observed Advertisements According to Type of Viewing. Source: Pearson (2007:14)

In each case observed, a superior level of concentration accompanied fastforwarded adevertising view. All regards were fixed on the screen, even that of those who at the moment did not have the remote control in their hands. Thus the researchers propose that calling this phenomenon *speed watching* instead of *fast-forwarding* might be more close to reality (Pearson – Barwise, 2007).

Data from 2007 from the United States of America verify the results on the British market. Real-time viewing is still overwhelming, news and sports lose their relevance with time, and DVR devices are esteemed by users because of their practical functions, the easiness and convenience of use, and not because of the possibility to zap advertisement by them. Results show that 25 per cent of all viewing was time-shifted, mainly motivated by convenience and the possibility to watch multiple programs. Only 30 per cent of the surveyees stated watching time-shifted content expressly for zapping advertisement. 30 per cent of surveyees always watched commercials that they believed relevant to them and those they enjoyed (Loughney, 2007).

As for time-shifting, 71 per cent stated that they fast-forwarded advertisement, the rest watched recorded programs as if they were live broadcasts, i.e. they did not fast-forward commercial breaks. 25 per cent of households owning a DVR said that since they had their device, they were more aware of advertisements than before (Loughney, 2007).

When comparing DVR households with those not equipped with the device (see Table 4.3) we can see that, altogether, during time-shifting, more users watch commencials carefully than switch channels or leave the room (Loughney, 2007).

	Having a DVR	Not having a DVR
Fast-forwarded advertisement	71%	-
Did not switch channels, but paid less	11%	40%
attention to advertisements		
Did not switch channels and paid attention	5%	8%
to advertisement		
Did not switch channels and paid no	9%	29%
attention		
Switched channels	1%	10%
Left the room	4%	12%

Table 4.3. Viewing Habits of DVR-Users and Non-Users During Advertising Breaks. Source: Loughney (2007:20)

An interesting question here is how to evaluate the two ways of television consumption and which is more representative of advertising avoidance. In order to be able to answer this question, one ought to judge the added value of a fast-forwarded commercial for the advertiser, for a brand of for brand-awareness. In terms of absolute numbers, the rate of non-viewers of advertisements (including those who left the room, switched channels and paid no attention) was 51 per cent among those watching a live flow while only 14 per cent among time-shifters. However, those watching live flow did considerably pay more attention to advertisement (48 per cent), than time-shifters (16 per cent).

In conclusion we can say, that in their glory days, analog video recorders had already reached a considerable penetration rate, even though the success of the technology is primarily due to the appearance of prerecorded home video and to the possibility to watch home-made videos, an only in a lesser extent to the recording and reviewing of broadcast content. DVR until now is highly successful in terms of consumer reception. The types of most recorded content correspond to those of the analog era, i.e. in most cases users record movies, series and documentaries. At the same time the possibility to pause a live flow, then rewind it, or deliberately start the viewing of a program with a time shift all correspond to a new type of behavior. The resulting transformation of the viewing schedules mainly affects primetime programming, i.e. the period of most valued television content, although this effect until now is not radical. The rate of advertisement zapping is not high within total view and ad views either yet, though one must not forget that with the increase of time-shifted view of this type, even though not a primary motive for time.shifting, but the rate of zapped advertisement will also increase as a general consumer behavior.

5. EMPIRICAL RESEARCH

In this chapter we present the set-up of our empirical research. First, we present the methodology used in the research, than we formulate the research problem related to the thesis which we further develop into research questions for each phase of the empirical research process. Following this, we present the research model and the hypotheses related to our main empirical query. Then, in a chronological order, following that of the steps of our empirical research, we review and discuss the results of our research.

The goal of the research is on one hand to discover and unveil the consumer appreciation of DVR technology related to digital television as an innovation, its perceived advantages and appealing proprieties for users as well as the factors influencing the acceptance of DVR technology. On the other hand, our research aims to observe the usage habits of DVR-owning households, the intensity of use, their changing behavior related to the watching and zapping of advertising, as well as the role DVR and television have in households. By observing people and households owning a DVR device we aim to have a deeper insight into changing usage habits, namely whether the advent of this technology within a household brings about a more active and more influential role of the viewer in a traditionally passive and receptive television consumtion that can be considered a well-anchored daily routine.

5.1. MIXED METHOD RESEARCH DESIGN

Research design is chiefly determined by the aim of the research and the research questions (Crotty, 1998). The aim of the present research is to discover the consumer and user acceptance, technology usage of new media technologies and innovations and to identify the factors determining the acceptance thereof. The specific context of the present thesis and the relating research is digital television and within it, the usage of digital video recording technology and the unit of observation would be individuals, potential technology adopting television viewers. Our research questions and hypotheses are presented in Chapter 5.2.

"Mixed method research studies use qualitative and quantitative data collection and analysis techniques either in parallel or sequential phases." (Teddlie–Tashakkory, 2003:11). The advantage of combining various methods is to aid a better answering of the given research questions and drawing more robust conclusions. Drawing better and more reliable conclusions is possible when the combined use of the chosen methods reinforces and completes each individual method and reduces the eventual weaknesses and deficiencies of them (Teddlie and Tashakkorie, 2003). The use of a mixed method research design in the present thesis allows the better understanding of each research questions as well as the determining of a most relevant subsequent phase, parallel to a deeper understanding of the research questrions.

Leech and Onwuegbuzie (2009) distinguish three dimensions of research design in their analysis of studies using a mixed method approach: partially or fully mixed methods, concurrent (i.e. parallel data collection) or sequential time dimension, and with an equal or unequal emphasis on the various methods. Along these dimensions, they identify eight different types of available mixed research design, shown in Figure 5.1.



Figure 5.1. Typology of mixed research. Source: Leech – Onwuegbuzie (2009:269)

According to Denzin (2009, [1970]) in a study, the robustness of the research design is can chiefly be influenced through triangulation, i.e. the use of methodological combinations. Denzin (1978) distinguishes four basic methods of triangulation. The first is the triangulation of data, that is, the use of various data sources. The second is the triangulation of participants, i.e. involving various researchers and raters. The third is theoretical triangulation, that is, the interpretation of result along various perspectives and theoretical backgrounds. The fourth is methodological triangulation, i.e. the use of various methodologies in the study of a given research area.

Patton (1990), himself a researcher mostly using qualitative methodology, argues that the usage of mixed methods indicates that a researcher recognized the need to stay open-minded to the understanding of things in various ways. He highlights that methodological purity is less important than finding and collecting relevant and useful information.

Cresswell et al. (2003) distinguish six types of mixed method research design along four criteria (implementation, priority, stage of integration and theoretical perspective), as shown in Table 5.1.

Table 5.1. Types of research design based on mixed methods, Source: Cresswell et al. (2003:224).

Design type	Implementation	Priority	Stage of	Theoretical
			integration	perspective
Sequential	Quantitative	Usually quantitative;	Interpretation	May be present
explanatory	followed by	can be qualitative or	phase	
	qualitative	equal		
Sequential	Qualitative	Usually qualitative;	Interpretation	May be present
exploratory	followed by	can be quantitative or	phase	
Sequential	Fither quantitative	Quantitative	Interpretation	Definitely present
transformative	followed by	qualitative or equal	interpretation	(i.e. concentual
uansiormative	qualitative or	quantative of equal	phase	framework
	qualitative			advocacy
	followed by			empowerment)
	quantitative			empowerment)
Concurrent	Concurrent	Preferably equal, can	Interpretation	May be present
triangulation	collection of	be quantitative or	phase or	
C C	quantitative data	qualitative	analysis phase	
	and qualitative data	*		
Concurrent nested	Concurrent	Quantitative or	Analysis phase	May be present
	collection of	qualitative		
	quantitative and			
	qualitative data			
Concurrent	Concurrent	Quantitative,	Usually analysis	Definitely present
transformative	collection of	qualitative or equal	phase, can be	(i.e. conceptual
	quantitative and		during	framework,
	qualitative data		interpretation	advocacy,
			_	empowerment)

According to the two classifications above, the present thesis uses a fully mixed, sequential research methodology with a dominant emphasis on quantitative phases. Thus, data collection and analysis is performed sequentially, in respective qualitative and quantitative phases and data collection in a previous phase in each case determines the design of the following phase (Leech and Onwuegbuzie, 2009). At the same time, Creswell et al. (2003) highlight that a research design using exclusively one of the above-mentioned six types is very rare and thus suggest to researchers using mixed methods to dynamically and innovatively vary and apply each approach. According to this, the

present thesis uses an approach both building upon sequential exploratory and sequential explanatory phases.

The empirical research, based on mixed methods, has been realized according to the contents of Figure 5.2. Following an exploratory qualitative first phase we designed an exploratory quantitative phase. This was followed by another qualitative phase, the aim of which was to better and more deeply assess the results of the first two phases and to prepare another following quantitative research. The final quantitative phase to which our main research model (to be presented in chapter 5.2.1.) is related, is followed by a concluding qualitative phase in order to assess the potentially remaining open questions and doubtful points. The research process thus comprises both qualitative and quantitative methods built up in an iterative manner. The empirical research is thus realized in a sequentially, the earlier phases of our research chiefly supporting and testing the final research model.

Figure 5.2. Sequential explanatory and exploratory research design of the present thesis, based on Creswell et al. (2003:225)



In Table 5.2. we present a summary of each research phase, their goal and sample size. The first exploratory survey related to the thesis took place in Fall 2008 conducted as part of a wider research focusing on video content consumption. In order to better understand the conclusion of this research and to better get acquainted with the users of DVR technology, we inserted a qualitative research phase, during which in-depth interviews were conducted with lead users of the technology. The methodology of interviewing was even more justified that these subjects were hard to reach in number and thus for a quantitative research, and that they could provide through their subjective points of view insights, experiences, stories, that other research methods would not

reveal. Parallel to these in-depth interviews, focus group interviews were conducted with non-users and seldom-users of television technology that greatly helped revealing, understanding and analyzing the remaining aspects of audiovisual content consumption habits and platforms.

Following this phase, we proceeded to the translation and re-translation of existing scales in the literature, to the testing of our questionnaire and pre-tesing of our research model within a survey including university students.

The final research model was tested on a sample composed of 18-69 year-old internet users in possession of a television set. This survey contributed to answering the other research questions as well. To analyze the effects of technology diffusion and expert-validate the result of the empirical research we proceeded to expert interviews.

Phase	Туре	Aim	Methodology	Time	Sample
1.	QuaL	preparation of the penetration testing	market and academic experts; expert focus groups	September 2008	two focus groups with n=6 and 5 experts respectively
1.	QuanT	testing penetration in Hungary	online query (18-39 yrs, internet user, demogr. representative sample)	October 2008	n=1000 (incl. 40 owners of DVR sets)
2.	QuaL	analysis of lead users	semistructured personal interviews	April-May 2010	n=6 (from 5 households)
2.	QuaL	analysis of those turning away from television	3 focus groups (1 group of total rejecters, 1 seldom viewers, 1 mixed)	May 7th, 2010	n=8, 8, 10 persons, respectively
2.	QuanT	questionnaire, test of scales	online query (own questionnaire, through Google spreadsheets)	10-16th May, 2010	n=234, students in 1st year, Corvinus University of Budapest
3.	QuaL	expert validation of research results	semistructured expert interviews	September, November, 2010	Market professionals from the 2 main television subscription providers:2 interviewees + 1 secondary interview
3.	QuanT	study of DVR acceptance, test of hypotheses	online query (18-69 yrs internet users)	14-21st November, 2010	n=500

Table 5.2. Phases of the empirical research. Source: own table

Blue is indicating the qualitative; the red is indicating the quantitative phases.

5.2. RESEARCH QUESTIONS AND PHASES OF THE EMPIRICAL RESEARCH

The goal of the research is on one hand to discover and unveil the consumer appreciation of DVR technology related to digital television as an innovation, its perceived advantages and appealing proprieties for users as well as the factors influencing the acceptance of DVR technology. On the other hand, our research aims to observe the usage habits of DVR-owning households, the intensity of use, their changing behavior related to the watching and zapping of advertising, as well as the role DVR and television have in households. By observing people and households owning a DVR device we aim to have a deeper insight into changing usage habits, namely whether the advent of this technology within a household brings about a more active and more influential role of the viewer in a traditionally passive and receptive television consumtion that can be considered a well-anchored daily routine. Our goal is to provide a general model for MediaTechnology Acceptance Model (MTAM) and our research ensures the first model test.

With the transforming media and media technology landscape, it is particularly interesting a question how, to what extend and by whom will a transforming broadcast mass media will be accepted in a digital, convergent media environment. Thus we put digital television and within it, a specific technology, that of digital video recording into the focus of our research. Both our exploratory research phase and qualitative studies preceding our study confirm that the technology of digital video recording within digital television technology is a worthwhile focal point to our study.

In the following we present our research questions that we answer through our empirical research and the planned research phases and methodology related to each research question: **<u>Research question</u>**: What are the influencing factors of the acceptance of media technology innovations related to mass media, meaning television related technology innovations in our research?

Subquestions:

• Does the role and place of television as a medium change through digital technologies?

• Who are the lead users of the digital video recorder? How can they be described, what attributes do they have concerning the possession of other technological devices, their innovation orientation and demographic variables?

• Which are the factors preventing the acceptance and use of media technology? As the technology acceptance model focuses on the factors helping the acceptance and adoption we aim to start to identify and explore the preventing factors of adoption during the qualitative research phases.

We aim to answer the main research question through testing our research model, which rates the overall strength of the model. We will evaluate the relationships (strength and directions) between the variables of our model and so analyse the factors influencing the media technology acceptance. In order to prepare a well grounded research model we step by step build up our research on iterative qualitative and quantitative phases. Our aim is to develop a Media Technology Acceptance Model and serve of our research as a first test to this model. The research question endeavors to provide relevant answers chiefly to the academic community and literature focusing on the study of technology acceptance. We present the hypotheses related to the research question in detail in the following chapter. We will test the hypothesis according to the test of our research model and to the tests of correlation for each element. We examine the context of the model through the test of the model as a whole. Drawing from the technology acceptance model, we examine the independent variables determining the perceived usefulness and perceived enjoyment in the case of media technologies and we employ the variables of perceived ease of use and the determinants thereof from the theory of technology acceptance model. In our exploratory study including both in-depth interviews and focus groups, we gained a better insight to the relation between technology and its potential users thus helping to shape the final research model. With the identification of these determining factors, we aim to propose for the academic community an original set of variables specific to media technologies although we hope that our set of variable would also serve as a guideline for market actors by identifying specific user behavior and other determining factors.

Regarding our subquestions which highly relates to the main research question first we assess the perception of television viewing by viewers on different levels. In our exploratory study we analyze the perception of digital television viewing as well as that of traditional television viewing. We aim to gain insight into the habits of active television viewers and owners of digital video recorders through focus groups. Eventually, in our quantitative study intended to test the empirical model, we will be able to compare through the results of the integrated gratification scale, the gratifications of subscribers to digital services and those of analog subscribers. Our assumption is that gratification does not change for television, although digital technology will help television keep its role within users' media portfolio. From the analysis of this area we expect to extend academic literature examining the role of media consumption and media as a whole, as we will be able to add substantial information to the changing or on the contrary, stable need-satisfying function of a medium of great past.

Than we seek answers to the second subquestion through personal interviews conducted with technology users and through a sub-sample of our quantitative query. Clusters formed according to the extent of actual use and the description of these clusters along demographic, innovation-orientation and technological attributes will clarify who the lead users are, in case a cluster responding to the criteria of lead users can be identified. In order to deeply understand the lead users we both use qualitative analysis as well as quantitative methods.

According to international experience and academic literature, digital video recording is an appealing technology and its use is valuable to television-viewing audiences. At the same time, the diffusion of this recording technology is far from overwhelming, since 10 years, from its introduction; it failed to revolutionize its markets. Thus we find it important to unveil the elements that withhold users from using this technology even with a positive attitude towards it, and thus preventing the purchase of a set and the advent of the technology in a majority of households. We seek an answer to this research question through qualitative focus group interviews. We anticipate that the results related to this research question would serve as a relevant affirmation to market actors as well, and that they will later help extending the technology acceptance model with inhibiting factors.

5.2.1. The research model and the hypothesises

Our research model was tested among 18-69 internet users in Hungary. The model is integrating the relevant parts of technology acceptance model (indicated as colored the basic TAM variables). The new independent variables are the identified gratification theory based variables (Perceived social usefulness, Perceived entertainment usefulness, Television affinity). Figure 5.3. is representing our model with the latent variables and the source of the used scale in brackets.

Figure 5.3. The research model, Source: own figure



When defining our research model and measurement scales we highly leaned on the the analysis of the TAM summary table (shown in the theoretical part of the dissertation) as well as on the result of our mixed-method based empirical studies.

Used latent variables

We introduce in the following section our latent variables.

Perceived ease of use is an important determinant of the use oftechnology or systems along with perceived usefulness in TAM (Davis, 1989; 1993; Davis et al., 1992; Mathieson, 1991). It is affecting directly the future behavioral intention to use and in case of hedonic information systems it also influences perceived enjoyment. (Van der Heijden, 1994; Venkatesh, 2000).

Perceived ease of use in TAM is the degree to which a person believes that using a particular system would be free of effort'' (Davis, 1989, p. 320). The studies using TAM found more times direct effect between perceived ease of use and perceived usefulness (eg.: Davis, 1989; Davis et al., 1989; Venkatesh and Davis, 1996; Szajna, 1996; Mathienson, 1991; Van der Heijden, 2004). While others examining television technology or digital technology did not examined this relationship (eg. Choi, 2003; Koufaris, 2002) or did not find significant relationship (Ha & Yook, 2009). So we think to be important to further analyse the relationship of these two variables in our own research model.

Perceived usefulness is the degree to which a person believes that using a particular system would enhance his or her job performance'' (Davis, 1989, p. 320). Perceived usefulness is one of the main variables used in TAM and having a significant effect on behavioral intention to use.

Perceived enjoyment The extent to which "the activity of using a specific system is perceived to be enjoyable in its own right, aside from any performance consequences resulting from system use" (Venkatesh, 2000, p. 351). It was proven in TAM that perceived enjoyment is a significant determinant factor of technology acceptance beside perceived ease of use and perceived usefulness (Venkatesh, 2000). It has a more important role in case of hedonic, entertainment technologies (Van der Heijden, 2004).

Behavioral intention to use reflects the aim of the individual to use in the future the given technology. Also the Theory of reasoned action and Technology acceptance model proved that behavioural intention to use determines the use of computer technology. It differs from the usage of the technology, as behavioural intention to use reflects the attitude towards the technology as well (Davis et al., 1989). Behavioral intention to use indicates the motivation to use, the expected future use of the technology based on positive attitudes. Although TAM has been widely used to predict individuals's acceptance and usage of new technology we have to note that also individual level (external) factors may influence the acceptance and so on TAM constructs. In our research model we have integrated seven individual variables based on the literature review and our own research results as potential influencing factors in case of media technologies.

Based on previous research we can state that in the acceptance process the relationship and attitude towards technology has a high effect on the perceived usefulness as well as the ability perceived to be able to use the new technology (Thatcher and Perrewe, 2002).

Technology Self-efficacy is the degree to which an individual believes that he or she has the ability to perform a specific task/job using the given technology (Compeau and Higgins, 1995).

Technology anxiety is the degree of "an individual's apprehension, or even fear, when she/he is faced with the possibility of using computers (Venkatesh, 2000).

One of the main theoretical pillars of our research is the uses and gratification bachground providing the motivation of media use and content consumption. We uses the initial gratification scales measuring television viewing motivations. We wish to measure the consumers', viewers'attitudes and affinity of the medium where the technology innovation appears by three latent variables.

Television affinity is an attitude towards the medium that reflects the importance people assign to tv or specific programs. Greenberg (1974) first reported using a three-item likert scale to measure intensity of one's attachment of TV. Rubin used that measure and later increased it to five measures (Rubin, 1981).

Perceived entertainment usefulness is the degree to which a person believes that the technology (in our case television) would provide entertainment, enjoyment, and relaxation (Rubin et al., 2004).

Perceived social usefulness reflects the extent that the medium (in our case television) provides social satisfaction, companionship to the individual (Rubin et al., 2004).

We expect relationship among the external variables of our model according to their effects on endogen variables. It means that we expect a positive correlation between variables of television gratifications (television affinity, perceived social usefulness, perceived entertainment usefulness) and the negative correlation between the technology relationship variables (technology self-efficacy, technology anxiety).

Hypothesises

The hypothesise H1a-H1c will show the relations of gratification theory background and the techology acceptanc model. In other words they reflect connections and structure of the consumer gratifications of the mediatype and the perception of the related technology innovation. We are looking for the answer for the question whether the medium specific gratifications and affinity are in relation with media technology perceived usefulness and if yes thant which factors are the most influencing ones.

H1a: Television affinity will positively affect the perceived usefulness of the digital video recorder.

We could not identify in technology acceptance literature the systhematic examination of technology affinity, in our case mediatype affinity. Stern et al (2008) used the computer affinity variable in their research, which was measured by the adaptation of Rubin's (1981) television affinity scales. They found a positiv relationshipt between computer affinity and perceived usefulness of it (Stern et al., 2008). Mafé et al. (2010) researched the effect of television program affinity and sms affinity on the participation in television programs using TAM as theoretical background. Their results also proved a positive relationship between television program affinity and the participation intention (Mafé et al., 2010). Based on our own exploratory studies we also support the deeper examination of this relationship of medium specific affinity and perceived usefulness of the technology innovation.

H1b: Perceived social usefulness of television will positively affect the perceived usefulness of the digital video recorder.

H1c: Perceived entertainment usefulness of television will positively affect the perceived usefulness of the digital video recorder.

When considering TAM as theoretical context we can identify usually more factors (external latent variables) as influencers of perceived usefulness as well as perceived ease of use. Zhang and Mao (2008) examined the effect of perceived information, social and entertainment usefulness on perceived technology usefulness. Ha and Yook (2009) analysed the relationship between perceived cognitiv and affectiv usefulness on perceived technology usefulness. Jung et al. (2009) argued that content has a determining role in perceived technology usefulness. We can see that the integration of the links of medium

relatid gratifications and usefulness is a relevant tendency in case of media technology acceptance, however there is no unified and systhematicly used partial model to examine it. We agree that content has a critical role int he perception of a media technology innovation, while the usage of related gratifications provide a better grounded and consumers' need based approach and conclusions. Our recommendation is Rubin (1981), Rubin et al. (2004) uses and gratification approack in case of television context. Based on our exploratory studies in case of media technologies and so in case of television and videotechnologies the most important need satisfaction function can be identified as social and entertainment usefulness. The original gratification scales (Rubin, 1981) will be used to measure perceived entertainment and social usefulness, and their effect on perceived usefulness of the digital video recorder technology.

H2a: Technology self-efficacy will positively affect the perceived ease of use of the digital video recorder.

Fenech (1998) integrated self-efficacy variable into TAM case of web acceptance, than Venkates (2000) used the technology self-efficacy as determining factor of perceived ease of use, and they found a pozitive relationship between the two variables. Both in case of information technology (Hong et al., 2002; Venkatesh and Bala, 2008; Purkhayasta, 2009), and of entertainment communication technologies (mobilephones; Zhang and Mao, 2008) stornger or weaker but positive relationship was identified between technology self-efficacy and perceived ease of use of the technology. We can examine the effect of the latent variable showing the self-perception of the individuals including knowledge and control. Beside the study of Zhang and Mao (2008) this relationship was not examined in case of media technologies, however self-efficacy may influence the technology innovation acceptance independently of the goal of the usage (work vs. entertainment).

H2b: Technology anxiety will negatively affect the perceived ease of use of the digital video recorder.

Our exploratory study suggested that the negative attitude towards the new digital technologies, the anxiety against these technologies may inhibit the acceptance and so the diffusion of the innovation. The technology anxiety reflects an emotional relation, an attitude while technology self-efficacy reflected their own knowledge, and control

perception. Venkatesh (2000) during his three points data collections found a significant negative relationship between technology anxiety and perceived ease of use. Venkatesh and Bala (2008) also proved this negative connection. In case of communication of media technologies the relationship of technology anxiety and perceived ease of use was not examined.

The next hypothesises are describing the basic propositions of TAM, so that the strength and direction of the relationship between behavioral intention to use and perceived usefulness, perceived ease of use and in case of hedinoc technologies, the perceived enjoyment.

H3a: Perceived ease of use of the digital video recorder will positively affect the perceived usefulness of the digital video recorder.

From the first step of TAM usage (Davis, 1989) the positive relationship between perceived ease of use and perceived usefulness was integrated as it is clearly logical that if a use of a technology is simle than it will have higher usefulness and higher behavioral intention to use. Both in case of work related technology use (Davis, 1989; Davis et al., 1989; Szajna, 1996; Venkatesh, 2000; Venkatesh and Bala, 2008) as well a case of communication and media technologies (Van der Heiden, 2004; Bruner and Kumar, 2005; Porter and Donthue, 2006; Wang et al., 2008; Kwong and Park, 2008; Stern et al., 2008; Lee and Chang, 2011) and also the television context related researches (Choi, 2009; Jung et al., 2009) found a significant positive relationship between perceived eas of use and perceived usefulneess. Ha and Yook (2009) in case of IPTV acceptance did not find significant relation, while more reserchers (Koufaris, 2002; Tan and Chou, 2008; Zhang and Mao, 2008) did not examine this relation. In literature the majority examined and found a positive relation between the two variables.

H3b: Perceived ease of use of the digital video recorder will positively affect the perceived enjoyment of the digital video recorder.

We prefer those technolgies which are easier to use, and we enjoy them more. In case of TAM considering hedonic use two research exmined the relationship of perceived ease of use and perceived enjoyment and found a positive significant relation (Van der Heiden, 2004; Bruner and Kumar, 2005). As we aim to provide a widely usable media technology specific acceptance model, we highly emphasises the concept of Van der Heiden (2004)

where perceived enjoyment appears in the model.

H3c: Perceived ease of use of the digital video recorder will positively affect the behavioural intention to use of the digital video recorder.

Davis (1989) intoduced in TAM the perceived ease of use and behavioral intention to use variables and found a positive relation between them. Generally in TAM studies a weaker but positive relationship was found as in case of perceived usefulness and behavioral intention to use; Legris et al. (2003) analysing 22 studies and 28 analysis found 10 positive relation, 3 non significant and 15 non examining this relationship studies. Van der Heiden (2004) et hedonic information systhems found a positive significant relation. Regarding media technology specific researches positive significant relation was identified: blog acceptance (Hsu and Lin, 2008); MMS acceptance (Wang and munkatársai, 2008); SMS advertising acceptance (Zhang and Mao, 2008); mobil televison (Jung et al., 2009). At the same time it seems that if in case of the entertainment technologies the perceived enjoyment variable is present in the model beside perceived eas of use, than no significant relation was identified: online co-design (Lee and Chang, 2011), online buying (Koufaris, 2002), mobil internet appliances (Bruner and Kumar, 2005). Regarding television context we did not find a study using perceived enjoyment variable, however the cited studies and our exploratory research results also indicate the importanc eof this relationship.

H4: Perceived usefulness of digital video recorder will positively affect the behavioural intention to use of the digital video recorder.

Davis (1989) introduced in his TAM model the relationship between perceived usefulness and behavioral intention to use. Legris et al. (2003) provided a metaanalysis of TAM researches (28 analysis) and found 16 positive significant relations, 3 non szignificant and 9 studies did not examine this relationship. Schepers and Wetzels (2007) also doing a TAM metaanalysis found 38 significant relationship out of 38 researches. Considering media technology specifica TAM usage we can also identify the positive significant relation: MMS acceptance (Wang et al., 2008); SMS advertising acceptance (Zhang and Mao, 2008); mobile television acceptance (Jung et al., 2009), IPTV (Ha and Yook, 2009), online co-design (Lee and Chang, 2011). However in case of blog acceptance (Hsu and Lin, 2008) no significant relation was found, but we can not forget
that in case of blog acceptance the user was te content provider not the content consumer. Van der Heiden (2004) in case of hedonic information systems identified a positive significant relationship but the perceived enjoyment had higher effect on behavioral intention to use. In our study we expect that the perceived usefulness of the technology innovation (DVR) will be higher thant the effect of perceived enjoyment as it provides usefulness in the content consumption of the main media (television) not in the technology usage.

H5: Perceived enjoyment of digital video recorder will positively affect the behavioural intention to use of the digital video recorder.

Van der Heiden (2004) integreted into TAM researhc model the perceived enjoyment factor when he examined the acceptance of hedonic information systems. Zhang and Mao (2008) also used perceived enjoyment in case of SMS advertising acceptance however they considered it as influencer of perceived usefulness. Hsu and Lin (2008) found perceived enjoyment the most influential factor at blog acceptance, while Ha and Shoe (2009) identified positive relationship between perceived enjoyment and attitude when they analysed e-buying acceptance. Lee and Chang (2011) focused on online co-design and also found positive significant relationship. As our aim is to provide a media technology acceptance model where the voluntary use and enjoyment factor. We have to emphasize that in television context focused TAM studies the role of perceived enjoyment was not examined. It provides a new approach in our reasearch of television technology.

The next hypothesis is separete from the research model, however we will test it with quantitative methods regarding the gratification changes in the digital televison environment.

H6: The television viewing motivations and gained gratifications are defined mainly by the content and not by the technology, so that there is no difference between the television gratifications of digital subscribers and analogue subscribers.

Rubin (1981) developed the television gratification scale and theory in the golden period of television (1970-80) and was validated in several studies. It is an important point to follow whether the appearance of digital television technology in the housholds (signal coding, voice and picture quality, digital video recording) as technological functions change the gratification set of the viewers or not. With this hypothesis we focus on this question.

5.3. FIRST QUALITATIVE AND QUANTITATIVE RESEARCH PHASE: EXPLORATORY STUDY

The aim of this phase is to assess audiovisual content consumption habits of users and to reveal user judgment, perception and rating of digital television. A particular focus was put on user rating of time-shifting, the perceived advantages thereof and the attitudes related to recording televisual content and to advertisement. The survey in this phase was expressly carried out in an exploratory manner and it aimed to register the diffusion level of the technology, and as such, aimed to study on a large-sample environment the early stages of DVR-use and time-shifting. The questionnaire was based upon the results of international studies and empirical experience on time-shifting and digital video recording.

5.3.1. The role of the qualitative research phase

Research was initiated by an exploratory expert focus group, the aim of which was to prepare the penetration study. The expert focus group was composed of members of the Institute of Marketing and Media of Corvinus University of Budapest, a market researcher of Magyar Telekom and members of a consulting company specialized in information and communication and media markets. A sin this phase our express aim was to prepare and shape the following quantitative research phase as well as integrate an expert point of view into our research, the use of the method of an expert focus group was decided. After presenting and discussing secondary research results, the focus group was introduced to the aims of the penetration study and discussed and elaborated the potential questionnaire items. Afterwards, the items of the afore made questionnaire were adapted and completed within and with the help of the expert focus group.

The method of data collection as well as the planning of the query also were decided during the expert focus group phase. For the exploratory penetration study an online survey method was chosen as it can be well used on a large sample representative (gender, age, education, settlement type) of a whole country.

5.3.2. QUESTIONNAIRE DEVELOPMENT

Surveying allows to gather results describing a larger statistical population and is fitting for assessing the attitudes and orientation of a larger statistical population (Babbie,

2003). Surveying is able to authentically represent consumer opinion and attitudes, it is flexible in use and offers quantifiable data (Szokolszky, 2004). The relevance of online survey is given by the high penetration rate of the targeted 15-39 year age group, half of which being a regular and active internet user. Within the age group we aimed to find individuals open to novelties and technological innovation, an attitude which can be assessed through an active internet usage. Ilieva et al. (2002) point out fast response time, fast results, a high cost-effectiveness in the case of large samples and an ease of use for the surveyees leading to a better data quality. At the same time Taylor (2000) warns that a researcher has to consider additional and necessary factors while using of online surveys compared to traditional surveys: visual and audio elements can also be used in the questionnaire, surveyees tend not to give extreme values, "don't know" and "not sure" types of answers are more frequent and the online sample might underrepresent certain groups of individuals. Kellner (2004) finds that a well-planned and well-executed online survey gives satisfying results compared to traditional data collection methods of personal and telephone surveys.

The expert focus group discussed each item of the planned questionnaire, as well as its structure and the formulation of the questions whithin. A sample questionnaire had been elaborated previous to the focus group based on academic literature and results of preceding research.

A new questionnaire had to be developed for no scale relative to VCR or DVR usage habits and to the rating of technological attributes is available. We endeavored to compose a questionnaire which is fully intelligible and adequately formulated to a Hungarian participant. The questionnaire focused on the rating of the advantages of the technology and the surveyees' video content consuming habits and examined the attitude towards television advertisements. The questionnaire was available online, included 25 questions and required about 20 minutes to fill in.

Surveyees could first read an introductory text related to the topic of the questionnaire in which several terms used further in the questionnaire were defined to avoid any confusion and difficulty in filling the questionnaire (in the Appendix 3. in Hungarian).

In the case of questions asking for rating and measuring opinion and attitudes, we used a four-level scale where we expected a firm attitude towards one direction or towards the other, and a five-level Likert scale when asking of their usage habits and attitude towards advertisement.

In order to assess respondents attitudes of traditional and digital television, we used semantic differential scales invented by Osgood et al. (1957, cited by Szokolszky, 2004) in the field of psychology as an idiosyncratic rater scale. According to the principle of the methodology, words are substitutes for objects and events, and as such, evoke one's actual reactions towards these. We distinguish between denotative, connotative and associative aspects of meaning. Starting from the fact, that connotative meaning is expressed through attributes, one can measure an attitude towards a notion by using polar adjectives at each end of the scale (Szokolszky, 2004).

5.3.3. Attributes of the research sample

The aim of the research was not to study the whole population. Instead, a focus was put on the 15-39 year-old, internet user group who thus give the statistical population for the research. The 15-39 years age group is leading digital technology usage, although television for them might no longer be a central medium. They watch less television than the average (AGB Nielsen, 2010), though this also partly stems from their lifecylce. This age group is lead user concerning their technology-orientation and usage of related devices, which is represented by the high rate of internet users in this category (NRC, 2009). In Hungary, in 2007, 74 per cent of regular internet users were between 15 and 39 years old. Focusing on younger age groups was all the more justified by the fact that, according to international data, the age group of under 44 years were equipped in a significantly greater proportion with the preceding VCR technology as well as with other digital devices (Mullan, 1997). Thus even though demographic attributes vary along markets and product groups, a more active participation of younger age groups within the acceptance and diffusion of information and communications and media technologies can be observed. Even though in the case of innovators the belonging to the younger age group is not unequivocal, the distinction seems relevant for information and communication technologies, according to the results of Mahajan et al. (1990b) and Dickerson and Gentry (1983).

The sample of 1000 respondents used during the data collection is representative of the Hungarian population with access to internet, aged between 15- 39 by gender, age, place of residence and education. During sampling, we only had one filter question, whether respondents had a television set in their household. Those without a television set were not included in the sample. Representativity of the sample was ensured by NRC's online panel of 70,000 members. Data collection was conducted by NRC.

The sample has a balanced proportion according to the gender of respondents. Distribution of women and men is quasi-identical, with 48.7 per cent of respondents being female and 51.3 male. 12.5 per cent of respondents belong to the 15-18 age group, 23.9 per cent to the 19-24 age group, 21.8 per cent are between 30-34 of age, 20.6 per cent between 35-39. While analyzing the education criterion, one has to consider that a non negligible part of the respondent is still in the education system. Thus among those with 8 years of highest completed studies, some are still in high school, and among those with a completed high school, many are still in college/university. In our sample, 20.8 per cent a general secondary school, 32.2 completed a vocational secondary school, 32.0 per cent a general secondary school, while 15.0 percent had a college/university degree.

In the field of research concerning television and modern information and communications devices, the place of residence and the distribution thereof is especially important an attribute. In the countryside, in some places, like small villages, some of the examined technologies, like digital cable service sor IPTV are unavailable. Thus there exist a number of services user knowledge and appreciation of which will largely be affected by their place of residence, i.e. where and by whom these services will be reachable. In our sample, 20.5 percent of respondents inhabit the capital, Budapest, 13.7 live in county capitals, 29.1 percent live in other towns and 33.1 percent in villages.

Another important attribute for television and related services is the size of the household. Considering that television viewing can be both an individual and social (eg. watching with other members of the household) activity, household size can also greatly influence viewing habits. In our sample, 6.6 of respondents live in single person households, 17.7 per cent in two-person households, 26.9 per cent in three-person, 31.7 in four-person, 12.2 per cent in five-person and 4.8 per cent in a six or more person households.

Television access patterns of the examined households differ from the national average. 12 per cent have access to television through terrestrial reception, while at the period of data collection, Hungarian average was 20+ percent. It is of course unsure whether respondents are in each case aware of their type of reception and beyond the 5 per cent "don't know" answers, there might be respondent indicating a false answer.

Respondents were able to give multiple answers to the question, therefore the aggregated summary will exceed 100 per cent. It is unlikely that a household have access to more than one service, although there can be cases when the "main" television set of the household is connected to a paid service, while the other sets in the household have recourse to free-to-air types of reception (eg. terrestrial reception, individual satellite receiver). By all accounts, from the point of view of our research and the present sample, representing the defined population, it is important to have data on this very population, concerning their actual habits and patterns of television consumption as well as of their knowledge of different types and possibilities of reception (thus in our case, only 5 per cent declared not knowing in what manner they receive their televisual signals, the remaining 95 per cent felt competent enough to answer the question).

In a research examining television viewing, another determining factor is the number of television sets in the household. A greater number of television sets will indeed allow individual consumption preferences and patterns to manifest themselves even within the context of a household. It is a well-known fact that Hungary also has a relatively large number of households with multiple television sets, and that is no different in our sample. 24.1 per cent of the examined households possessed only one television set, 41.8 per cent had two sets, and 34.1 had three.

The high rate of home access to internet is no surprise. The respondents to an online survey are inevitably internet-users, and a decisive majority in our sample (95.5 per cent) has access to the web from their home.

5.3.4. DATA COLLECTION

After the questionnaire development we proceeded to a paper-format pretest trial with 15 university students. According to subjects' comments and the results of the pretest, we then refined the questionnaire in terms of content and form, and added additional choices in the case of two questions.

The main data collection took place in October 2008. An online questionnaire, hosted on NRC market research company's website, was used to collect data. Panel members received a hyperlink to our questionnaire via e-mail sent to them regularly by the market research company containint calls for participation in research. Data collection took one week. Panel members had no individual incentive offered for participating in

this very research; respondents were eligible to a sweepstake organized by the research company.

5.3.5. Results of the exploratory study

There was no need for additional data recording thanks to the online data collection. Coding was done in cooperation with NRC. After data purification, data analysis and processing was conducted using SPSS 15 software.

A main aim of our research⁹ was to reveal viewer perception of digital television. Surveyees rated the determining aspect of digital television on a four-point scale, whether they considered the given aspect important, or conversely, unimportant (see Appendix 4, Tables 1 and 2). Aside from the means of each attribute, we indicated the standard deviation values to show the dispertion of the values from the average. According to these, the age group of 15-39 the most important attribute is the possibility to zap advertising (average of 3.21), although the average score for each item exceeded 2.5, the limit value for positive preferences on a scale of 1 to 4. It is interesting to compare preference rankings for all respondents (Appendix 4, Table 1) and those for DVR-owners (Appendix 4, Table 2), showing that for each group, the top 2 attributes and functions are those related to a DVR technology. At the same time, DVR-owners, thanks to their personal experience, valued more the possibility to pause a live tv stream, whereas ad zapping ranks only fourth. DVR-owners ranked third the electronic program guide, as a practical and important service. Intelligent and evolutive devices and interactive functions in both cases ranked at the bottom. Interactive functions reached a substantially lower average score than the remaining functions. It seems that viewers as a whole do not expect interactivity from television: neither respondents who had a subscription to digital television, nor respondent of the sample as a whole found this function attractive.

The overall perception of digital television is thus attractive, just like our literature review suggested. The 15-39 age group found the technological novelties offered by digital television, like the flexible and user-friendly viewer environment or the applications that improve viewer experience particularly attractive.

⁹ The present chapter largely relies on the article entitled "The End of Traditional Television Viewing? (Vége a hagyományos tévézandnek?)" by Nóra Nyirő and Ágnes Urbán, published in the Fall issue of Hungarian journal Médiakutató (Media Researcher).

In order to reveal the attitudes towards traditional and digital television, we used semantic differential scales. The differences appearing in a rater's judgment, and thus the differences in attitude can be revealed using semantic differential scales of generally seven points. The scale thus allows the rater, beside the neutral middle response, three points in each direction. The polar adjectives used here were designed and tested in a precedign research about listening to music on analog and digital platforms.

Attitudes towards traditional and digital television viewing as well as the differences of user judgment between the two technologies are shown on Figure 5.4. representing the slightly different semantic differential results comparing the two platforms. Aside from one attribute, there seems to be a resolute difference in the rating of the two platforms. The 15-39 age group finds traditional television rather ordinary and old-fashioned, in contrast to digital television, which is youthful and highly special. It is interesting that results presented previously all showed that the ease and friendliness of use were both major characteristics of digital television, however respondents rated traditional television as easier to use and digital television as more complicated to use. This might show that even though 15-39 year-old users appreciate and are looking forward to the attributes specifically presented as assuring an increased ease of use, because of the relative lack of information and knowledge about the new technology, respondents rate digital television as harder to use. Thus it seem crucial that the authorities and services providers affected by the digital television transition try to ease users' anxieties by providing educational and information materials. Results suggest that a present barrier to the diffusion of digital set-top-boxes is that even the 15-39 age group, the most open to technology and regular internet user estimates that digital television is harder to use than traditional television.

The 15-39 year age group estimates that digital television is more modern, up-todate, and what is most important, personal than traditional television. Aside from personal, they attributed digital television with attributes reflecting success and youthfulness. They rated digital television personal, fashionable, flexible, leading and exciting, in contrast to a rigid, passive, lagging, boring and mass-market traditional television.

In the case of the manageability of the two platforms, similar results came up as before. Traditional television was found to be easier to use while digital television harder to use by the 15-39 age group. This can both express a users' rating of their own

experience or their assumptions on the technology itself as well. Both indicators mean that the background of perceived difficulty to handle must be further investigated in the future and a potential change of attitudes related to the upcoming digital transmission to be followed. This percepcion however might be a present barrier to the diffusion process of digital television technology. As Rogers (2003) outlines, the diffusion of innovations can be accelerated if these are perceived by consumers as useful and easy to use.

Figure 5.4. Semantic differential results of traditional vs. digital television (scale values: 1-7). Source: own research, 2008



NB: we found a significant difference in all cases of polar adjectives at p< 0.05, apart from "accessory vs. elemental" where the differences are significant at p< 0.1, n=956

The appreciation of the two platforms gets the closest to each other at the "accessory vs. elemental" pair. Even though the average score is below 4 for both technologies, in the respondents' opinion, there is no substantial difference between the two platforms regarding their accessory or elemental status.

A list of the determining attributes of the two platforms can be drawn from the results. When we compare the differences to the middle, neutral value, we can notice that traditional television viewing can be referred to as ordinary, mass-market and impersonal.

In contrast, attributes like special and personal appear as most influential in the case of digital television. This is coherent with the present penetration rates of the two platforms, with traditional television being widespread and the number of households in posession of digital television set-top-boxes limited. It is however important to outline that digital television still was rated as rather easy to use, with an average of 3.42. Though it is rated as more complicated to use than traditional television, the difference is not slight, according to the averages, both platforms are rather easy to use. Referring to the evaluation of the accessory or elemental role of the two platforms, the fact that the ratings of both converge to the "accessory" value might be important, although both are closer to the natural, central value. It seems that irrespective of the method of viewing, television is attributed a rather accessory role by viewers, at least in this, younger, age group.

On the whole, digital television was thus rated more modern, up-to-date and personal by respondents than traditional television. This can indicate a greater attachment to digital television, where a personal and customized content and communication would more easily be realized.

The evaluation of time-shifting; content recording habits

The question what proportion of their viewing time respondents watch in timeshifting, irrespective of the used technology (the question mentioned digital set-top-box, video recorder and dvd-recorder expressly) was answered by 622 respondents (see Figure 5.5.). Half of the respondents never watch any time-shifted content while the other half can be referred to as active recorders who watch programs after their original broadcast time.

Figure 5.5. The proportion of time-shifted viewing – What proportion of your daily viewing time do you spend on watching time-shifted content (from a set-top-box, video cassette or DVD disc)? Source: own research, 2008; n=622



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There were no observable differences as for the user evaluation of the advantages of time-shifting. A delayed view of a couple of minutes might be worth as much as the delayed view of an interesting program by a user gone to vacation several weeks after the original air date. However, respondents estimate that the most important attribute of timeshifting is the possibility to manage their their viewing times as they wish and in accordance of their own schedule. We must add that VCR and DVD-recorders are equally capable of recording content, though they they are less user-friendly and storage media have a lower capacity than DVR sets.

Table 5.3. Advantages of time-shifting (scale: 1-4, 1= not important at all, 4= very important) Source: own research, 2008; n=994

Advantages	Mean (st. dev.)
I can watch programs in another time (eg. watch an early evening program late at night or watch longer movies during the weekend)	3,02 (0,93)
I can record my favorite programs while I'm on a vacation or spend long time far from home	2,88 (0,99)
I can record everything and watch it later on zapping advertisements	2,77 (0,99)
I can collect my favorite programs (eg. episodes of a series)	2,77 (0,99)
My device records a program while I watch it, this way I won't miss anything in case, for example, of a phone call	2,68 (0,97)

User evaluation of all attributes exceeded the central value (of 2.5) on the 1-4 scale, therefore we can say that time-shifting is clearly attractive to consumers (Table 5.3). Moreover, many viewers already use more or less the possibility of recording a program and watching it later.

An important element of the exploratory study is to show the evolution of technology usage by studying connected device ownerships of the concerned technologies. An analysis of this sort provides relevant information as for consumers' cross-usage and co-usage of media technology devices. VCR and DVD-recorders can be considered preceding technologies for time-shifting and set-top-boxes. We must outline that only as much as 40 respondents out of a sample of 1000 declared being equipped with a set-top-box capable of recording content, which is far below our expectations. 72.5 per cent of set-top-box owners also own a VCR, a DVD-recorder or both, compared to 61.1 per cent of those not owning a set-top-box and 59.1 per cent of the whole sample of 15-39 year-olds. Thus set-top-box owners are also more equipped with older recording

devices than the entire age group. This shows on one hand that the audience open to innovation had already climbed the ladder of technological development, they did not enter the market by first purchasing a set-top-box but already were users of preceding technologies and devices which they had not disposed of when changing to newer technology. It is also important to note that compared to the entire age group, set-top-box users are more likely to own DVD-recorders jointly with their set-top-box. They are also more likely to own both a VCR and a DVD-recorder along their set-top-box, while they are less likely to own only a VCR along with their set-top-box. This higher possession rate of the device nearest in technological progress to the set-top-box forecasts a considerable openness to technology and an "innovator" type of consumer behavior even though at this moment this only represent a small group of respondents within our sample.

A reversed analysis of cross-ownership reflects well the technology ownership forecast mentioned before. Indeed, it can be seen that the penetration rate of set-top-boxes is the highest (17.9 per cent) among those in possession of both a VCR and DVDrecorder, followed by that of DVD-recorder and that of VCR-owners (13.7 and 7.8 per cent respectively). Thus we can advance that following innovators' technology acceptance, the group of those currently using DVR technology as well will be the first to change to set-top-box devices, as they are the ones that already have a knowledge of a type of digital recording technology.

Another aspect of the study was to analyze how DVR-owners and VCR/DVDowners utilize their recording possibilities, what differences and similarities can be identified concerning the use of the two technologies. In this context VCR and DVD correspond to traditional technology where a kind of external recording medium (a videocassette or a dvd disc) is needed for the storage of video content. A presupposition was that there will be significant differences in usage patterns of the two devices and that DVR-owners use their recording possibilities more frequently and more intensively than VCR/DVD owners. In the survey VCR/DVD-owners had to answer the same set of questions concerning their recording habits as DVR-owners.

Even with a large research sample (n=1000) only 40 respondents declared being equipped with a digital set-top-box capable of recording, making this a barrier to our comparison in terms of sub-samples. To compare the results, we proceeded to a cross-table analysis as justified by the use in the questionnaire of an ordinal scale (frequency of recording) (Table 5.4). We had to recode our original data as the number of cases for

several cells was inferior to the expected minimal number of 5. Thus we considered as frequent recorders all respondents who declared recording content at least weekly and as seldom recorders those recording less frequently.

						J		100010			
posses	sion	of a	a given	technology,	Source:	own	research,	2008;	n=40	(DVR),	n=582
(VCR/	DVE))									
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Table 5.4. Distribution of the frequency of content recording, according to the

		Frequent recorder	Seldom recorder	Never
DVR owners	number of respondents	24	11	4
	%	61,54	28,21	10,26
VCR/DVD owners	number of respondents	141	331	111
	%	24,19	56,78	19,04
Total	number of respondents	165	342	115
	%	26,53	54,98	18,49

The relation between the used recording technology and the usage frequency is significant at the 0.01 level according to the Pearson chi test. A Gamma statistic (with values between 0 and 1) can be computed for ordinal scales and tables with random sizes to measure the strength of a relation. In our case, it amounted to 0.55 i.e. a moderately strong relation between technology ownership and recording frequency. The mode (the value that appeared most frequently) is 2 ("several times a week") for DVR-owners and 6 ("less than monthly") for VCR/DVD-owners. There is a presumable bidirectional cause and effect relationship: not only user-friendliness of DVR "accustoms" users in a way to time-shifting but, according to previous experience from technological innovation, it can be expected that those who are more open to novelties and value a new recording technology, would be the first to change to DVR technology.

At the same time there is no considerable difference between users of the two technologies as for the reasons of recording a program inasmuch as respondents elaborated a similar ranking of these (see Table 5.5). The sole main difference appeared in the case of the item entitled "I am distracted by something while watching", which was more frequent in the case of DVR-owners. This result is not suprising considering the fact

that VCR/DVD technologies are not capable of live recording unless a cassette or DVD disc have previously been made ready for recording while DVR automatically records the onging flow watched by users.

Table 5.5. Reasons of recording a program. Source: own research, 2008; n=36 (DVR-owners), n=471 (VCR/DVD-owners)

Reason	rank among DVR owners	rank among VCR/DVD
		owners
I am not at home at the moment of broadcast of the	1	1
program I want to watch		
There are two programs on two different channels at	2	2
the same time I am interested in		
There is someone else in our household that the	3	3
program will interest and we want to watch it later		
together		
I am distracted by something while watching (eg.	4	6
phone call)		
Somebody in the family watches another channel	5	4
I collect movies, series	6	5
To zap advertisements	7	7

A surprising fact though is that advertisement zapping ranked last for both technologies, while the same attribute reached a high score in the evaluation of the advanced attributes of digital television by users. Thus it seems that ad zapping is only attractive to users in words, in their daily usage habits (i.e. the actual usage of the technology) it seems a lot less important to them in both cases of DVR and VCR/DVD users. Results show that for both platforms movies and weekly series constitute the most frequently recorded contents, while sports and news programs are the least watched in time-shifting (see Appendix 4, Table 3.).

5.3.6. SUMMARY AND CONCLUSION OF THE EXPLORATORY STUDY

Our exploratory study clearly showed that the younger, active internet-user and technology-oriented population has an overall positive opinion about digital television. Among the new functions offered by digital television technology and set-top-boxes, both DVR-owners and the sample as a whole **preferred clearly those related to the digital video recorder** (eg. easy recording, pause and rewind functionality with live stream, ad

zapping). This serves as an additional reason to put these functions, related to the DVR into the focus of our further study.

Recording habits seem to show a higher usage in the case of DVR-owners than those using analog technology. Nevertheless, these result should be taken cautiously on one hand because of the early date of our research (October 2008) concerning the diffusion of this technology in Hungary, and on the other because of the limited number of respondents in our sample in possession of this device (n=40). Nonetheless, this result served as an important indicator in our further research, as it projects the possibility of chaning user habits with the future advent of this technology into households where technology would become an important element of television viewing.

At the same time, we observed that **although advertisement zapping is an important and precious element** of digital television for users, it seems to occupy **less an important rank as a motivational factor.** Thus we can propose the assumption that even though advertisement avoidance is closely related to television viewing, it will not be a crucial motive for user adoption of new technology and the integration thereof into their viewing habits.

The motives of use of analog and digital video recorders do not differ substantially, thus we live with the assumption that gratification supplied by and the role of the two platforms are similar or identical, although in the case of digital technology usage, a new motive appeared slightly strongly, that of the possibility of user interference into watched television flow ("I am distracted by something while watching (eg. phone call)"). Thus viewers seem to integrate a temporal dimension into their viewing habits (when to watch continually or when to take a break) thus becoming active – although not yet interactive – viewers.

Our exploratory study is an important source of information because at the date it was conducted, there was no available data source concerning digital video recording and time-shifting for Hungary. Hungary's television audience measumerement company, AGB Nielsen first published a press release with a short study on the topic in 2009 that report an insignificant usage of time-shifting measured on a representative household sample of Hungary (AGB, 2009).

According to the results and information of the exploratory study we proceeded with a qualitative and quantitative research phase during which two directions were further investigated. Ono ne hand, we seeked to extend the available intelligence on active and lead users while on the other, we investigated deserters from television and their technology and their relation to digital technology, as we aimed to examine to what extent digital technology can play a role in renewing and improving the position and appeal of television.

5.4. SECOND QUALITATIVE RESEARCH PHASE: LEAD USERS' INTERVIEWS AND REFUSERS' FOCUS GROUPS

5.4.1. IN-DEPTH INTERVIEWS WITH DVR -USERS

Following an exploratory research phase that concentrated on the wider context of the consumption of audiovisual content, we deemed another phase of qualitative research best suited beforehand of our main quantitative data collection phase. In this phase we focused on deeper understanding of users' relation to technology, based on von Hippel's (1986) approach on collecting information about lead users. In this phase, we intended to explore habits of digital video recorder technology users in order to prepare the following quantitative phase of our research. The collection of a wider array of information about active users was all the more important that in our preparatory study, the number of DVR users was fairly low and the conclusions and insight derived from that study had to be further developed, understood.

In the planning and execution of our qualitative research phases we largely relied on the book entitled "Qualitative evaluation and research methods" by Patton (1990). Patton (1990) argues that qualitative methodology can enable a researcher to use a flexible research design, to focus on individual cases, to accede to personal contacts and collect insight to further research personally. Qualitative methodology also offers a holistic perspective i.e. examines and thus tries to understand a phenomenon as a whole, treating it as a complex system, which is even more true for the use of mixed method research design (Patton, 1990).

We decided to conduct in-depth interviews (see interview quide in Appendix 5.) with lead and active users of and living in households equipped with digital video recorders because of insolvable problems in organizing focus group studies (as in the scheduling of potential participant as in the location of the potential interview). In-depth interviews however offered a possibility to qualitatively assess technology users' relation to television and reveal the conditions of the advent of DVR's in households, that of their

use. In the interviews we aimed to focus on the planned topics of the upcoming quantitative survey, in order to reveal eventual problems of interpretation and to assess the spatial role of television and set-top-box devices within households. The latter was indicated as an important factor by technology domestication theory (Haddon, 2006). An excerpt of the interviews can be found in Annex 5.

5.4.1.1. Presentation of the interviewees and the interview process

Table 5.6. presents the relevant characteristics of the interviewees. We interviewed five users from five households. All interviewees lived in Budapest, which is the result of our using snowball referrals in gathering interview participants. Through this snowball technique, idenfied technology owners in our surrounding were requested to recommend further individuals known to them who are equally equipped with the technology and would be open to participate in our research.

Interviews lasted an average 30 to 40 minutes, and were carried out using a semistructured questionnaire guide, although leaving the possibility to interviewees freely telling stories and an unbound course of conversation. At the end of the interviews, we discussed a set of questions included in the questionnaire for the upcoming quantitative query of DVR-owners that were judged critical. These questions were items of the scales about usefulness and ease of use. In case interviewees were unsure of the meaning of an item, we requested them to reformulate these in their own words. We also asked them to suggest additional items in case they felt that the original set of items was incomplete. To finish the interview, we requested them to sketch up the room of their residence where their main television set and their set-top-box equipped with a digital video recorder were located, with focus on the locations of the television set and the viewing spaces. According to whether interviewees agreed to it, the interviews were tape-recorded, and in all cases, notes were taken. It is important to outline that the main aim of the interviews was to discover active users' attributes and to illustrate their relation with technology. We did not aim to further content analyze the interviews' transcripts. The interviews were carried out in April and May 2010. With our five interviews we achieved a state of theoretical saturation as, at the end, we received no further information about DVR usage and about the design of a relevant theoretical model and set of items.

	Gender	Age	Household	Place of	Since when do they	Education	Nr. of set-
			size	residence	own a DVR device		top-boxes in
			(persons)				household
1	Female	36	1	Budapest	Aug. 2009.	University	1
2	Male	30	2	Budapest	May 2008. (arrival of	University	1
				_	the service in preceding	_	
					provider's offer)		
3	Female	37	2	Budapest	March 2008.	University	1
4	Male	32	2	Budapest	Jan. 2008. (arrival of	University	1
				_	the service in Hungary)	_	
5	Female	31	3	Budapest	May 2008. (arrival of	University	1
				-	the service in preceding	-	
					provider's offer)		

Table 5.6. Characteristics of the interviewees. Source: own elaboration

5.4.1.2. Results of the personal interviews

The results of the interviews are presented based on the structure of our questionnaire guide, even though the issues might not have been addressed in the same order during the interviews because of their semistructured nature.

The role and future of television viewing

Respondents unanimously considered entertainment, a relaxed passing of spare time, a pleasant means of distraction as the main characteristics of the role television occupied in their lives. Television obviously is a medium with an important role in their lives. Television is part of their daily distraction, it is an important medium to them and television occupied a central place in their habitat. Both the main television set and the set-top-box are located in respondents' living rooms, in a social space. They are regular television viewers even though sometimes they do not turn the television on for one or two days.

"Telly Entertainment, unmissable ... part of present-day life for the flow of information. It is part of our culture, important part of our spare time, but we also watch series elsewhere, we download them and watch them on a tv screen." (Woman, 31)

"TV distraction, entertainment, obviously" (Woman, 37)

Interviewees defined the role and the potential future role of television in their lives as stable, altough they estimated that content is the decisive factor for the future of television and they qualified technology more a convenience service, though according to an interviewee, the importance of television is stabilizing. While addressing this issue, respondents spontaneously mentioned the relation between television and internet and they unanimously considered that the internet was an indispensable part of their lives while television had a somewhat less important role. They expect television to be a part of their lives on a long term and do not believe it would disappear before long.

"We watch six series that we download and two other series on air" (Woman, 31)

"I don't believe that digital will stabilize tv's position. What is fresh, we consume on the internet. If you have a tv it's extremely comfy, buti t won't outweigh the internet, but I can't imagine us not having a tv... you must have one, if something turns up, you can turn it on and watch it" (Woman, 31)

"Internet is the central media, that's where I watch the program guide, I use less the EPG. The importance of tv as a medium is stabilizing, with a diminution of viewing time; ... my viewing habits change a lot slower than my web surfing habits." (Woman, 36)

Reasons for changing to a digital subscription, sources of information

We deemed it important to study the reasons and motives behind changing to a digital subscription and to what extent the offer of service providers influenced their decision or to what extend digital television as such was a key factor. As a whole, for those respondent who changed to digital television right at the beginning, with the first availability of the service, the main motive was digital television as such, and the new feautres offered by it. They gathered information from mass media and service providers' advertisements. Among later entrants, the arrival of triple-play offers (telephone, television and internet together) was a main trigger to the change.

"We changed because of HD... Sports, mainly. Because of this, picture quality is important. Since then I also watch sports events in live. But I also like to record them., But only for reviewing... Skiing season, olympic games. It was worth its price" (Man, 30)

"They offered it in a package with internet. The transition was simple... and the technology also attracted me, it was a novelty, and the bandwidth and the quality of service was also important." "I knew of it from a tv ad and you could read of it on the internet. There was no personal information source" (Man, 32)

"...we learned of it from the "apa kezdődik¹⁰" campaign" (Woman, 31)

"They took out the German RTL channel. Here, it was still available. As I am a series junkie, I subscribed. But since then I don't buy tv guides any more, I don't have tv guides any more."

¹⁰ "Daddy, it's about to begin" – ad campaign for Magyar Telekom's T-Home IPTV service

"It mattered that it's digital. I was interested in this possibility that I can pause a program, I can record it if I don't make it home in time, this was what motivated me the most, this was what was new to me" (Woman, 37)

User evaluation of digital television's novelties

According to the results of the preliminary study, non-users of the technology were those who ranked digital video recording the highest as an expected attribute of digital television. At the same time we wished to discover how technology owners rank, prioritize new functions and new services without any given boundaries or predefined set of answers, and how they justify this. According to this, we can say that interviewees once again ranked first the functions linked to digital video recorders like the possibility to pause, the ease of recording and the possibility of reviewing. Among the services linked to digital television technology, they estimated that DVR was the most valuable and attractive. As second most important, they mentioned the EPG function that brought an important change to television viewing. One respondent also expressly mentioned the availability of HD (high definition) picture quality as most important because of sports contents but in this case as well, DVR followed straight after. Video on demand (VOD) was a seldom or never used function even though respondents estimated that it was conforting that if they had had much spare time they would have something to watch. One respondent mentioned occasionally listening to digital radio in connection with their subscription to digital television.

"We use the pause and rewind, we use the recorder and use pretty much the tv guide part. There too, what is really good is that we can look upprogramming by time and in a thematic view. We used the radio once or twice, we don't use video on demand at all. Among the three we use the most important I think is the pause and rewind. Forexample, it happens that we watch an ad for a second time, or yesterday I missed a half a minute part and we rewinded. So I think that's what we use the most." (Woman, 31)

"We use the recording function the most, and when we watch tv, the pause function." (Woman, 37)

"I use it every day, a scheduled recording from Monday to Friday, there's "Lipstick Jungle" it's set to Saturday, and I also sometimes record ad hoc... but that also several times a week. And also, if I get sleepy, and can't finish to watch something, I won't keep watching, I record the rest and watch it the following day." (Woman, 37)

Changing viewing experience and habits

Interviewees had a differing opinion about the change of viewing habits and that of television consumption, although all affirmed that their viewing habits did change since they had their digital subscriptions. This change affected less the contents they consumed, their preferences of content did not change but the new functions and the digital video recorder in particular rather changed their manner of watching television, their consumer behavior, their levels of attention and of awareness. Without specifically asking them, the possibility of advertisement zapping came to the front while addressing this subject. Interviewees, similarly to the results of the preliminary quantitative study, seem to have discovered this function and find it useful, ad zapping is not their primary goal when using the personal video recorder and time-shifting. At the same time it is clearly visible that with time DVR owners and subscribers to digital television get accustomed to ad zapping and become accomplished ad zappers.

"Yes my television watching became much more conscious and I watch less television and I watch less background television. I consider whether to record a given program, and if I decide it's not worth recording, the question is whether it's worth to watch it in live at all. So I decide to switch off my television more often than before...

The proportion of watching films increased slightly, let's say, now sometimes I watch a movie or two that I recorded" (Woman, 36)

"It changed a lot thanks to the DVR. Before I had to go out during the ad break now all I have to do is skip the ad... although zapping ads is no goal, it's an additional thing I got used to" (Man, 30)

"My viewing habits changed a bit: there's a possibility not to watch in real time. Many times we record movies and series and we don't have to be at home or we don't have to watch at the exact time The viewing time has shifted. But I don't watch more... Something that's new and that wasn't there before is the VOD, it's not really common, but more than before."

"The habit of sitting down and watchinghas also changed a bit. You can stop and you can wait for the others."

"We don't use time-shifting to only skip ads. There's no goal of this sort. But when we watch something recorded, we always skip ads (only if the ad is terrible)." (Man, 32)

,... they changed. We also watch those that we missed before because we didn't have time and we weren't at home. Now we catch up and there are also series that are scheduled for recording weeks in advance. If we are watchning something and something comes up, for example the phone rings, or we have to go to the kids, we can pause it and than continue watching from there. The third thing is that if we pause a live feed we get a puffer time and than if there's a break, we can skip it – the announcements and sometimes even the commercials... indeed, I think they changed drastically" (Woman, 31)

"That's true, but it's not important to us. For me because of my line of work, and for my partner because of an attachment to them – so we do watch ads" (Woman, 31)

Comparison between real-time watching and time-shifting

We asked our interviewees to compare their real-time and time-shifted viewing habirs. We gave them several angles to consider in order to be able to answer this rather complex question. According to the interviews, contents watched in real time and during later playback do not differ considerably. They still watch the most time and the most of their programs in real time, although they did not perceive any difference in viewing times or whether they watched alone or in company. One respondent mentioned that with this technology, one could wait up the others with viewing a program. It seems, although it is not obvious, that time-shifting goes with a conscious consumer decision, whether it means only a few minute delay from the live feed or a later playback of a content recorded beforehand: viewer attention is greater and background watching is less likely than in the case of real time watching.

"There's background television with time-shifting as well, but on the whole it's still characterized by a greater overall attention." (Woman, 36)

"In real time: I usually watch tv on weekends, weekday mornings and evenings, and watch sports the most of the time; often alone, but not always. When I watch in playback, I don't watch alone, mostly during weekday evenings, series with delay, or recorded movies or series."

"Recorded means programs that I'm particularly interested in. I concentrate on give things, I want to watch them, I don't change channels. Real time viewing is when one zaps between programs." (Man, 30)

"It restructured entertainment: we watch all episodes of a weekday series in one, during the weekend. Watching became more structured. It cannot be dissociated from content. I record what I'm interested in. It's not worth anything in itself, it depends on content... It good because you can wait for the others to start watching." (Man, 32)

"When we got this subscription, we hadn't have our child yet and watched more tv, I think 75% in real time. But since we have our child and watch less, because of his schedule, this should be around 50-50%. The time and the type of programs we watch didn't change." (Woman, 31)

" If I watch something that's recorded, I sit down to watch that particular thing, but otherwise, tv is on non-stop during the weekend...", (Woman, 37)

Usefulness of the DVR

Examples and insights brought by the interviewees match the international observations presented in the theoretical chapter of the thesis and the results of our preliminary study. This subject was an important part in the construction of our final scale on perceived usefulness related to technology acceptance model (Davis, 1989) for our main quantitative study, as this topic also was an important element of the theory of innovation diffusion (Rogers, 1995; Hall, 2006; Gatignon and Robertson, 1985).

"It makes viewing more flexible, you don't miss anything. It's rare, but it also works for parallel programs. It gives you a certain assurance, a reliability, no fear that you'll miss something... before, you didn't have this." (Man, 32)

"I'm open to these kinds of new things, but this is brilliant, and it makes my life much easier"

"It makes viewing more flexible, I don't have to worry not to make it home in time or miss something.

"We use it every day, when we watch tv in the evening, each day it happens that we pause it for something, we go take a shower, and other things, eating, ... and we pause the flow almost every time during the evening film... there's the advantage to fast forward commercials" (Woman, 37)

"You make yourself a puffer!... once again films become uninterrupted, without this there's no television any more"

"We can guess how long a break is. It's a good game. AXN 4 minutes, TV2 8 minutes (Man, 30)

Integration DVR into viewing habits; daily usage

The interviews clearly showed that the DVR became part of interviewees' daily viewing habits. Technology owners unequivocally and unanimously declared that the DVR became part of their daily viewing habits, and pausing, short rewinding became part of everyday viewing. It became as natural for them as the remote control or the access to multiple channels. They would unequivocally miss this function if they had to spare it, and they would be uneasy to give this function up even though none of them considered this technology vital. DVR also means a reason for holding on to a service provider, a means of increasing loyalty: in one case, users failed to change to another subscription with much better rates because the other service provider was unable to offer this technology.

"DVR becomes a part of daily viewing routine, short rewinding is part of daily watching" (Woman, 36)

"We got a lot better offer, with a fee cheaper of a cuple of thousand HUF per month. We called the service provider to ask whether they also offered a DVR with the set-top-box. My girlfriend said that if there's no rewinding and fast forwarding, we don't change, at thus we stayed" (Man, 30)

"This became almost mechanical, that you can watch something again, that you can stop it. It's not conscious, it's like a reflex when I reach for the remote to watch something back. It's very comfortable, if it weren't available, I'd miss it. I can hardly imagine how I could return watching tv the old way" (Man, 32)

"I can imagine watching television without it. It's a convenience function which is good if it's there, while I couldn't imagine my existence without the internet. But sometimes I notice its lack... it's addictive, you can easily get used to it. After, if we watch tv somewhere else, for example, where this device is not there, I miss it, one would mechanically stop the program, rewind it, record it and it's not there... you can really get used to it." (Woman, 31) "I use it every day, a scheduled recording from Monday to Friday, there's "Lipstick Jungle" it's set to Saturday, and I also sometimes record ad hoc... but that also several times a week. And also, if I get sleepy, and can't finish to watch something, I won't keep watching, I record the rest and watch it the following day."

"Three weeks ago we were in Siófok on a long weekend. I was in the bathroom when I shouted out, 'Please pause it, pause it', but after I realized that we're not at home... (laughs)...he said okay, but there was no way to do it"

"We use it every day, when we watch tv in the evening, each day it happens that we pause it for something, we go take a shower, and other things, eating, ... and we pause the flow almost every time during the evening film... there's the advantage to fast forward commercials"

"Now I couldn't, in no way... (laughs)... I'd absolutely miss it." "It's strange f it isn't there, it became so much a part of our everyday life, I would say it's like the mobile phone" (Woman, 37)

Levels of difficulty related to the use of the DVR

Perceived ease of use is another important element both within innovation diffusion theory and technology acceptance model. As we saw in our preliminary explorative study, the 18-39-year-old internet-surfer population considered digital television more complicated and harder to use. DVR accounts for one of the greatest change factors compared to traditional television in terms of technology usage. This is also the technology we wish to examine in our study. Therefore we asked users how complicated and difficult they believed the technology was. According to the interviews, the technology is easy to master, although one must not forget that the interviewees were highly educated, open to innovations and proficient technology users.

"It's relatively easy, in no way complicated or scary." (Woman, 36)

"The technology in my opinion is not yet fully developed, but it's easy to learn it" (Man,

"Easy, intuitive useablilty, we already know it from a vcr remote" (Man, 32)

"It requires a minimal time to get accustomed to, and then it goes naturally. Sometimes it is easier to use than a video recorder" (Woman, 31)

Aspects missing from the DVR; technology expansion

We also wished to know what additional attributes respondents would add to digital television technology, and what would a technology look like that they would gladly adopt beside the extant ones. According to the received answers, we can say that technology users would welcome the possibility to attact an external data storage device, as there are contents that they would like to store on a long run, "for ever". They can also imagine a DVR attached to the net, an opening of the technology to a sort of social media,

30)

collaborative filtering and to a system of suggestions based on viewing habits. At the same time they clearly rejected an automated recording function of set-top-boxes.

"I miss recording on external devices very much!!!!" (Man, 30)

"...it would be good if there were a DVD-recorder in it, and social media ..." (Woman, 31)

"With my frieds we like to send sms messages to each other whether one's watching M1 or RTL... I can imagine this going through this box... I don't know how they could manage to do it, but in theory, it looks interesting."

"It bothers me that I can't export it... It would be great if I could store it as long as I want"

"This, this would annoy me if it recorded by itself… That a box more than being there but talk to me and almost act as a man, no way… absolutely NOT, that it automate itself that much, I wouldn't like. (Woman, 37)

5.4.1.3. Summary and conclusion of the personal interviews

Interviewees were gathered through snowball samping with the criterion that they be in possession of a digital video recorder. Their acquaintances thus knew that they had these devices, and that this technology previously had come forward as a subject of conversation among them. The interviews show that these people are among the most early entrants to the technology, and found out about the availability of the service through mass media, commercials of service providers and direct offers. For all interviewees, television had an important role of entertainment. At the same time all interviewees were active technology users and multimedia consumers, who considered being connected to the internet more important in their lives than television. Nevertheless, we must outline that television appeared as a means of their spending of spare time and satisfying their needs of entertainment, while the internet played a multiple role and satisfied a more complex array of needs, as it can be used, beyond satisfying the sole need of users for entertainment, as a work tool, a means of social correspondence or of gathering information. As for their portfolio of audiovisual content consumption, content available on the internet (eg. downloadable movies, series) also play an important role. Their change to a digital subscription was not particularly motivated by the arrival of bundled offers, but mainly for later entrants, it served as a last boost for changing to digital.

Informants considered the **digital video recorders and the most valuable and useful of the functions brought by digital television**. All became active users of the technology with pausing, recording and rewinding **becoming part of their daily viewing routine**. At the same time **advertisement zapping** appears **more a learned behavior** that users acquire during the everyday use of the technology than being a prior motive of use of their DVR. They would miss the functionalities of the DVR in case they had to spare them or if they weren't available. There was also a case where an interviewee didn't change providers for this particular reason, and others too, could definitely not imagine their television viewing without the technology, therefore the client retaining capacity of the technology can also be raised. **Perceived usefulness attached to the DVR by respondents was validated** by them.

Interviewees considered that DVR technology was easy to master and required a minimal investment of energy and time. We also must outline that all informants were active technology users, advanced internet users and open to innovations therefore we can presume that they were already experienced in using previous similar technology and in learning the usage of a new technological device.

According to the interviews, **the patters of consumption of real-time and timeshifted television viewing do differ**, although the type of watched content resembled and real-time viewing was dominant within the total viewing time. One respondent mentioned the **social experience of digital television** by the possibility to wait up for others to start viewing a program. It seems nevertheless that time-shifting (both in the case of a fewminute shifting and in that of a later playback of recorded material) involves a more conscious viewer choice and a greater viewing attention and lesser background viewing than in the case of real-time viewing.

All respondents considered that **recording to external memory devices would be an important potential improvement** of the technology and a factor to make it more appealing to users for a long-term storage of their most valued programs. They also mentioned as potentially appealing the shift to social media, the recommendation of programs according to users' viewing habits although they firmly rejected a potential functionality of automatic recording without their consent.

According to the interviews, the dimensions of the **technology acceptance model** (**TEM**) **upon which our research model is based seem to subsist and to be relevant in a media technology environment** and in this case in the environment of DVR technology.

The aspects defining viewer usefulness could well be identified from respondents' answers and stories, and the aspects of user perceived enjoyment expected from media technologies and those related to the base medium, television were also unfolded. Three items on Davis's (1989) usefulness scale destined to be included in the final questionnaire were found harder to interpret. In the original questionnaire, these were designed in relation to respondents' workplaces. Thus our interviewees considered the items related to efficiency and effectiveness less relevant while they agreed and considered relevant the items related to user usefulness based on our literature review and explorative study.

5.4.2. FOCUS GROUPS WITH REFUSERS OF TELEVISION

Alongside the in-depth interviews with DVR-owners, we decided to conduct focus group interviews (see interview quide in Appendix 6.) with persons on the other edge of attachment to television, as we considered the relation of viewers a decisive element to further be studied. The primary aim of the study was to gather information about the ways digital technology and digital video recorders would raise the attractivity of television viewing among those who have a less positive view of television. We were interested in participants' patterns of audiovisual content consumtion (ie. what platforms do they use, how frequently and what types of content do they consume). We wished to map all solutions in the market in competition with television in order to serve as a consumption profile for our main study. We also asked the group of rejecters about their knowledge about digital television, and what additional functions, possibilities they would expect of digital television and video recorder.

A focus group study design was justified as we had a greater number of available participants from the target group at reach (see further characteristics in the next chapter) and personal manifestations of one participants in a focus group can encourage other participants to share their views on a given subject and thus provide a greater number of examples and cases for each given subject. The personal experience of a participant can foster a group dynamic and trigger other participants to share their opinions.

5.4.2.1. Attributes of focus group participants and the interview process

As non-viewers of television were easier to reach even among university students (active internet-users and seldom television viewers, aged between 18 and 22), participants were recruited among them. We were expressly looking for participants with

a strong technology orientation and for whom the internet is a decisive part of their everyday life and who consider television viewing important to a lesser extent. Participants were recruited among students of Business Informatics in their third year of university visiting the Media Economics course. These students fit the most the abovementioned criteria and we were in direct contact with them as part of their regular studies of this subject. Focus groups were conducted during one period of the Media Economics course, so that participation do not require an additional scheduling task of students. Participation was not obligatory but participating students received extra points in class participation grades.

The discussion guide of the focus groups can be found in Annex 6. The same guide was used for all three groups, although the composition of the groups differed. One group included total rejecters of television, those who previously answered that they almost never watched television (with only some rare exceptions, eg. the Olympic Games or the Football World Cup). Another group was composed of infrequent viewers who admitted watching television once or twice a week and do not reject television as such. A third, mixed focus group was conducted in order to assess and study the synergies and/or the debate from the clash of the two different points of view. In the first group, there were 5 men and 2 women, in the second group, all 8 participants were male while in the third, mixed group there were 9 men and one woman. The majority of the participants lived in Budapest (at home or in a student residence), only two were commuters. We asked students living in a student residence to formulate their opinion, information and examples of television viewing considering the environment where they mostly have access to television, which is most likely their place of residence, where they go home to on weekends, as in student residences they most likely have access to television in shared social spaces.

The focus group conducted with infrequent viewers was moderated by the author of the present thesis while the remaining two groups were moderated by an experiences qualitative researcher at Szonda-Ipsos research company, with the author of this thesis present as an observer taking further notes to the tape-recorded material. The interviews lasted between 55 and 65 minutes.

5.4.2.2. Results of the focus group study

The results of the interviews are presented following the structure of our interview guide and additional elements that arised are also categorized. In case of differences in opinion among different groups, we present the results for each group and signal whether the given feedback came from one or the other group. In case there was no difference of opinion on a topic, we will proceed to a unified summary on that aspect of the results of the three interviews.

Viewing habits, contents consumed

Provided that participants were differentiated along their viewing habits, the three groups gave different opinions on the topic even though similarities appeared as well. A similarity was the viewing of sports events, that even total rejecters mentioned as a content they liked to watch on television.

" sports are an exception, if there's an event of this sort and if I'm interested in it and they also broadcast it in television, then I watch it on tv... tennis, for example"

"football, me too, I watch on tv, it's far more enjoyable than with an online stream"

"sports are live... it's a bad feeling if others already know the score and I have to watch it later"

It is important to outline that the type of content that interests this seldom viewing group is largely the same. Series come at first place, with as much as 7 to 10 titles of followed series mentioned during each one of the interviews, then films and documentaries followed by sports which they select from their televisual content portfolio. Nevertheless, some of this content is not followed by them on a television screen. Television had a relatively negative perception among non-viewers, who considered it a waste of time though they admitted that it was cheap, offered an easy entertainment and that a bigger television screen was more suitable than notebook and PC screens. The group with occasional viewers qualified television a source of entertainment that required the least intellectual effort. In this group the viewing of series produced by television channels themselves, like entertaining programs and shows appeared as well.

"all I can and I'd want to watch from a recording I can have from an alternative source, it's not television that first comes to my mind... I get information much easier than from television"

"we watch television more to relax, for mind degradation"

Among reason mentioned for abandoning television was the change in schedules, the fact that previously they had less access to other means of entertainment, and that, in many cases, they hadn't have access to the internet. They also mention a change in their needs that content broadcast in television was no longer able to satisfy.

"I had more time in general school, and less from the second part of secondary school"

"it's too much a constraint to adapt to program schedules. I mean in time"

"at home, for example, we hadn't had access to internet... it wasn't available in the whole village either"

"we had a lower intellectual standard. Now you can spend time in a lot more intelligent way... Mónika show or Pokemon are no longer that captivating."

Occasional viewers were not in agreement on the extent background television viewing was typical of them, there were both conscious viewers and multitaskers in the group.

"if I'm bored, I turn on the television and anything is good"

"I usually do it on "multi", I play on my notebook and sometimes take a peek on the tv screen"

"if I want to watch something, I choose it and watch it but I don't like it when it plays in the background, it just disturbs me"

Video content consumption

All three focus groups showed that participants consumed a lot of content intended to broadcasting, although they did it in a large part on other platforms than television. Even occasional viewers said that they download a lot of series and movies from the internet in their original language, at the same time it appears in the given country. Among those who didn't watch television at all, this was true for documentaries as well. Participants often watch series (which ranked the first among the consumed type of programs), in bulk, a number of episodes, or even a whole season at once. They outlined as an advantage of downloading the fact that they can decide when to watch a video, they can fast forward the parts they find boring and that there are no ads.

"series mainly... I'd say series"

"series, movies, nature documentaries, documentaries, movies from the internet in English"

"with series, all episodes together, I downlad the whole season then I watch it... if let's say I do have time and I'm interested, I watch the entire season."

"I watched all of Prison Break during a day"

"I like to download in advance, sometimes I spend an hour to find like 10 torrents to download, and when I've got time, I already have them and I can watch them"

"online at the beginning it's a bit annoying, but then it's easy, it doesn't restrain you as much as tv does... tv is also plugged into my computer, I always sit in front of it anyway"

They occasionally watch movies in cinemas, more in case it offers some kind of added value, in superior picture or sound quality. However they only buy DVD's for gift or on very special occasions, when they wish to keep for ever a content dear to them.

"I like to watch a movie in cinema when it offer some added value, the films I watch at home are not even for movies"

"action movies are better in cinema, but a film that makes you think and runs on several threads – rather at home"

"concert DVD, for the booklet ... after watching it, I buy it just to have it on my shelf"

Knowledge and use of digital television

Participants mostly knew about most of the functions offered by digital television, although a participant declared not knowing anything about the topic. Those who were occasional viewers had a firmly better and more accurate understanding of digital television. An interesting element of all three discussions was the appearance of a parallel made with the internet, and the statement that digital television services offered for viewers similar possibilities than content downloadable from the internet. Occasional viewes had a slightly positive opinion of the new services offered by digital television while rejecters were more disdainful and depreciatory of digital television and considered these services as a late struggle of television industry. Rejecters believed that digital television is unnecessary and that many people won't be able to use the technology, although they themselves find out about it over the internet.

"magazines on the internet, on technet you can read recurring news about digital tv"

"many people won't be able to handle it ..."

"for households it's like throwing money out of the window... they have to change their devices ..."

"I'm not really into it, I don't really follow it"

"it looks like it's running after the internet... it's not like before, when tv became color tv, and many channels appeared, now, you have the internet, where all these services are available and they just run after them and try to lure back people.

(quotes from rejecters)

"there won't be any more attachment to a location and to time... I can rewind it, I can record it to watch it later, so they make tv look like the internet"

"tv as a device will be there, the question is what we'll whatch on it... since I can waitch a movie in 1.5 hours instead of 2.5 hours"

"Basically, I think that digital tv viewers are those aged between 18 and 35… they record, zap the ads...at 8 p.m. they watch a program broadcasted at 2 p.m... they watch the whole program in half its original time"

(quotes from occasional viewers)

Evaluation of the functions of digital television

We asked participants of the focus groups to collectively gather the functions of digital television although thereafter we proceeded to a brief presentation of these in order for non-user participants who were not aware of the functions of digital television to have a brief overview. After this, just like in our in-depth interviews, we asked the groups to evaluate these functions and rank them, which are according to them the most attractive and useful functions and which are those they are not interested in. Of these answers we could clearly distinguish occasional users from total rejecters. Occasional viewers had a more positive insight of the new functions and on the whole, ranked DVR and its functionalities the highest. Rejecters of television didn't consider DVR attractive even for contents they are basically interested in. They only would have given it credit in case a series ran at the same time in Hungary than in every other country. At the same time in the mixed group a participant who declared himself a non-viewer, evoked a personal experience when they had a subscription to IPTV with a DVR, he regularly used it to record and later watch his favorite series when other members of the family were not watching something else, though since they don't have their digital subscription, he never watches television even for his favorite series.

"recording is the best, because the most of the time I'm not at home when they broadcast what I want to watch."

"it makes it more competitive with PC and internet... like program information, download vs. recording, sound quality... tv will break through a bit once again"

"the program guide is very good too, I can set it to turn on when the program I want to watch begins"

(quotes from occasional viewers)

"I would be interested at best if series had their premiere in Hungary at the same time as in the US"

"it looks like it's running after the internet... it's not like before, when tv became color tv, and many channels appeared, now, you have the internet, where all these services are available and they just run after them and try to lure back people.

"When we had a subscription to IPTV I always recorded my favorite series with our DVR and watched them when my mother wasn't at home and the tv was available... it was easy and nice... since then I don't watch tv at all, not even my favorite series"

(quotes from rejecters)

The future of television

Opinions differed as for the future of television as well between rejecters and occasional viewers. On one hand, the latter group considered it unlikely that television disappear, according to them, at worst, it would transform and new solutions would appear. Rejecters, on the other hand, estimated that there was no chance television would become part of their lives.

"I think stream tv is what starts to become fashionable and would supplant television, although digital tv might keep its share with its HD quality, it's not unequivocal"

"tv won't disappear, it will only change a lot... RTL should really change to HD, I often watch Showder Klub¹¹ in a better quality on RTL most¹²"

"*tv doesn't stand a chance, at least, in my life, it won't return"* (quotes from rejecters)

At the same time participants in all groups were able to mention functions that would make television more attractive to them. These were the possibility to review their favorite programs (catch-up tv), a system of social recommendation, program recommendation, an access to an archive of vintage movies exempt of royalties. They also rejected an automated recording function of set-top-boxes.

"something like RTL Most now. The possibility to review one's favorite programs."

"there should be a "like" button on the remote control"

"I could imagine an internal system of comments, an internal twitter... I'm browsing the films and I watch what other people said about it... that would be nice"

"don't let the tv decide what I want to watch... it could make suggestions but I wouldn't want it to record anything by itself. I really wouldn't like that."

¹¹ Hungarian show broadcast on RTL Klub

¹² RTL Most ("RTL now") – online portal of the channel's video contents

5.4.2.3. Summary and conclusion of the focus groups

The focus groups studies unequivocally showed that **consumers' attitude to television as a medium and their content consumption can fundamentally determine** to what extent they evaluate television positively or negatively, and the extent of technology acceptance of digital television and its functionalities. Occasional viewers, just like technology users, **ranked most useful the DVR among the functionalities of digital television**. This result once again shows that this technology is the most attractive to both active and less active viewers and we thus put this function in the focus of our following studies. This direction seems also reinforced by an insight that a non-user appeared most likely to return to watching television on account of this functionality and until they had access to the technology in their household, he was a regular viewer even though he zapped advertising during viewing. This also seems to reinforce the assumption that **one truly discovers the advantages of the technology through a personal experience** and thus a personal tryout would lead to a real technology acceptance, at least in the case of technology rejecters.

It is also obvious that, just like in the case of our in-depth interviews, **content is a key factor to determine television viewing**. The main question is whether offered content is capable of satisfying user demand. It is thus imperative implement user gratification related to television into our model.

Participants of all three focus groups were active consumers of video content. They consume these content mainly over the internet through streaming and downloading on their PC or notebook and sometimes attached to their television set. Occasionnaly they go to cinema provided that large screens and audio effects carry a sufficient added value. Mobile television was not a feature used by participants.

Current consumer attitude towards television was determining in the evaluation of the future of television. Similarly to the in-depth interviews, participants showed a positive reception of potential social features and rejected the possibility of an automated recording.

In this case as well we found the dimensions of the technology acceptance model relevant and identifiable, although usefulness variables related to technological innovation will likely be determined by the original attitude towards the basic media (ie. traditional television). The test of the items of the questionnaire related to perceived usefulness also matched the results of in-depth interviews, i.e. respondents judged irrelevant and uninterpretable the items optimized to working conditions and computers ("use of DVR helps me finishing my work faster", "the use of DVR increases my personal efficiency", "the use of DVR increases my personal effectiveness"). Items related to user usefulness based on our literature review and explorative study were judged relevant and interpretable by participants in the same way as in-depth interviewees.

5.5. SECOND QUANTITATIVE RESEARCH PHASE: PRE-TEST OF MEASUREMENT SCALES AND QUESTIONNAIRE

According to the cross-validated results of the exploratory study and the qualitative research phase, the emphasis of our research on media technology acceptance was put on digital video recorders among the set of available functionalities of digital television used by viewers. Both qualitative and quantitative results of the preliminary study unequivocally show the relevance of a research model based on the technology acceptance model and the conceptual framework of the diffusion of innovations. During a qualitative research phase (with in-depth interviews and focus groups) we assessed all the categories related to our research model to be tested and we required participants to evaluate critical items of scales to be used in our questionnaire. Preparatory to our query among IPTV subscribers, we proceeded to a test query in order to test our questionnaire and scale items on a larger sample.

During our test query we obviously had to consider that in this sample, a majority of respondents will be non-users of the technology we wish to study, thus this study and the related model will primarily be able to examine and integrate the behavioral intentition to use into the final model. Thus we modified our research model according to the conditions of our test query as follows: we changed the dependent variable from "current use" to "future intention to use" as a considerable part of participants will likely not be equipped in their households with a DVR.

5.5.1. QUESTIONNAIRE DESIGN

We used the questionnaire designed for our main study in our test query as well. Scale items were designed following the results of international studies. For several variables, we designed the scale items based on our previous studies and research. These items were tested and evaluated by participants during our preceding qualitative research phases. The questionnaire and scales are presented in Annex 7 and 8 in Hungarian (the final questionnaire is presented in English). The sources for scales in the questionnaire are presented in Table 5.7. The translation of scale items in English was verified by two academic experts with a proficiency level in English. The scale items in Hungarian were back-translated to English by an independent expert. Proposed scale items in Hungarian were altered, if needed, according to the results of the qualitative studies, as mentioned beforehand. In case of gratification scales er resorted to a Hungarian translation used by Babocsay (2002) and previously by Kósa and Vajda (1998). Self-designed scale items were first used during this test query which thus served as an important testing phase before our final study. We used several scales for measuring each measurement unit in order to evaluate each one of them and to include only the most relevant scale for each construct into our final query.

Variable	Source of scale	Place in the questionnaire
	(nr. of items)	•
Perceived usefulness	Davis (1989) (4)	Question 6. (1-7 scale)
Perceived usefulness	own scale (6)	Question 6. (1-7 scale)
Perceived ease of use	Venkatesh – Davis (2000)	Question 6. (1-7 scale)
	(4)	
Perceived social usefulness	Originally: Rubin (1983).	Question 1. (nominal
	Based on Hungarian	variable)
	translation by Babocsay	
	(2002) (2)	
Perceived enjoyment	Originally: Rubin (1983).	Question 1. (nominal
	Based on Hungarian	variable)
	translation by Babocsay	
	(2002) (3)	
Television affinity	Rubin (1981) (5)	Question 3. (1-5 scale)
Innovation orientation	Bauer et al. (2005) (3)	Question 8. (1-5 scale)
Innovation orientation	Goldsmith et al. (1995) (6)	Question 8. (1-5 scale)
(Global innovativeness		
scale)		
Innovation orientation	Goldsmith et al. (1995) (6)	Question 8. (1-5 scale)
(Electronic innovativeness		
scale)		
Perceived enjoyment	Venkatesh (2000) (3)	Question 6. (1-7 scale)
Perceived enjoyment	Cheung et al. (2000);	Question 7. (7 point
(semantic differential scale)	Igbaria et al. (1995) (4)	semantic differential scale)
Self efficacy	Venkatesh – Bala (2008)	Question 8. (1-5 scale)
	(4)	
Behavioral intentition to use	Venkatesh – Davis (2000)	Question 6. (1-7 scale)
	(2)	
Technological experience	self-reported data	Questions 5. and 9.

Table 5.7. Sources of the scales used in the questionnaire. Source: own collection
Scales used in the questionnaire follow a tradition observed in the literature and we employed the 1-5 and 1-7 scales and nominal items accordingly as well. Based on our literature review of studies related to the technology acceptance model (Table 2.2. and Annex 2.) we sticked for relevant model variables to items present in the original model. Even though we encountered numerous self-developed scales and numerous modifications of the original model in a variety of ways, we focused on the most cited and most reputed original articles' use of scales the reliability of which being the most tested in the literature. We included a gratification scale and a television affinity scale based on Rubin et al.'s (2004) "Communication Research Measures" (based on a translation by Babocsay [2002]) and we adapted the innovation orientation scale from Bearden and Netermayer's (1999) "Handbook of Marketing Scales" and from the article by Bauer et al. (2005). In addition to elements included in our model, the questionnaire contained further questions, namely the whole set of items of the gratification scale, a set of questions evaluating the importance of media technologies (based on Babocsay [2002]) and an adaptation of technology affinity scale to the internet.

5.5.2. Attributes of the research sample

First year students of the Faculty of Business Administration of Corvinus University of Budapest attending the Marketing course participated in our test query. 234 students filled our questionnaire which corresponds to a response rate of almost 100 per cent.

The demographic characteristics of the sample are as follows. The distribution of respondents according to gender indicates a relative balance with 53 per cent of respondents being females and 47 per cent males. The average age was 20.6 years, the youngest respondent was 19 years old, the oldest, 27, the mode being 20 years. Respondent were all university students with a secondary school final examination and a completed secondary education. 44.9 per cent of respondents lived in the capital, Budapest, 18.4 per cent in county capitals, 28.2 per cent had their primary residence in other towns and 8.5 per cent lived in villages. 40.2 per cent of respondents lived in households of 4 persons, 28.6 per cent in households of 3, 17.1 per cent in households with five or more persons, 12 per cent in two-person households and 2.1 in single households.

As for respondents' access to technological devices, only one respondent declared not having access to internet at home. Therefore home internet penetration rate in our sample is 99.6 per cent. Among them, 79.9 per cent had their subscription for more than 5 years, 43 per cent said not being equipped with a television se tat home, 33.8 per cent owned 2 television sets, 23.1 per cent had 3 and 11.5 had 4 or more television sets at home. 76.9 per cent of respondents declared being in possession of a device capable of recording televisual content.

We included three questions concerning televisulal content recording devices (see Annex 7, Question 5), although because of the self-administered nature of the questionnaire, responses from a number of respondents proved to be inconsistent as they answered questions 5/b and 5/c related to set-top-boxes with DVR, even though they declared in question 5/a not being equipped with one of these devices. Therefore during data purification answers for questions 5/b and 5/c were only kept for respondents having a valid answer for question 5/a. There was no case where a respondent gave a positive answer to question 5/a and would not complete questions 5/b and 5/c. Overall 36 respondents declared having a set-top-box equipped with a DVR in their household, 15 (6.2 per cent of the total sample) among them did not have access to other recording technologies. 23.1 per cent of respondents owned no recording device, 20.9 per cent owned a DVD-recorder, 26.5 per cent a VCR and 7 respondents (3 per cent) had access to all three technologies.

5.5.3. DATA COLLECTION

Our test query, similarly to our final query, was conducted online. The online questionnaire was available to respondents between May 10th and 16th 2010. Students responding to the questionnaire thus had the possibility to choose the best fitting moment for them to fill out our questionnaire. A hyperlink to the questionnaire was sent to the sample through the online administration system of the university. The questionnaire was elaborated using Google's form creating tool. Data collection was closed on May 17th 2010 and the database contaning the answers downloaded in Excel format. Overall, the questionnaire contained nine parts and required about 15 minutes to be completed.

5.5.4. TEST OF SCALES AND RESULTS OF THE PILOT STUDY

The main goal of the test questionnaire was to test the reliablilty of the scales adapted from the literature in preparation of the final study. As mentioned before, the translation of the scales was verified by two experts. We also proceeded to a backtranslation of the items and during the qualitative phase, requested participants to evaluate the items of the usefulness scale judged critical for the study. The qualitative phase provided assistance in the testing of the content validity of the set of items and in unveiling the perceived variables related to the technology acceptance model. In addition, employing scales tested several time in the international literature largely contributed to the validity of our scales.

We used the Cronbach's a coefficient to test the instruments' reliability and in order to select the scales to be included in the final questionnaire (see Table 5.8). All scales yielded a relatively strong Cronbach's alpha, with all values higher than .60 (Malhotra, 2002) and show a high internal consistency. According to the results we can establish that among the perceived enjoyment scales, the scale based on Venkatesh (2000) yielded a higher score of .93 than that of Igbaria et al. (1995) with a Cronbach's alpha of .85. As for innovation orientation, Goldsmith et al.'s (1995) scale with a Cronbach's alpha of .90 excelled that of Bauer et al. (2005) ($\alpha = .71$).

Table 5.8. Reliability of scales used for the pilot study (Cronbach-alpha values). Source: own research

Variable	Source of scale	Cronbach alpha
	(nr. of items)	
Perceived usefulness	Davis (1989) (4)	0.83
Perceived usefulness	own scale (6)	0.84
Perceived ease of use	Venkatesh – Davis (2000) (4)	0.93
Television affinity	Rubin (1981) (5)	0.79
Television affinity	own scale based on Rubin (1981)	0.81
	(5)	
Innovativeness	Bauer et al. (2005) (3)	0.71
Innovativeness (Global	Goldsmith et al. (1995) (6)	0.90
innovativeness scale)		
Innovativeness (Electronic	Goldsmith et al. (1995) (6)	0.84
innovativeness scale)		
Perceived enjoyment	Venkatesh (2000) (3)	0.93
Perceived enjoyment	Igbaria et al. (1995) (4)	0.85
(semantic differential scale)		
Self efficacy	Venkatesh – Bala (2008) (4)	0.77
Behavioral intentition to use	Venkatesh – Davis (2000) (2)	0.97

Contrary to our prior expectations that scale items related to perceived usefulness in Davis's (1989) technology acceptance model will not perform well in our quantitative query as they are hard to interpret in the context of home entertainment eletronics, the scale showed a relativelyhigh internal consistency. Results from answers to the four scale items (for mean, standard deviation, see Annex 6) and a Cronbach's alpha of .83 suggest that the set of items dubbed out-of-context during qualitative tests, can effectively be used in a self-administered questionnaire.

Results for each of the remaining scales were evaluated and analysed in order to study their applicability. Media usage habits of this young age group and their relation to media technologies is an interesting important field of research as well. Although not in the main focus of this very research, we briefly present the results of our study on this topic in the following.

In studying respondents' gratifications, we followed the methodology used in his doctoral thesis by Babocsay (2002) where gratifications were not queried for each medium on a Likert-scale but respondents were asked to choose a medium they preferred in the given situation. As the employed online questionnaire tool (Google spreadsheet) limited the number of choices to five, we narrowed our query to media technologies enabling consumers to have access to audiovisual content. Results (see Table 5.9.) confirm the expectation that in a query related to audiovisual content consumption, one should narrow and specify the type of content they want to evaluate in connection with the internet (in our case: viewing of online video content) and in our days it is no longer sufficient to dub an item "internet" without any further specification. According to the received answers, the internet in our days offers almost the whole spectrum of media gratifications and we can talk of a complex satisfying of needs in this case. The used scale measured six types of gratification: relaxation, company, learning, excitement, habit and escape. Based on this, the internet, as the most complex media, reached a very high score for learning and habit gratifications and performed well for company and excitement gratifications as well. Nevertheless, the body of respondents predestined a such dominant role of the internet, as the internet arrived on top of respondents evaluation in nine cases. Television arrived on top for relaxation and time spending based on routine. Results also show that VCR and DVD are serious competitors to television in the case of several gratifications while for enjoyment, television competes with cinemas. Overall, this result complies with the experience of focus groups, where series and movies arrived on top of the age group's preferred contents, i.e. those that VCR, DVD and cinemas also can offer. Cinemas also serve as an important social media and a common experience, as in the social gratification it reached a high mentioning score, along with the internet and mobile telephone as media technologies. In the case of mobile telephones, social connections and company functions are still dominant however excitement and time passing habits also seem to appear in the gratification list, although with a lower response rate.

	internet	mobile	cinema	television	VCR/
		phone			DVD
1/9 I want to relax	28.63	.85	5.56	27.78	37.18
1/9 I want company	34.19	30.77	31.20	.43	3.42
1/9 I want to learn today's news	79.91	2.14		17.52	.43
1/9 I want excitement	24.79	2.99	44.87	1.28	26.07
1/9 I want to pass time	66.24	2.56	1.28	22.65	8.26
1/9 I want to learn something about life	72.22	1.71	2.99	13.68	9.40
1/9 I want to forget about	23.93	5.13	19.66	14.96	36.32
problems					
1/9 I want entertainment	18.38	3.42	52.56	3.85	21.79
1/9 I want to learn about myself	82.48	5.98	1.71	2.99	6.84
1/9 I just want something to do	65.38	6.84	2.14	16.24	8.97
1/9 I want some thrills	9.83	.85	38.03	5.98	44.87
1/9 I want get away from what I	33.76	11.54	28.63	11.54	14.53
am doing					
1/9 I want enjoyment (fun)	29.06	12.82	20.94	8.12	29.06
1/9 I want to feel less lonely	23.08	44.87	20.51	5.56	5.98
1/9 I want to calm down	19.66	19.66	4.27	25.64	29.91
1/9 I want to learn how to handle my problems	69.66	14.10	1.28	5.56	8.97

Table 5.9. Results of the gratification scale in the pilot study. Source: own research, n = 234

We equally studied the importance of each media type for respondents which confirms the conclusions of the gratification scale. Internet is by far the most important media. It was the only media not to receive the least score of 1 (out of 5) at all and standard deviation was also the lowest (.54). This rank scale reflects, in large part, respondents' emotional ties to each media type and not necessarily reflects the actual frequency of use or time spent by using the given media.

5.5.5. Summary and conclusion of the test of scales and of our Questionnaire

The primary goal of the pilot study and data collection was to test our scales and analysis potential of gathered data. According to analyses carried out until this stage, thanks to the evaluation and selection of more reliable scales for given variables, the retained variables are reliable. The test of the questionnaire shows that scale items carefully prepared, and developed after verified translation are easy to interpret even in a self-administered questionnaire and yield high Chronbach's alpha coefficients along a small proportion of missing values. Gratification and media importance scales and questions also seem relevant and reflect respondents' preferences, attachment as well as media technologies' need- satisfying functions. Alongside the gratification scale we considered unnecessary a further investigation of the importance of each mediums' general entertainment attributes (Question 2) as the items included in the gratification scale fill this function and additional intelligence cannot be extracted from this question. Thus we no longer plan on using this question in the final questionnaire. In order to be able to incorporate the gratification effect related to the medium, in the final questionnaire we will use a seven-point Likert scale for the query of the items of the gratification scale instead of a choosable type employed in the test questionnaire.

The results of the pilot study have a far broader potential for data analysis, and it would be particularly interesting to analyze the relation of the studied age group with each medium and the digital video recorder, although, as mentioned beforehand, we aim to assess this aspect in a broader scope, during our final quantitative study. Thus within the framework of this dissertation, the results of the pilot study will not be continued as its main reason for existence was only to test the scales to be included in the upcoming query.

5.6. THIRD QUALITATIVE RESEARCH PHASE – EXPERT INTERVIEWS

In the third qualitative phase, we contacted interviews with two determining actors of the Hungarian market in providing digital television services and thus offering DVR devices, Magyar Telekom (T-Home) and UPC Hungary. The main goal of this research phase was to expert validate data and results gathered during the preceding research phases. We also aimed to incorporate into our research topical insights and experience from professionals in possession of a broad market intelligence as the topic of the dissertation innately implies a practical and managerial aspect. This qualitative phase of expert interviews thus helped in gathering intelligence and understanding intelligence already gathered, in order to be fully relevant and integrated before conducting a quantitative query on a representative sample.

The interviews offered a chance to get acquainted with the opinion of specific experts of the two major actors on the studied market in terms of actual consumer experience, feedback, and practical information about users and non-users. The research guide can be found in Annex 8.

Expert interviews took place as in-depth interviews in Fall 2010. We present the interview process in the following subchapter.

Primary interviews (see interview quide in Appendix 8.) were completed with the information gathered from one secondary source during the writing of the dissertation in order to draw an even deeper and more accurate picture of the market situation. The later included source is an interview on the theme of digital television with Judit Grósz, director of marketing of UPC Hungary, published in the January-February 2011 issue of @M electronic magazine (Gáborják, 2011).

5.6.1. PRESENTATION OF THE SUBJECT OF THE EXPERT INTERVIEWS AND PROCESS OF THE INTERVIEWS

We interviewed Ida Sztahura, head of division of Magyar Telekom's Directorate of Product Management and Innovation and Mónika Tóth, Video Product Manager of UPC Hungary.

Both interviews took place in the of the respective companies' headquarters i.e. in the working environment of the interviewees. Interviews lasted between 25 and 30 minutes during which we followed a semi-structured interview guide (available in the Annex in Hungarian), leaving open the possibility for the free flow of information and to an unbound thread of the interviews. The interviews opened with a presentation of the interviewer, the research topic and the goals of the interview following which we switched to the set of questions that covered three main topics. Interviewees received the interview guide in advance and were thus prepared in its topics allowing a much shorter duration of the interviews while keeping the same information richness. After express permission from the interviewees, the interviews were tape-recorded and field notes were made.

In the processing of this phase, the aim was not to illustrate the results with detailed comments from our informants as we did for the preceding qualitative research phases, but to get acquainted with the expert opinions and reflexions on the results of our preceding studies in order to validate these, and also to enrich our research with relevant and topical market trends and insights. In accordance to this, we will proceed to a summarizing description of the results of the two expert interviews and the above-mentioned (Gáborják, 2011) interview article.

5.6.2. RESULTS OF THE EXPERT INTERVIEWS

Subscribers to T-Home are enabled to choose a set-top-box equipped with a personal video recorder within their IPTV offer. During the introductory phase of the service, all subscribers received set-top-boxes equipped with DVR. Since January 2010 this service is optional, with 35-40 per cent of new subscribers taking the option. Hence 70-80 per cent of all subscribers to T-Home's IPTV are equipped with a DVR in their household. In the case of UPC, subscribers to digital cable are offered the opportunity to choose an option with a mediabox with integrated DVR functions. 44 per cent of subscribers to the service have access to DVR. According to these facts we estimate that in Hungary, between 180,000 and 200,000 households¹³ are equipped with this device. Counting an average 2.6 persons per household, this corresponds to 468,000 to 520,000 people.

The number of households chosing DVR is rising. Both experts along with the cited interview confirmed that the technology is still in the phase of education, i.e. consumers still ought to be trained and taught about the advantages of digital television and with it, digital video recorders. Communication by service providers is a factor that has a direct effect on consumers' choices, thus when a given campaign focuses on the advantages of digital video recorders, a leap can be observed in consumers enquiring about and chosing this option. It is also clear that communication among consumers, i.e. word-of-mouth has an even more important role as a group of enquirers also appear on

¹³ Based on news by Mediainfo (2011) the number of UPC subscribers amounts to 250,000 households, 44 per cent of which are equipped with DVR, i.e. 110,000 households. The number of T-Home's IPTV subscribers is approximately 100,000 70-80% of which with DVR (i.e. 70-80,000 households). Thus a minimum of 180,000 households are equipped with DVR, and by taking the more optimistic value for T-Home and counting another 10,000 from smaller access providers (eg. Invitel, DataNet) this number rises to 200,000 households.

the market who heard of the digital video recorder from acquaintances (and perchance, had a possibility to try them out). In their vision of the future, both interviewees formulated a firm view that the market faces a phase of intensive growth and DVR technology will have spread within 10 years. Of couse, service providers' offers (eg. triple-play) served as a push in the direction of spreading digital television and DVR technology as well.

Both providers offer their DVR devices (the technology therefore acting an additional source of income as well) for a monthly fee of 1000 HUF (ca. 4 EUR). At the same time, both interviewees declared that at the moment the historic costs of a set-top-boxes with DVR functions still add up to 25 to 40,000 HUF (ca. 100-150 EUR) per piece for providers. On a long term though, they count on decreasing cost prices, along with a growing number of subscribers.

As for service providers' business model, the flat rate charged for DVR service offers an additional source of income, and the service has a yet unused potential to attract revenues from the side of potential advertisers. Non-linear advertising solutions though carry a potential danger that advertisers' market prospects and innovativity, along with traditional advertising spaces' protective strategies, not reflect positively these expectations as they fail to at the moment. Although, by means of the new technology advertisers are offered the possibility to serve their target groups with specific contents, interactive advertisments and to provide targeted content to them all of which can be measured thanks to the two-way data traficc capabilities. Technology is thus given although Hungarian advertisers don't seem open to this form of advertising in yet. At the same time, content producers and content owners do not authorize the recording of their contents to other digital storage devices than DVR's, hence the closed system.

Both interviewees mentioned the enhancement of consumer interactivity as a main future direction for development, although updating is capital intensive for both technologies (IPTV and cable). Interactive services, like service providers' video archives and the central recording and availability of broadcast televisual content to a later view point in the direction of time-shifting as a consumer behavior.

DVR technology clearly increases consumer loyalty, once they try it out, consumers hold on to it. According to T-Home's own survey, 67 per cent of IPTV subscribers with a DVR are satisfied with their service in contrast to 14 per cent measured among cable subscibers. DVR technology and IPTV subscriptions altogether have a

greater client-keeping potential, this group of users specifically act as potential consumers to other value-added and more expensive contents and telecommunications services. Thus it is an important element for consideration in client acquisition that the group of users opting for high-quality digital television with DVR holds an important business professional for further services of these companies. According to the interviewees, although households with DVR and mostly households subscribers to IPTV services do not differ significantly from other subscriber groups in any demographic respect, they tend to be more wealthier, reliable and more receptive to advertising messages that focus on technology, still they do not constitute a specific market segment with given specific attributes.

Households tend to quickly discover and learn the use of DVR's after receiving the device. EPG and DVR are among the first functionalities to be mastered and the most commonly used. Downloadable contents follow a more classic learning curve, they spread diffuse slowly and further education is needed. Television consumption shows patterns of change in DVR-equipped households, as identified by T-Home by collecting and analyzing set-top-boxes' usage statistics. According to a focus group study by T-Home conducted in 2009, users, subscribers mentioned that a traditional television viewers shape their daily routine along television programs, the start times of which structuring viewers' schedules. Traditional television was equivalent with passivity, inactivity and an indivividual type of viewing for them. In contrast, informants perceived that IPTVviewers increasingly enjoy watchning television while the part of passive viewing is declining, as they only watch what really interests them. They also watch more television in company, mostly during the common viewing of recorded content. In respondents' opinion, television viewing goes with less conflict as the flow can easily be stopped and viewing can be shifted in time. The results of the study also showed that viewers do not look for time-shifting as a functionality and tend to say that they do not require it. IPTVsubscribers only discovered all the advantages of their subscription and the effects of the technology to their viewing habits though their own experience. They identified the following as advantages of the technology: the possibility to stop a program, that of zapping advertisements, the experience of rewinding and reviewing given parts, the possibility to fit their favorite television programs into their own schedules and the possibility to watch films collectively, in family (T-Home, 2009).

5.6.3. SUMMARY AND CONCLUSION OF THE EXPERT INTERVIEWS

Both market expert interviewees and received research materials confirmed the results of our preliminary and second qualitative studies showing that **DVR technology is determining within digital television**. Users and subscribers value most this functionality and rank first among the advantages offerend by digital television those related to DVR (namely that they are able to pause and rewind content and the simple recording function). High-definition (HD) television, the EPG function and downloadable content also appeared during the interviews as further elements of user preferences and thus ground for development and education for providers. **Expert interviews confirmed once again our choice to focus on DVR technology within the complex set of functionalities** offered by digital television technology.

Thanks to our interviews with experts of Hungary's two major digital operators, we gained valuable insights into current trends of the Hungarian market. **The interviews confirmed our insight from in-depth interviews** with lead users about consumer satisfaction, a positive evolution of television as a whole and on the evolution of viewing habits. At the same time incumbents' **positive expectations on further market development and diffusion of DVR technology** confirm that of our secondary sources and the positive user evaluation of the technology we observed during our previous research phases. DVR-users considered digital television useful, **flexible and capable of reducing family conflicts** while extending the possibility to a family to watch television together, which all confirm and **validate our research directions concerning users' perceived usefulness**.

During in our literature review and previous research phases we established that the ease to learn and to use a technology and the perception thereof have a crucial role in technology acceptance. Experts agreed with the conclusion of our previous studies that the **DVR is easy to learn and users tend to use this functionality** of digital television among the first and it remains among **the most frequently used** functionalities. **Thus the study of perceived ease of use as a factor is relevant.**

5.7. THIRD QUANTITATIVE RESEARCH PHASE – TEST OF THE RESEARCH MODEL

In Chapter 5.2.1. we presented our research model, the variables included in the model and our hypotheses. As a last step of our empirical research based on a mixed methodology we tested our hypotheses on a representative sample of 18 to 69 years-old 143

internet users. The main objective of this research phase was to test our empirical model and hypotheses with structural modeling on a representative sample of the adult Hungarian population. We chose an online survey design for reasons of cost-effectiveness and fast results, furthermore supported by the growing internet penetration rates (as of second half 2009, 55 per cent of the 15-69 years-old Hungarian population is a frequent internet user [NRC, 2009]).

5.7.1. QUESTIONNAIRE DESIGN

Our questionnaire (see Appendix 9/a.) was based on the questionnaire used for our pilot survey which we altered according to the conclusision of the second qualitative research phase. Thus, as mentioned before, scales and item to be used in this last survey were judged appropriate, valid and reliable.

In our third research phase we proceded another time to a revision and fine-tuning of our questionnaire connecting its elements item by item with those of our model's presumptions and taking into consideration the decisive factors of structural modeling.

Measurement scales

The question on ranking each medium by importance did not carry any added information, for this reason we decided no longer to use it. We altered our set of questions on gratification from multiple-choice questions between different types of media to 7point Likert scales focusing solely on television, in order for its media specific gratification to be studied and to be included into our research model. By doing this, we were able to include individual variables of gratification into technology acceptance model i.e. to reflect the relation between individuals and television as the mass communication medium in focus of our study. This method of using the gratification scale is in accordance with Ha and Yook's (2009) research during which perceived cognitive (information function) and affective (enjoyment function) gratifications were integrated into IPTV acceptance model. In our case we chose to incorporate enjoyment gratifications (treated by Ha and Yook [2009] as "affective"), as our previous research phases and our pilot study confirmed that television was no longer a primary source of information and as such, information no longer a main function of television for viewers. Wirth et al. (2000) included the gratification scale in their empirical model as well. Zhang and Mao (2008)'s variable of Perceived social usefulness and Bauer et al.' (2005) variable of Perceived entertainment also correspond to the measure of this gratification on

own scales. However, in our study, we aspired to employ already tested scale structures which, in addition, originally aim to measure the latent variable, therefore we sticked to using the original scale designed by Rubin (1983) to measure latent variables related to these gratifications.

A main conclusion of our pilot study (i.e. the second quantitative research phase) also validated by following expert interviews was that DVR technology is still in its education phase and therefore users' relation to the new technology is crucial for its acceptance. Because of this conclusion we incorporated an additional variable (technology anxiety) beside our individual technological efficacy (self efficacy) variable, based on Venkantesh and Bala's (2008) most comprehensive and up-to-date technology acceptance model.

According to the results of our pilot study and expert interviews, and the newest developments of the technology acceptance model, we included an additional variable (image) into our model. This variable, as used previously by Venkatesh and Bala (2008), and Purkashtaja (2009) intended to measure the prestige value of innovations and the effect of environment on technology in an early phase of diffusion.

At the same time, we did not include the "result demostrability" and "subjective norms" variables of technology acceptance model into our research model as Venkatesh et al. (2003) in their meta-analysis of theories about individual acceptance show that these variables have a very limited and insignificant (below .1) effect for the behavioral intentition to use and actual use in case of voluntary systems.

The remaining variables and scales of the model used in the pilot study were retained. Among the two different types of perceived enjoyment used in our pilot study, we retained that designed by Venkatesh (2000) because of it better fitting our empirical model and questionnaire structure and its better performance in terms of reliability and validity, we retained

In our literature review, we also drew from domestication theories that advocate the study of technologies present in households within their complex technological environment. In order to obtain data on respondents' technology-related equipment and device usage, in question 8 respondents were queried about their possessing additional technologies and devices allowing the consumption of video content.

We proceeded to a test query of the questionnaire modified according to the above, among an age group different from that of the respondents in our second quantitative research phase, in order to test whether our questionnaire and the questions within are intelligible for all age groups. 7 people between 33 and 60 years of age filled our questionnaire. Their feedback was used in the final wording of the questionnaire.

Presentation material, video stimuli

The aim of stimuli used in the questionnaire was to visually illustrate the use of the DVR's functionalities and technology usage to respondents, instead of a verbal description used during the pilot study. A self-made video of 2 minutes demonstrated the use and the most essential functionalities and advantages of DVR technology (as identified during the previous research phases)¹⁴. In our questionnaire, after enquiring respondents about their gratifications, affinity and technology availability related to television, as base medium, we asked them to watch the above video with sound. After viewing the presentation we required them to continue the questionnaire which followed with scales related to technology acceptance model. Therefore, by having been informed of the technological innovation, all respondents were enabled to rate the appearing statements. The contents of the video was recorded and edited by us specifically with the intention of using it in our survey. Before the survey and before its finalization, 7 people were asked to watch and rate the video. With the elaboration of an own video stimuli, we were able to present the technology in its actual environment, without having to resort to advertising material from content and/or technology providers. Indeed, our goal was not to present the offer of one or the other service provider plus by using an advertisement we would not have been able to handle recall effects. Furthermore, we necessarily had to include the stimulus in Hungarian therefore the use of international presentation materials was out of question as well.

5.7.2. Attributes of the research sample

The survey's sample of 500 respondents was representative of the Hungarian internet-user population between 18 and 69 years of age by gender, age, place of residence and education. No filter question was used. Representativity of the sample was ensured by NRC's online panel of 70,000 members. Data collection was conducted by NRC.

 $^{^{14}}$ The video stimulus cane be viewed on the CD-ROM attached to the dissertation or on the following link: <u>http://www.youtube.com/watch?v=oPtMPMRTy6U</u>

The sample has a balanced proportion according to the gender of respondents. Distribution of women and men is quasi-identical, with 52.2 per cent of female respondents and 47.8 per cent male. 36.5 per cent of respondents belong to the 18-29 age group, 24.9 per cent to the 30-39 age group, 23.1 per cent are between 40-49 of age, 15.5 per cent between 50-69. While analyzing the education criterion, one has to consider that a non negligible part of the respondent are still in the education system. Thus among those with 8 years of highest completed studies, some are still in high school, and among those with a completed high school, many are still in college/university. In our sample, 34.0 per cent completed a primary school, 39.9 completed a secondary education, while 26.1 per cent had a college/university degree.

In the field of research concerning television and modern information and communications devices, the place of residence and the distribution thereof is especially important an attribute. Thus there exist a number of services user knowledge and appreciation of which will largely be affected by their place of residence, i.e. where and by whom these services will be reachable. In our sample, 26.3 per cent of respondents inhabit the capital, Budapest, 46.9 live in county capitals and other towns while 26.8 per cent in villages.

Another important attribute for television and related services is the size of the household. Considering that television viewing can be both an individual and social (eg. watching with other members of the household) activity, household size can also greatly influence viewing habits. In our sample, 8.6 of respondents live in single person households, 24.9 per cent in two-person households, 25.1 per cent in three-person, 24.1 in four-person, 11.1 per cent in five-person and 4.5 per cent in six or more person households.

Television access patterns of the examined households differ from the national average. 10.4 per cent have access to television through terrestrial reception, while at the period of data collection, Hungarian average was around 20 per cent. This information is all the more important since the studied technology is only available through subscribtion services and service providers usually charge an extra fee for it. It is of course unsure whether respondents are in each case aware of their type of reception and beyond the 3.8 per cent "don't know" answers, there might be respondent indicating a false answer. Respondents were able to give multiple answers to the question, therefore the aggregated summary will exceed 100 per cent. By all accounts, from the point of view of our

research and the present sample, representing the defined population, it is important to have data on this very population, concerning their actual habits and patterns of television consumption as well as of their knowledge of different types and possibilities of reception (thus in our case, only 3.8 per cent declared not knowing in what manner they receive their televisual signals, the remaining 96.2 per cent felt competent enough to answer the question).

In a research examining television viewing, another determining factor is the number of television sets in the household. A greater number of television sets will indeed allow individual consumption preferences and patterns to manifest themselves even within the context of a household. It is a well-known fact that Hungary also has a relatively large number of households with multiple television sets, and that is no different in our sample. 28.2 per cent of the examined households possessed only one television set, 40.9 per cent had two sets, 20.6 three and 9.6 per cent more than three.

The high rate of home access to internet is no surprise. The respondents to an online survey are inevitably internet-users, and a decisive majority in our sample (95 per cent) has access to internet from their home and used it during the past one month. 71 per cent of respondents have already tried online shopping, 13 per cent are frequent, 35.3 per cent are occasional online purchasers. 48.6 per cent of respondents use online banking services.

5.7.3. DATA COLLECTION AND PREPARATION FOR STATISTICAL ANALYSIS

The questionnaire was tested with a the pilot study in a preceding research phase. After modifications based on received feedback, we proceeded to a paper-format selfadministered test query with 7 respondents the results of which served to fine-tune the wording and formal apects of the questionnaire.

Online data collection took place in November 2010. An online questionnaire, hosted on NRC market research company's website, was used to collect data. Panel members received a hyperlink to our questionnaire via e-mail sent to them regularly by the market research company containint calls for participation in research. Data collection took one week, during which a sample of 500 respondents guaranteeing representativity was reached. Panel members had no individual incentive offered for participating in this very research; respondents were eligible to a sweepstake organized by the research company.

The gathered sample of 500 responses fills the minimum sample size requirement for structural equation modeling (Hair et al., 2010). Each response of the questionnaire was made required, thus the issue of missing values was avoided.

5.7.4. HYPOTHESES AND MODEL TEST RESULTS

As Gefen, Straub, and Boudreau (2000, p. 6.) highlights "structural equation modellin (SEM) has become de rigueur in validating instruments and testing linkages between constructs". They distinguish between 2 SEM methodological directions: the covariance based (eg. LISREL) and the variance based (eg. Partial Least Squares, PLS) techniques. Among SEM methods path analysis is the most prominent one. The measurement model specifies the relationship of the indicators, the variables and latent variables, based on the direction of the relationship we can identify reflective and formative methods. The reflective measurement model has its roots in classical test theory, when the direction of causality is from the construct to the indicators; thus, observed measures are assumed to reflect variation in the latent variable(Henseler et al., 2009).

In our study we use a reflective model, as our goal is to test a theoretically supported model and not the prediction. We provide a new media technology specific acceptance model based on latent variables and measurement scales from previous literature.

Measurement model and measurement scales

The conceptual model consists of eleven latent variables: television affinity, perceived social usefulness, perceived entertainment usefulness, image, electronic innovativeness, technology self-efficacy, technology anxiety, perceived usefulness, perceived ease of use, and behavioral intenion to use. The casual model analyses were conducted by a maximum-likelihood estimation procedure using AMOS 18.0, descriptive statistics and Cronbach' alpha were also calculated by using SPSS 18.0. We provide first the reliability and validity analysis than the the model test results.

Reliability analysis

We have to evaluate the reflective measurement models from reliability and validity point of view as well. The first criterium to be checked is internal consistency for

which Crombach's alpha (Cronbach, 1951; Cronbach és Meehl, 1968) is the traditional criterium which provides an estimate for the reliability based on the indicator intercorrelations. At the same time alpha coefficient value increases with the number of scale items (Malhotra, with Simon, 2008, p.329.). An other weakness of alpha coefficient is that it is often over or under estimating the value of internal consistency in case of latent variables (Raykov, 1997; Raykov, 1998, Brunner and Süß, 2005; Graham 2006). That is why composite reliability (CR) is recommended to use by more studies (Wert et al., 1974; Fornell és Larcker, 1981a; Graham, 2006; Hair et al., 2010).

CR is taking into account that the indicaters, scale items have different weights while can be interpreted the same way as Cronbach's alpha. CR is the calculated value of latent variable the related indicators' standardized factor loadings and the measurement error. CR is considered good over 0.7 as Crombach's alpha (Hair et al., 2010), however some considers 0.6 as minimum value (Byrne, 2010), and others consider 0.8 (Brunner és Süß, 2005). In our study we used 0.7 criterium based on Hair et al (2010).

Calculation of CR, where lambda is the standardized factor loading, Var(e) is the measurement error (Fornell and Larcker, 1981a; Henseler et al. 2009):

$$\rho_{\eta} = \frac{\left(\sum_{i=1}^{p} \lambda_{yi}\right)^{2}}{\left(\sum_{i=1}^{p} \lambda_{yi}\right)^{2} + \sum_{i=1}^{p} \operatorname{Var}(\varepsilon_{i})}$$

When using SEM we also have to analyse the reliability of indicators. A strukturális egyenlőségek modellezése esetén az indikátorok megbízhatóságát is vizsgálnunk kell. We expect the absolute value of correlation between the latent variable and the given manifest variables, the indicators to be higher than 0.7, meaning the factor loading of the indicator has to be higher than 0.7 (Henseler et al., 2009). Some researchers (eg. Churchill, 1979) recommend to put out of the model indicators not reaching a 0.4 factor loading. Others (Henseler et al., 2009) warn to be cautious when deleting indicators, and only recommend it when the realiability is low and the removal significantly enhances CR.

Validity analysis

We examined content, convergent and discriminant validity. Convergent and discriminant validity are important to consider in case of SEM (Henseler et al., 2009).

Content validity

Content validity is a subjective but systhematic evaluation reflecting how much the content of scale items is able to represent the measurement object (Malhotra, 2005). It means that content validity requires more qualitative approach. The literature review of technology acceptance model and gratification theory, the qualitative data collection from technology users and television refusers, as well as the professional expert interviews, and last but not at least the scale test and pilot questionnaire done with students supported the scale selection, comparaison, and recomposition which all were part to have a corresponding content validity.

Convergent validity

Fornell and Larcker (1981a, 1981b) propose to use a average variance extracted (AVE) as convergent validity indicator. They propose AVE to be higher than 0.5 meaning that the latent variable is able to explain on the average half of the variance of the indicators.

Calculation of AVE, where lambda is the standardized factor loading, Var(e) is measurement error (Fornell and Larcker, 1981a; Henseler et al. 2009):

$$\rho_{vc(\eta)} = \frac{\sum_{i=1}^{p} \lambda_{y_i}^2}{\sum_{l=1}^{p} \lambda_{y_l}^2 + \sum_{i=1}^{p} \operatorname{Var}(\varepsilon_i)}$$

Discriminant validity

Discriminant validity provides a proof that the scale is not correlating with other latent variables from which it would be different (Malhotra, 2005).

Discriminant validity is the complementer concept of convergent validity. In case of reflective SEM two indeces are recommended. (Henseler et al., 2009): the Fornell-Larcker criterium and crossloadings. The Fornell-Larcker (1981a) criterium says that the variance of the latent variable is explained more by its own indicators than the variance of any other latent variable. "The AVE of each latent variable should be higher than the squared correlations with all other latent variables. Thereby, each latent variable shares more variance with its own block of indicators than with another latent variable representing a different block of indicators." (Henseler et al., 2009, p. 300). The crossloadings criterium is more permissive, "if an indicator has a higher correlation with another latent variable than with its respective latent variable, the appropriateness of the model should be reconsidered" (Henseler et al., 2009, p. 300). Although the Fornell–Larcker criterion assesses discriminant validity on the construct level, the cross-loadings allow this kind of evaluation on the indicator level.

Summarizing the scale and measurement model reliability and validity test we used classical coefficients (Cronbach, 1951; Churchill, 1979) and based on Henseler et al. (2009) other newer indices as well, which jingle with the two step SEM concept Anderson and Gerbing (1988):

- Cronbach's alpha coefficient (> 0.7)
- Composite reliability (CR; > 0.7)
- Indicator reliability (> 0.7)
- Average variance extracted (AVE; > 0.5)
- Fornell-Larcker criterium (AVE > R^2 with any other latent variable)
- Crossloadings (correlation of the indicator with its own latent variable > correlation of the indicator with its any other latent variable).

Based on the literature review we can state that the first four criteria are crutial to check (Cronbach-alpha, CR, AVE, Factor loading) as being most frequently used in SEM (Hair et al. 2010, Byrne, 2010). We aimed to satisfy these criterum first of all, but also checked the Fornell-Larcker criterium and crossloadings.

To validate our measurement model and provide the reliability and validity indecis we used a confirmatory factor analysis (CFA) 15 by AMOS 18.0, and removed the indicators with lower than 0.5 factor loading. Than step by step we removed the lower factor loading from CFA and checked the model fit and the criteria above. We also took into consideration the modification indeces, the outlire ones, and we deleted the indicator (PU_1). Based on this iterative process we finalized our CFA, measurement model.

The final measurement model consisted of 9 latent variables and 25 indicators. Appendix 9/b. shows the latent variables and indicators as well as the correlation tables.

¹⁵ Beside the check of normality we accepted the precondition that our sample size of 500 persons provide a robust and normal distribution. We did not have any missing data.

The correlations prove that latent variables have acceptable discriminant validity, as the indicators of a latent variables have higher correlation with eachother than with any other indicator of other latent variables.

Table 5.10. Confirmatory factor analysis and scale reliability and validity results, source: own analysis

Variables / indicators	Factor loading	CR	AVE	Cronbach alpha
Perceived entertainment usefulness*	_	0,92	0,79	0,87
PEEntU_1	0,79			
PEEntU_2	0,83			
PEEntU_3	0,85			
Perceived social usefulness*		0,88	0,79	0,79
PESU_1	0,88			
PESU_2	0,76			
Televisin affinity*		0,95	0,82	0,93
TVaff_1	0,84			
TVaff_2	0,87			
TVaff_3	0,79			
TVaff_5	0,88			
Technology anxiety*		0,89	0,81	0,82
Anx_2	0,79			
Anx_3	0,88			
Technology self-efficacy*		0,93	0,86	0,88
SelfEff_3	0,88			
SelfEff_2	0,89			
Perceived enjoyment*		0,92	0,80	0,88
PEnj_3	0,84			
PEnj_2	0,80			
PEnj_1	0,84			
Perceived usefulness**		0,91	0,78	0,88
PU_2	0,75			
PU_3	0,78			
PU_4	0,91			
Perceived ease of use*		0,96	0,86	0,93
PEOU_1	0,90			
PEOU_2	0,85			
PEOU_3	0,93			
PEOU_4	0,81			
Behavioral intention to use*		0,92	0,85	0,86
BI_2	0,83			
BI 1	0,90			

* Crossloadings and Forner-Larckner critera are met

** Crosloadings are ok; Forner-Larcker criterium is not met in case of PU and BI (0.78 vs 0.82)

The model fit of our CFA¹⁶ (CMIN: 428.616 (df=239; p< 0.000); CMIN/df= 1.79; GFI= 0.935; TLI= 0.971; CFI = 0.977; PCFI= 0.779; RMSEA= 0.040; PCLOSE= 0.998; HOLTER 0.5 = 322 és HOLTER 0.1 = 341) was good, the scale reliability and validity measures are summarized in Table 5.12.

Based on the analysis above the indicators are acceptable and the factor loadings were higher than 0.7. CR AVE indeces meets the acceptance level in case of each latent variable. Crossloadings are also good, and the Fornell-Larcker criterium is met except one case Perceived Usefulness (PU) and Behavioral intention (BI). But as all the other criterium is met, we accepted the latent variables and indicators (see Table 5.10.).

Structural model: Hypothesis testing

Model fitting. Hair et al. (2010) suggest to use more fit indeces together beside checking chi square and degree of freedome: an absolute fit index (GFI, RMSEA vagy SRMR), an incremental fit index (CFI, TLI), a goodness of fit index (CFI, TLI, GFI) and a badness of fit index (RMSEA, SRMR). We have to emphasize that we can not talk about *,,one magic index*" in case of SEM which limit the good fit from the bad (Byrne, 2010, Hair et al., 2010). We also have to consider the model characteristics influencing the quality of model fit, as sample size, model complexity (number of indicators and variables) (Hair et al. 2010). Hair et al. (2010) say that in case of larger sample sized and complex models it is not realistic to require the fit indeces over 0.95. Hair et al. (2010) provide acceptance levels for 250 individuals and 12-30 measurement variables which we summarize in Appendix. 10. As we have 500 persons sample and 25 measured indicator variables we used Hair et al. (2010) criterium levels. The results of structural equation modeling obtained for the proposed conceptual model revealed a chi-square of 769.94 (df=261). All the used indices reached the expected 0.92 level, except GFI, but it is also close, and often not recommended to use as highly influenced by sample size and model complexity. The model fit indeces results are the followings: GFI = 0.89; TLI = 0.93; CFI= 0.94; RMSEA = 0.063. These results suggest that our model fit is acceptable. Figure 5.6. shows the final model with structural path coefficients and t-values for each

¹⁶ When using SEM in case of larger sample sizes (>200) the classical Chi test is usually significant (p<0,01), which could proove to disapprove our null hypothesis and so the suitable fit our data. Buti n case of larger sample sized the subjective model fit indeces are recommended, and if they are acceptable we can accept the whole model even if Chi test is significant (Byrne, 2010; Hair et al. 2010). This was the problem launched the development the model fit indeces, and the acceptance criteriums are summarized in Appendix 10.

hypothesized relationship as well as squared multiple correlations (R^2) for each endogenous constructs



Figure 5.6. A model showing causal paths and R2 for applying TAM, Source: own figure

Bold lines are indicating significant pathes (p<0.05), the dashed line is indicating the insignificant path *** p<0.001; **p<0.01; *p<0.05, t values in parantheses

Hypothesis testing. Figure 5.6. shows the results of the caseual model testing and hypotheses analysis. For the statistical significance of parameter estimates, t-values were used. All pypotheses except hypothesis 3c (H3c: 0.05; t=1.37), the path from perceived ease of use to behavioral intention to use, were statistically supported. The linckage of gratification theory and technology acceptance model is supported. Those ones who has higher affinitity to television perceived more useful the innovation, the DVR (H1a: 0.13; t= 2.23). The television, as context of the innovation provided social (H1b: 0.17; t= 2.78) and entertainment (H1c: 0.19; t= 3.35) usefulness and received positive sstatistical support

As we hypothetized the path from technology self-efficacy showing the technology usage skills of the individual (H2a: 0.19; t= 3.81), and from technology

anxiety, reflecting the individuals' (H2b: 0.46; t= -8.25) towards perceived ease of use were positively significant.

The perceived ease of use of DVR is positive influencing the perceived usefulness of DVR (H3a: 0.46; t= 10.18) and perceived enjoyment of DVR (H3b: 0.43; t= 9.02). While as we said before the perceived ease of use did not have significant effect on behavioral intention to use DVR in the future (H3c: 0.05; t=1.37).

The perceived enjoyment of DVR (H5: 0.17; t=4.54) and perceived usefulness (H4: 0.82; t= 14.85) had significant positive effect on be havioral intention to use of DVR. Our proposed conceptual model (directly perceived usefulness and perceived enjoyment) explained a high amount, 80 percent of variance for behavioral intention to use ($R^2 = 0.80$).

According to our suggestion we found correlation. A televízió affinitás és társas hasznossága között 0,59 (t=9,57; p<0,001), a televízió affinitás és szórakoztató hasznosság között 0,55 (t=8,957; p<0,001), a társas és szórakoztató hasznosság között 0,55 (t=8,85; p<0,001), erejű kapcsolat van. Az egyéni technikai én hatékonyság és a technikai aggodalom között – 0,40 (t=-6,83; p<0,001), kapcsolat van.

Decomposition of effects. To assess the signivicance of direct, indirect and total effects of predictor variables on dependent variables, the decomposition of effects analysis was conducted. The standardized effects will be shown between two variables (dependent, independent variable) according to Table 5.11. To idendify the significance of indirect effects we used Sobel-test¹⁷ (Sobel, 1982; Baron and Kenny, 1986) and bootstrapping.¹⁸ Sobel test is recommended in case of larger sample sizes, which we reach with 500 individuals. While more are recommending using bootstrap method to prove significance of indirect effects (MacKinnon et al., 2004; Shrout and Bolger, 2002) which can be done by AMOS or in case of non latent variables by SPSS and SAS macros(see: Preacher and Hayes, 2004).

¹⁷ Sobel test calculation: *z*-value = $a*b/SQRT(b^2*s_a^2 + a^2*s_b^2)$, where a is the standardized regression weight of the independent variable, b is the non standardized regression weight of mediator variable and s_a is the standard error of a, s_b is the standard error of b.

¹⁸ Bootstrapping is the practice of estimating properties of an estimator (such as its variance) by measuring those properties when sampling from an approximating distribution. When observations can be assumed to be from an independent and identically distributed population, we can use bootstrapping by constructing a number of resamples of the observed dataset (and of equal size to the observed dataset), each of which is obtained by random sampling with replacement from the original dataset.

		Total	Indirect	Direct
Dependent variable	Independent variable	effect	effect	effect
Perceived ease of use	Technological self efficacy	0.19		0.19
	Technological anxiety	0.46		0.46
Perceived usefulness	Television affinity	0.13		0.13
	Perceived social usefulness	0.17		0.17
	Perceived enjoyment usefulness	0.19		0.19
	Perceived ease of use	0.46		0.46
	Technological self efficacy	0.09	0.09	
	Technological anxiety	-0.21	-0.21	
Perceived enjoyment	Perceived ease of use	0.43		0.43
	Technological self efficacy	0.08	0.08	
	Technological anxiety	-0.20	-0.20	
Behavioral intentition to				
use	Perceived ease of use	0.51	0.45	0.05
	Technological self efficacy	0.09	0.09	
	Technological anxiety	-0.23	-0.23	
	Perceived usefulness	0.82		0.82
	Television affinity	0.10	0.10	
	Perceived social usefulness	0.14	0.14	
	Perceived enjoyment usefulness	0.16	0.16	
	Perceived enjoyment	0.17		0.17

Table 5.11. Decomposition of direct, indirect and total effects for model, Source: own figure

Effects in bold were significant at the p< .01 level, those in italic at the p< .05 level.

We could identify low but significant indirect effect between technology selfefficacy and perceived usefulness (R^2 =0.09) and higher but negative indirect effect between technology anxiety and perceived usefulness (R^2 =-0.21). Similar the technology self-efficacy (R^2 =0.08) and technology anxiety (R^2 =-0.20) had significant indirect effect on perceived enjoyment. The highest indirect effect was identified between perceived ease of use and behavioural intention to use, which is not surprising after getting a low and insignificant direct effect. So the effect of perceived ease of use on behavioural intention to use is mediated by perceived usefulness and perceived ease of use. Televison affinity (R^2 =0.10), Perceived social usefulness (R^2 =0.14) and perceived entertainment usefulness (R^2 =0.16) also had significant indirect effect on behavioural intention to use through perceived usefulness.

5.7.5. GRATIFICATIONS RELATED TO TELEVISION: COMPARISON BETWEEN DIGITAL AND ANALOG CONTEXTS

Among our research questions presented beforehand was the difference between viewer gratifications of analog and digital viewers in the context of television as a mass medium. We deemed important the study of this question for one has to analyze the evolution of consumer motives related to a medium in a changing technological environment in order to assess whether changing technology and the advent of digital solutions and devices have any influence on perceived usefulness of users. Or if technological innovation does not affect the basic utilities related to the medium, then user gratifications will still be stable and content consumption will still be determining. As a result, gratification will hardly be likely to be related to technological development.

A presumption of ours was that digital technology will not bring any change to consumer motives related to television and therefore gratification structures between the two types of content consumption (respective users of analog and digital technologies) will not differ significantly.

We based our study of this question on Rubin's (1983) scale on the motives of television viewing. We used a simplified, 16-item version of the scale, already tested by Babocsay (2002) and during our second qualitative research phase as well. Scale items and the related usefulness factors are presented in table 5.12.

Statement (indicator)	Usefulness (factor)	Deleted
Watching television means relaxation for me.	relaxation	
Watching television makes me relaxed.	relaxation	
Watching television is a good option if I want some thrilling.	thrill	
Watching television provides excitement.	thrill	
I choose watching television if I want get away from what I am doing	escape	
Watching television makes me to forget about problems	escape	
Watching television entertains me.	entertainment	Х
Watching television makes me happy.	entertainment	
Watching television gives enjoyment.	entertainment	
Watching television provides company	company	
While watching television makes me to feel less lonely	company	
Watching television helps me to pass time.	pass time	
I choose watching television if I just want something to do	pass time	
Watching television helps to learn about life	learning	
I choose watching television if I want to learn today's news	learning	X
I choose watching television if I want to learn how to handle my problems	learning	

Table 5.12. Gratification scales and factors. Source: own analysis

The preliminary factor structure was finalized following a confirmative factor analysis. The analysis was carried out using AMOS 18.0 software. We received a good fit of the model in our preliminary study where all indicators were included. However when reviewing the modification indexes and factor scores we decided to remove two indicators from the main study (see Table 5.12.). In the end, thanks to the latter simplification, two indicators lead to represent each each factor thus leading to a balanced factor structure. At the same time, the goodness of fit of the model improved considerably when, based on the modification indexes, a route between two error elements was added. No further modification was made to the factor structure as a minimum of two indicators are required to represent a latent variable and according to the R² indexes, the explanatory power of the two related latent variables is satisfactory (0.41 and 0.49 respectively) (see Figure 5.6.). The main indicators of fit of the final confirmatory factor analysis were as follows: Chi square = 130.46; df=55; GFI=0.96; AGFI = 0.93; NFI=0.96; TLI=0.96; IFI=0.98; CFI=0.98; RMSEA=0.52; Holter indexes: 281 and 315.

Figure 5.6. Final gratification factor structure and standardized factor scores according to CFA. Source: own figure



Following this, along the above factor structure, from the indicator pairs we elaborated the variables measuring gratifications by calculating their means. Then we compared these between respondents in possession of a digital subscription and respondents with only an analog access to television. Respondent having access to both digital and analog technologies were categorized as digital subscribers with the assumption that digital technology (provided that in every case, it is related to a paid-for access) was their primary method of content reception. Thus in our sample, 303 digital subscribers and 178 analog (or unpaid-for) viewers were identified along with 19 "don't know" answers. We decided to carry out a Welch's d-test (Vargha, 2000) for several reasons. First, the two subsamples have a considerable difference in terms of sample size. Second, the Levene's Test for Homogeneity of Variance indicated that homoscedasticity is absent in the case of one gratification factor (company) while it is a necessary condition for running the F-test, which is more robust and less sensitive to the absence of homogeneity of variances (Sajtos – Mitev, 2007:166-167). Following this, we took a random subsample of the total sample of 303 digital subscribers in order to perform n ANOVA (with both an F-test and a Welch's d-test) on this latter and the original sample of 178 analog subsample. As expected, we found no significant difference, neither by comparing the variances of the full subsamples with robust tests nor by comparing that of equal-size subsamples. We could not identify any significant difference between the two groups, p>0.135 in each case. Therefore our hypothesis H_0 , i.e. that the gratifications for the two groups of television viewers are different, can be rejected. Thus our hypothesis that the arrival of digital technology in broadcasting and into households does not affect the structure of viewer usefulness is confirmed. Therefore we can affirm that there is no difference in the usefulness and gratifications of television consumption in the sample of 18-69 year-old internet users having access to either digital or analog television. (See last Appendix for the tables of the statistical analyses).

5.7.6. CHARACTERISTICS AND IDENTIFICATION OF DVR-USER SUBSAMPLE

Based on the lead user interviews (2nd qualitative phase) we aimed to identify an audience open to digital video recorder technology who are at the same time heavy television content consumers. However the professional interviews could not identify the characteristics of digital video recorder users based on demographic approach. To identify the characteristics of digital video recorder owners we made binominal logistic regression. Our goal was to examine the demographic and technology profile of digital

video recorder owners, to check whether we can forecast the DVR ownership based on these classical segmentation data. If yes than we can provide a well identifiable and targetable audience for the service and technology providers.

As the model estimation based on the whole sample was not good we made the analysis for the digital television subsample as well in order to have a better regression model. Because of the number of estimated parameters we analysed separately the demographic and technology characteristics. We used Enter method in order to be able analyse the independent variables together based on their collective effect. The results of the logistic regression test are summarized in Table 5.13.

In case of binominal logistic regression the recommended sample size is 400 and at least 10 times higher than the number of estimated coefficients. (Hosmer and Lemeshow, 2000, p. 247.; Hair et al., 2010, p. 330.). Our sample size of 500 aloowed us the accurate use of logistic regression up to 50 paramters, but as the DVR owners in our sample counted 76 we did not increased the number of estimation parameters up to the theoretical maximum. After condering the methodological literatures (Malhotra, with cooperation of Simon, 2008; Sajtos and Mitev, 2007; Hair et al. 2010; Hosmer and Lemeshow, 2000; Székelyi and Barna, 2004) we accepted the DVR owners non-owners ratio of 76: 424 meaning 1:5 ratio. When taking the digital television subscribers subsample thant the DVR owner non-owner ration changed to 76:227 meaning 1:3 ratio. As the number of estimated parameters had to be limited we examined separately the demographic and technology profiles on the two samples (total and digital tv subscribers). At the demographic data after doing crosstable analysis and Chi square test we contracted some low subsample variables (eg.: children in the family from 3 different age group children). For technology profile development we used the 8th question of our questionnaire whether household disposes the technology or not. When testing the fit and significance of our logistic regression we used Cox & Snell¹⁹, Nagelkerke coefficients, Hosmer –Lemeshow test²⁰ and the goodness of model estimation which is summarized in Table 5.13.

¹⁹ Cox & Snell index value can be hardly interpeted as it never reaches the maximal 1 value, and it is difficult to compare. Nagelkerke is providing the previous index projected on the maximal value of the model, so it is really between 0-1 and it is easier to interpret (Székelyi and Barna, 2004, p. 391.).

²⁰ Hosmer Lemeshow test is testing the model fit, where H_0 hypothesis is that there is a significant difference between the real and expected values, meaning that in case of significance the fit of the model is not acceptable (Hair et al., 2010, 336. old).

Independent variables	Sample	Model signf. (Chi2 szign.)	Cox & Snell R ²	Nagel- kerke R ²	Hosmer Lemeshow (signf.)	Est. goodness (%)***	Significant independent variables
Demographic	Total	0,451	0,056	0,097	0,82	84,8 (1,4) vs. 84,8	no children (p=0,07; B = 24,163) 18-29 years (p=0,08; B=2,730) Budapest (p=0,09; B=2,905)
characterstics*	Digital subscri bers	0,08	0,12	0,183	0,07	77,7 (9,3) vs. 77,6	18-29 years (p=0,07; B=3,608) 40-49 years (p=0,06; B=3,142) Budapest (p=0,01; B=3,557)
Technology background**	Total	0,005	0,072	0,126	0,05	85,4 (5,5) vs. 84,8	having VCR (p=0,03; B=2,539) having Smartphone (p=0,09; B= 0,593)
	Digital subscri bers	0,014	0,105	0,161	0,06	79,2 (15,4) vs,77,6	having VCR (p=0,01; B=2,498)

Table 5.13. Binominal	logistic	regression re	esults summary	Source:	own research	n
				,		

*(gender, age, settlement, education, children, family status, size of the household, income) **(number of TV sets, VCR, DVD, smart phone, mobilephone, PC, Laptop/notebook)

*** first number shows the goodness of model estimation, in paranthesis the identified percentage of DVR owners; vs initial percentage of owner non-owner share

The only acceptable regression model was the one among digital subscribers based on technology ownership, but only one independent variable had significant effect, the ownership of previous analogue recorder technology, video cassette recorder (VCR). We could not identify demographic or a clear technology profile of DVR owners. So we suggest to use VCR ownership as orientation for sales purposes, but we have to discover other motivational, attitude or personality based characteristics of DVR owners and users.

5.7.7. ANALYSIS OF THE OPEN-ENDED QUESTION ON DVR

The last question of our survey was an open-ended one. In this we asked respondents to add any additional comment they might have on DVR. With 53 received responses, more than 10 per cent of the 500 respondents completed this question.

We analyzed these responses in connection with respondents' potential relationship to the technology (whether they were positive or negative), with special regard to all responses with a negative tone. By doing this we seeked to gather further information on additional elements preventing the diffusion of this technology. After reading the given responses we endeavoured to identify and group relevant preventing factors. At the same time we also paid special attention to responses mentioning any lack related to the technology.

In 34 among the 53 responses respondents had a positive opinion about DVR technology, estimated that it was a positive technological advance and would suggest it to all those that like consuming televisual content. Several of them declared wishing to use the technology or having someone in their environment who already does. Among those positive respondent who also declared an intention to use, the availability of the service, its price and the lack of spare time were the preventing factors to the actual use. The most frequently appearing preventing factor was price (with 9 respondents mentioning it). 4 respondends identified the lack of time as the main reason for their limited consumption of content and not adopting the technology of which though, they had a positive opinion.

"It would be nice if it were more affordable and with a comprehensible users' manual"

"It's nice because if something important comes up, a guest, a family member or something else, I can do that and later watch the show I had to leave"

"I wanted it for a long time but where we live they can't provide a set-top-box and they can't even tell when it's going to be available"

"My sibling has one. They use it every day."

"I'd buy one if I had enough money."

"I'd like to know it better. I hope some time later I will manage to."

"I can zap all the ads. It's very useful and spares me a lot of time."

"I'd love to use it if I had a compatible TV set + a DVR device! I can't afford it as a teacher. I think that the device is brilliant though!"

"I spend my little spare time with something else than watching TV. To my current viewing habits, the equipment I have is enough, I don't aim any higher, I don't watch series. Although as a child I'd have been crazy for it."

We also received 9 responses with a negative attitude towards the technology. This negative attitude stemmed mainly from the attitude towards the base medium, that is, users considered television viewing expendable and of no social usefulness. Thus here we can see that the acceptance of a technology, the attitude towards it is highly influenced by the perception of the related base medium. Besides these, respondents also expressed worries about the complexity to use the technology.

"It is appalling that development called forth +1 energy waster with +1 remote control" "It's absolutely unnecessary, this device is only good to reinforce people becoming more and more estranged from each other. They'll spend more and more time in front of electronics and less and less time with people of their surroundings (family, friends)."

"We have a cable subscription, but as it's a new technology, there are many problems with it. A lot of years will have to pass for it to be perfect." "Though I know how to use it, it doesn't take me long to learn to use it, but that I should occupy myself with having to use this when watching a movie? No, thanks. I already have enough buttons and functions."

We received six responses that express indifference towards the technology, although there is no indication to whether the technology in itself is indifferent to these respondents or whether it is watching television as such. In any case, a fundamental reluctance and critical approach towards technological advances are apparent as obstructing factors.

"I think that we don't need to mystify no so-called modern devices. E.g. the digital video recorder."

"I doesn't preoccupy me. I can do without it." "It's good to see the world and technology progress. But it doesn't interest me."

In the case of positive answers, 17 respondents have expressed missing something from DVR as a technology or as a service. These pieces of information might be important indicators for broadcasters as they show concerns and explicitly expressed needs by a group of more open-minden consumers, already users, adopters of the technology. Service providers thus can use this intelligence in order to extend consumer satisfaction or to attract additional subscribers.

"It would be nice if it were more affordable and with a comprehensible users' manual" "I thought to myself, let's have a digital video recorder. But as no could do to connect it with my PC, I no longer wanted it. As I only watch the news and Formula 1 races in TV, I wanted

to record then edit these races to later burn them onto a DVD. But unfortunately it's impossible."

"I'd be glad if I could record several programs parallelly with it. They also should indicate the amound of storage space left on the device."

"It's a pity that one can only review a recorded content instead of being able to save it to a DVD for example."

"Though I know how to use it, it doesn't take me long to learn to use it, but that I should occupy myself with having to use this when watching a movie? No, thanks. I already have enough buttons and functions."

"I had one, and I though it was very useful. Only we had a bandwidth problem because when I was surfing on the internet and watch TV parallelly, the image became pixelated."

"Providers need to have more effective adverts for promoting it."

"Until now we haven't managed to recond any movie we wanted."

"At the moment I don't have a digital video recorder because I think one can record too few content onto the device we can get with the digital satellite subscription. The 3 hours of recording offered by T-home is too few."

"A digital recorder would have any sense if there were some interesting content on tv that I'd want to watch more than once."

"I miss that it doesn't select ads automatically when recording"

The possibility of external storage is a consumer need that surfaced. Education related to the technology also still seems an important issue even though, as we saw beforehand, providers have been advertising their digital service with this functionality for years. The lack of content also appeared: if viewers judge that content in television is not worth recording then digital video recording as a technology will not have any consumer value either.

5.7.8. SUMMARY AND CONCLUSION OF THE HYPOTHESES AND MODEL TEST

The previous research phase provided a well grounded background for our analysis of the conceptual model and hypothesises. We accepted our structural model with acceptable model fit providing an explanation of 80 percent of the variance. We were able to prove due to the model test results to relate the technology acceptance model and gratification theory in case of media technology innovation acceptance. Table 5.14. summarizes the results of hypothesis test, where we rejected one (H3c) while the other hypothesis were accepted as being significant.

Table 5.14. The hypothesises	of the dissertation	and the results	of hypothesis test.	Source:
own research				

Hypothesis	Acceptance
H1a: Television affinity will positively affect the perceived usefulness of	Accortad
the digital video recorder.	Accepted
H1b: Perceived social usefulness of television will positively affect the	Accepted
perceived usefulness of the digital video recorder.	-
H1c: Perceived entertainment usefulness of television will positively affect	Accepted
the perceived usefulness of the digital video recorder.	
H2a: Technology self-efficacy will positively affect the perceived ease of	Accepted
use of the digital video recorder.	
H2b: Technology anxiety will negatively affect the perceived ease of use	Accepted
of the digital video recorder.	*
H3a: Perceived ease of use of the digital video recorder will positively	Accepted
affect the perceived usefulness of the digital video recorder.	
H3b: Perceived ease of use of the digital video recorder will positively	Accepted
affect the perceived enjoyment of the digital video recorder.	-
H3c: Perceived ease of use of the digital video recorder will positively	Pofusad
affect the behavioural intention to use of the digital video recorder.	Keluseu
H4: Perceived usefulness of digital video recorder will positively affect the	Accepted
behavioural intention to use of the digital video recorder.	
H5: Perceived enjoyment of digital video recorder will positively affect the	Accepted
behavioural intention to use of the digital video recorder.	Ĩ
H6*: The television viewing motivations and gained gratifications are	Accepted
defined mainly by the content and not by the technology, so that there is no	
difference between the television gratifications of digital subscribers and	
analogue subscribers.	

*H6 hypothesis was tested separately from our model.

We found significant but low indirect effect between technology self-efficacy, and perceived usefulness, and perceived enjoyment. The highes indirect effect was identified between perceived ease of use and behavioural intention to use, meaning that the effect of perceived ease of use towards behavioural intention to use mediated by perceived usefulness and perceived enjoyment. Television affinity, perceived social usefulness and perceived entertainment usefulness had significant indirect effect on behavioural intention to us through perceived usefulness.

We could not identify specific demographic characteristics of DVR owners, same was found in case of technology profile of them. The general market segmentation criteria are not valid. Our recommendation is that we can use VCR ownership as orientation towards potencial DVR buying however we should use different motivations, attitudes, personal characteristics based exploration to identify the specifics of DVR owners.

When discovering the **embarrassing factors** of DVR technology acceptance, we found that the **negative attitude towards the context medium**, television as clear barrier. The **complexity of the technology** or the difficulty of usage also appeared as embarrassing influencers. A clear need could be identified to be able to **record on separate data medium**. Also the knowledge sharing about the technology is still important. The **negative influencing role of lack of good television content** came out of the research, if there is no interesting content in the television than the new DVR technology is not valuable for the viewers.

6. DISCUSSION

6.1. RESEARCH RESULTS OF THE DISSERTATION, MAIN CONCLUSIONS

The dissertation's starting point was an aim to understand the acceptance of media technology innovations. To our study, we chose the context of television viewing as a typically passive experience and the arrival of related digital technologies, and particularly that of digital video recording. A focus on DVR was justified by the results of our first and second research phases and the fact that the use of this technology intrinsically brings about a change in users' viewing behavior.

Based on our theoretical background, our aim is to formulate and carry out a first test of a widely usable model focusing on media technology acceptance, i.e. a Media Technology Acceptance Model (MTAM). Our goal is to connect technology acceptance and usage theory with media usage and choice theories. Indeed, in a consumers (here: viewers) point of view, the aspects of content consumption, the demand satisfying role of the medium per se and related innovation acceptance and use cannot be treated separately. Therefore in the context of our study it is of major importance to identify the determining factors and design the corresponding independent variables to a technology acceptance model specific to media technology innovations. We therefore believe that the technology acceptance model can be applied to media technologies with the integration of gratification theory and with regard to innovation diffusion theory. Even though our approach stands upon several theoretical pillars and therefore is slightly complex, it follows an approach proposed by Wirth et al. (2008) according to which the deeper understanding of communications and media technologies indeed requires multiple theoretical approaches. In our research we focus on individual acceptance and therefore chose individuals as our unit of observation

The research design we employed throughout the dissertation uses a mixedmethod approach. We thus endeavored to give a comprehensive answer to the posed research questions through multiple approaches and on several levels of analysis with an iterative approach of subsequent qualitative and quantitative research phases, using both online and offline data collection methods. We aimed to answer the research questions both from a quantitative and a qualitative aspect. Table 6.1 gives a summary of the connection between our research questions and each research phase.

Research questions and subquestions	Related
	research phases
What are the influencing factors of the acceptance of media	1st, 2nd, 3rd qual.
technology innovations related to mass media, meaning television	and quant. phases.
related technology innovations in our research?	Chiefly: 3rd quant.
	phase.
- Does the role and place of television as a medium change	2nd qual. and 3ed
through digital technologies?	quant. phase
- Who are the lead users of the digital video recorder? How	3rd quant. and 2nd,
can they be described, what attributes do they have	3rd qual. phases
concerning the possession of other technological devices,	
their innovation orientation and demographic variables?	
- Which are the factors preventing the diffusion of digital	2nd and 3rd qual.
video recorders?	and 3rd quant.
	phases

Table 6.1. Research ques	tions and research	n phases. Sou	irce: own table
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Our mixed-method data collection was built up of three qualitative and three quantitative phases. Each phase was subsequent to the preceding phase and used the findings of all previous phases in order to give a deeper insight into the research problem, to identify the relevant, concrete technology to be analyzed and in order to identify the relation of consumerts, viewers to the given technology. Table 6.2 gives a summary of the results ad conclusions of our research phases preparing the test of our research model.

Table 6.2. Research phases and main conclusions. Source: own research

Research phase	Main conclusions
1. Qualitative and	- Positive consumer evaluation of digital television, appealing
quantitative phase	technology: A relevant focus for research in a consumer perspective
	- Most attractive element of the studied innovation: functions offered by
	digital video recorders: DVR ought to be put into the focus of a study on
	digital television technology.
	- DVR users record programs more frequently. A changing consumption
	pattern of media content appears.
	- Ad zapping not a decisive motive of use for the technological
	innovation. At the same time it is a popular function and carries added
	value for the technology. Thus ad zapping as a manifestation of ad
	avoidance is an additional value, it is not determining in technology
	usage.
	- Motives of use of analog and digital video recorder are very similar. At
	the same time the use of new technology shows systematic change in
	television consumption.
2. Qualitative	- DVR as technological innovation appears in everyday discussions,
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phase – user	carries enough importance to talk of it to acquaintances.
interviews	- DVR users are active technology users, are innovation-oriented.
	Overall, internet is more important to them than television, although
	television is important for spare time, enjoyment and collective
	gratifications.
	- DVR is unequivocally the most useful and most used functionality
	related to users' digital television subscription.
	- DVR became part of their lives and part of their daily television
	viewing behavior, routine.
	- Elements of technology acceptance model are valid and relevant for the
	study of DVR.
2. Qualitative	- Relation to television and television consumption unequivocally
phase – focus	determine openness towards and appreciation of innovations in the
groups with	related technologies.
rejecters	- For this group also functionalities related to DVR are most attractive of
	digital television.
	- Rejecters of television also are active video content consumers on other
	platforms. DVR technology succeeded in attracting one participant in
	Flamente of technology accentence model are relevant although
	- Elements of technology acceptance model are relevant, although
	relation to the base medium
2 Quantitativa	The nilet study confirmed content validity, no negative feedback
2. Quantitative	- The phot study commined content validity, no negative recuback
study for test of	Chronbach's alpha coefficient calculated to assess scale reliability
scales and of	- Chronoach's applia coefficient carculated to assess scale reliability. Ouestionnaire items showed a high level of reliability (71 - 97)
questionnaire	- Question on importance does not carry any additional relevant
questionnane	information beside items of gratification scale, the use of the latter thus
	discontinued
	- We altered our set of questions on gratification from multiple-choice
	questions between different types of media to 7-point Likert scales
	focusing solely on television, in order for its media specific gratification
	to be studied and to be included into our research model.
3. Qualitative	- Expert interviews confirmed own studies' results and: DVR is the most
phase – expert	valued and used function of digital television technology. It is easy and
interviews	quick to learn and users consider it especially useful. Expert interviews
	thus validated our research models' main dimenstions and our
	conclusions.
	- Ca. 180 to 200,000 Hungarian households have access to the
	technology at the moment and further and stable market development is
	expected. For operators, DVR as a potential source of income from
	expected. For operators, DVR as a potential source of income from consumers and opening to advertising market.
	expected. For operators, DVR as a potential source of income from consumers and opening to advertising market.At the same time no specific demographic character, attribute, user
	expected. For operators, DVR as a potential source of income from consumers and opening to advertising market.At the same time no specific demographic character, attribute, user segment can be identified. Therefore integrating demographic attributes

- Structural model accepted thanks to goodness of fit and explanatory				
power of 80%. Hypotheses confirmed (with one exception) with				
significant relationships.				
- No significant difference found between gratifications of analog ar				
digital television viewers.				
- DVR owners could not be identified based on demographic				
characteristics and technology profile. It means that classical				
segmentation criteria are not valid anymore in case of media technology				
innovations.				
- Factors preventing the acceptance of DVR: viewers turning away from				
television, user concern about new technology, (un)availability of				
service, price, lack of free time. A lack of possibility to save recorded				
content onto an external memory device, that of further education				
possibilities and the lack of existence of suitable content were identified				
as additional defects.				

Blue is indicating the qualitative, red is indicating the quantitative phases.

Next we present our results in the context of our research model (5.3. Figure, p.90.) and we link the results to the previous literature.

Anwering **our main research question** our results confirmed that viewers' attitude towards the medium has a determining effect on the perceived usefulness of the technology. Therefore we suggest to extent the technology acceptance model with this attitude as an individual factor in the context of media technologies. A main conclusion of the research phases preceding the test of our model was that **the integration of this relation into our model is justified.** We confirmed this extension during the test of our model on a large sample query. Our results confirmed that the technology acceptance model was indeed a useable and useful theoretical framework in explaining consumer intention to use DVR devices.

Results confirm the relevance of joining uses and gratification theory with the technology acceptance model. Social and entertainment usefulness determining perceived usefulness were identified as significant explanatory variables using a classic gratification scale. Thus our results confirm those of preceding studies in the field (Zhang – Mao, 2008; Ha – Yook, 2009; Jung et al., 2009). An important result of our research is the test and confirmation of the relevance of the original uses and gratifications variables, which were tested and validated several times in other fields of research, whereas in the case of both television and other media types researchers until now mostly used own or edited scales.

Our study, in accordance with previous research results (Fenech, 1998; Venkatesh, 2000; Hong et al., 2002; Venkatesh – Bala, 2008; Purkhayasta, 2009; Zhang – Mao,

2008) confirmed that individuals' **self-efficacy** on how they are able to use a given technology does influence the perceived ease of use of technology. Thus we can say that the more individuals feel capable of using a given media technology, the more they perceive it easy to use. Apart from Zhang and Mao (2008), no known research has been conducted on this relationship in the case of media technologies, even though it may have an effect on technology acceptance, **irrespective of the goal of usage (work or entertainment)**. Therefore an important result of our study is to confirm the significant role of individual variables in the study of complex situations of technology acceptance.

Technological anxiety does reflect individuals' attitudes in which our results tally with the results of other studies in the field (Venkatesh, 2000; Venkatesh – Bala, 2008), all of which found a significant negative relationship. Thus the higher an individual's anxiety from a technology i.e. the more they dread using a new technology, the less they perceive it easy to use. As the relationship between technological anxiety and perceived ease of use has not yet been studied in the context of communications and media technologies, our results give an important indication as to the future use of these variables.

As a conclusion, our research model included five individual attributes, all of which turned out to be relevant. Results show that those people who are more attracted to television and lend a greater social and entertainment usefulness to this medium also found more useful a related technological innovation (DVR). Just like individual gratification attributes, the intrinsic ability (self efficacy) and emotional attachment (technological anxiety) both related to technology usage had a considerable effect on user perception of the given technological innovation.

All but one of our hypotheses related to the technology acceptance model's fundaments were supported. We verified (in concordance with international academic literature) that the more individuals find a media technology enjoyable, the more it is likely that they will eventually use it in the future and therefore the more likely technology acceptance will arise. We also verified that the more users consider the given technology easy to use, the more useful and enjoyable they will find it.

Thus our results confirm that perceived ease of use has a positive effect on perceived usefullness, as proposed by other studies in the fields of work-related technologies (Davis, 1989; Davis et al., 1989; Szajna, 1996; Venkatesh, 2000; Venkatesh

– Bala, 2008), communications and media technologies (Van der Heijden, 2004; Bruner – Kumar, 2005; Porter – Donthue, 2006; Wang et al., 2008; Kwong – Park, 2008; Stern et al., 2008; Lee – Chang, 2011) and specifically in the context of television (Choi, 2009; Jung et al., 2009). We propose, according to our findings and the remaining theoretical background, to integrate perceived ease of use into a media technology acceptance model.

The relationship between ease of use and perceived enjoyment has only been studied twice in the context of the technology acceptance model applied for entertainment technologies (Van der Heijden, 2004; Bruner – Kumar, 2005). These studies identified a positive significant relationship between the two variables, just like our study. Even though few other studies verified the relationship between ease of use and perceived enjoyment, based on our results, we believe it important to employ perceived enjoyment in a model focusing on media technology acceptance.

Our study did not verify a positive effect of perceived ease of use on the behavioral behavioral intentition to use. This confirms the results of previous studies which included perceived enjoyment in their model as well (Lee – Chang, 2011; Koufaris, 2002; Bruner – Kumar, 2005). Even though relating theory, as well as the results of our previous research phases emphasize the role of the ease of use, we were unable to find any study on technology acceptance in the context of television where perceived enjoyment was included in the theoretical model. Therefore we suggest a further testing of this relationship, even more that for example, Van der Heijden (2004) in his study found a significant effect.

Nevertheless, according to our literature review and own research, perceived usefulness and perceived enjoyment seem to be the two determining factors as for the future intention to use a media technology, and these two factors moderate the effect of perceived ease of use as well. The positive effect of perceived usefulness fits perfectly into the literature on technology acceptance, as it is a determining element of the original model (Davis, 1989) as shown by the meta analyses (Legris et al., 2003; Schepers – Wetzel, 2007) and communications and media technology articles (Wang et al., 2008; Zhang – Mao, 2008; Jung et al., 2009; Ha – Yook, 2009; Lee – Chang, 2011; Van der Heijden, 2004).

Van der Heijden (2004) in his study of hedonic information systems observed a strong positive relationship between perceived enjoyment and behavioral intentition to use, and a stronger relationship for entertainment technologies than other studies for an online environment (Hsu - Lin, 2008; Ha - Shoe, 2009; Lee - Chang, 2011). In our study, the relationship between perceived enjoyment and the behavioral intentition to use was positive, although this effect was lesser than that of perceived usefulness (.17 vs. .82, respectively). As the effect of perceived enjoyment on technology acceptance has not yet been studied in the context of technologies related to television, this relationship accounts for an important added value of our research. When comparing perceived enjoyment for an online environment and for a television environment, a conclusion for developing a media technology acceptance model is that perceived enjoyment by all means has a role in technology acceptance and has an effect on the future behavioral intentition to use. The strength of this effect however varies according to the type of medium and the given content. Therefore we believe that perceived usefulness and perceived enjoyment appear to be the two most determining factors in a technology acceptance model for media technologies. Along the varying type of media and content, the explanatory power of each diminishes at the expense of the other, i.e. when perceived enjoyment has a greater role, the sole usefulness diminishes, and vice versa.

6.1.2. SUMMAR OF THE RESULTS RELATED TO THE RESEARCH SUBQUESTIONS

Answering our first research subquestion (whether the television gratifications change due to the technology change) we used our first quantitative and second qualitative research phases and third quantitative phase. This hypothesis related to our subquestions was confirmed, **as no significant difference could be observed between gratifications of analog viewers and digital subscribers**. It seems that earlier gratification studies (Rubin, 1983; Katz et al., 1973; Haridakis – Whitmore, 2006) still depict well the individual utilities of television as a medium. Besides this, however, there is a constant search for identifying and studying gratifications offered by new media and a changing media landscape (see e.g. television: Lin, 1993; Shao, 2009; advertisements: O'Donohoe, 1994; internet usage: Ko et al., 2005; social networks: Urista et al., 2009; Raacke – Bonds-Raacke, 2008; MP3 players: Zeng, 2011; e-books: Shin, 2011).

As for the second subquestion we examined the charactristics of DVR-users during both qualitative (second and third qualitative phases) and a descriptive analysis (first and third qualitative research phases). No particular demographic feature, attribute, user segment could be identified as idiosyncratic to DVR-users. We can conclude that that classical market research based segmentatni attributes are not valid anymore in case of media technology innovation. According to our research however, there seems to exist a niche of viewers receptive to this technology, even though they ought to be identified and distinguished from the overall population along other psychographic and reception attributes (e.g. conscious, planned consumption, selective and targeted content consumption, good time management). The identification of these attributes requires further studies.

The third subquestion focused on factors preventing the diffusion of digital video recorders. The second qualitative and third quantitative phases were meant to provide an answer to this question. Our results lead to two main conclusions. First, it is necessary to include the study and effects of preventing factors into technology acceptance and diffusion in order to be able to analyze preventing and facilitating effects in a complex and comprehensive environment of the given technology. Second, in case of a media technology innovation, one ought to investigate this issue on two separate levels of **analysis.** First, one needs to assess acceptance with regard to the actual use of the given technology, focusing on the aspect of internalization in terms of technology and content related to the given medium. Second, on a broader level, one often ought to assess a marketing-driven acceptance related to the innovation as a provided service and as such, investigate the purchase itself and the factors influencing consumer behavior. Baaren et al. (2009; 2011) in their study on HDTV acceptance propose an alternative approach to technology acceptance model addressing the issue of a required two-level analysis. We must outline though that the explanatory power of this dual approach is beneath that of the original TAM model. Thus we propose a further refining of the dual approach for a media technology acceptance model (MTAM) until user acceptance (individual user level) be satisfactorily explained.

6.1.3 CONCLUSIONS FOR DIFFUSION OF MEDIA TECHNOLOGY INNOVATIONS

Our research focused on a micro-level individual acceptance behavior. However, as a result of our wide-range data collection we can comment on innovation diffusion literature. As Mahajan et al. (2010) in their theoretical article on innovation diffusion suggest, it is important that researchers assess a macro-level study of innovation diffusion following an understanding of factors of individual acceptance. In our sample, 15.6 per cent of respondents owned a digital video recorder which is comparable to the official data of a 13 per cent penetration rate and 9 per cent desirous of a DVR device (Médiainfo, 2010). In an open-ended question of our survey, 7 per cent of respondents had a positive

self-declared impression of DVR technology. In case this 7 to 9 per cent of the population join the existing 13 to 15 per cent of DVR-owners, the technology would reach a 22 to 23 per cent penetration rate in 2012 (counting with a 1 to 2 year-long compulsory contract period) in Hungary. With this ratio, according to innovation diffusion theory (Rogers, 2003; Mahajan et al., 1990a), DVR technology in Hungary is already over the phase of innovation and within one to two years it will have quit the current phase of early adoption for that of early majority. According to our expert interviews, the two service providers had positive expectations and considered digital subscriptions as well as DVR as important and potentially determining pillars. This seems to be reflected by these providers' advertising campaigns where they use a presentation of DVR's advantages and possibilities in order to promote their subscriptions to digital television. Parallel to this, an expansion of manufacturing capacities can be expected with subsequently falling historical costs which might lead to an additional decrease in end-user prices or eventually to this additional service offered becoming free (all the more that a monthly fee of 1000 HUF [ca. 4 EUR] is already a relatively low additional cost within a user's subscription). Therefore we can say that actors engaging in change as well as communications channels (Rogers, 2003), decisions on a marketing-mix level and competition (Gatignon – Robertson, 1985) are all likely to support the diffusion of DVR.

As asserted before, according to Christensen's (1997) criteria, we do not consider DVR a disruptive technology. At the same time we believe that in this case too a supplyside assistance of technology diffusion is more likely to be identified, which according to Markides (2006) is characteristic of disruptive technologies. The diffusion of DVR technology both in Hungary and in the world can be characterized by a slow start and a current period of growth which is constant although far from radical – contrarily to the description of the diffusion of communications technologies by Ortt and Shoormans (2004). Von Hippel (1994) suggests a focus on lead users which we followed in our second qualitative and third quantitative research phases. From the results that followed, we believe that a niche segment of users can clearly be identified for whom comfort functions offered by DVR devices are important and to which they are attached to. However we believe that the penetration of this technology will not, or will very slowly reach 100 per cent as a result of the surrounding multimedia environment.

In connection with domestication theory (see, e.g. Haddon, 2006, 2007; Venkatesh – Nicosia, 1997), in our second qualitative and third quantitative research phases and

during our in-depth interviews with lead users (where we asked them to sketch up the room of their residence where their DVR was located) we studied the technological environment of DVR-owners. According to the results of this research, we can say that DVR-user households are more likely to possess fewer television sets (1 or 2) and the DVR device is connected to the household's main television set. According to in-depth interviews with lead users, the main television set occupies a traditional space within the households as it is to be found in a central space in the living room and often with direct view to other spaces (kitchen, corridor). Interviewed users, who were, according to the above, innovators and early adopters, were living in households equally well equipped with additional media and communications technologies (mobile phone, smart phone, laptop, PC) and they also were active users of these technologies. Even though they were in possession of a DVR and were active users of the device, they characteristically declared being active video content consumers upon other platforms (mainly PC and laptop) as well, and also consumed typical televisual content on these.

6.2. THEORETICAL AND PRACTICAL SIGNIFICANCE OF THE STUDY

Theoretical significance

Research related to the present dissertation has theoretical added value which contributes to the academic literature. First, we expanded the technology acceptance model to media technologies and inserted individual factors into the model. Technology acceptance model proved to be a suitable framework for the study of consumer behavioral intentition to use related to media technology innovations. In addition, the three individual variables describing gratifications from and attachment to television had significant explanatory power for both direct and indirect effects. Therefore our study shows that it is worthwhile to include further individual-level variables and to identify relevant individual factors among the variables used in all technology acceptance models. Our further investigation verified that television affinity, social and enjoyment usefulness, all based on the classic gratification scales are critical in explaining the adoption of new technologies. Therefore we propose that upcoming studies on media technology acceptance use scales based on gratification theory.

Based on our result we succeeded in establishing the foundations of a media technology acceptance model as our integrative research model connecting the technology acceptance model with the individual variables of gratification theory proved to give a robust explanation of the future behavioral intentition to use of the studied media technology. As general technological readiness and anxiety, the ease of use and the attitude variables on gratification all directly or indirectly (through perceived usefulness and perceived enjoyment) reinforced the explanatory effects describing the behavioral intentition to use, we can affirm that an efficient management and reinforcement of these aspects by service providers will contribute to winning additional subscribers.

Through an accurate and systematic establishment of our research we succeeded in designing an innovation acceptance model relative to media technologies that overcomes the idiosyncratic inseparability of content and technology in the field of media by integrating the individual variables of gratification theory into the technology acceptance model. By doing this we believe that we achieved to design the fundaments of a Media Technology Acceptance Model (MTAM) to be further developed. A general model, to be applicable in each and every segment of the complex media technology environment, has to be further investigated and developed and therefore additional research and testing is required, whereof we will address in the part presenting the directions for further research.

Methodological significance

Our research has a methodological significance as well, as we had recourse to a **mixed-method (hybrid) research model and assessed our research questions through triangulation** which allowed a more complex methodology in the search for patterns in consumption, use and acceptance in a growingly complex media and technology environment. Few academic works on technology acceptance and innovation diffusion have used a mixed-method approach or data and/or methodological triangulation (e.g.: Greenhalgh et al., 2008). This is not surprising to the effect that a mixed-method design characteristically requires a longer period of research and more resources contrary to a purely quantitative or qualitative approach, or an approach with a quantitative dominant that is preceded by one or a few pre-studies, or again a quantitative data collection in multiple waves. Innovation diffusion and acceptance research is mainly quantitatively oriented (see Mahajan – Peterson, 1985; and own literature review on technology acceptance model), therefore and in the lack of comprehensive qualitative phases, an abundance of intelligence is lost that could assure a deeper understanding, a refining of the topic or assist in an subsequent validation of results. In our dissertation we structured

the presentation of our findings following the set-up of our subsequent research phases, as suggested by Sandelowsky (2003) for mixed-method, sequential research designs with a quantitative dominant. At the same time in our conclusion we focused on answering our research questions using the complex set of results of all research phases.

Practical significance

A practical significance of our study is to provide useful information and insights to consider for content and service providers through a deeper insight assured by our mixed-method research design, about factors preventing user acceptance of DVR technology, a deeper understanding of current user groups of this technology as well as for the advertising market through studying the spreading phenomena of time-shifting and subsequent advertisement zapping. Our research confirmed that users are most attired by DVR functionalities among those offered by digital television technology as a whole (first quantitative and second and third qualitative research phases). We also confirmed that DVR technology is still in a phase of user education. Therefore we suggest to content providers to continue stressing these functionalities (e.g. digital video recorders' ability to easily record, pause or rewind a program) in their advertising efforts, as they have done until now. At the same time it is imperative for service providers to emphasize the simplicity of use of the technology in order to struggle against users' technological anxiety. An additional and potentially rewarding task for providers would be to examine and manage any further elements preventing user acceptance of the technology, e.g. price elasticity of users with an emphasis in their communications on its affordability to everyone, or an emphasis on the flexibility of the service and its adaptability to users' free time. We suggest for providers to consider and propose a solution to users for all the elements that our results show as deficiencies of the current service (e.g. the possibility to record to an external memory device, the availability of the service or the selection of available content). Our study shows that DVR technology is not only attractive to users, it is also a factor of loyalty for a group of consumers. A group of lead users can thus be identified who are attached to this technology and therefore can be of effect on their environment as for the use of the technology. The practical relevance on studying this particular area is affirmed by the fact that sectoral studies and trend analyses already include DVR and time-shifting (Nielsen, 2009; Braun, 2010; Mediainfo, 2010). According to the latest available data from Nielsen (2011), 38 per cent of US households already own a DVR and the amount of viewing time spent on watching time-shifted content grew 17.9 per cent in the third, 13.4 per cent in the fourth quarter of 2010 (compared to the same period of 2009) to reach 10.5 hours a week.

6.3. LIMITATIONS OF THE STUDY

Limitations of a study should be assessed through its reliability, validity and generalizability (Churchill, 1979). Regarding reliability and validity we introduced the test and results at the different research phases and we can say that our research has met the reqirements.

From generalizability point of view a limitation of our pilot study as well as that of our in-depth interviews is them focusing on attitudes and perceptions of digital television of only a limited age group, that of the 15 to 39 year-olds. Therefore a further qualitative research for insights could be conducted by including a wider age group in order to analyze whether there is a difference for the 40+ age group, whether they have a different judgment of digital television as a media technology innovation or whether there is a determining factor in the acceptance of technological innovations in this group that we were unable to identify among the 15-39 age group. At the same time we can affirm that during the test of our research model (third qualitative phase), both reliability and validity were assessed (see Chapter 5.7.4) and data collection was assisted with a quantitative pilot study (see Chapter 5.5) while the main data collection was conducted on a representative sample of the 18-69 year-old population by the basic demographic variables and therefore the result thereof are generalizable.

A limitation of our research is that it only examines one given medium (television) in the context of a very new technology (DVR) as an innovation. In order to develop a general model applicable to all media technologies it would be worthwhile to conduct further research examining the evolution of social usefulness, enjoyment usefulness in the context of other types of media. It is likely for example that in the case of mobile phones or social media sites the role of social usefulness will be considerably more important while in the case of innovations related to content consumption, enjoyment usefulness will be more determining. At the same time it would be worthwhile designing a general affinity scale as the one employed in our study only stands for television and was designed in the golden age of television. Therefore it is questionable whether statements denoting extreme attachment are applicable in a current multimedia and multiple-choice environment.

In a methodological point of view, research in similar technology acceptance scenarios raise the possibility to design a study following users in their actual viewing environment or to conduct an experiment instead of the video stimuli used in the present study where respondent could only watch a video about the technology without actually being able to try it out. The first option would involve a complicated longitudinal study where several data collection phases would have to be conducted in order to study current non-users who subsequently would purchase and use the technology. This methodology can be employed in cases where the technology examined can be related to a distinct group of users. This is the case for example with the study of computer use at workspaces, that of telephone exchanges or healthcare technologies, where the group of actual non-users are available at the given workspaces which are about to introduce a new technology and therefore can be interviewed or observed before using the technology, during the training phase and following a longer period of usage (e.g. Venkatesh, 2000; Venkatesh – Bala, 2008). At the same time this kind of tracking is difficult in an end-user situation as potential adopters would have to be identified prior to the adoption of the given technology and tracked longitudinally with several queries in their households or online. Therefore in similar situations, conducting experiments would be a compromise where data collection can be carried out on subjects before the tryout of the technology (non-user), after an initial training (fresh adopter) and following a 30 to 60-minute usage (user). In our case, our financial limitations did not allow to conduct an experiment jointly with a quantitative survey on a demographically representative sample of at least 500 participants. Even though a similar experiment would have had the added value to complete our research of individual acceptance by the factor of trial, as suggested by Rogers (2003), we believe that video stimuli were an appropriate compromise in the case of a technology like the digital video recorder with a relative ease of use.

In the design of the variables of structural models Hair et al. (2010) warn that even though a facilitated measurability of the included variables and thus the use of few scale items is more likely to supply more robust results, latent variables can be assessed more thoroughly through employing multiple-item scales. Therefore one has to consider whether in the given variable structure an extension of the measurement scale would be relevant. It is important to point out that our model fills the minimum requirement of two items for each studied latent variable. At the same time widely tested and validated scales were used. Our research model has a quite strong explanatory power ($R^2 = .80$) even though there can exist additional dimensions that have been missed out from the model. An indication to this for example might be the relatively low explanatory power of perceived enjoyment ($R^2 = .19$). The question is whether the relationships observed in our original model would stand after including additional variables.

6.4. DIRECTIONS FOR FURTHER RESEARCH

A possible extension of our research would be to expand the number of gratification variables used in our model or to identify additional variables that would improve the goodness of the model and incorporate them into the model. According to our results so far, a potential area of improvement would be to identify and test the independent variables that determine perceived enjoyment. Similar studies do not seem to employ a uniform set of variables either. In connection with the study of DVR's user and television affinity a further examination of the role sex as a dichotomous variable is another potential subject for further research. Indeed, women seemed more affine according to our gratification scales even though based on our qualitative pilot studies we rejected the relevance of this demographic attribute.

In the technology acceptance model, research mainly focuses on factors that support acceptance while the description of preventing factors (e.g. technological anxiety) is rare. In our second qualitative and third quantitative research phase we initiated a research in this direction, gathering insights as to identify factors preventing the diffusion of media technology innovations. We believe that identifying and testing preventing factors is an important direction for future research. In addition we believe that beyond external factors (e.g.: price, coverage), internal factors are to be further considered.

In order to design a model that can predict the acceptance of media technology innovations, it is important to test the relationship between individual factors and technology acceptance in a broader scope than that of television and DVR. Therefore the research model proposed in our dissertation ought to be tested on other existing media types. We believe that through an affinity scale, social and enjoyment usefulness give a valid framework of study for all media technologies and therefore to a general media technology acceptance model. At the same time it is likely that individual gratifications will vary with the given medium (i.e. social usefulness is likely to be stronger for relationship-oriented network media while enjoyment usefulness for media involving content consumption). It is worthwhile to review whether there exist any additional individual variable or usefulness that can be incorporated into the model.

Even though the original television affinity scale showed an outstanding reliability and had a significant explanatory power in our model, the low mean values and low explanatory powers of the scale items, completed with the results of our qualitative studies, we believe that a new affinity scale ought to be designed in order to be applicable to any media type. In our second quantitative research phase we employed the same television affinity scale to measure users' attachment to the internet and we also identified similar uses of the scale in several studies (Anderson, 2005; Mafé – Blas, 2006; Papacharissi – Rubin, 2000). According to our results, the internet in itself has a so complex usefulness function that the aforementioned affinity scale can but superficially assess it. In the case of television (second qualitative and quantitative and third quantitative phases) we believe that refined scale items are required to assess the current multimedia environment as even those respondents who self-identified as regular viewers and content consumers hardly deemed that the statements of the scale items characterized them.

PUBLICATIONS RELATED TO THE TOPIC OF THE DISSERTATION

Book chapter

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APPENDIX

List of a appendices

Appendix 1. TAM research summary – the articles not indicated in the main text (in Hungarian)

Appendix 2. TAM measurments and scale summary - the articles not indicated in the main text (in Hungarian)

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Appendix 4. Selected results of 2008 exploratory study (in Hungarian)

Appendix 5. Lead users interview questionnaire (in English)

Appendix 6. Focus group interview questionnaire (in English)

Appendix 7. Pretest questionnaire (in Hungarian)

Appendix 8. Expert interviews questionnaire (in English)

Appendix 9/a. Final questionnaire (in Englis)

Appendix 9/b. Final scale items, measurement and structural model analysis related results, correlation tables (in English)

Appendix 10. SEM model fit indices summary and acceptance criteria (in English)

Appendix 11. Analysis of television gratifications: total sample and random subsample variance analysis (in English)

Szerző	Év	Kutatási terület	TAM használat /	Eredmény / Javaslat	Modell
Fishbein and Ajzen	1975	TAM modell elméleti alapja	TRA Theory of Reasoned Actions modell	TRA modell kialakítása	Beliefs and Evaluations Normative Beliefs and Motivation to Comply
Szajna	1996	Elektronikus levelező rendszer használata és elfogadása	TAM tesztje: email használat előtt és 15 hét utáni időszakban is felvett kérdőív, ahol önbevalláson alapuló (self reported use) is volt illetve valós használat (actual use) a számítógépes adatok alapján. Elemzés: regresszió és korreláció az önbevalláson és a mért adatok alapján.	Önbevalláson alapuló adatok nem megfelelőek az aktuális használatra vonatkozóan.	Perceived Usefulness (U) Perceived Ease of Use (EOU) Pre-Implementation Version Perceived Usefulness (U) Perceived Ease of Use (EOU) Pre-Implementation Version
Gefen és Straub	1997	Nemek közötti különbségek az email-ek megítélésében és használatában.	TAM és SPIR integrálása. SPIR (perceived Social Presence, mely egy adott médiumban megtestesülő emberi kontaktust vizsgálja és az adott médium információs gazdagságát kombináló megközelítés.	Nemek között különbség azonosítható, két modell integrálása megfelelő.	Gender SPIR PU Use PEOU

Appendix 1. TAM research summary – the articles not indicated in the main text. Source: Own summary
Fenech	1998	World Wide Web fogyasztói elfogadása	Saját képesség és technológiai önbizalom (self-efficacy) bevonása a modellbe.	Alap TAM modell nem nyújt elégséges magyarázó kontextust. Számítógépes Én-hatékonyság (self efficacy) mint magyarázó változó bevonása kielégítő modellt ad.	
Hong és munkatársai	2002	Digitális könyvtárak elfogadása	TAM alap modell alkalmazása, azonban egyedi független változók integrálása	Egyéni jellemzők és rendszer tulajdonságok mérése	Individual Differences Computer Self-Efficacy H H H B H B H B H B H B H B H B H B H
Legris, Ingham és Collerette	2003	Meta-analízis: Információrendszerek re való alkalmazás esetére.	TAM modell kritikus újraértelmezése, Venkatesh és Morris (2000) modelljét javasolják	TAM megfelelő modell, de három korlát: hallgatói megkérdezések, önbevalláson alapuló adatok, szoftver / rendszeralkalmazásokra fókuszál.	Experience Voluntariness Subjective Perceived Norm Perceived Usefulness Intention Job Relevance Output Quality Result Demonstrability

McCloskey	2003	Elektronikus kereskedelem elfogadása	Módosított TAM modell kiegészítve a biztonsággal, mint online vásárlás meghatározó eleme (elméleti modell)	Modell végül azt mutatta, hogy az online töltött időnek komoly hatása van az e-kereskedelemben való részvételre, és gyakoriságra, ugyanakkor a biztonsági és adatvédelmi elemeknek nem volt hatása.	EASE OF USE Ves or No USEFULNESS Frequency SECURITY CONCERNS Hours using Internet Dollars spent online per year
Yang és Yoo	2004	Információs rendszerek elfogadása és használata: adatbáziskezelő programok kapcsán.	Attitűd kognitív és affektív komponensének integrálása a modellbe, ugyanakkor kihagyják az eredeti TAM magatartásbeli szándék (BI) moderáló változót!	Érdemes attitűd méréssel bővíteni TAM modellt, de lényeges hatással a kognitív komponens bír.	Perceived Usefulness Perceived Ease of Use
Vijayasarath y	2004	Online vásárlás	TAM modell kibővítése (augmented TAM) és PU, PEOU faktorokkal egyenlő befolyásoló hatást feltételező egyéb faktorok integrálása modellbe	Hasznosság, PEOU, kompatibilitás, titoktartás meghatározóak az attitűdben, biztonság nem. Vásárlási szándékot erősen befolyásolja attitűd, normatív hiedelmek és az én hatékonyság.	H6 Usefulness H1 Ease of Use H3 Compatibility H4 Privacy H5 Security Normative Beliefs H8 Self Efficacy H8

Bauer és munkatársai	2005	Mobil marketing fogyasztói elfogadása	Theory of reasoned action (TRA) alapján fejlesztett, de TAM.hoz nagyon hasonló modell	Az elfogadásban mind az innovációhoz kötődő változók mind az egyéni, fogyasztóhoz kötődő hatások fontos szerepet játszanak, a TAM modellbe átépített változók jól magyarázzák a hatásokat.	$\begin{array}{c c c c c c c c c c c c c c c c c c c $
Burton- Jones és Straub	2006	Meta-analízis (48 tanulmány)	TAM modellekben használt használat (usage) mérési módjáról	Két lépcsős mérési meghatározást javasolnak: mérni kívánt rendszer / alkalmazás meghatározása, majd második lépésben a mérőszámok meghatározása.	
King és He	2006	Meta-analízis TAM modell megbízhatóságáról	Észlelt hasznosság (Perceived Usefulness, PU) és a magatartásbeli szándék (Behavioral Intention, BI) megbízható mérőszámok és jól használhatóak különféle területeken.	TAM érvényes és robosztus modell, további kiterjesztése és alkalmazása várható.	3 Contextual Factors 1 Prior Factors Perceived Usage Usage Attitude Attitude 4 Consequent Factors

Karahana, Agarwai és Angst	2006	Egyéni hiedelmek szerepe: technológia kompatibilitás kérdése, CRM rendszer használat esetén vizsgálva	TAM modell kibővítése több szinten kompatibilitással: munka, gyakorlat, tapasztalat és értékek szintjén	Kompatibilitás skála kialakítása, TAM modellel való kapcsolat validálása	H4b H4d H4d H4d H4d H4d H4d H4d H4d H4d H4d
Bosnjak, Obermeier és Tuten	2006	Online aukciók és vásárterek vizsgálata	Theory of reasoned action és TAM alkalmazás elsősorban a fogyasztói magatartás motivációs és szándékos viselkedési aspektusának integrálása miatt	Mindkét elmélet alkalmazható a technológiákhoz kötődő fogyasztói magatartás előrejelzésére, de a technológia elfogadás modellje az online vásárterek használatára vonatkozóan spefikusabb előrejelzést ad.	Perceived Use Verceived Usefulness
Schepers és Wetzels	2007	Meta analízis (51 cikk, 63 tanulmány)	TAM modell konstrukciók és vizsgált technológia területek azonosítása, szubjektív normák és moderáló változók hatásának vizsgálata	4 terület azonosítása: speciális software applikációk, internettel kapcsolatos technológiák, mikroszámítógépek, kommunikációs technológiák. Igazolják TAM modell validitását korrelációs és SEM vizsgálattal.	Subjective Norm Perceived Usefulness Attitude towards Use Behavioral Intention to Use Actual system Use Perceived Ease of Use

Turel és Yuan	2007	Web alapú tárgyalás támogató rendszerek	TAM modell kiegészítve a tárgyaló partner használati intenciójának megítélésével, mint hálózati hatással	Modellt validálták, relevánsnak ítélték. Hálózati hatással rendelkező technológiák elfogadási modelljéhez alap	Perceived N N N Perceived Perceived 0.327 + N Attitude 0.327 + N Attitude 0.189 + Perceived Usefulness 0.340^{++} 0.189 + Perceived 0.189 + 0.189 +
Lin, Shih és Sher	2007	E-szolgáltatási rendszerek fogyasztói elfogadása	Technológia készültség (technology readiness) integrálása a TAM modellbe	Technológia készültség és elfogadási modell (Technology Readiness and acceptance model) kidolgozása, mely jobb magyarázó erővel bír nem munkahelyi, szervezeti környezetben történő technológiai innovációk elfogadása esetében	Optimism Innovativeness Discomfort Insecurity Discu
Chin, Johnson és Schwarz	2008	TAM modellek skálahasználata	Likert skálák helyett gyorsabb formájú skálák használatának (fast form scales) tesztje, mely szemantikus differenciált jelentett a cikkben.	Javasolják az egyszerűsített és gyorsabb kitöltést segítő, erősebb magyarázó kontextust nyújtó szemantikus differenciál használatát.	Fast Form: 0.49 Original: 0.62 Predicted Usage Ease of Use Fast Form: 0.24 Original: 0.22
Yuení és Ma	2008	E-learning technológia elfogadás a tanárok körében.	TAM kibővítése szubjektív normák és számítógépes Én hatékonyság.	E-learning technológia elfogadás modell kialakítása, PU nem mutatott szignifikáns hatást a későbbi e-learning használatra.	Perception Anchors Subjective Norm 0.36** 0.36** Efficacy 0.30** Perceived Ease of Use

Elliott és Fu	2008	Technológiai innovációk fogyasztói elfogadás és értékesítési technikák összefüggése	TAM modell alkalmazása a különböző értékesítési technikák hatásának vizsgálatára	Az eltérő értékesítés taktikák (termék, verseny és fogyasztó orientált) eltérő hatással vannak a technológia elfogadás elemeire és a végleges elfogadásra	Perceived Expressiveness Perceived Enjoyment Perceived Enjoyment Perceived Base of use Normalive pressure
Sharma,	2009	TAM modell	TAM modell és	Észlelet hasznosság és használat	
Yetton és		példáján bemutatott	kiterjesztéseinek elemzése	közötti kapcsolatot inflálja és így	
Crawford	2000	meta-analizis		teves kapcsolatot mutathat.	
Li es Huang	2009	Online vasarias:	Eszleit Kockazat elmelet	Eszleit kockazatot figyelembe kell	
		csatornák elfogadása	(TPR)) és technológia	alkalmazásakor PU és PEOU	
		esutornak entogadasa.	elfogadás modell alkalmazás	hatása és így alan TAM modell	
			online vásárlás esetében	megerősítést nyert.	
Ha és Stoel	2009	E-vásárlás elfogadása	TAM kiegészítése elektronikus vásárlás minőségéve, élvezettel és bizalommal	E-vásárlás minőségét meghatározó faktorok: biztonság, website design, ügyfélszolgálat és a légkör. Hasznosság jelentősen meghatározza e-vásárlás elfogadását, PEOU nem.	Usefulness 0.29** 0.47** 0.13* 0.56 0.38** 0.56 0.56** 0.13* 0.56** 0.13* 0.56** 0.13* 0.56** 0.13* 0.56** 0.13* 0.56** 0.13* 0.56** 0.14.25) Ease of Use 0.55** (6.39) 0.55** 0.53** 0.13* 0.23** 0.13* 0.23** 0.1415 Enjoyment 0.23** (4.23)

Purkayastha	2009	Fogyasztói magatartás viselkedés előrejelzése online szolgáltatások igénybevételeke	és banki bróker or	TAM Szolgáltatás modellé Acceptance Mode	kiterjesztés elfogadási (Service el) (SAM)	PU és PEOU hozzáférési szignifikánsan használat valós az elfogadást.	mellett az lehetőség befolyásol színűségét,	észlelt is lta a vagyis	Image Job Perceived Job Usefulness (PU) Loyalty Quality Price Price Result Price Senstrivity Result 0.151** Trevarids Usage Anxiety Perceived Senstrivity Ease of 0.244** Switch to Self Efficac * Competition Time Perceived Ease of Location Accessitiy (PEA)
Schierz, Schilke, Wirtz	2010	Mobil elfogadása	fizetés	Alap TAM kibővítése mobilitással, Ver Davis (2000) mc elemeinek használ	modell egyéni nkatesh és odell egyes lata	TAM modell m alapot ad. Kompatibilitás, biztonság és s szerepe megha fizetés elfogadá	egfelelő viz egyéni mo zubjektív n atározó a sában.	sgálati bilitás, normák mobil	Perceived ormpatibility Perceived security 30^{+} Perceived 10^{++}

Szerző	Év	Kutatási terület	Minta 7	Fechnológia	PU és PEOU skála,	Technológia	Mérési pontok száma
			nagyság ú	íjdonsága	egyéb skálák	használat mérése	
Szajna	1996	Elektronikus levelező	61 hallgató E	E-mail használók vizsgálata	Davis (1989) alap skála	Önbevalláson alapuló	Két pontos mérés: használat
		rendszer használata és			használata mindkét	és rögzített használati	előtt (kivéve használat) és 15
Cafan ás	1007	Nomok közötti	202 fő	Svakorlott a mail haarnálák	Devis (1080) elen skéle	adalok is Fogodott ás küldött o	Fay pontos adatfalvátal
Straub	1997	különbségek az email-	592 IU C	Jyakonou e-man nasznatok	Davis (1969) alap skala	rogadou es kuldou e-	Egy pointos adatterveter
Struct		ek megítélésében és				munok	
		használatában.					
Fenech	1998	World Wide Web	150 hallgató II	nternetezők és nem	Davis (1989) alap skála	n.a.	Egy pontos adatfelvétel
		fogyasztói elfogadása	iı	nternetezők együtt	+ számítógépes én		
					hatékonyság		
Hong és	2002	Digitális könyvtárak	585 digitáis	már kipróbálták, így a	Davis (1989) és saját	Jövőbeli használati	Egy pontos adatfelvétel,
munkatarsai		elfogadasa	konyvtar	technologia nem volt uj a	skalak	szandekot (BI) mert.	szemelyes megkerdezes.
			nasznalo	rendszeres és nem			
				rendszeres használók			
McCloskey	2003	Elektronikus	138 egyetemi	online vásárlást már	Davis (1989) és saját	Online vásárlásról	Egy pontos adatfelvétel
		kereskedelem	hallgató	kipróbálók	kiegészítés	önbevalláson alapuló	
		elfogadása				adatok	
Yang és	2004	Információs rendszerek	211 IT hallgató	Software használók	Davis (1989) TAM skála	Önbevalláson alapuló	Egy pontos adatfelvétel
Yoo		elfogadása és			+ Cites attitűd skála	adatok	
		nasznalata:					
		programok kapcsán.					
Vijayasarath	2004	Online vásárlás	281 internet	internet használók, nem	Több forrású skála	Használati szándékot	Egy pontos adatfelvétel,
у			használó	biztos hogy online	használat	mért (BI), használatot	online megkérdezés
				vásárlók		nem	
Bauer és	2005	Mobilmarketing	1028 válaszadó	vegyes minta	Több forrású skála	Használati szándékot	Egy pontos adatfelvétel
munkatársai	2006	elfogadása	250 1		használat, 192. oldal	mért (BI)	
Karahana,	2006	CRM rendszer	278 munkatárs	14 nem használó, de	Davis (1989) skála +	Onbevalláson alapuló	Egy pontos adatfelvétel hat
Agarwai es		nasznalat		treningeit, a tobbiek	kompatibilitas Moore	adatok	nonappai a trening utan
Aligst	2006	Online aukciók és	188 online	Használók akik	TAM esetén Davis	Önbevalláson alapuló	Két pontos adatfelvétel a
	2000	chille auxelox es	100 Olillic	inaszinatok, akik	This escient Davis	One vanason and pulo	iser pointos adatterveter, a

Appendix 2. TAM measurement and scales summary – the articles not indicated in the main text. Source: own summary

Bosnjak, Obermeier és Tuten		vásárterek vizsgálata	vásártéren vásárló, online aukciók iránt érdeklődő	vásároltak is	(1989) alapskálák + vegyes skála használat	adatok	második alkalommal a vásárolt termékek rögzítése Online megkérdezés
Turel és Yuan	2007	Web alapú tárgyalás támogató rendszerek	72 szenior és vezető menedzser	Nem használók, de napi szinten tárgyalásban érintettek	Davis (1989) és saját skála	Használati szándékot mért (BI), használatot nem	Egypontos adatfelvétel, telefonos megkérdezés
Lin, Shih és Sher	2007	E-szolgáltatási rendszerek fogyasztói elfogadása	406 online befektetési fórum résztvevő	Online befektetési fórumok résztvevő, vegyes online tőzsde használók és nem	TAM Davis (1989) alapján, Technology Readiness Parasuraman (2000) alapján	Használati szándékot mért (BI), használatot nem	Egypontos adatfelvétel Online megkérdezés
Yuen és Ma	2008	E-learning technológia elfogadás a tanárok körében.	280 tanár szakos hallgató	Nem használók	Davis (1989) és más skálák	Használati szándékot mért (BI), használatot nem	Egy pontos adatfelvétel
Chin, Johnson és Schwarz	2008	TAM modellek skálahasználata	283 hallgató fele normál fele gyors formátummal	Nem használók	Davis (1989) skála	Használati szándékot mért (BI), használatot nem	Egy pontos adatfelvétel
Elliott és Fu	2008	Technológiai innovációk fogyasztói elfogadás és értékesítési technikák összefüggése	312 egyetemi hallgató	Nem használók	TAM változók Davis (1989) alapján + több forrású skála használat	Vásárlási szándékot mért (Intention to purchase), használatot nem	Egy pontos adatfelvétel
Li és Huang	2009	Online vásárlás: online értékesítési csatornák elfogadása.	637 internetező	Aki már valaha vásárolt online	Több forrású skála használat	Önbevalláson alapuló adatok	Egy pontos adatfelvétel, online megkérdezés
Ha és Stoel	2009	E-vásárlás elfogadása	298 internetező egyetemi hallgató	Aki már vásárolt valaha online	Davis (1989) TAM skálák + több forrású skála használat (568. o.)	Használati szándékot mért (BI), használatot nem	Egy pontos adatfelvétel, online megkérdezés
Purkayastha	2009	Banki online bróker szolgáltatások igénybevételekor	189 felhasználó	Online banki szolgáltatást használók, akik az új szolgáltatásról egy leírást kaptak	Fishbein és Ajzen (1975); Venkatesh (2000); és Venkatesh és Davis (2000)	Használati szándékot mért (BI), használatot nem	Egy pontos adatfelvétel, online megkérdezés
Schierz, Schilke, Wirtz	2010	Mobil fizetés elfogadása	1447 mobil használó (rep. minta)	Mobil használók, mobil fizetést nem biztos	Több forrású skála használat (213. o.)	Használati szándékot mért (BI), használatot nem	Egy pontos adatfelvétel, online megkérdezés

META-ANA	VIETA-ANALÍZISEK TAM modell tesztelésére								
Legris,	2003	Meta-analízis:	22 tanulmány						
Ingham és		Információrendszerekre való	elemzése						
Collerette		alkalmazás esetére.							
King és He	2006	Meta-analízis TAM modell	88 TAM tanulmány						
		megbízhatóságáról	elemzése						
Burton-	2006	Meta-analízis TAM	48 tanulmány						
Jones és		modellekben használt használat	elemzése						
Straub		(usage) mérési módjáról							
Schepers és	2007	Meta analízis TAM modell	51 cikk, 63						
Wetzels		konstrukciók és vizsgált	tanulmány elemzése						
		technológia területek							
		azonosítása							
Sharma,	2009	TAM modell példáján	75 tanulmány						
Yetton és		bemutatott meta-analízis	elemzése						
Crawford									
Turner és	2010	TAM előrejelző képességének	73 tanulmány						
munkatársai		(actual use) vizsgálata	elemzése						

Appendix 3. Selected questions of exploratory study (2008)

2008 őszi online megkérdezés válogatott kérdései (a kérdőív nagyobb témakört ölelt fel, de a 16 oldalas verzióból a dolgozatban felhasznált kérdéseket csatoljuk. A 12-17. kérdések ugyanazok voltak a videós DVD-s háztartások számára megfogalmazva).

Üdvözöljük Önt az NRC legújabb kutatásának kérdőívén! Kutatásunk célja, hogy felmérjük az internetezők televíziónézéssel kapcsolatos szokásait, tapasztalatait, véleményét és igényeit.

Kérjük, legyen segítségünkre ebben a kutatásban, és segítse munkánkat az adatfelvételben. Az adatokat az adatvédelmi törvénynek megfelelően kezeljük, személyes adatait harmadik fél részére semmilyen körülmények között nem adjuk ki!

A kérdőívet kitöltők a kutatás lezárása után ajándék nyereménysorsoláson vesznek részt!

A digitális televíziós műsorterjesztési eljárások terjedésével ma már lehetséges az ún. set-top-box készülék merevlemezére televíziós műsort rögzíteni. Ezzel a hagyományos videónál (DVD-nél) nagyobb mennyiségű műsor rögzíthető, akár egy teljes nyaralás idejére beprogramozhatók a kedvenc műsorok. Ha véletlenül egy műsor nézését kell megszakítani (pl. váratlan telefonhívás miatt), akkor egyetlen gombnyomással lehetővé válik a felvétel megkezdése és a néhány perccel később akár lehet is folytatni a nézést, miközben természetesen a készülék folyamatosan rögzít. A késleltetett nézés ezáltal lehetővé teszi, hogy ne akkor nézzük az egyes televíziós műsorokat, amikor azokat a csatornák adják, hanem akkor, amikor az leginkább megfelel a saját időbeosztásunknak.

K1a. Rendelkezik az Ön(ök) háztartása televízióval?

Kötel	lező:IGEN
\odot	1. igen
\odot	2. nem ► 29.Oldal (D1)
K1. I	Milyen <mark>televíziós vételi módot</mark> alkalmaznak Önök?
Több	o válasz lehetséges!
~	1. digitális kábel televízió (pl. UPC digital, T-kábel)
~	2. digitális műhold (pl. UPC Direct, DigiTV)
~	3. digitális mikrohullám (Antenna Digital)
~	4. IPTV (I-home, InviTV)
~	5. hagyományos (analóg) kábel (pl. UPC, T-kábel, Fibernet)
~	6. egyéni műholdvevő (nem előfizetéses)
~	7. földfelszíni (tető- vagy szobaantenna)
~	8. nem tudom
K1b.	Hány működő televízió készüléke van a háztartásban?
\odot	1. 1 darab
\odot	2. 2 darab

3. 3 vagy több darab

K2. Hogyan vélekedik Ön a digitális televíziózás alábbi tulajdonságairól? Kérjük, értékelje az alábbi állításokat aszerint, hogy mennyire fontosak Önnek? RANDOM

KAIVDOM				
	egyáltalán nem tartom fontosnak	inkább nem tartom fontosnak	inkább fontosnak tartom	nagyon fontosnak tartom
áttekerhetem a reklámokat	\odot_1	\odot_2	\odot_3	\odot_4
elektronikus műsorújság, ezért nem kell nyomtatott, vagy internetes műsorújságot elővennem (EPG)	\odot_1	\odot_2	••3	⊙₄
intelligens készülék, amely 'megtanulja és megjegyzi' kedvenc műsoraimat, csatornáimat	\odot_1	\odot_2	\odot_3	\odot_4
élőadás rögzítésének, visszatekerésének, újranézésének lehetősége	\odot_1	\odot_2	\odot_3	\odot_4
egy-egy sorozat több részének a felvétele egy gombnyomással beállítható, így sosem maradok le egyetlen részről sem	\odot_1	\odot_2	\odot_3	\odot_4
interaktív készülék, amelyen keresztül bekapcsolódhatok a műsorba (pl. szavazhatok, rögtön megvehetek egy terméket stb.)	\odot_1	\odot_2	\odot_3	\odot_4
a készülékre rögzített műsorok kiírhatók DVD-lemezre	\odot_1	\odot_2	\odot_3	\odot_4
átrendezhetem a televíziós programokat, akkor nézem meg a műsorokat, amikor nekem megfelel, órákkal vagy akár napokkal később	\odot_1	\odot_2	⊙₃	\odot_4

K3. Rendelkezik-e Ön olyan set-top-box készülékkel, amely alkalmas a műsorrögzítésre? Megjelenik ha: K1_1 || K1_2 || K1_4 *Kötelező:IGEN*

 \odot 1. igen

- \odot 2. nem
- \odot 3. nem tudom

K4. Használt-e Ön digitális televíziós előfizetését megelőzően videót (VCR) vagy DVD rögzítőt tévéműsorok felvételére?

Megjelenik ha: K3 == 1 \odot

1. igen

 \odot 2. nem

K5. Miként változott az Ön videórögzítő vagy DVD rögzítő használata a set-top-box készülék beszerzése óta?

Megjelenik ha: K4 == 1

- \odot 1. kevesebbet használom a videót/DVD-t műsorrögzítésre
- \odot 2. többet használom a videót/DVD-t műsorrögzítésre

- \odot 4. egyáltalán nem változott a videó/ DVD rögzítő használata
- \odot 5. egyáltalán nem használom a videót/DVD-t műsorrögzítésre, amióta set-top-boxom van

 $[\]odot$ 3. körülbelül ugyanannyit használom a rögzítőt, csak más céllal (pl. csak a hosszú távon megőrizni kívánt műsorokat rögzítem)

K11. Hogyan ítéli meg Ön a műsorrögzítés következő lehetőségeit? Kérjük, értékelje az alábbi állításokat aszerint, hogy mennyire fontosak Önnek? RANDOM

	egyáltalán nem fontos	inkább nem fontos	inkább fontos	nagyon fontos
a készülék tévénézés közben is rögzíti a műsort, így például egy telefonhívás esetén sem maradok le semmiről	\odot_1	\odot_2	⊙₃	\odot_4
más időpontban nézhetem a műsorokat (pl. késő este nézhetem meg a kora esti programot, vagy a hosszabb filmeket hétvégére hagyhatom)	\odot_1	•	⊙₃	\odot_4
utazás, hosszabb távollét alatt is felvehetem a kedvenc műsoraimat	\odot_1	\odot_2	\odot_3	\odot_4
mindent rögzíthetek és utólag, a reklámokat áttekerve nézhetem meg	\odot_1	\odot_2	• 3	\odot_4
összegyűjthetem a kedvenc műsoraimat (pl. egy sorozat epizódjai)	\odot_1	\odot_2	\odot_3	\odot_4

K12. Milyen gyakran rögzít Ön televíziós műsort a set-top-box készülékkel? Megjelenik ha: K3 == 1 Kötelező:IGEN

- \odot 1. naponta \odot
- 2. hetente többször
- \odot 3. hetente
- \odot 4. havonta többször
- \odot 5. havonta
- \odot 6. ritkábban
- \odot 7. soha ► 19.0ldal (K18)

K13. Mennyire jellemző Önre, hogy a következő okokból műsort rögzít a televízióból a set-top-box készülékre?

Kézütkfe: Kérjük, az értékeléshez használjon 5 fokú skálát, ahol az 1-es jelentése 'egyáltalán nem jellemző', míg az 5-ösé 'teljes mértékben jellemző'. A közbülső értékekkel árnyalhatja véleményét.

Megjelenik ha: K3 == 1 RANDOM

	1-egyáltalán nem jellemző	2	3	4	5-teljes mértékben jellemző
nem vagyok otthon a megnézni kívánt műsor sugárzásának idején	\odot_1	\odot_2	\odot_3	\odot_4	\odot_5
két különböző csatornán fut egyszerre engem érdeklő műsor	\odot_1	\odot_2	\odot_3	\odot_4	\odot_5
a családban valaki másik csatornát néz	\odot_1	\odot_2	\odot_3	\odot_4	\odot_5
a hirdetések áttekerése miatt	\odot_1	\odot_2	\odot_3	\odot_4	\odot_5
megzavar valami a nézés közben (pl. telefonhívás)	\odot_1	\odot_2	\odot_3	\odot_4	\odot_5
gyűjtöm a filmeket, sorozatokat	\odot_1	\odot_2	\odot_3	\odot_4	\odot_5
mást is érdekel a háztartásunkban az adott műsor és együtt akarjuk később megnézni	\odot_1	\odot_2	\odot_3	\odot_4	\odot_5
egyéb okból, éspedig:	\odot_1	\odot_2	\odot_3	\odot_4	\odot_5

Megjelenik ha: K3 == 1										
	naponta	hetente többször	hetente	havonta többször	havonta	ritkábban	soha			
napi sorozatok, szappanoperák	\odot_1	\odot_2	\odot_3	\odot_4	\odot_5	\odot_6	\odot_7			
heti sorozatok	\odot_1	\odot_2	\odot_3	\odot_4	\odot_5	\odot_6	\odot_7			
filmek	\odot_1	\odot_2	\odot_3	\odot_4	\odot_5	\odot_6	\odot_7			
dokumentumfilmek	\odot_1	\odot_2	\odot_3	\odot_4	\odot_5	\odot_6	\odot_7			
sportközvetítés	\odot_1	\odot_2	\odot_3	\odot_4	\odot_5	\odot_6	\odot_7			
szórakoztató műsorok (pl show-műsor)	\odot_1	\odot_2	\odot_3	\odot_4	\odot_5	\odot_6	\odot_7			
hírek/időjárás	\odot_1	\odot_2	\odot_3	\odot_4	\odot_5	\odot_6	\odot_7			
egyéb műsort, éspedig: -	\odot_1	\odot_2	\odot_3	\odot_4	\odot_5	\odot_6	\odot_7			

K16. Milyen gyakran rögzíti az alábbi műfajú műsorokat a set-top-box merevlemezére?

K17. Mennyire jellemző Önre, hogy a felvett műsorokat.. Kérjük, az értékeléshez használjon 5 fokú skálát, ahol az 1-es jelentése 'egyáltalán nem jellemző', míg az 5-ösé 'teljes mértékben jellemző'. A közbülső értékekkel árnyalhatja véleményét. Megjelenik ha: K3 == 1 RANDOM

	1-egyáltalán nem jellemző	2	3	4	5-teljes mértékben jellemző
igyekszem a felvett műsort a lehető leghamarabb megnézni függetlenül attól, hogy akkor mi megy a televízióban	\odot_1	\odot_2	\odot_3	\odot_4	\odot_5
csak akkor nézem meg, ha semmi más számomra érdekes nincs a televízióban	\odot_1	\odot_2	\odot_3	\odot_4	\odot_5
jellemzően másik napon esti főműsoridőben (19-22 óra) nézem meg a felvett műsorokat	\odot_1	\odot_2	\odot_3	\odot_4	\odot_5
jellemzően hétvégén napközben nézem meg a felvett műsorokat	\odot_1	\odot_2	\odot_3	\odot_4	\odot_5
jellemzően akkor nézem meg, amikor egyedül vagyok és ráérek	\odot_1	\odot_2	\odot_3	\odot_4	\odot_5
jellemzően akkor nézem meg, amikor társaságban (családdal, barátokkal közösen) tudjuk megnézni a felvett műsort	\odot_1	\odot_2	\odot_3	\odot_4	\odot_5
jellemzően a főműsoridőn kívüli idősávokban (késő éjszaka, reggel, hétköznap napközben) nézem meg a felvett műsorokat	\odot_1	\odot_2	\odot_3	\odot_4	⊙₅

K24. Milyen gyakran néz Ön video tartalmat (pl. televízió műsort, filmet, videoklipet, stb.) a következő módokon? RANDOM

In the one							
	naponta	hetente többször	hetente	havonta többször	havonta	ritkábban	soha
televízió (élőben)	\odot_1	\odot_2	\odot_3	\odot_4	\odot_5	\odot_6	\odot_7
televízióból felvett	\odot_1	\odot_2	\odot_3	\odot_4	\odot_5	\odot_6	\odot_7
vásárolt videó/DVD	\odot_1	\odot_2	\odot_3	\odot_4	\odot_5	\odot_6	\odot_7
kölcsönzött vagy barátoktól kölcsönkapott videó/DVD	\odot_1	\odot_2	\odot_3	\odot_4	\odot_5	\odot_6	\odot_7
internetről letöltött tartalom (a televízió képernyőjén)	\odot_1	\odot_2	\odot_3	\odot_4	\odot_5	\odot_6	\odot_7
internetről letöltött tartalom (a számítógép képernyőjén)	\odot_1	\odot_2	\odot_3	\odot_4	\odot_5	\odot_6	\odot_7
internetről letöltés nélkül (streaming) nézett	\odot_1	\odot_2	\odot_3	\odot_4	\odot_5	\odot_6	\odot_7
mobil telefonon/egyéb hordozható eszközön	\odot_1	\odot_2	\odot_3	\odot_4	\odot_5	\odot_6	\odot_7
mozi	\odot_1	\odot_2	\odot_3	\odot_4	\odot_5	\odot_6	\odot_7
egyéb, éspedig: -	\odot_1	\odot_2	\odot_3	\odot_4	\odot_5	\odot_6	\odot_7

K26a. Ön szerint mennyire jellemzik a következő tulajdonságok a hagyományos televíziózást? Kérjük, értékelje a hagyományos televíziózást egy 7 fokú skála segítségével az alábbi jellemzők alapján!

Helyezze el a hagyományos televíziózást az adott végpontok között az alapján, hogy Önben milyen kép alakult ki róla! RANDOM

	1	2	3	4	5	6	7	
Szokványos, hétköznapi	\odot_1	\odot_2	\odot_3	\odot_4	\odot_5	\odot_6	\odot_7	Különleges, egyedi
Fiatalos	\odot_1	\odot_2	\odot_3	\odot_4	\odot_5	\odot_6	\odot_7	Öreges
Könnyen kezelhető	\odot_1	\odot_2	\odot_3	\odot_4	\odot_5	\odot_6	\odot_7	Nehezen kezelhető
Modern	\odot_1	\odot_2	\odot_3	\odot_4	\odot_5	\odot_6	\odot_7	Elavult
Személyes	\odot_1	\odot_2	\odot_3	\odot_4	\odot_5	\odot_6	\odot_7	Személytelen
Naprakész	\odot_1	\odot_2	\odot_3	\odot_4	\odot_5	\odot_6	\odot_7	Elavult
Egyszerű	\odot_1	\odot_2	\odot_3	\odot_4	\odot_5	\odot_6	\odot_7	Bonyolult
Rugalmas	\odot_1	\odot_2	\odot_3	\odot_4	\odot_5	\odot_6	\odot_7	Merev
Divatos	\odot_1	\odot_2	\odot_3	\odot_4	\odot_5	\odot_6	\odot_7	Hagyományos
Interaktív	\odot_1	\odot_2	\odot_3	\odot_4	\odot_5	\odot_6	\odot_7	Passzív
Vezető	\odot_1	\odot_2	\odot_3	\odot_4	\odot_5	\odot_6	\odot_7	Lemaradó
Egyedi	\odot_1	\odot_2	\odot_3	\odot_4	\odot_5	\odot_6	\odot_7	Tömegcikk
Izgalmas	\odot_1	\odot_2	\odot_3	\odot_4	\odot_5	\odot_6	\odot_7	Unalmas
Kiegészítő	\odot_1	\odot_2	\odot_3	\odot_4	\odot_5	\odot_6	\odot_7	Elsődleges

Ugyanezt a szemantikus differenciál kérdést kérdeztük le digitális televíziózásra vonatkozóan is.

Appendix 4.

Results of the exploratory penetration study Table 1. Perception of digital television (Scale: 1-4, 1= not important at all, 4= very imporant) (all respondents). Source: own research, 2008 M.

	Mean
	(variance)
I can forward the advertisments	3,21 (0,95)
I can restructure the tv programs, and may watch them when I want even some hours or days later.	3,04 (0,94)
The possibility of recording, backward and forward and reviewing of tv programs.	2,90 (0,95)
The recorded program can be transferred to DVD as well	2,88 (0,94)
I can program the recording of a serie with one push of the button, so I do not miss a part of it.	2,80 (0,99)
Electronic program quide which allows not to buy a printed program quide or internet program quide.	2,76 (0,96)
Intelligent devices which learns my favourite programs and channels.	2,73 (0,93)
Interactive device which allows the participation in television programs (eg. voting, buying)	1,98 (0,92)

n=994

Table 2. Perception of digital television (Scale: 1-4, 1= not important at all, 4= very imporant) (DVR owners). Source: own research, 2008

	Mean
	(variance)
The possibility of recording, backward and forward and reviewing of	3,48 (0,80)
tv programs	
I can restructure the tv programs, and may watch them when I want even some hours or days later.	3,45 (0,76)
Electronic program quide which allows not to buy a printed program quide or internet program quide.	3,29 (0,75)
I can forward the advertisments	3,22 (0,78)
I can program the recording of a serie with one push of the button, so I do not miss a part of it.	3,08 (0,88)
The recorded program can be transferred to DVD as well	3,08 (0,80)
Intelligent devices which learns my favourite programs and channels.	3,05 (0,81)
Interactive device which allows the participation in television programs (eg. voting, buying)	2,15 (1,07)
-40	•

	Ranking of DVR	Ranking of
	owners	VCR/DVD owners
Films	1	1
Weekly series	2	2
Documentaries	3	5
Soap operas, daily series	4	4
Entertainment shows	5	3
Sport	6	6
News	7	7

Table 3. Type of recorded programs. Source: own research, 2008

n=36, n=472

Appendix 5. Lead users' interview questionnaire Digital television quide (lead users): 40 minutes

Introduction: 2 minutes

1. What does television watching mean for you?

2. Since when do you have digital television subscription with DVR/STB device?

3. Why did you choose this type of television subscription? What influenced your decision?

4. Have your television viewing habits changed since do you have this technology? If yes how?

5. Do you use your DVR since your household have it? Did you have any program recorder device before?

6. Please compare your television viewing habits when watching live and when watching time-shifted programs!

7. Ha a digitális videórögzítő hasznosságát vizsgáljuk, akkor miben látod te ennek a technológiának a hasznosságát?

8. When we talk about entertainment what kind of role DVR may hav in it?

9. What do you think about the usability of DVR technology?

10. Can you imagine the television in the future without DVR?

11. What kind of attributes do you associate to the television viewing in the new digital context and before in the old analogue context?

12. What kind of functions or possibilites would make even more attractive this technology?

13. Scale test (5 minutes) Is the question understandable, do you feel it relevant? Is the formulation correct, would you use different words?

(Davis (1989) and own perceived usefulness items)

Appendix 6. Questions for the focus group interviews

Digital television guide (university student group)

Plan: 60 minutes

- 1) General television viewing (25 minutes)
 - a) Do you watch television? Those who answer yes: how much, what and when? Those who answer no: please leave with the other moderator, from this point there are two parallel groups.
 - b) What does television viewing mean for you? What kind of picture do you have about TV viewing? What associations do you have? What moods, feelings, values are associated to it? Positive, negative?
 - c) TV VIEWERS: When do you watch TV, what do you view? What is still associated with TV? Chanel / programme / actor? What is the social situation, with whom? Series, sport, music, news? Movie? Do you watch DVD, what, why?
 - d) NON TV VIEWERS: Do you watch TV content at all? What? Series, sport, music, news? Movie? Do you watch DVD, what, why? Did you use to watch TV before? Since when have you not? Why not? What changed then? Lifestyle, circumstances? What did you do instead? What do you do in that period of the day that you have spent with watching TV before?
- 2) Digital television viewing (25 minutes)
 - a) What's that? What did you hear about that: Where? What do you think about it? How would you characterize it, what associations do you have?
 - b) Need a description of concept, but at least a feature list:
 - i) VOD
 - ii) HD picture
 - iii) 5.1 sound
 - iv) EPG
 - v) DVR
 - vi) radio signal
 - c) (Do you understand?) Do you like it? Do you think it relevant? For whom it is intended? How do you imagine the user of digital TV?
 - d) What do these services resemble to? What are the analogies? Library, video rental, internet pages, downloading, video recorder, cinema?
 - e) How would you complement it, what would be a service that would make it interesting and exciting? Social services, learner equipment and recommendation, tagging, searchabilty?
- 3) Testing of the statement list (10 minutes)
 - a) Fill it as if you were users, now that you now the service! Is the question understandable, do you feel it relevant? Is the formulation correct, would you use different words? (see personal interview draft)

Appendix 7.

Pretest questionnaire

Köszönjük, hogy részt vesz kutatásunkban, melynek célja, hogy felmérjük az egyes médiumokkal, médiatechnológiákkal kapcsolatos szokásait, tapasztalatait és véleményét. Kérjük, legyen segítségünkre ebben a kutatásban, és segítse munkánkat az adatfelvételben. A kérdőív kitöltése önkéntes!

1)	Először	arra	vagyunk	kíváncsiak,	hogy	az	alábbi	helyzetekben,	melyik	eszközt,	médiumot
vá	lasztia. n	nelvikł	ez fordul	elsősorban?	Soronl	ként	csak eg	v választ ielölið	ön meg!		

	Televízió	Videó/	Internet	Mozi	Számítógép	Mobilte
					(internet	lefon
		DVD			hozzáférés	
		DID			nélkül)	
Pihenésre vágyom						
Társaságra vágyom						
A napi híreket akarom megtudni						
Izgalomra vágyom						
El akarom ütni az időt						
Tanulni akarok valamit az életről						
El akarom felejteni a problémáimat						
Szórakozásra vágyom						
Többet akarok tudni önmagamról						
Csak úgy akarok valamit csinálni						
Borzongásra vágyom						
Valami mást akarok csinálni, mint						
amivel addig foglalkoztam						
Vidámságra vágyom						
Kevésbé akarom egyedül érezni						
magam						
Meg akarok nyugodni						
Meg szeretném tanulni, hogy						
hogyan kezeljem saját problémáimat						

2) Az emberek különböző információs eszközöket, szórakozási, vagy pihenési lehetőségeket kedvelnek. Kérem mondja meg, hogy mennyire fontosak Önnek személyesen az alábbi eszközök. (1 = egyáltalán nem fontos, 5 = nagyon fontos)

	Egyáltalán				Nagyon fontos
	nem fontos				
a Mozi	1	2	3	4	5
b Könyv	1	2	3	4	5
c Televízió	1	2	3	4	5
d Videó (analóg, kazettára rögzít),	1	2	3	4	5
DVD rögzítő (DVD lemezre rögzít)					
e Internet	1	2	3	4	5
f Rádió	1	2	3	4	5
g Napilap	1	2	3	4	5
h Mobiltelefon	1	2	3	4	5
i Vonalas telefon	1	2	3	4	5
j Digitális videó rögzítő	1	2	3	4	5
(merevlemezre rögzít, valós idejű					
adást is)					
k Számítógép (internet hozzáférés	1	2	3	4	5
nélkül)					
l Magazinok (heti, havi)	1	2	3	4	5

egyet, 5= terjesen egyetertek)						
	Egyáltalán nem értek				Teljesen egyetértek	Nem tudom
	egyet					
Számomra a televíziónézés az egyik legjobb dolog a napi	1	2	3	4	5	
tevékenységeim között						
Üresnek érezném a napomat	1	2	3	4	5	
televízió nélkül						
A szabadidőmben szívesebben nézek televíziót, minthogy valami	1	2	3	4	5	
mást csináljak						
Könnyen eltöltök néhány napot	1	2	3	4	5	
televízió nélkül						
Elveszettnek érezném magam	1	2	3	4	5	
televíziónézés nélkül						

<u>3/a) Kérem értékelje, hogy mennyire ért egyet az alábbi kijelentésekkel! (1 =egyáltalán nem értek egyet, 5= teljesen egyetértek)</u>

<u>3/b) Kérem értékelje, hogy mennyire ért egyet az alábbi kijelentésekkel! (1 =egyáltalán nem értek</u> egyet, 5= teljesen egyetértek)

- <u></u>	Egyáltalán nem értek egyet				Teljesen egyetértek	Nem tudom
Számomra az internetezés, online jelenlét az egyik legjobb dolog a napi tevékenységeim között	1	2	3	4	5	
Üresnek érezném a napomat internet hozzáférés nélkül	1	2	3	4	5	
A szabadidőmben szívesebben internetezek, minthogy valami mást csináljak	1	2	3	4	5	
Könnyen eltöltök néhány napot internet hozzáférés nélkül	1	2	3	4	5	
Elveszettnek érezném magam internet hozzáférés nélkül	1	2	3	4	5	

4) Hány televíziókészülékkel rendelkezik az Ön háztartása?

- nincs televíziókészülék a háztartásunkban
- egy televíziókészülék van a háztartásunkban
- két televíziókészülék van a háztartásunkban
- három televíziókészülék van háztartásunkban
- négy vagy több televíziókészülék van a háztartásunkban

5/a) Rendelkezik-e az Ön háztartása televízióműsor rögzítésére alkalmas eszközzel? (több választ is megjelölhet)

- igen van videórögzítőnk (analóg, videókazettára rögzít)
- igen van DVD rögzítőnk
- igen van set-top-boxunk, melyben digitális videó rögzítő van
- nem nincs egyik sem.

5/b) Ha van digitális videó rögzítő (set-top-box) a háztartásban, mennyi ideje rendelkeznek ezzel a készülékkel?

XX év XX hónap

5/c) Ha van digitális videó rögzítő (set-top-box) a háztartásban, szokta-e használni a digitális videó rögzítőt televíziónézés során?

• igen rendszeresen használom: különböző műsorokat, sorozatokat rögzítek vele rendszeresen, gyakran megállítom vagy visszatekerem a műsort, amit éppen nézek

• igen alkalmanként használom: néha felveszek vele egy-egy műsort, vagy megállítom, visszatekerem a műsort, ha lemaradtam valamiről

• igen kipróbáltam már: vettem fel vele műsort, vagy megállítottam, visszatekertem a valós idejű műsort, de csak néhány alkalommal

nem sosem használtam még ezt a funkciót, de ki fogom próbálni

• nem sosem használtam még ezt a funkciót és nem is tervezem, hogy kipróbálom.

Kérem olvassa el az alábbi a digitális televíziózás és a digitális videó rögzítő technológia jellemzőit bemutató szöveget!

A digitális televíziós műsorterjesztési eljárások terjedésével ma már lehetséges az ún. set-top-box készülék merevlemezére televíziós műsort rögzíteni. Ezzel a hagyományos videónál (DVD-nél) nagyobb mennyiségű műsor rögzíthető, akár egy teljes nyaralás idejére beprogramozhatók a kedvenc műsorok. Ha véletlenül egy műsor nézését kell megszakítani (pl. váratlan telefonhívás miatt), vagy ha lemaradtunk egy fontos pillanatról, akkor megállíthatjuk és visszatekerhetjük, majd előre tekerhetjük a nézett műsort, mivel természetesen a készülék folyamatosan rögzít. A kedvenc sorozatainak egy gombnyomással felvehetjük, nem kell részenként beállítanunk és rögzítenünk külön-külön a műsorokat. A késleltetett nézés ezáltal lehetővé teszi, hogy ne akkor nézzük az egyes televíziós műsorokat, amikor azokat a csatornák adják, hanem akkor, amikor az leginkább megfelel a saját időbeosztásunknak, és mindezt a távirányító segítségével, külön eszköz (kazetta) igény nélkül. Természetesen a késleltetett televíziónézés lehetősége a korábbi analóg technológiák, mint videórögzítő és DVD rögzítő is rendelkezésre álltak már.

<u>6) Kérem ezek után értékelje az alábbi kijelentéseket a digitális videó rögzítővel (DVR) kapcsolatban</u> <u>függetlenül attól, hogy valójában rendelkezik-e a háztartása jelenleg az eszközzel vagy nem.</u> (1=egyáltalán nem értek egyet, 7=teljesen egyetértek)

	Egyáltalán nem értek egyet						Teljesen egyet értek
A DVR használata segíti a feladataim gyorsabb elvégzését	1	2	3	4	5	6	7
A DVR használata növeli a személyes eredményességemet	1	2	3	4	5	6	7
A DVR használata javítja a hatékonyságomat.	1	2	3	4	5	6	7
A DVR hasznos a számomra.	1	2	3	4	5	6	7
A DVR rugalmasabbá teszi az időbeosztásomat	1	2	3	4	5	6	7
A DVR használatával nem maradok le semmiről, mert visszatekerhetem a műsort, ha valamit nem láttam, vagy nem értettem.	1	2	3	4	5	6	7
A DVR használatával könnyebben el tudom dönteni, hogy mit mikor nézzek meg.	1	2	3	4	5	6	7

A DVR segíti a reklámok elkerülését mivel lehetővé teszi, hogy áttekerjem a reklámokat a felvett, vagy a sugárzási időnél később nézni kezdett programok esetében.	1	2	3	4	5	6	7
A DVR kellemesebbé, nyugodtabbá teszi a televíziónézést, mert nem kell aggódnom, hogy lemaradok valamiről, vagy később kapcsolódóm be a nézésbe, hiszen visszatekerhetem a televízióműsort.	1	2	3	4	5	6	7
A DVR személyesebbé és rugalmasabbá válik a televíziónézés, mert én döntöm el, mit mikor nézek meg és mindezt egy gombnyomással elintézhetem, nem kell kazettával és beállítással bajlódnom.	1	2	3	4	5	6	7
A DVR segítségével időt takaríthatok meg, mert a reklámokat áttekerve rövidebb idő alatt tudom megnézni az adott műsort, mint valós időben.	1	2	3	4	5	6	7
	Egyáltalán nem értek egyet						Teljesen egyet értek
A digitális videórögzítő működtetése/használata világos és érthető.	1	2	3	4	5	6	7
A digitális videórögzítő használata nem kíván túl nagy szellemi erőfeszítést.	1	2	3	4	5	6	7
A digitális videórögzítőt könnyű használni.	1	2	3	4	5	6	7
Könnyen elérem, hogy a DVR azt csinálja, amit akarok. / Nem okoz számomra nehézséget, hogy a DVR azt csinálja, amit akarok.	1	2	3	4	5	6	7
Ha lenne digitális videórögzítőm, akkor használnám a készüléket. / Mivel van digitális videórögzítőm tervezem, hogy a jövőben is használni fogom.	1	2	3	4	5	6	7
Ha lenne digitális videórögzítőm, akkor a jövőben is használnám a készüléket. / Mivel van digitális videó rögzítőm, úgy vélem, hogy rövid időn belül újra használni fogom a digitális videó rögzítőmet.	1	2	3	4	5	6	7
Élvezetesnek találom a digitális videó rögzítő használatát	1	2	3	4	5	6	7
A digitális videó rögzítő használata jó móka	1	2	3	4	5	6	7
Jól szórakozom mikor a DVR-t használom	1	2	3	4	5	6	7

7) Az alábbi tulajdonság párok közül melyik jellemzi inkább a digitális videó rögzítőt? Kérem értékelje az egyes tulajdonságpárok mentén ezt a technológiát!

Élvezetes X X X X X X X X Utálatos

Izgalmas X X X X X X X Egyhangú

Kellemes X X X X X X X Kellemetlen

Érdekes X X X X X X X Unalmas

8) A következőkben arra kérjük, hogy saját magára vonatkozóan értékelje az alábbi állításokat a szerint, hogy mennyire jellemző az adott magatartás Önre. (1= egyáltalán nem jellemző, 5 = nagyon jellemző)

	Egyáltalán				Nagyon
	nem				jellemző
	iellemző				rám
	rám				
Akkor (is) tudom használni a szórakoztató elektronikai	1	2	3	4	5
eszközöket,					
he contri nince e trimeretten alti elmondie heere heeren					
na senki mines a kornyeken, aki elmondja, nogy nogyan					
használjam					
ha valaki először megmutatta, hogy hogyan használjam.	1	2	3	4	5
ha használtam már hasonló szórakoztató elektronikai eszközt	1	2	3	4	5
ha csak a használati utasítás (help) van a segítségemre	1	2	3	4	5
Gyakran próbálok ki új termékeket / szolgáltatásokat a	1	2	3	4	5
barátaimnál hamarabb.					
Általában élyezem az új termékek /szolgáltatások	1	2	3	4	5
megyásárlását	-		-		-
Vonakodva kezdek új dolgokha használok új dolgokat azelőtt	1	2	3	4	5
hogy látnám a környezetemben a használatát	1	-	5		5
Pitkán bízom meg az új ötletekben míg azt nem látom hogy	1	2	3	4	5
körülöttem az emberek elfegedték ezt	1	2	5	+	5
Tudom hogy általában az utolsák között vagyak akik	1	2	2	4	5
liuoni, nogy analaban az utolsok között vagyok, akik	1	2	5	4	5
Litrom kall hagy mág amharak hagználnak agy új dalgat	1	2	2	4	5
mielőtt án is elgondolkodnák a használatán	1	2	5	4	5
Általában nagyon ávatas vagyak új ötlatak alfogadásakor	1	2	2	4	5
Altalabali hagyoli ovatos vagyok uj otietek ellogadasakol.		2	3	4	5
Hajlamos vagyok ugy erezni, nogy a megszokott, regi utak a	1	2	3	4	2
legjobbak az eletben.					
Altalában én vagyok az utolsó a baráti körömben, aki értesül a	1	2	3	4	5
legfrissebb szórakoztató elektronikai termékekről.					
A barátaimmal összehasonlítva én nagyon kevés szórakoztató	1	2	3	4	5
elektronikai cikkel rendelkezem.					
Általában az utolsók között vagyok a baráti körömben azok	1	2	3	4	5
között, akik megvesznek egy új szórakoztató elektronikai					
terméket, mikor az megjelenik.					
Már ismerem az új szórakoztató elektronikai termékek nevét a	1	2	3	4	5
többi embernél korábban.					
Ha hallanám, hogy megjelent egy új szórakoztató elektronikai	1	2	3	4	5
termék a boltokban, akkor az érdekelne annyira, hogy meg is					
vegyem.					
Akkor is megvennék egy új szórakoztató elektronikai terméket,	1	2	3	4	5
hogyha csak kevés tapasztalatom van vele kapcsolatban.					

Appendix 8.

Questions for the professional interviews

- 1) Market and penetration of digital video recorder
 - According to their estimation, how many households have a DVR (own + competitors)
 - How fast is the diffusion of the device? Do they experience a steady or dynamic growth?
 - What are their short and long term expectations?
 - From a business point of view, what is the importance and role of DVR in the television programme distribution portfolio?
 - How do they think about IPTV and DVR in the long term?
 - Do they have development plans concerning DVR?
- 2) Experiences about consumers
 - In the advertising messages, after the very first campaign ("apakezdődik" – "daddy it starts"), many service providers put DVR into focus again (Aunt Magdi falls down the steps, World Championship of football). What is their experience, do consumers understand and inquire about these?
 - What is the opinion of their consumers about the DVR? How pleased are they? Does this help to keep the consumers? Do they stick to their appliance? Does this improve their loyalty? Are they willing to pay more for it? Since they can choose between DVR and non-DVR STB, what is the rate of choosing one or the other?
 - Do consumers give negative feedbacks? If yes, what are their problems?
 - What are the experiences about the use (based on STB data!) Do all DVR household use it, or are there different segments? Is there an identifiable learning curve after the appliance gets into the household, or consumers can use it right away? What kind of viewing preferences can they identify in the DVR households?
 - What are DVR households like? Is there any specific household model or psychographic, demographic, media consumption characteristics?
- 3) Content providers (TV channels) and other stakeholders (i.e. advertiser)
 - What is the opinion of content providers and other stakeholders about the IPTV service and the DVR? Do the care or inquire about it? Does it mean a concern for them even if a far one?
 - Do they plan special advertisements, or an entry into advertisement market using the new solutions provided by the IPTV and DVR?

Appendix 9/a

Final questionnaire

Dear Madame / Sir!

The aim of our research is to survey your habits, experiences and opinion about television viewing and media technologies. There are no correct or wrong answers, the questionnaire is for surveying the different perceptions and opinions.

With your answers you contribute to the research of Nóra Nyirő, fellow of the Corvinus University Budapest. Filling out the questionnaire would take cc. 15 minutes. Please start the questionnaire only if you have this amount of time under quiet circumstances! During the questionnaire you will need the loudspeakers or headphones of your computer.

Filling out the questionnaire is voluntary!

Thank you for your cooperation!

K1. Please rate how much do you agree with the following statements about television viewing! Please do not just think about television in general, but try to remember tv programmes (movies, series, sport, show, news, etc.) that you like to watch, even from recordings. (1 = strongly disagree, 7 = strongly agree)

Obligatory: YES F	RANDOM						
	Strongl y disagree - 1	Diagree - 2	Modera tely disagre e - 3	Neither agree nor disagre e - 4	Modera tely disagre e - 5	Agree- 6	Strongly agree - 7
Watching television means relaxation for me.	\odot_1	\odot_2	\odot_3	\odot_4	\odot_5	\odot_6	\odot_7
Watching television provides company.	\odot_1	\odot_2	\odot_3	\odot_4	\odot_5	\odot_6	\odot_7
Watching television provides excitement.	\odot_1	\odot_2	\odot_3	\odot_4	\odot_5	\odot_6	\odot_7
Watching television helps me to pass time.	\odot_1	\odot_2	\odot_3	\odot_4	\odot_5	\odot_6	\odot_7
Watching television makes me to forget about problems.	\odot_1	\odot_2	••3	\odot_4	\odot_5	\odot_6	⊙ ₇
Watching television entertaines me.	\odot_1	\odot_2	\odot_3	\odot_4	\odot_5	\odot_6	\odot_7
Watching television makes me happy.	\odot_1	\odot_2	\odot_3	\odot_4	\odot_5	\odot_6	\odot_7
While watching television makes me to feel less lonely	\odot_1	\odot_2	••3	\odot_4	\odot_5	\odot_6	⊙ ₇
Watching television gives enjoyment.	\odot_1	\odot_2	\odot_3	\odot_4	\odot_5	\odot_6	\odot_7
Watching television makes me relaxed.	\odot_1	\odot_2	\odot_3	\odot_4	\odot_5	\odot_6	• ₇
Watching television is a good option if I want some thrilling.	\odot_1	\odot_2	⊙₃	\odot_4	\odot_5	\odot_6	⊙ ₇
I choose watching television if I just want something to do	\odot_1	\odot_2	•3	\odot_4	⊙ ₅	\odot_6	• ₇
I choose watching television if I want get away from what I am doing	\odot_1	\odot_2	••3	\odot_4	⊙₅	\odot_6	• ₇

Watching television helps to learn about life	\odot_1	\odot_2	\odot_3	\odot_4	\odot_5	\odot_6	\odot_7
I choose watching television if I want to learn today's news	\odot_1	\odot_2	\odot_3	\odot_4	\odot_5	\odot_6	⊙ ₇
I choose watching television if I want to learn how to handle my problems	\odot_1	\odot_2	••3	\odot_4	⊙ ₅	\odot_6	⊙ ₇

K2. How many television sets has your household got?

- \odot 1. there are no television sets in our household
- \odot 2. there is 1 television set in our household
- \odot 3. there are 2 television sets in our household
- \odot 4. there are 3 television sets in our household
- \odot 5. there are 4 or more television sets in our household

K3. Please rate how much do you agree with the following statements about your television viewing habits!

(1 = strongly disagree, 7 = strongly agree)										
	Strongl y disagree - 1	Diagree - 2	Moderate ly disagree - 3	Neither agree nor disagree - 4	Moderate ly disagree - 5	Agree- 6	Strongl y agree - 7			
Watching television is one of the most important things I do each day.	\odot_1	\odot_2	\odot_3	\odot_4	\odot_5	\odot_6	\odot_7			
If the television set wasn't working, I would really miss it.	\odot_1	\odot_2	•3	\odot_4	\odot_5	\odot_6	\odot_7			
Watching television is very important in my life.	\odot_1	\odot_2	\odot_3	\odot_4	\odot_5	\odot_6	\odot_7			
I could easily do without television for several days.	\odot_1	\odot_2	•3	\odot_4	\odot_5	\odot_6	\odot_7			
I would feel lost without television to watch.	\odot_1	\odot_2	\odot_3	\odot_4	\odot_5	\odot_6	• 7			

K4a. Has your household got appliances for recording television programmes? You can choose several answers!

Obligatory: YES ~

~

~

~

1. Yes, we have a video recorder (to record on analog video casette).

- 2. Yes, we have a DVD recorder (to record on DVD disk).
- 3. Yes, we have a set-top-box (media box), containing a digital video recorder.
- 4. No, we don't have any recording appliances.

K4b. Since when has your household got a digital recording appliance (set-top-box, media-box)? Mark the closest time interval!

Appears if: K4a_3 Obligatory: YES

- \odot 1. Less than 6 months.
- \odot 2. About 1 year.
- 0 3. About 2 years.
- \odot 4. More than 2 years.

K4c. Do you use the digital video recorder (stop, rewind, record, record of series) while watching television?

Appears if: K4a_3 Obligatory: YES

• 1. Yes, I regularly use it: I record different programmes, movies, series weekly, and I often stop or rewind the programme being watched.

• 2. Yes, I occasionally use it: sometimes (monthly, or in special occasions) I record programmes, or stop, rewind the programme being wathced.

• 3. Yes, I have already tried it: I have rarely recorded programs, or stopped or rewinded the programme being watched

4. No, I have never used this function, but I'll try it.

• 5. No, I have neves used this function, and I don't plan to try it.

K5. Please rate how much are the following statements true of you concerning the non real time video content viewing! Obligatory: YES RANDOM

	/1						
	Very untrue	Untrue	Somewh at untrue	Neutral	Somewh at true	True	Very true
When choosing a television subscription, it is important to have a digital video recorder technology in the subscription.	\odot_1	\odot_2	⊙3	\odot_4	⊙₅	\odot_6	⊙7
I watch movies, series and programmes on the internet (not downloaded).	\odot_1	\odot_2	⊙₃	\odot_4	\odot_5	\odot_6	⊙ ₇
I download movies, series and programmes from the internet to watch later.	\odot_1	\odot_2	⊙₃	\odot_4	\odot_5	\odot_6	• 7
I watch television programmes ont he internet ont he webpages of television channels.	\odot_1	\odot_2	\odot_3	\odot_4	\odot_5	\odot_6	⊙ ₇
I watch television or other video content on my mobile phone.	\odot_1	\odot_2	•3	\odot_4	\odot_5	\odot_6	• 7

Now please watch the following short film about the features of digital video recorders and the possibilities of digital television viewing!

To watch the video, please turn on the loudspeakers of your computer or put on your headphones! You can play the video by clicking the play button! After watching the film, you can continue filling the questionnaire by clicking the "Continue" button,

K6a. After you have watched the short film, please rate the following statements about the digital video recorder, irrespective of if you have such an appliance int he household or not!

Based on the short film illustrating the the digital video recorder, and possibly about your own experiences, please rate how much do you agree with the following statements! (1 = strongly disagree, 7 = strongly agree)

	Strongly disagree - 1	Diagree - 2	Moderate ly disagree - 3	Neither agree nor disagre e - 4	Modera tely disagre e - 5	Agree- 6	Strongly agree - 7
Using DVR would enable me to accomplish tasks more quickly.	\odot_1	\odot_2	\odot_3	\odot_4	\odot_5	\odot_6	⊙ ₇
Using DVR increases the value and enjoyment of television viewing.	\odot_1	\odot_2	\odot_3	\odot_4	\odot_5	\odot_6	⊙ ₇
Using DVR would enhance my effectiveness.	\odot_1	\odot_2	\odot_3	\odot_4	\odot_5	\odot_6	\odot_7
I would find DVR useful in my life.	\odot_1	\odot_2	\odot_3	\odot_4	\odot_5	\odot_6	\odot_7
The interaction with DVR is clear and understandable	\odot_1	\odot_2	⊙₃	\odot_4	\odot_5	\odot_6	⊙ ₇
Interaction with DVR does not require a lot of mental effort	\odot_1	\odot_2	• 3	\odot_4	\odot_5	⊙ ₆	⊙ ₇
I find DVR easy to use	\odot_1	\odot_2	\odot_3	\odot_4	\odot_5	\odot_6	\odot_7
I find it easy to get DVR to do what I want it to do	\odot_1	\odot_2	\odot_3	\odot_4	\odot_5	\odot_6	\odot_7
Assuming I have access to the DVR I intend to use it	\odot_1	\odot_2	\odot_3	\odot_4	\odot_5	\odot_6	• 7
Given that I have access to the DVR I predict that I would use it in the future.	\odot_1	\odot_2	•3	\odot_4	\odot_5	⊙ ₆	• ₇

Obligatory:yes RANDOM

K6b. After you have watched the short film, please rate the following statements about the digital video recorder, irrespective of if you have such an appliance int he household or not!

Based on the short film illustrating the the digital video recorder, and possibly about your own experiences, please rate how much do you agree with the following statements! (1 = strongly disagree, 7 = strongly agree) Obligatory: ves RANDOM

Obligatory.yes r	ANDOM						
	Strongly disagree - 1	Diagree - 2	Moderate ly disagree - 3	Neither agree nor disagre e - 4	Modera tely disagre e - 5	Agree- 6	Strongly agree - 7
Using DVR would not scare me at all.	\odot_1	\odot_2	\odot_3	\odot_4	\odot_5	\odot_6	\odot_7
Using DVR would make me feel unconfortable and uneasy.	\odot_1	\odot_2	\odot_3	\odot_4	\odot_5	\odot_6	⊙ ₇
Using DVR would make me nervous.	\odot_1	\odot_2	\odot_3	\odot_4	\odot_5	\odot_6	\odot_7
I found using the DVR enjoyable	\odot_1	\odot_2	\odot_3	\odot_4	\odot_5	\odot_6	\odot_7
The actual process of using the DVR is pleasant	\odot_1	\odot_2	\odot_3	\odot_4	\odot_5	\odot_6	\odot_7
I have fun using the DVR.	\odot_1	\odot_2	\odot_3	\odot_4	\odot_5	\odot_6	\odot_7
People around me who use DVR and so the forwarding, stopping functions, have more prestige than those who do not.	⊙ ₁	••2	•3	⊙₄	⊙₅	⊙ ₆	⊙7
People around me who use DVR and so the forwarding, stopping functions, have a high profile	\odot_1	•2	⊙₃	\odot_4	⊙₅	\odot_6	⊙ ₇
Having a DVR and so using the forwarding and stopping functions, is a status symbol around me.	\odot_1	••2	⊙₃	\odot_4	⊙₅	\odot_6	• ₇

K7. Please rate how much do you agree with the following statements about your behavoir! (1 = strongly disagree, 7 = strongly agree) Obligatory:yes RANDOM

Obligatory:yes R	ANDOM						
	Very untrue	Untrue	Somewh at untrue	Neutral	Somew hat true	True	Very true
I could use the electronic technologies if there is no one around to tell me what to do as I go.	\odot_1	\odot_2	⊙₃	\odot_4	\odot_5	\odot_6	⊙ ₇
I could only use the electronic technologies if someone showed me how to use.	\odot_1	\odot_2	⊙₃	\odot_4	\odot_5	\odot_6	⊙ ₇
I could only use the electronic technologies if I had used similar technology before this.	\odot_1	\odot_2	⊙₃	\odot_4	⊙₅	\odot_6	⊙ ₇

I could use the electronic technologies if I had just the built in help facilities for assistance.	\odot_1	\odot_2	• 3	\odot_4	⊙₅	\odot_6	⊙ ₇
In general, I am the last in my circle of friends to know about the latest new electronic entertainment equipment.	\odot_1	• 2	⊙₃	\odot_4	⊙₅	\odot_6	⊙ ₇
Compared to my friends, I own very little electronic entertainment equipment	\odot_1	\odot_2	\odot_3	\odot_4	\odot_5	\odot_6	⊙ ₇
In general, I am among the last m my circle of friends to buy new electromc entertainment equipment when]tappears	\odot_1	• 2	⊙₃	\odot_4	⊙₅	\odot_6	⊙ ₇
I know the names of new electronic entertainment equipment before other people do.	\odot_1	\odot_2	••3	\odot_4	⊙₅	\odot_6	⊙ ₇
If 1 heard that new electromc entertainment equipment was avadable in the store, I would be interested enough to buy it.	\odot_1	⊙ ₂	⊙₃	⊙₄	⊙₅	⊙ ₆	⊙ ₇
I will buy a new 1tern of electromc entertainment equipment even if 1 have had little experience with it	\odot_1	••2	•3	⊙₄	⊙₅	⊙ ₆	⊙ ₇

K8. Please indicate the technology devices you or your household have and uses at least ocasionally!

No. Please multicate the technology devices you of your household have and uses at least ocasionally. Please read the explanation before starting! (Indicate first and second column if you have the technology device in your household and you use i tat least occasionally, indicate only the first if you have the device but you did not use it, or just tried it, and indicate column three if there is no suck kind of device in your household.

	We have in my household	I use it at least occasionally	Not availabe in my house hold
Smartphone, any function used.	\checkmark_1	\checkmark_2	\checkmark_3
Mobile phone, used for video, television content viewing	\checkmark_1	✓ 2	\checkmark_3
Mobile phone, used for gaming.	\checkmark_1	\checkmark_2	\checkmark_3
Mobile phone, used for internet surfing, emailing.	\checkmark_1	√ 2	\checkmark_3
Laptop / Notebook used for work or learning.	\checkmark_1	\checkmark_2	\checkmark_3
Laptop / Notebook used for gaming.	\checkmark_1	\checkmark_2	\checkmark_3
Laptop / Notebook used for video content, television content viewing.	\checkmark_1	\checkmark_2	\checkmark_3
Laptop / Notebook used for internet surfing, emailing	\checkmark_1	\checkmark_2	\checkmark_3
PC used for work or learning.	\checkmark_1	\checkmark_2	\checkmark_3

Obligatory:yes

PC used for gaming.	\checkmark_1	\checkmark_2	\checkmark_3
PC used for video content, television content viewing.		\checkmark_2	\checkmark_3
PC used for internet surfing, emailing	\checkmark_1	\checkmark_2	\checkmark_3

K10. What kind of television access do you have at home?

More answer possible! Obligarory:yes

SUSSISS

- 1. digital cable (eg. UPC digital, T-kábel)
- 2. digital satelite (eg. UPC Direct, DigiTV)
- 3. digital microwave (Antenna Digital)
- 4. IPTV (T-home, InviTV)
- 5. traditional analogue cable (eg. UPC, T-kábel, Fibernet)
- 6. separate satelite (no subscription)
- 7. terrestrial broadcast, (no subscription)

-66666. Do not know K11. If you have any comment regarding DVR technology, its functions, its usage, please indicate now!

Appedix 9/b.

Scales and measurement model analysis

		Removed based on the validity and
Coding	Statement (scale item)	reliability test
PESU_1	Watching television provides company	
PESU_2	Watching television helps me to feel less lonely	
PEEntU_1	Watching television gives me entertainment	
PEEntU_2	Watching television makes me happy	
PEEntU_3	Watching television gives enjoyment	
TVaff_1	Watching television is one of the most important things I do each day.	
TVaff_2	If the television set wasn't working, I would really miss it.	
TVaff_3	Watching television is very important in my life.	
TVaff_4	I could easily do without television for several days.	х
TVaff_5	I would feel lost without television to watch.	
Anx_1	Using DVR would not scare me at all.	Х
Anx_2	Using DVR would make me feel unconfortable and uneasy.	
Anx_3	Using DVR would make me nervous.	
	I could use the electronic technologies if there is no one around to tell me what to do	
SelfEff_1	as I go.	X
SelfEff_2	I could only use the electronic technologies if someone showed me how to use.	
C - 1656 - 0	I could only use the electronic technologies if I had used similar technology before	
SelfEff_3	uns.	
SelfFff 4	assistance.	x
PEni 1	I found using the DVR eniovable	^
PEni 2	The actual process of using the DVR is pleasant	
PEni 3	I have fun using the DVR.	
PU 1	Using DVR would enable me to accomplish tasks more quickly.	X
PU 2	Using DVR increases the value and enjoyment of television viewing.	
PU 3	Using DVR would enhance my effectiveness.	
PU 4	I would find DVR useful in my life.	
PEOU 1	The interaction with DVR is clear and understandable	
PEOU 2	Interaction with DVR does not require a lot of mental effort	
PEOU 3	I find DVR easy to use	
PEOU 4	I find it easy to get DVR to do what I want it to do	
BI 1	Assuming I have access to the DVR I intend to use it	
BI 2	Given that I have access to the DVR I predict that I would use it in the future.	

Descriptive Statistics												
	Ν	Minimum	Maximum	Mean	Std. Deviation							
PESU_1	500	1,00	7,00	3,2640	1,67688							
PESU_2	500	1,00	7,00	3,6460	1,66921							
PEEntU_1	500	1,00	7,00	5,0900	1,25581							
PEEntU_2	500	1,00	7,00	4,3920	1,40224							
PEEntU_3	500	1,00	7,00	4,2760	1,40989							
TVaff_1	500	1,00	7,00	2,7780	1,64625							
TVaff_2	500	1,00	7,00	2,9160	1,76271							
TVaff_3	500	1,00	7,00	2,9660	1,55489							
TVaff_4	500	1,00	7,00	2,8320	1,80840							
TVaff_5	500	1,00	7,00	2,6340	1,66421							
PU_1	500	1,00	7,00	4,0260	1,69679							
PU_2	500	1,00	7,00	4,7880	1,65303							
PU_3	500	1,00	7,00	4,1280	1,67368							
PU_4	500	1,00	7,00	4,6380	1,63104							
PEOU_1	500	1,00	7,00	5,5440	1,30056							
PEOU_2	500	1,00	7,00	5,5980	1,35649							
PEOU_3	500	1,00	7,00	5,5040	1,34819							
PEOU_4	500	1,00	7,00	5,4520	1,43800							
BI_1	500	1,00	7,00	4,8160	1,71699							
BI_2	500	1,00	7,00	4,2740	1,80262							
Anx_1	500	1,00	7,00	2,5180	1,50805							
Anx_2	500	1,00	7,00	2,6120	1,51064							
Anx_3	500	1,00	7,00	2,6020	1,44352							
PEnj_1	500	1,00	7,00	4,4620	1,49030							
PEnj_2	500	1,00	7,00	4,3720	1,47715							
PEnj_3	500	1,00	7,00	4,0940	1,53031							
Imag_1	500	1,00	7,00	3,0140	1,75954							
lmag_2	500	1,00	7,00	2,8220	1,68404							
lmag_3	500	1,00	7,00	2,9560	1,68872							
SelfEff_1	500	1,00	7,00	5,5180	1,60213							
SelfEff_2	500	1,00	7,00	5,5940	1,61939							
SelfEff_3	500	1,00	7,00	5,4620	1,59676							
SelfEff_4	500	1,00	7,00	5,6680	1,49608							
Valid N (listwise)	500											

	Seff	PEnj	BI	PEOU	PU	Tvaff	PESU	Anx	PEntU
SelfEff_2	0,883	-0,012	0,021	0,334	0,012	-0,266	-0,164	-0,357	-0,136
SelfEff_3	0,875	-0,012	0,021	0,331	0,012	-0,264	-0,162	-0,353	-0,134
PEnj_1	-0,011	0,836	0,58	0,348	0,607	0,236	0,266	-0,269	0,267
PEnj_2	-0,011	0,804	0,558	0,335	0,584	0,227	0,256	-0,258	0,257
PEnj_3	-0,011	0,844	0,585	0,351	0,612	0,238	0,269	-0,271	0,269
BI_1	0,021	0,626	0,903	0,418	0,82	0,184	0,177	-0,364	0,34
BI_2	0,019	0,574	0,827	0,383	0,751	0,169	0,162	-0,333	0,311
PEOU_4	0,305	0,336	0,373	0,807	0,36	-0,1	-0,026	-0,421	0,092
PEOU_3	0,352	0,388	0,431	0,931	0,415	-0,115	-0,03	-0,486	0,107
PEOU_2	0,323	0,355	0,395	0,853	0,381	-0,105	-0,028	-0,445	0,098
PEOU_1	0,34	0,374	0,416	0,899	0,401	-0,111	-0,029	-0,469	0,103
PU_4	0,013	0,662	0,827	0,407	0,912	0,266	0,337	-0,346	0,372
PU_3	0,011	0,561	0,702	0,345	0,773	0,225	0,286	-0,294	0,316
PU_2	0,011	0,545	0,681	0,335	0,751	0,219	0,278	-0,285	0,307
TVaff_5	-0,264	0,248	0,179	-0,109	0,256	0,878	0,513	0,182	0,48
TVaff_3	-0,239	0,223	0,161	-0,098	0,231	0,792	0,462	0,164	0,433
TVaff_2	-0,263	0,246	0,178	-0,108	0,254	0,873	0,51	0,181	0,477
TVaff_1	-0,253	0,237	0,171	-0,104	0,244	0,839	0,49	0,174	0,459
PESU_2	-0,14	0,241	0,148	-0,025	0,28	0,442	0,756	0,064	0,416
PESU_1	-0,165	0,283	0,174	-0,029	0,329	0,519	0,888	0,075	0,488
Anx_3	-0,354	-0,282	-0,354	-0,458	-0,333	0,182	0,074	0,878	-0,071
Anx_2	-0,32	-0,255	-0,319	-0,414	-0,301	0,164	0,067	0,793	-0,064
PEEntU_3	-0,13	0,271	0,319	0,097	0,346	0,464	0,466	-0,069	0,848
PEEntU_2	-0,127	0,264	0,312	0,095	0,338	0,453	0,456	-0,067	0,829
PEEntU_1	-0,121	0,252	0,297	0,09	0,322	0,432	0,434	-0,064	0,789

Correlation of scale items and latent variables

Correlation of latent variables

	Soff	DEni	BI	PEOLI	DLI	Tyaff	DESII	Δηγ	DEntll
Seff	1	FLIIJ	Ы	FLOO	FU	Ivan	FL30	AllA	FLIILO
PEnj	-0,014	1							
BI	0,023	0,694	1						
PEOU	0,378	0,416	0,463	1					
PU	0,014	0,726	0,907	0,446	1				
Tvaff	-0,301	0,282	0,204	-0,124	0,291	1			
PESU	-0,186	0,319	0,196	-0,033	0,37	0,584	1		
Anx	-0,404	-0,321	-0,403	-0,522	-0,38	0,207	0,084	1	
PEntU	-0,153	0,319	0,376	0,115	0,408	0,547	0,55	-0,081	1

Correlation of scale items

	SelfEff 2	SelfEff 3	PEnj 1	PEnj 2	PEnj 3	BI 1	BI 2	PEOU 4	PEOU 3	PEOU 2	PEOU 1	PU 4	PU 3	PU 2	TVaff 5	TVaff 3	TVaff 2	TVaff 1	PESU 2	PESU 1	Anx 3	Anx 2	PEEntU 3	PEEntU 2
SelfEff_3	0,773	1		<i>(</i> =	(=									_			-					_		_
PEnj_1	-0,01	-0,01	1																					
PEnj_2	-0,01	-0,01	0,672	1																				
PEnj_3	-0,01	-0,01	0,705	0,678	1																			
BI_1	0,019	0,019	0,524	0,504	0,528	1																		
BI_2	0,017	0,017	0,48	0,461	0,484	0,747	1																	
PEOU_4	0,269	0,267	0,281	0,27	0,283	0,337	0,309	1																
PEOU_3	0,311	0,308	0,324	0,312	0,327	0,39	0,357	0,751	1															
PEOU_2	0,285	0,282	0,297	0,286	0,3	0,357	0,327	0,688	0,795	1														
PEOU_1	0,3	0,298	0,313	0,301	0,316	0,376	0,345	0,725	0,837	0,767	1													
PU_4	0,011	0,011	0,553	0,532	0,559	0,747	0,685	0,328	0,379	0,347	0,366	1												
PU_3	0,01	0,01	0,469	0,451	0,474	0,634	0,58	0,278	0,321	0,294	0,31	0,705	1											
PU_2	0,009	0,009	0,456	0,438	0,46	0,615	0,564	0,27	0,312	0,286	0,301	0,685	0,581	1										
TVaff_5	-0,234	-0,232	0,207	0,199	0,209	0,162	0,148	-0,088	-0,101	-0,093	-0,098	0,233	0,198	0,192	1									
TVaff_3	-0,211	-0,209	0,187	0,18	0,188	0,146	0,134	-0,079	-0,091	-0,084	-0,088	0,21	0,178	0,173	0,695	1								
TVaff_2	-0,232	-0,23	0,206	0,198	0,208	0,161	0,147	-0,087	-0,101	-0,092	-0,097	0,232	0,197	0,191	0,767	0,691	1							
TVaff_1	-0,223	-0,221	0,198	0,19	0,2	0,154	0,142	-0,084	-0,097	-0,088	-0,093	0,223	0,189	0,183	0,737	0,664	0,732	1						
PESU_2	-0,124	-0,123	0,201	0,194	0,203	0,134	0,123	-0,02	-0,023	-0,021	-0,022	0,255	0,216	0,21	0,388	0,35	0,386	0,37	1					
PESU_1	-0,146	-0,144	0,236	0,227	0,239	0,157	0,144	-0,023	-0,027	-0,025	-0,026	0,3	0,254	0,247	0,455	0,411	0,453	0,435	0,671	1				
Anx_3	-0,313	-0,31	-0,236	-0,227	-0,238	-0,319	-0,293	-0,37	-0,427	-0,391	-0,412	-0,304	-0,258	-0,25	0,16	0,144	0,159	0,153	0,056	0,066	1			
Anx_2	-0,283	-0,28	-0,213	-0,205	-0,215	-0,289	-0,264	-0,334	-0,385	-0,353	-0,372	-0,275	-0,233	-0,226	0,144	0,13	0,143	0,138	0,051	0,059	0,696	1		
PEEntU_3	-0,115	-0,114	0,226	0,218	0,228	0,288	0,264	0,078	0,09	0,083	0,087	0,316	0,268	0,26	0,407	0,367	0,405	0,389	0,353	0,414	-0,061	-0,055	1	
PEEntU_2	-0,112	-0,111	0,221	0,213	0,223	0,282	0,258	0,077	0,088	0,081	0,085	0,309	0,262	0,254	0,398	0,359	0,396	0,38	0,345	0,405	-0,059	-0,053	0,703	1
PEEntU_1	-0,107	-0,106	0,21	0,202	0,212	0,268	0,246	0,073	0,084	0,077	0,081	0,294	0,249	0,242	0,379	0,342	0,377	0,362	0,328	0,385	-0,056	-0,051	0,669	0,654

Appendix 10.							
SEM model fit indices and acceptance criteriom							
(Hair et al. 2010: 647)							

No. of Stat		N < 250		N > 250				
vars. (m)	<i>m</i> ≤ 12	12 < <i>m</i> < 30	<i>m</i> ≥ 30	<i>m</i> < 12	12 < <i>m</i> < 30	<i>m</i> ≥ 30		
χ²	Insignificant p-values expected	Significant <i>p</i> -values even with good fit	Significant <i>p</i> -values expected	Insignificant <i>p</i> -values even with good fit	Significant p-values expected	Significant <i>p</i> -values expected		
CFI or TLI	.97 or better	.95 or better	Above .92	.95 or better	Above .92	Abo e 90		
RNI	May not diagnose misspecification well	.95 or better	Above .92	.95 or better, not used with N > 1,000	Above .92, not used with N > 1, 00	Above .90, not used with N > 1,000		
SRMR	Biased upward, use other indices	.08 or less (with CFI of .95 or higher)	Less than .09 (with CFI above .92)	Biased upward; use other indices	.08 less (with CFI above .92)	.08 or less (with CFI above .92)		
RMSEA	Values < .08 with CFI = .97 or higher	Values < .08 with CFI of .95 or higher	Values < .08 with CFI above .92	Values .07 wih CIf.97 ohigher	Values < .07 with CFI of .92 or higher	Values < .07 with CFI of .90 or higher		

Note: m = number of observed variables; N applies to number of observations per gr p when applying CFA to multiple groups at the same time.

Appendix 11.

Analysis of television gratificatioins Total sample

Test of Homogeneity of Variances

	Levene Statistic	df1	df2	Sig.
Relax_avr	3,468	1	353	,063
Pesu_avr	4,922	1	353	,027
Excite_avr	,032	1	353	,859
PassTime_avr	,404	1	353	,526
Escape_avr	2,986	1	353	,085
Entertain_avr	,144	1	353	,705
Learning_avr	2,077	1	353	,150

		ANOV	'A			
		Sum of Squares	df	Mean Square	F	Sig.
Relax_avr	Between Groups	,911	1	,911	,559	,455
	Within Groups	575,451	353	1,630		
	Total	576,362	354			
Pesu_avr	Between Groups	,084	1	,084	,038	,845
—	Within Groups	772,304	353	2,188		
	Total	772,387	354			
Excite_avr	Between Groups	,014	1	,014	,008	,929
	Within Groups	615,561	353	1,744		ļ
	Total	615,575	354			
PassTime_avr	Between Groups	,933	1	,933	,489	,485
	Within Groups	672,656	353	1,906		
	Total	673,589	354			
Escape_avr	Between Groups	,870	1	,870	,446	,505
	Within Groups	688,190	353	1,950		
	Total	689,059	354			
Entertain_avr	Between Groups	2,933	1	2,933	2,243	,135
	Within Groups	461,644	353	1,308		
	Total	464,577	354			
Learning_avr	Between Groups	,824	1	,824	,443	,506
	Within Groups	656,608	353	1,860		
	Total	657,432	354			

Robust Tests of Equality of Means

		Statistic ^a	df1	df2	Sig.
Relax_avr	Welch	,558	1	341,733	,456
Pesu_avr	Welch	,038	1	341,188	,845
Excite_avr	Welch	,008	1	353,000	,929
PassTime_avr	Welch	,489	1	352,195	,485
Escape_avr	Welch	,446	1	346,589	,505
Entertain_avr	Welch	2,243	1	352,872	,135
Learning_avr	Welch	,443	1	347,597	,506

a. Asymptotically F distributed.

Random subsamples

Descriptives									
				Std.		95% Confider	nce Interval for Mean		
		Ν	Mean	Deviation	Std. Error	Lower Bound	Upper Bound	Minimum	Maximum
Relax_avr	1	177	4,531	1,3849	,1041	4,326	4,737	1,0	7,0
	2	178	4,430	1,1593	,0869	4,258	4,601	1,0	7,0
	Total	355	4,480	1,2760	,0677	4,347	4,613	1,0	7,0
Pesu_avr	1	177	3,466	1,6075	,1208	3,228	3,705	1,0	7,0
	2	178	3,435	1,3393	,1004	3,237	3,634	1,0	6,5
	Total	355	3,451	1,4771	,0784	3,297	3,605	1,0	7,0
Excite_avr	1	177	3,785	1,3161	,0989	3,590	3,981	1,0	7,0
	2	178	3,798	1,3249	,0993	3,602	3,994	1,0	7,0
	Total	355	3,792	1,3187	,0700	3,654	3,929	1,0	7,0
PassTime_avr	1	177	4,246	1,4093	,1059	4,037	4,455	1,0	7,0
	2	178	4,143	1,3511	,1013	3,943	4,343	1,0	7,0
	Total	355	4,194	1,3794	,0732	4,050	4,338	1,0	7,0
Escape_avr	1	177	3,62	1,485	i,112	3,40	3,84	1	7
	2	178	3,52	1,302	,098	3,33	3,71	1	7
	Total	355	3,57	1,395	,074	3,42	3,71	1	7
Entertain_avr	1	177	4,86	1,129	,085	4,69	5,03	1	7
	2	178	4,68	1,158	,087	4,51	4,85	1	7
	Total	355	4,77	1,146	,061	4,65	4,89	1	7
Learning_avr	1	177	3,16	1,443	,108	2,94	3,37	1	7
	2	178	3,06	1,280	,096	2,87	3,25	1	7
	Total	355	3,11	1,363	,072	2,96	3,25	1	7

Test of Homogeneity of Variances

	Levene Statistic	df1	df2	Sig.
Relax_avr	3,468	1	353	,063
Pesu_avr	4,922	1	353	,027
Excite_avr	,032	1	353	,859
PassTime_avr	,404	1	353	,526
Escape_avr	2,986	1	353	,085
Entertain_avr	,144	1	353	,705
Learning_avr	2,077	1	353	,150

ANOVA									
		Sum of Squares	df	Mean Square	F	Sig.			
Relax_avr	Between Groups	,911	1	,911	,559	,455			
	Within Groups	575,451	353	1,630					
	Total	576,362	354						
Pesu_avr	Between Groups	,084	1	,084	,038	,845			
	Within Groups	772,304	353	2,188					
	Total	772,387	354						
Excite_avr	Between Groups	,014	1	,014	,008	,929			
	Within Groups	615,561	353	1,744					
	Total	615,575	354						
PassTime_avr	Between Groups	,933	1	,933	,489	,485			
	Within Groups	672,656	353	1,906					
	Total	673,589	354						
Escape_avr	Between Groups	,870	1	,870	,446	,505			
	Within Groups	688,190	353	1,950					
	Total	689,059	354						
Entertain_avr	Between Groups	2,933	1	2,933	2,243	,135			
	Within Groups	461,644	353	1,308					
	Total	464,577	354						
Learning_avr	Between Groups	,824	1	,824	,443	,506			
	Within Groups	656,608	353	1,860					
	Total	657,432	354						

Robust Tests of Equality of Means

		Statistic ^a	df1	df2	Sig.
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PassTime_avr	Welch	,489	1	352,195	,485
Escape_avr	Welch	,446	1	346,589	,505
Entertain_avr	Welch	2,243	1	352,872	,135
Learning_avr	Welch	,443	1	347,597	,506
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a. Asymptotically F distributed.