

## **Nested analysis-based mixed method research of television and video recording audiences**

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### **Abstract**

This article presents the theoretical background of mixed method research design and its relevance for audience research through the presentation of a mixed method based study. Following Lieberman (2005) my research design is a nested analysis where mixing large-N analysis (LNA) and small-N analysis (SNA) has been used. The purpose of the empirical research was to look at the individual acceptance of media technology innovation in case of television audiences, and exploring the changes in video content consumption and attitudes towards television and recording technology.

**Keywords:** mixed method research, nested analysis, audience research, video content consumption, digital video recorder, television.

### **Introduction**

This essay draws on insights and results on some audience research-related aspects from a longitudinal, 2 year study into the development and changes of television audiences, and their attitudes and relationship towards television and other video platform technologies. The research period covered the beginning of the diffusion of digital video recorder technology, an introduction which drew the attention of television service and content providers to considering the implications of the incremental changes caused by this technology in 2010. Although the final focus of the study was the digital video recorder as media technology innovation, I took a wider angle on wider television and other audio-visual content consumption during data-collection in the different phases.

My research interest focused on the changes in audiovisual and television audiences, and aimed to identify the factors influencing the acceptance and usage of the new digital devices into the previously passive television context. However it was evident from the first stage of the research process and design planning, that this complex context of audio-visual content consumption – involving different platforms, different contents, gratifications, many digital technologies and services as well as the wide range of audience characteristics

– requires a specific research approach to structure and orient the research design. At the same time I had expected, in the year that I launched the study, that there would be such small audiences for some of the technologies, most notably the digital video recorder, that I would need to adopt a specific approach allowing me to combine larger and smaller samples, and data collection methods. Another reason behind the selection of nested analysis-based mixed method study was that it provides different paths in the combination of Large-N analysis (LNA) and Small-N Analysis (SNA), depending on the results of the concrete study; and so it can ensure an expected flexibility during the research process and enable the researcher to identify the most suitable paths and topics within the overall study.

The essay is structured as follows: first, I give an overview of the theoretical background of the nested analysis-based mixed method research design; next, I introduce and explain step-by-step my nested analysis-based audience research study of television and video recording audiences; and finally, I discuss the lessons of the application of this research design for audience research studies.

### **Theoretical background – Mixed method research and Nested analysis**

“Mixed method research studies use qualitative and quantitative data collection and analysis techniques either in parallel or sequential phases.” (Teddlie-Tashakkori, 2003:11).

The advantage of combining various methods is the help it gives towards better answering 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 thereby reduces the weaknesses and deficiencies of each (Teddlie and Tashakkori, 2003).

According to Denzin (2009, [1970]), in any study the robustness of the research design can chiefly be increased through triangulation, that is, the use of methodological combinations. Denzin (1978) distinguishes four basic methods of triangulation. The first is triangulation of data, that is, the use of various data sources. The second is triangulation of participants, i.e. involving various researchers. The third is theoretical triangulation, that is, the interpretation of results 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 who mostly uses qualitative methodology, argues that the usage of mixed methods indicates that a researcher has recognized the need to stay open-minded as to the understanding of things in various ways. He highlights that methodological purity is less important than finding and collecting relevant and useful information.

Within mixed method research we can identify different paradigms, as Harrits (2011) argues. He emphasizes two main paradigms in mixed method research: the nested analysis approach and the praxeological knowledge-based approach. Nested Analysis was first suggested by Evan Lieberman in 2005, and refers to the way the choice of methods is

contained within a coherent model, depending on the results of previous analyses. The second was introduced by Bourdieu (1973) and implies a specific ordering of the research process. It requires a first stage of initial breaking with common sense and building an objective model, then a second break with the model, incorporating a reflexive sense of the limitations to objective knowledge.

The present mixed method study was based on Lieberman's (2005) nested analysis approach. Lieberman (2005) emphasized the lack of usage of mixed method research in political science. He offered a project which joined a case study with statistical analysis arguing that, beyond the separate advantages of each approach, there is a clear synergistic value of the nested research design. He argued that "statistical analyses can guide case selection for in-depth research, provide direction for more focused case studies and comparisons, and be used to provide additional tests of hypotheses generated from small-N research. Small-N analyses can be used to assess the plausibility of observed statistical relationships between variables, to generate theoretical insights from outlier and other cases, and to develop better measurement strategies" (Lieberman, 2005: 435). Nested analysis allowed the observation of the same reality (in my case, factors affecting acceptance, viewing habits, television as medium, and the internet as video platform) from different levels. The nested analysis is relevant for analysing individual behaviour and attitudes (Lieberman, 2005).

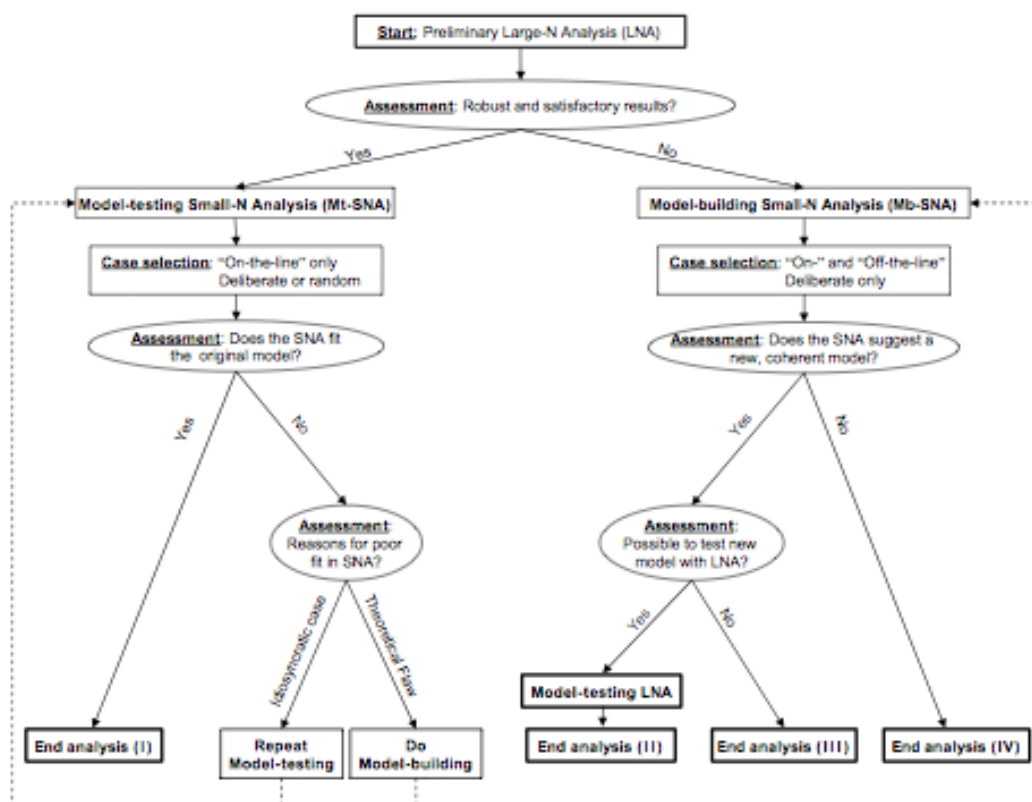
Lieberman's study delivers the benefits of distinct complementarities and a move from small-N analysis (SNA) towards Nested analysis. He describes a set of strategies for gaining maximum analytic leverage when combining SNA and LNA within a single framework (summarized in **Figure 1**).

LNA is defined by Lieberman (2005: 436) as "a mode of analysis in which the primary causal inferences are derived from statistical analyses which ultimately lead to quantitative estimates of the robustness of a theoretical model and SNA as a mode of analysis in which causal inferences about the primary unit under investigation are derived from qualitative comparisons of cases and/or process tracing of causal chains within cases across time, and in which the relationship between theory and facts is captured largely in narrative form".

The promise is that besides gaining complementary information from the LNA and SNA phases, the nested research design allows each step of the analysis to provide direction for approaching the next step, so that both LNA and SNA can inform each other, with the result that the analytic payoff is greater than the sum of the parts. LNA may provide insights about rival explanations and help the case-selection strategy for SNA, while SNA can help to improve the quality of measurement instruments and model specifications used in the LNA.

Depending on the results of the first LNA, one can move on Model testing Small N Analysis, if the results are robust, or Model building Small-N analysis if the results are not yet robust. Then the analyst has to consider the new findings and redirect insights from the SNA, and decide on either ending the analysis, or carrying out additional iterations of SNA or LNA. Nested analysis ensures both the exploration of general relationships and explanations

and the specific explanations of individual cases and groups of cases. This enables analysts to ask good questions and find the relevant answers (Lieberman, 2005).



**Figure 1:** Mixed method research as nested analysis (Lieberman, 2005: 437)

Lieberman (2005) states that nested analysis formally begins with a quantitative analysis, or preliminary LNA. “Thus, a prerequisite for carrying out a nested analysis is availability of a quantitative dataset, with a sufficient number of observations for statistical analysis. The preliminary LNA provides information that should ultimately complement the findings of the SNA, and that will guide the execution of the SNA” (Lieberman, 2005:437). The preliminary LNA guarantees an explicit consideration of the universe of cases for which the theory ought to apply. Also the goal of this preliminary LNA is to explore as many appropriate testable hypotheses as possible. This LNA study of course may have several forms depending on the availability of data (dichotomous, probabilistic or deterministic relationships).

Lieberman (2005) at the same time differentiates LNA and SNA from the generally-used methods of quantitative and qualitative analysis. He argues that SNA may also include quantitative analysis. “For example, one could analyse a survey of individuals for a given country if that analysis could shed light on the dynamics of the social or political process being studied for the country at large. The analysis of individual behaviour is specifically relevant to the nested approach only to the extent that they shed light on the larger questions being considered in the LNA. In a similar manner, the SNA might include time-series analysis (using country-year as the unit of observation) as a way of linking cause to

effect or for dealing with case-specific rival explanations, particularly when the LNA was carried out as cross-sectional analysis" (Lieberman, 2005:441). Beside Lieberman's (2005) examples, we could also consider a quantified content analysis approach in the SNA phase, or a small sample-based Q-methodology.

In summary, we can say that nested analysis aims to provide a stronger basis for causal inference than the sum of its small-N and large-N phases and delivers the complementary distinctiveness in the two modes of analysis (Lieberman, 2005). As a weakness, Lieberman (2005) does say that the costs of integrating LNA and SNA are significant, mainly in additional work, as more investigator effort is required.

However this nested analysis approach is not entirely new in political science, rather, it is a systematization of an approach within a field. A central contribution of nested analysis is the way it considers research design and case-selection to be dependent on the purpose of SNA. Nested analysis is the way to gain causal leverage due to the combination of methods (Harrits, 2011). A mixed method research strategy of nested analysis permits a "zooming in" on the causal processes, and so a defining element of nested analysis is the continuous alteration between LNA and SNA while all analytical steps are directed towards the same goal (Lieberman, 2005). When using nested analysis, we are observing the same reality from different levels of analysis, which enables the researcher to establish orientations and verification during the research process.

My study was initiated within the methodological approach of nested analysis, focused on understanding audiences in terms of their media technology innovation acceptance and use. Rather differently from the context of the political science studies cited by Lieberman (2005), where trends in country and mainly international level macro-level data are analyzed in the LNA phases and built further or tested by case studies, and individual-level data analysis in the SNA phases, my study could be run in one country and explored on a cumulative macro-level (the whole adult internet user population) the individual technology acceptance, while in SNA phases it provided the individual level analysis of different audience groups. I also used a pre-stage SNA (**Table 1**, phase 1.1) to prepare the first LNA phase (**Table 1**, phase 1.2) to maximize the gained knowledge of this first LNA stage.

### **Audience research by nested analysis – the case of video recording and television audiences**

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, and usage of new media technologies and innovations, and to identify the factors determining the acceptance thereof.

Through data collection triangulation a fully mixed method, and sequential research design was realized, having quantitative work as its dominant phases. The study used a cyclical design to make use of interim findings and integrate them into the preparation and

finalization of the next research phase. **Table 1** reflects this flow through the stages of empirical data collection, showing how the quantitative and qualitative phases were organised in relation to each other in the moves from data collection to analysis, meaning that our research could lead from exploratory to explanatory, or vice versa.

The research presented here was carried out between November 2008 and November 2010, focusing on television content consumption through different platforms and video recording (analogue and digital) audiences. The research had 3 qualitative and 3 quantitative phases, each offering different angles on the understanding of the explored audiences.

In **Table 1**, I present a summary of each research phase, their goal and sample size. The first exploratory survey (phase 1.2) took place in Fall 2008, focusing on video content consumption at a time when the hype of digital video recorder started spreading in the television market. In this data collection phase, as part of a larger overview I focused on the younger age groups (18-39 years) as I expected to be able to include more advanced digital technology users in my research. In order to better understand the conclusion of this research and to get acquainted with the users of digital television and digital video recorder technology, I inserted a qualitative research phase. During this, in-depth interviews (phase 2.1a) were conducted with lead users of these technologies about their online and mobile video content consumption. The methodology of interviewing was made more necessary by the fact that these subjects were hard to reach and thus too few in number for quantitative research; but they could provide, through their subjective points of view, insights, experiences, and stories that other research methods would not reveal. Parallel to these in-depth interviews, focus group interviews (phase 2.1b) were conducted with non-users and seldom-users of television technology which greatly helped in revealing, understanding and analysing other aspects of the habits and platforms of audio-visual content consumption.

In order to prepare a quantitative research model test for media technology innovation acceptance, I proceeded by pre-testing my research model in a survey (phase 2.2.) with university students. However, beside its methodological role, this phase also provided relevant new insights about this age group's relation with and attitude toward television and internet-based audio-visual content consumption.

Before running a whole population survey, the findings were discussed and validated by a marketing professional providing digital television and internet service. This qualitative phase (phase 3.1) ensured the explanatory side of the previous knowledge of users and viewers, and also introduced the reflections of service provider professionals about their audience.

The final data collection (phase 3.2) aimed to test my media technology innovation acceptance model, and captured wider information about the adult population regarding their television and internet affinity, their technology use and video content consumption platforms. The sample was composed of 18-69 year-old internet users who are in possession of a television set. This survey contributed to disclosing the factors which influence digital video recorder adoption, while, due to its wider data collection, it has also provided inputs

and insights about video content consumption of cross-media and non-cross-media audiences as well.

**Table 1:** Phases of the empirical research. Source: author's own table

<b>Research Phase.</b>	<b>Methodology</b>	<b>Aim</b>	<b>Method</b>	<b>Time</b>	<b>Sample</b>
1.1	<i>qualitative</i>	<i>preparation of the first LNA study, questionnaire development</i>	<i>market and academic experts; expert focus groups</i>	September 2008	two focus groups with n=6, 5 experts (30-59 yrs)
1.2	Quantitative LNA study	DTV attitude, online video consumption	online query	October 2008	n=1000 (incl. 40 owners of DVR sets) (18-39 yrs, internet user)
2.1a	Qualitative SNA study	analysis of lead users (DTV, DVR)	Semi-structured personal interviews	April-May 2010	n=5 (from 5 households) (30-36 yrs)
2.1b	Qualitative SNA study	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, (18-22 yrs)
2.2	<i>Quantitative LNA study</i>	<i>questionnaire, test of scales and the theoretical research model</i>	<i>online query (own questionnaire, through Google spreadsheets)</i>	10-16th May, 2010	n=234, university students, (19-27 yrs)
3.1	Qualitative SNA study	expert validation of research results	Semi-structured expert interviews	September, November, 2010	service providers 2 interviewee + 1 secondary source interview, (age not available)
3.2	Quantitative LNA study	study of DVR acceptance	online query	14-21st November, 2010	n=500, (18-69 yrs internet users)

The first qualitative phase and the second quantitative phase served first of all as methodological preparation for the next phases.

The mixed method-based audience and user research was well-suited to exploring variations in the construction of factors influencing and determining the video content

consumption habits, platforms and technology innovation acceptance. The systematic inquiry into the variations of meaning among interview and survey respondents helped to validate the research instruments and scales, and provided complementary subsets, enriching the overall findings.

### **First research phase**

After the pre-study SNA (phase 1.1) with professionals, which aimed to ensure that the quite expensive first LNA data collection was well-grounded, the study was launched by an LNA exploratory research (phase 1.2). The aim of this phase was to assess viewers' audio-visual content consumption habits and to reveal their judgments, perceptions and ratings of digital television. A particular focus was put on viewers' rating of time-shifting (when television content is not consumed in real-time, but after it has been aired), the perceived advantages thereof and the attitudes related to recording televisual content and advertisements. The survey in this phase was expressly carried out in an exploratory manner, aiming to register the levels of diffusion of the digital video recorder (DVR) and digital television technology; and as such, it aimed to work within a large-sample environment. The questionnaire was built on the results of international studies and empirical experience on time-shifting and digital video recording. The questionnaire focused on respondents' ratings of the advantages of the technology and their video content consuming habits, and examined their attitude towards television advertisements. I aimed to identify the factors influencing the take-up of digital video recorders and the use of time-shifting.

My exploratory study clearly showed that the younger, active internet-user and technology-oriented population have 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 associated with the digital video recorder (e.g., easy recording, pause and rewind functionality with live stream, ad zapping). This finding served as a reason to put these functions, related to the DVR, into the centre of my further study.

Recording habits do seem to be higher among DVR-owners than among those using analogue technology. However, these results should be taken cautiously, on the one hand because of the early date of my research (October 2008) in relation to the diffusion of this technology in Hungary, and on the other hand because of the limited number of respondents in my sample who were in possession of this device (n=40). Nonetheless, this result served as an important indicator in my further research, as it suggests the possibility that user habits do change with the further arrival of this technology into households, where technology would become an important element of television viewing.

At the same time, I observed that, although advertisement zapping is an important and valued element of digital television for users, it seems to occupy a less important position as a motivational factor. Thus we can put forward the proposition 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 of this into people's viewing habits.

The motives for use of analogue and digital video recorders do not differ substantially, so we must work with the notion that the gratification supplied by and the role of the two platforms are similar or identical. However, in the case of digital technology usage, a new motive appeared quite strongly, that of the ability of the user to interrupt their watching of television ("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.

As I could not yet form a good model or propose a causal relationship between digital recorder usage and predictor variables (advertising attitude, zapping, online video content consumption), I proceeded with a qualitative, model-building SNA research phase in which two directions were further investigated. On the one hand, I tried to expand the available intelligence on active and lead-users so as to better understand motivating factors among this niche viewer group; while on the other hand, I investigated 'deserters' from television and its technology, and their relation to digital technology, as I hoped to examine how far digital technology might play a role in renewing and improving the position and appeal of television. This model-building SNA served as a step to identify a new relevant model for the factors influencing new media technology acceptance and use in the case of the traditional television-related audio-visual content.

### **Second research phase – model building SNA and second LNA**

In this phase I focused on getting a deeper understanding of users' relation to technology, based on von Hippel's (1986) approach to collecting information about lead users (phase 2.1a). I intended to explore the habits of digital video recorder technology users in order to prepare for the following quantitative phase of my research. The collection of a wider array of information about active users was all the more important in that, in my preparatory study, the number of DVR users was fairly low, and the conclusions and insights derived from that study had to be further developed, in order to be properly understood. Because in this period of my data collection the penetration rate of DVR devices was very low, the methodology selected was personal interviewing so that I could focus on those rare lead users of the technology.

Interviewees were gathered through snowball sampling with the simple criterion that they had to be in possession of a digital video recorder. Their acquaintances thus knew that they had these devices, and that this technology previously had become a topic of conversation among them. The interviews show that these people are among the earliest entrants to the technology, and that they found out about its availability through the mass media, the commercials of service providers, and direct offers. For all interviewees, television had an important entertainment role. At the same time all interviewees were active technology users and multimedia consumers, who valued in their lives being

connected to the internet more highly than television itself. But it is important to see that while television appeared to be a means of spending spare time and satisfying needs for entertainment, the internet played multiple roles and satisfied a more complex array of needs, as it can be used, beyond the need for entertainment, as a work tool, a means of social correspondence or of gathering information. Within their portfolio of audiovisual content consumption, content available on the internet (eg, downloadable movies, series) also play an important role.

Informants considered the digital video recorder to be 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 to be more a learned behaviour, one which users acquire during the everyday use of the technology rather than this being a prior motive for use of their DVR. They would miss the functionalities of the DVR if they had to do without them or if they weren't available. Respondents valued the perceived usefulness attached to the DVR. Interviewees considered that DVR technology was easy to master and required a minimal investment of energy and time.

Alongside the in-depth interviews with DVR-owners, I decided to conduct focus group interviews (phase 2.1b) with people on the other edge of television attachment, as I considered the relation of viewers a decisive element to be further studied. As I was able to identify people who identified themselves as "rare or non-television viewers", focus groups were used in order to collect more opinions and data. The primary aim of this part of the study was to gather information about the ways digital technology and digital video recorders might raise the attractiveness of television viewing among those who have a less positive view of it. I was interested in participants' patterns of audiovisual content consumption (ie, what platforms they use, how frequently and what types of content do they consume). I wished to map all the alternative solutions currently in competition with television in order to be able to construct a consumption profile for my main study. I also asked the group of rejecters about their knowledge of digital television, and what additional functions and possibilities they would look for in digital television and the video recorder.

This focus group study unequivocally showed that consumers' perception of television as a medium and their content consumption can fundamentally shape the extent of technology acceptance of digital television and its functionalities. Occasional viewers, just like technology users, ranked the DVR as the most useful among the functionalities of digital television. This result shows again that this technology is the most attractive to both more active and less active viewers, and I therefore included this function at the centre of my next research phase. This direction seems also reinforced by the discovery that a non-user appears most likely to return to watching television on account of this functionality; once he had access to the technology in his 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 personal experience, and thus a personal try-out could lead to real technology acceptance, at least for technology rejecters.

It is also obvious that, just like in the case of my 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 to add user gratifications related to television into my model.

In this second SNA phase I 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 affinity). 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 displayed. At the same time it became clear that I had to integrate entertainment and social dimensions, which also may influence the acceptance and use of digital technologies. The model-building SNA phase suggested a new coherent model based on technology acceptance, and enlarged it by gratification-based and medium affinity-based variables. Following Lieberman's (2005) nested analysis structure, I integrated a model-testing LNA phase.

As a result of the cross-validated results of the exploratory study and the qualitative research phase, the emphasis of my 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 from the preliminary study unequivocally show the relevance of a research model based on the technology acceptance model. In this second LNA phase (phase 2.2) I developed a pre-test of my planned research model which included new relationships and variables. The primary goal of the pilot study and data collection was to test my scales and analytic potential of the gathered data. According to analyses carried out up to this stage, thanks to the evaluation and selection of more reliable scales for given variables, the retained variables were found to be reliable. The testing of the questionnaire shows that scale items, carefully prepared and developed after verified translation, were easy to interpret even in a self-administered questionnaire, yielding 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 and attachment, as well as media technologies' need-satisfying functions.

However, after this LNA phase in which I was able to prove the value of a relevant research model, some of the variables still seemed to be less relevant (eg, the impact of technology use on personal image, and personal innovativeness) and I was lacking the dimension of the service and technology provider side. For this reason, I integrated a model-testing SNA phase based on professional interviews, which aimed to validate the research model before the final national sample-based LNA study. This phase provided an even better selection of the influencing factors and eliminated the ones with no effect, but it also required pre-validation by the digital television and video recorder providers.

### **Third research phase: model testing SNA phase and model testing LNA**

In the third qualitative phase (phase 3.1), I arranged interviews with two significant actors of the market who provide digital television services, and thus also offer DVR devices. The main goal of this research phase was to bring expert validation to the data and model prepared during the preceding research phases. I also aimed to incorporate into my research some insights and experience from professionals in possession of broad market intelligence of television audiences and digital service users. This qualitative phase of expert interviews thus helped in gathering new evidence and better understanding the evidence already gathered, in order to be fully relevant and integrated before conducting a quantitative query on a national representative sample.

Both market expert interviewees and the already-received research materials confirmed the results of my preliminary and second qualitative research phases, showing that DVR technology is a decisive component within digital television. Users and subscribers value most this functionality and rank it first among the advantages offered by digital television those related to DVR (namely, that they are able to pause and rewind content and use the simple recording function). The interviews confirmed my insight from in-depth interviews with lead users about consumer satisfaction, seeing it as a positive evolution of television as a whole and one which affects the evolution of viewing habits. At the same time respondents' positive expectations about further market development and about the diffusion of DVR technology confirm those of my secondary sources and the positive user-evaluation of the technology that I observed during my previous research phases. DVR-users considered digital television useful, flexible and capable of reducing family conflicts while extending the possibility for a family to watch television together: all of which confirm and validate the research directions concerning users' perceived usefulness.

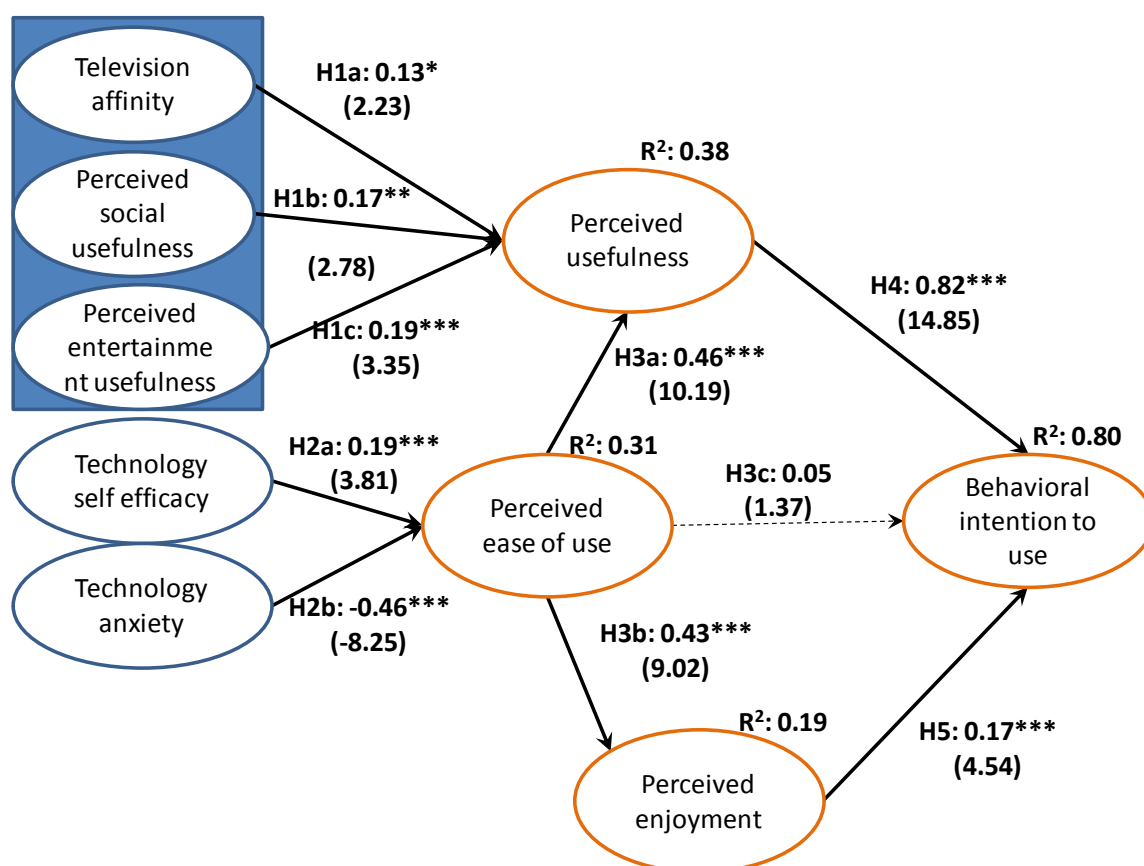
During the literature review and previous research phases, I established that the ease of learning how to use this technology, and the wide acceptance of this, have a crucial role in technology acceptance. Experts agreed with the conclusion of the previous research phases that the DVR is easy to learn, and that users tend to use this functionality of digital television from the beginning, and it remains among the most frequently used functionalities. Thus the examination of this perceived ease of use as a factor is relevant. This validation SNA phase helped me to finalize and clean the research model, and proved the relevance of it at the same time.

As a last step (phase 3.2) of my empirical research based on a mixed methodology, I tested my hypotheses on a representative sample of 18 to 69 years-old internet users. The main objective of this research phase was to test my empirical model and its hypotheses with structural modelling on a representative sample. I chose an online survey design for reasons of cost-effectiveness and fast results, a decision further supported by growing internet penetration rates. I was able to prove, through these model test results, a relationship between user gratifications and technology acceptance in case of media technology innovations.

I had a 500 person sample and 25 measured indicator variables; and I used criterion levels from Hair et al. (2010) to evaluate the final model. The results of structural equation

modelling 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 for Goodness of Fit Index (GFI), but this is also close, and often not recommended to use as it is highly influenced by sample size and model complexity. The model fit indices results are the followings: GFI = 0.89; Tucker Lewis Index (TLI) = 0.93; Comparative Fit Index (CFI) = 0.94; Root Mean Square Error of Approximation (RMSEA) = 0.063. These results suggest that my model fit is acceptable. **Figure 2** shows the final model with structural path coefficients and t-values for each hypothesized relationship as well as squared multiple correlations ( $R^2$ ) for each endogenous constructs.

**Figure 2:** A model showing causal paths and  $R^2$ . Source: author's own figure.



*Bold lines indicate significant paths ( $p < 0.05$ ), the dashed line indicates the insignificant path  
\*\*\*  $p < 0.001$ ; \*\*  $p < 0.01$ ; \*  $p < 0.05$ , t values in parentheses*

**Hypothesis testing.** For the statistical significance of parameter estimates, t-values were used. All hypotheses except hypothesis 3c (H3c: 0.05;  $t = 1.37$ ), namely, the path from perceived ease of use to behavioural intention to use, were statistically supported. The linkage of gratification theory and technology acceptance model is supported. Those ones which have a higher affinity for television perceived more value in this innovation, the DVR (H1a: 0.13;  $t = 2.23$ ). The television, as context of the innovation, gained social (H1b: 0.17;  $t =$

2.78) and entertainment (H1c: 0.19;  $t = 3.35$ ) usefulness, and this received positive statistical support.

As I had hypothesized, both the path from technology self-efficacy towards showing the technology usage skills of the individual (H2a: 0.19;  $t = 3.81$ ), and that from technology anxiety, reflecting individuals' unease, towards perceived ease of use (H2b: 0.46;  $t = -8.25$ ), showed positive significance.

The perceived ease of use of DVR is a positive, influencing both its perceived usefulness of DVR (H3a: 0.46;  $t = 10.18$ ) and the perceived enjoyment of using it (H3b: 0.43;  $t = 9.02$ ) (although, as I said before, the perceived ease of use did not have significant effect on behavioural 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 a significant positive effect on behavioural intention to use the DVR. My proposed conceptual model (directly perceived usefulness and perceived enjoyment) explained a large amount, amounting to 80 per cent of variance for behavioural intention to use ( $R^2 = 0.80$ ).

In accordance with my suggestion, I found a correlation between television affinity and perceived social usefulness (0,59 ( $t = 9,57$ ;  $p < 0,001$ )), television affinity and perceived entertainment usefulness (0,55 ( $t = 8,957$ ;  $p < 0,001$ )), and perceived social and entertainment usefulness (0,55 ( $t = 8,85$ ;  $p < 0,001$ )). Between technology self-efficacy and technology anxiety, however, a negative relationship was identified ( $- 0,40$  ( $t = -6,83$ ;  $p < 0,001$ )).

## **Discussion**

This paper's main aim has been to draw out implications for methodological synergies and an overview of the strength and problems of mixed method research design in the case of audience and user-studies, based on this empirical research.

We have seen an example of a nested analysis-based mixed method approach used in a case of researching audiovisual content consumers. At the same time I have to argue against critics of mixed method research, as there are questions around its definition and added value compared to a general research with sequenced steps. Due to this mixed method based approach, I was able to explore knowledges and beliefs regarding people's changing television use and consumption, and to ensure appropriate engagement with different members of the television value chain and viewers.

This longitudinal mixed method research provided qualitative and dialogic moments at the beginning of the diffusion of digital television technology and of the digital video recorder, and so made important discoveries of wider relevance to the context I was researching: the changing patterns of consumption of television and video content.

Johnson et al. (2007) state that mixed methods research is an intellectual and practical synthesis based on qualitative and quantitative research, but that it also offers a powerful third paradigm choice which will often provide the most informative, complete, balanced and useful research.

The nested analysis-based mixed method approach deployed here helped me to structure my longitudinal research because of the clear orientation and interaction of the LNA – SNA phases provided in Lieberman’s study (2005). Instead of separate handling of the phases, I was able to follow, after the first LNA, the approach of building a model of SNA in order to generate a more relevant and more robust research model with which to answer my initial research questions. I gained many insights from the preliminary Large-N analysis, but this alone was still not fully satisfactory for examining the factors which affect media technology innovation in the context of audiovisual (and mainly television) consumption. Nested analysis oriented me to move into the model-building Small-N analysis phase. I used “on-” and “off-the-line”, deliberate case selection as recommended by Lieberman (2005). In practice this meant that I sought interviews with technology users (on-cases, deliberate case-selection) and with technology and base-medium rejecters (off-the-line cases, deliberate case-selection). This model-building SNA helped me to identify new aspects and suggested a new coherent model, which could be translated into variables of the technology acceptance model, and ensured its enlargement. As a next step I could then test the new model with a Large-N analysis, which produced satisfactory results, but not yet on a national representative sample, for which some slight model modifications seemed to be relevant. In order to be able to validate my model, I launched a model-testing Small-N analysis phase involving market professional interviews, which delivered confirmation for my research model, but suggested some slight changes regarding which final variables to include and so led me to a final LNA phase on a national representative sample. This nested analysis approach, as a critical realist paradigm, fitted my research questions and approach, focusing on the causal relations between various predicting factors of media technology innovation acceptance. The quantitative (LNA) and qualitative (SNA) phases were mutually translatable as I was observing the same reality and phenomenon in the different phases. This research design also allowed for the presence of different voices: from the mass television audience to the professionals, and included both qualitative and quantitative data, which facilitated sensitivity to different participants’ voices and the issues each wanted to raise.

I endeavoured to give a comprehensive answer to my original research questions through using multiple approaches and through working on several levels of analysis, with an iterative approach of successive qualitative and quantitative research phases, using both online and offline data collection methods. I aimed to answer the research questions both from a quantitative and a qualitative angle. **Table 2** (below) gives a summary of the connections between my research questions and each research phase.

“A great strength of small-N analysis is the juxtaposition of both similar and contrasting cases, helping to make transparent the operationalization of concepts that are largely hidden in the analysis of a statistical dataset. Furthermore, comparison provides an empirical basis for making narrative assessments of counter-factual claims” (Lieberman, 2005: 441). Through the SNA phases I could identify both the technology users’ (similar) cases (phase 2.2.1), and the non-users (contrasting cases) (phase 2.1.2) while the interviews provided a clear added value in my study. I identified and added the content-related

variables to my research model (television affinity) based on the lead users' interviews, as well as the rejecters' focus groups (perceived social usefulness and perceived entertainment usefulness). The 3.1 phase thus provided the clear need for a variable relating to technology anxiety.

**Table 2:** Research questions and research phases. Source: author's own table.

Research questions and subquestions	Related research phases
- What are the influencing factors of the acceptance of media technology innovations related to mass media, meaning television related technology innovations in my research?	1st, 2nd, 3rd qual. and quant. phases. Chiefly: 3rd quant. phase.
- Does the role and place of television as a medium change through digital technologies?	2nd qual. and 3ed quant. phase
- 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?	3rd quant. and 2nd, 3rd qual. phases
- Which are the factors preventing the diffusion of digital video recorders?	2nd and 3rd qual. and 3rd quant. phases

My study was inspired from a methodological point of view by the nested analysis-based mixed method research, but I also have to admit that in certain respects my empirical study differs from the initially proposed nested analysis paradigm. Lieberman (2005) proposed this approach for comparative political science research, and his Large-N analysis was based on national states, with nested subcases of individuals or organizations helping the international and comparative approach. The Small-N analysis with its qualitative approach focuses on a historical analysis and a process of tracing based on case studies. I adapted this methodology for my case of researching television and video recording audiences, and so the units of Large-N analysis were individuals (viewers, members of television audience) and no international comparative analysis was carried out. In the Small-N phases I used interviews and focus groups as neither historical case study analysis nor process-tracing were adequate for understanding my audiences. I integrated data collection methods used in audience and media research instead of comparative political science-based methods. In his account of the steps in a nested analysis-based research, Lieberman (2005) did not allow for model modification after model-testing SNA phases. The reason behind this step in my empirical study was that in respect of the phenomenon of media technology innovation acceptance, and of understanding the related audience attitudes and behaviour, I felt the need to seek validation from those players in the process who are the technology providers and service sponsors for the audience I was exploring. This phase did help guarantee the achievement of a model-testing SNA phase, which is similar to the historical analysis used by Lieberman (2005), as I could get insights based on historical market data from the professional interviews.



The promise from my study is the opportunity to adapt the nested analysis research paradigm into the audience and media research field. A clear strength of my research is that I could use the nested analysis paradigm as a strategic research design approach and consciously follow the phases of its methodology. This allowed me to redesign my research model after the first preliminary LNA phase, and I could thus provide a coherent better understanding of the causal relationships I was exploring. Due to its longitudinal (2-year) nature, but also its focused and strategically-planned data collection procedures, I was able to track the changes in the television and video recording audiences, as well as identify the stable influencing factors in media technology acceptance. Because of this systematic approach and the translatable nature of the research phases, this study hopefully offers an important and possibly novel contribution to the field of audience and media research. This provides perhaps a good base for the design of future research based on nested analysis. The study has advanced on previous studies in as much as it has used nested analysis for audience and media research and adapted the approach to this field. At the same time we need to address the issue of resources as this nested analysis-based approach, when it requires so many phases, requires great dedication and effort from the analyst. The challenge of managing its financial requirements has to be faced as well.

I should point to some limitations of my study as well. The study was run only in one country, and thus changed the basic nested analysis approach developed in comparative studies. I used different samples for the different LNA phases, and each one used online questionnaire-based data collection, meaning that offline audiences were left out of the quantitative phases; yet they are also television and video recording audiences.

Although my study differs in some of its steps from the original nested analysis approach proposed by Lieberman (2005) in the field of comparative political science, I believe that I have been able to show that nested analysis-based mixed method research can beneficially be adapted and used in the field of audience and media research.

### **Biographical note:**

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