

2210 Master Thesis in Marketing

Stockholm School of Economics

Small Screen | Big Picture

An Exploratory Study of Mobile TV Services

Abstract

Mobile TV is a new service that carries a lot of buzz in media, articles in newspapers and magazines hail it as “the next big thing”.

This thesis uses an exploratory method to investigate the mobile TV landscape. The purpose of this thesis is to investigate what principal factors guide consumers in their choice to consume mobile TV, and to suggest how mobile TV services are likely to be received by consumers.

It is found that users appreciate the service. They use it in a number of places and for a fair amount of time. As long as the handset has the right size and good enough battery life, it is up to service providers to tailor a service that is recognizable, easy to use and clear on costs towards the consumer in order for mobile TV to become successful. A package consisting of well known channel brands is preferred.

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1	Introduction.....	5
1.1	Background.....	5
1.2	Purpose.....	6
1.3	Problem Area	7
1.4	Delimitations.....	8
1.5	Expected Contribution	8
1.6	Definitions.....	9
1.7	Underlying Technologies.....	10
1.7.1	Streaming Technologies.....	11
1.7.1.1	Implications of Streaming Technologies.....	11
1.7.2	Broadcasting Technologies.....	11
1.7.2.1	Implications of Broadcasting Technologies	12
1.7.3	Computer Facilitated Technologies	12
1.7.4	Implications of Computer Facilitated Technologies.....	12
1.8	Overview of Current Offerings.....	13
1.8.1	Current Streaming Services in Sweden.....	13
1.8.2	Swedish Broadcast Pilots.....	13
1.8.3	European Pilot Studies	13
1.8.4	International Commercial Broadcast Services.....	14
1.8.4.1	South Korea	14
1.8.4.2	Japan	14
1.8.4.3	The United Kingdom.....	14
1.8.4.4	Italy.....	15
2	Theory.....	16
2.1	Previous Research.....	16
2.2	Attributes of Innovation.....	18
2.2.1	Relative Advantage.....	18
2.2.2	Compatibility	18
2.2.3	Complexity.....	19
2.2.4	Trialability.....	19
2.2.5	Observability.....	19
2.2.6	Comparison	20
2.3	Technology Acceptance Model (TAM).....	20
2.3.1	Perceived Usefulness and Perceived Ease of Use.....	20
2.4	Pricing of Mobile Services.....	22
2.5	Applications for Studying Mobile TV	22
3	Method.....	24
3.1	Introduction.....	24
3.2	Sources of Primary Data	25
3.2.1	Interviews.....	25
3.2.2	Workshop.....	25
3.2.3	Focus Groups	26
3.2.4	In-depth Interviews with End Users	27
3.3	Sources of Secondary Data	27
3.3.1	Business Articles.....	27
3.3.2	Pilot Study Reports	28
3.3.2.1	bmco	28
3.3.2.2	Teracom/MMS.....	28
3.3.2.3	Viasat/Tele2.....	28

3.4	Reliability and Validity	29
4	Empirics and Analysis I	31
4.1	What consumer preferences can be discerned with regards to mobile TV?	31
4.1.1	Where?	31
4.1.2	When?	32
4.1.3	What?	33
4.1.4	How Much?	34
4.2	To what extent is consumer behavior influenced by different technological characteristics in new mobile TV services?	35
4.2.1	What Is Mobile TV?	35
4.2.2	Perceived Quality	36
4.2.3	The Hardware	37
4.2.4	Network Coverage	37
4.3	What are the factors determining how consumers adopt mobile TV?	38
4.3.1	Helping the Consumer	38
4.3.2	Using New Technology	39
4.3.3	Pricing	40
4.3.4	Observing Mobile TV	41
4.4	Summary of Analysis I	41
5	Analysis II	43
5.1	Attributes of Innovation	43
5.1.1	Relative Advantage	43
5.1.2	Compatibility	43
5.1.3	Complexity	44
5.1.4	Trialability	44
5.1.5	Observability	45
5.1.6	Summary of Attributes of Innovation applied to mobile TV	45
5.2	Technology Acceptance Model (TAM)	45
5.2.1	Perceived Usefulness	45
5.2.2	Perceived Ease of Use	46
5.2.3	Summary of TAM applied to mobile TV	47
5.3	Possible Scenarios	48
5.3.1	Scenario 1: Mobile TV Fails Due to Technological and/or Service-Related Factors	48
5.3.2	Scenario 2: Mobile TV Succeeds as an Independent Medium	50
5.3.3	Scenario 3: Mobile TV as a Catalyst for Change	51
5.4	Conclusions	51
6	Discussion	53
6.1	Possible Critique of This Study	54
6.2	Suggestions for Further Research	55
7	References	56
7.1	Printed Sources	56
7.2	Published Reports	57
7.3	Interviews with Industry Professionals	57
7.4	Focus Group Interview 2006-12-20	58
7.5	End User Interviews	58
7.6	Workshop 2006-11-30	58
7.7	Internet Sources (accessed 2007-06-24)	59
8	Appendices	60
8.1	Appendix A: Results From the Teracom Pilot Study	60

8.2	Appendix B: International Pilot Studies (Europe)	61
8.2.1	Table 1: Overview	61
8.2.2	Table 2: Usage Situations	61
8.2.3	Table 3: Frequency of Use	62
8.2.4	Table 4: Viewing Times	62
8.2.5	Table 5: Content Preferences	63
8.2.6	Table 6: Willingness to Pay	63
8.2.7	Table 7: Satisfaction	64
8.2.8	Table 8: Viewing Time	64
8.2.9	Table 9: Conditions	64
8.3	Appendix C: Commercial Data (South Korea)	65

1 Introduction

1.1 Background

Ever since the introduction of mobile phones, new functions have continually been added to the handsets. The digital camera and music player functions are popular components in today's handsets. Dedicated media players such as the iPod now feature video as the most highly anticipated new feature. At Apple's iTunes store, it is possible to purchase episodes of the TV show of your choice, and similar download services are also being offered to subscribers of 3G telephony. However, providers in the mobile phone industry are now trying to go one better than the media players by introducing the capability to receive broadcast TV in handsets. Such functionality is currently only available to a limited number of users, and the impending expansion to the mass market is expected to receive widespread attention. In South Korea media players also already boast receivers for mobile TV showing that the markets are not necessarily separated.

Recently (as of 2007), mobile TV has received much attention in the press. Industry as well as mainstream media report regularly on the latest developments in the field and are never late to comment on how big its impact is predicted to be.¹ In spite of this the academic research in the field of mobile TV is limited.²

The introduction of mobile TV services poses a number of challenges. Firstly, current available technology allows for delivery of mobile TV services and content to consumers through a variety of technologies (explained below). It is not yet clear whether consumers prefer one over the other or whether they matter at all. It is also possible that the different technologies are complementaries and that they will be

¹ For example, see <http://www.nyteknik.se/art/50505> or <http://www.dagensmedia.se/article.asp?article=21604> or <http://computersweden.idg.se/2.2683/1.89424>.

² This thesis is part of a larger research project about mobile TV. The main aim of this techno-economic project is to study the emerging system for mobile TV services, linking technology, strategy and market behavior. The project is a collaboration between Center of Information and Communication (CIC) at the Stockholm School of Economics and Wireless@KTH at the Royal Institute of Technology.

combined to create new patterns of consuming moving images on a mobile device. Secondly, regardless of which technology is favored, there are a plethora of political and legal considerations that need to be resolved before a commercial service can be launched. Bandwidth and frequency in the digital domain remain finite resources, calling for regulatory bodies to manage and distribute these valuable slots, often through time-consuming processes. In addition, broadcasting and/or streaming rights for mobile devices are not automatically included with the purchase of their terrestrial counterpart. Thirdly, consumers' habits of watching mobile TV is still relatively uncharted territory, and even though extensive research on viewing habits is currently being conducted together with consumer trials, it is impossible to predict what type of content will be in demand once the service is introduced to the mass market. Will programming reflect terrestrial channels or will it be something completely different with regards to content, length and scheduling? Lastly, there are many possible ways of charging payment for this type of service. The financial implications are significant. The Swedish market for mobile TV services is estimated to potentially include 1.6 million users and a turnover of 900 MSEK per year according to a report published by PTS (Post- och Telestyrelsen, the Swedish authority responsible for regulating, among other things, broadcasting frequencies)³. Finding a feasible business model for mobile TV services will require an understanding of how to bring together all of the issues outlined above.

1.2 Purpose

The purpose of this thesis is to investigate what principal factors guide consumers in their choice to consume mobile TV, and to suggest how mobile TV services are likely to be received by consumers. In order to provide a satisfactory answer within the scope of a master's thesis, the problem itself must be adequately defined. As a first step, the authors have divided the problem area into three discrete research questions. Individually, they act as clearly defined queries that may be addressed through the scientific gathering and analysis of quantitative and qualitative data, as well as through application of relevant theory. Collectively, their results serve as a basis for drawing conclusions regarding the overarching purpose and help draw up scenarios of how mobile TV is likely to be received by consumers. The scenarios will suggest how mobile TV could be packaged in order to be successfully launched.

³ PTS (1).

The three research questions are:

1. *What consumer preferences can be discerned with regards to mobile TV?*
2. *To what extent is consumer behavior influenced by different technological characteristics in new mobile TV services?*
3. *What are the factors determining how consumers adopt mobile TV?*

These questions will be elaborated upon in the following passages.

1.3 Problem Area

1. *What consumer preferences can be discerned with regards to mobile TV?*

Given the recent nature of mobile TV technology, existing research on the subject – especially with an academic focus – is scarce at best. However, several key players are currently conducting extensive consumer tests in order to identify relevant preferences and behavioral tendencies. By looking at the preferences of consumers it is possible to get a better understanding of the field.

2. *To what extent is consumer behavior influenced by different technological characteristics in new mobile TV services?*

There are a number of technologies that enable mobile TV. These technologies set a boundary to what consumers can do with mobile TV. Will consumers care what format is used? Will the choice made by consumers be influenced by technological factors? Looking at the different available solutions for mobile TV and customers' reaction to those, weak areas can be found.

3. *What are the factors determining how consumers adopt mobile TV?*

Questions one and two look at factors that are easily categorized as consumer preferences and inherent to technology. This question refers to factors that are related to consumer behavior once mobile TV services are about to launch.

By looking at users' perceptions of mobile TV it is possible to try to forecast the diffusion of mobile TV services amongst consumers. By drawing on findings gathered from the previous three questions, coupled with additional insights acquired from the

rich array of existing research on diffusion of new technologies, a number of potential future scenarios regarding consumer attitudes and behavior in the emerging mobile TV market will be formulated. While the authors acknowledge the uncertainty inherent in the predictive nature of these scenarios (and the inability to prove them true or false after the fact), it is not, however, an aim to provide mere speculation. Rather, the thesis will rely on existing data in order to establish likely scenarios based on previous theoretical discussions.

In order to investigate the questions the following steps have been taken. First, at the results from pilot studies conducted throughout Europe were looked upon in order to identify answers and issues. Second, a workshop with actors from the industry was held in order to share their insights. Third, a focus group discussion with users from the pilots was conducted in order to qualitatively assess consumer preferences and actual use of the product. Fourth, interviews with actors from the industry were conducted throughout the process of writing the thesis. Fifth, to further understand consumers' preferences and experience, interviews were conducted with users of mobile TV services.

1.4 Delimitations

This study is limited to consumer offerings due to the thesis being part of the aforementioned research project. For the same reason the thesis will not go further into discussions about technology. Different technologies within each group (streaming, broadcast, computer facilitated) will be presented only briefly, to give a picture of what they offer consumers. Due to the locality of the authors only Swedish users and representatives of companies with offices in Sweden have been interviewed.

1.5 Expected Contribution

Mobile TV services aimed at the mass market are developing at this time (June 2007), thus limited academic research has been conducted in this area. Current research has either focused on technical issues or been conducted by actors in the industry rather than academics. Although such research will assist in forming an empirical basis for this study, it is based on pure consumer observation, making few if any connections with established theory. The authors hope to shed light on the issues at hand by conducting one of the first studies combining established theory with a review of existing, commercially oriented research, which is to be augmented with new studies

designed and/or conducted by the authors. The aim is to provide an understanding of the effects of mobile TV services on consumer behavior. The academic dimension of this insight will contribute towards a better understanding of how consumers adopt and adapt to new technology by observing the effects as they happen.

Before addressing the research questions, a short background will be provided, establishing proper definitions of key terms, presenting underlying technologies, and an overview of current services.

1.6 Definitions

Before one begins to dissect a new phenomenon in the hopes of gaining some deeper understanding of it, one must be very clear on exactly what it is that is being studied. In order to do so, proper definitions are needed. The term *mobile TV* is somewhat ambiguous and lends itself to a number of different interpretations, which is why at the beginning of all interviews the respondent(s) were asked how they would define it. Here is a list of terms that the authors have encountered during research and how they were generally interpreted by the people encountered, professionals and consumers alike. The terms are in Swedish since the interviews were held in Swedish.

Term (Swedish)	Definition
Mobil	1. Mobile telephone handset (noun, informal)
	2. Mobile (adjective)
Mobil-TV	The functionality of moving images being shown on a mobile telephone handset
Mobil TV	The functionality of moving images being shown on a mobile handheld device (such as Palm, iPod etc.)
TV-mobil	A mobile telephone handset with the functionality of showing broadcast television

Note the difference between the second and third term; the mere hyphenating of the term causes a subtle shift in denotation. Note also that the last term explicitly refers to broadcast television whereas others do not. In preparing for the data collection, in this thesis mobile TV is defined as (Swedish: “mobil-TV”) *the functionality of moving images being shown on a mobile telephone handset*. This definition was chosen for a number of reasons: firstly, the secondary data stems from mobile telephone usage; secondly, the interview subjects’ experience is from mobile telephone handsets; thirdly, the scope of this master’s thesis prohibits a wider definition such as including

personal media players. Furthermore, this thesis disregards TV functionality in other portable/moving objects like vehicles and laptop computers. It could be argued that these devices would technically qualify as potential providers of mobile TV services. This point is certainly valid to some extent; however this thesis is concerned only with handheld devices no larger than your average pocket. This would make the chosen definition all but interchangeable with *personal TV* (Swedish: “personlig TV”), a term that has occasionally been used by industry professionals to describe future audiovisual consumption, including mobile TV and IPTV. However, because of its infrequency, and in order to avoid unnecessary confusion, the term mobile TV will be used throughout the remainder of this thesis.

The following are additional terms that will be used throughout the thesis.

Term	Definition
Video-On-Demand (VOD)	Video content delivered to the consumer whenever he/she wants to.
Wireless Application Protocol (WAP)	An open international standard for applications that use wireless communication. Its principal application is to enable access to the Internet from a mobile phone or other mobile device.
Electronic Program Guide (EPG)	A piece of software that allows the user to see what programs are available at the moment, and in the following hours and/or days.
Interactivity	Consumer interaction such as choosing between multiple viewing angles, voting, and purchase of related content; requires a data uplink.

1.7 Underlying Technologies

Mobile TV, as defined above, is not a single technology but rather the ability to watch TV on a mobile phone. What follows is a brief summary designed to provide an overview of the technological complexity involved and the implications each technological solution has to consumers. The technologies can be divided into three main segments: streaming, broadcasting, and computer facilitated technologies. No attempts will be made to decide the superiority of any given technology.

1.7.1 Streaming Technologies

Technology	Properties
3G (UMTS)	At present, the only commercially available form of delivery for mobile TV in Sweden. Pros: Interactivity, VOD. Cons: Picture quality, network capacity when a lot of people want to see the same program, users need compatible handsets, no common standard for all handsets.
High-Speed Downlink Packet Access (HSDPA)	Also known as 3.5G and turbo 3G. Pros: Same as for 3G, better image quality and faster channel switching compared to 3G, moderate upgrade cost for network. Cons: Network capacity, special handsets.
Multimedia Broadcast Multicast Service (MBMS)	A multicast technology, which means that a selected number of subscribers can receive the same content. Pros: Saves bandwidth compared to 3G, upgrade of existing 3G network. Cons: Network capacity, special handsets.

1.7.1.1 Implications of Streaming Technologies

Streaming technologies are a must to offer VOD. Also, the handling of interactive content works better with these technologies at this time as they provide a data uplink. The streaming technologies are controlled by the mobile phone network operators with heavy investments in infrastructure already in place. Still, if mobile TV really breaks through there will be a need for even more investments.

1.7.2 Broadcasting Technologies

Technology	Properties
Digital Video Broadcasting – Handheld (DVB-H)	A standard based on DVB-T (terrestrial digital TV) adapted for mobile use. Used in a number of pilots in Europe. Pros: Good picture quality, no problem with bandwidth, standardized. Cons: New network needs to be built, no VOD, no interactivity yet.
Digital Multimedia Broadcasting (DMB)	A standard based on DAB (digital radio) adapted for mobile use. Used in commercial services in South Korea. Pros: Same as for DVB-H, parts of network already in place. Cons: Same as for DVB-H.
Digital Audio Broadcasting-Internet Protocol (DAB-IP)	A standard based on DAB (digital radio) adapted for mobile use. Used in commercial service in Great Britain. Pros: Same as for DVB-H, parts of network already in place. Cons: Same as for DVB-H. Also, allows fewer channels than DVB-H and DMB.

1.7.2.1 Implications of Broadcasting Technologies

These technologies utilize new networks, this could move the power away from the network operators when/if companies such as cable and satellite broadcasters move in. If mobile TV breaks through broadcast alternatives are cheaper than streaming.

1.7.3 Computer Facilitated Technologies

Download	Downloading of videos to a computer that are then transferred to a mobile phone. At this time the only large commercial service is designed for the iPod, i.e. not available for mobile phones. Pros: Better image quality than other alternatives, great selection, consumes less battery, free when illegal. Cons: Need to transfer to mobile device, compatible device required, often illegal.
Push	Automatically downloads content that the user subscribes to, to the computer. The user then connects his/her mobile phone to the computer before moving out of the home or office to transfer the media from the computer to the device. Pros: Same as for download, fresh content conveniently. Cons: Same as for download.

1.7.4 Implications of Computer Facilitated Technologies

Computer facilitated technologies moves control away from all kinds of network operators. Still, the user cannot access live material or might run out of material available instantly with this method. However, at this time illegally downloaded material has far superior image quality compared to broadcast and streamed material.

Summary of Technologies

Type of technology	Name
Streaming Technologies	• 3G (UMTS) • High-Speed Downlink Packet Access (HSDPA) • Multimedia Broadcast Multicast Service (MBMS)
Broadcasting Technologies	• Digital Video Broadcasting – Handheld (DVB-H) • Digital Multimedia Broadcasting (DMB) • Digital Audio Broadcasting-Internet Protocol (DAB-IP)
Computer Facilitated Technologies	• Download • Push

1.8 Overview of Current Offerings

This chapter features an overview of the offerings of current services and pilot studies, including pricing and packaging.⁴

1.8.1 Current Streaming Services in Sweden

All major network operators in Sweden offer mobile TV via the 3G network. The number of channels varies as do the pricing. 3 is the only company offering a flat fee and dedicated TV software, users need to buy a new Nokia (N73, N95, or E65) in order to use the service.

Company	Number of Channels	Monthly Fee	Monthly Fee Per Channel	Data Transfer Cost
3	9	299 SEK		
Tele2	39		9 SEK	
Telenor	4			Maximum 9 SEK per day
Telia	12			Maximum 9 SEK per day

1.8.2 Swedish Broadcast Pilots

At this moment no commercial mobile TV broadcast service exists in Sweden.

However, three pilot studies were conducted during the fall of 2006 with the two-fold purpose of gaining an understanding of what customers want as well as testing the technology.⁵ Though similar in objective, the methods and measurements by which the main telecom operators conducted their studies differ somewhat.

Company	Network Coverage	Terminal Used	Number of Channels
Viasat/Tele2	Inner City of Stockholm	Samsung P 910	11
Telia	Hammarby Sjöstad	Nokia N92	8
Teracom	Inner City of Stockholm, Sundbyberg	Nokia N92	3 for free, 13 for free the first month then 50 SEK per month.

1.8.3 European Pilot Studies

A number of pilot studies have taken place throughout Europe. Information about these can be found in appendix B. The studies have all been conducted using DVB-H technology, except the BT Movio pilot which was conducted using DAB-IP.

⁴ In spite of mobile offerings being in a constant state of change, for the sake of convenience, this thesis refers to “current” as being available in June 2007.

⁵ Interviews: Fredrik Palm, Viasat; Joakim Strandqvist, Teracom.

1.8.4 International Commercial Broadcast Services

So far, services for broadcast mobile TV have been launched in South Korea, Japan, The United Kingdom, and Italy. The first two use DMB technology, whereas the two latter use DAB-IP, and DVB-H technology, respectively.

1.8.4.1 South Korea

The South Korean market was the first commercial market to introduce broadcast mobile TV. It is interesting to note that the technology has proliferated in spite of South Korea already having great 3G penetration and, as of late, the EVDO (a rival technology of HSDPA) technology having begun to gain ground. The S-DMB service offered by TU had 1,13 million subscribers as of April 2007.⁶ It is a service provided via satellite for a charge ranging between 9900 KRW to 13000 KRW per month (75-100 SEK), depending on the length of the contract. T-DMB, offered for free via terrestrial broadcast, had managed to amass roughly 1.8 million users at the end of 2006.⁷ Data on consumer behavior from the South Korean market can be found in appendix C.

1.8.4.2 Japan

In Japan, broadcast mobile TV has been in place since April 1st 2006, the service is free of charge to anyone with a compatible handset.⁸ Japanese consumers are known to adopt new technology at an early stage. They are also frequent commuters, a potential usage situation often mentioned for mobile TV. At the moment the material that is broadcast is the same as in the terrestrial TV network, but there are plans to lift the ban in 2008, and companies to produce special material for mobile TV are already set up by giants such as NTT DoCoMo and Fuji TV.⁹

1.8.4.3 The United Kingdom

Virgin Mobile offers mobile TV in the UK. It is based on the technology used in the BT Movio trial. Users can just choose one phone, the very large (compared to other

⁶http://www.bbc.co.uk/pressoffice/pressreleases/stories/2007/05_may/04/korea.shtml

⁷http://search.hankooki.com/times/times_view.php?term=dmb++&path=hankooki3/times/lpage/200612/kt2006120116564710440.htm&media=kt

⁸ <http://search.japantimes.co.jp/member/member.html?appURL=nb20060401a2.html> (Reg. Req.)

⁹ <http://search.japantimes.co.jp/cgi-bin/nb20061130a1.html> (Reg. Req.)

phones) Lobster costs £99.99. The service is free when signing up for a monthly contract, when using pay-as-you-go it costs £5 per month after the first 90 days. There are four TV channels and roughly 50 radio channels. The sales so far have been disappointing, reportedly around 10 000 units had been sold from the launch in October until mid January.¹⁰

1.8.4.4 Italy

In Italy, broadcast mobile TV is offered by two mobile network operators, TIM and 3. **TIM** offers eight channels, and users who sign up before the end of the 2006/2007 season also got to watch all of the Serie A (Italy's top soccer league, sponsored by TIM) games for free. The package costs €5 per month. Currently, three handsets are available: the Samsung P920, the Samsung P930, and the Brionvega N7100, all of which cost €99 when signing up for a package including 1000 minutes to any phone (and video calls to TIM subscribers), 700 SMS to TIM subscribers, and 300 SMS to any mobile phone. If choosing a package for €25 per month that includes 30 minutes to any phone and free calls to fixed lines and TIM subscribers during weekends the phones cost 199 euros.¹¹ **3 (Three)** offers a package with 13 channels, 1 gigabyte of data transfer, and 60 minutes of telephony for €29 per month. Customers who like to have another kind of package for data transfer and telephony can pay for mobile TV separately. One day costs 3 euros, one week 9 euros, one month 19 euros, and six months 59 euros. At the same price (per channel) you can add the channels Penthouse and Playboy. When signing up for the service customers get either the LG U900 or the Samsung P910 free of charge.¹²

¹⁰ <http://business.guardian.co.uk/story/0,,1991842,00.html>

¹¹ <http://www.tre.it>

¹² <http://www.tim.it>

2 Theory

This section introduces the theoretical background for the thesis. The main stream of theory used is used in information systems research to study the diffusion of innovations and user acceptance. The main reason for applying these theories in this thesis is the fact that they use the concept of different attributes as an approach to understanding consumer behavior. The attributes can in turn be linked to different factors. These factors have a clear connection to the data available on mobile TV.

2.1 Previous Research

The research questions stated in the purpose section all relate to consumer behavior. The behavior that arguably is most interesting in regards to new technology is the behavior of adoption. Mobile TV is something that is happening right now. Thus, previous research is very limited. Previous studies generally consist of pilot studies commissioned by companies with commercial interests in mobile TV. A citation search resulted in only one hit; a 2006 study about empirical findings on the perceived use of DMB from Korea.¹³ The authors of that study use exploratory research to study the users' perception of (DMB) mobile TV.

Rather, studies of similar subjects are the closest one can come to previous studies within the field. Innovations that have been studied include compact disc players¹⁴, personal computers¹⁵, web-based learning¹⁶, the Internet¹⁷, information systems¹⁸, mobile Internet¹⁹, and short messaging service²⁰.

A number of studies use *attributes of innovation* to study adoption of technology. Between 49 and 87 percent of the variance in the rate of adoption of innovations has been found to be explained by these five attributes: relative advantage, compatibility,

¹³ Shim et al.

¹⁴ Lowrey.

¹⁵ Thompson & Higgins, LaTour & Roberts, Venkatesh, Davis

¹⁶ Gong et al

¹⁷ Agarwal, Prasad.

¹⁸ Venkatesh & Davis.

¹⁹ Cheong & Park.

²⁰ Yan et al.

complexity, trialability, and observability. These are attributes as perceived by users, not relative to others.²¹

One model that is used to identify what causes people to accept or reject information technology is known as the *Technology Acceptance Model* (TAM). In a citation search 698 articles were found on the subject in 2003.²² It is known as the most widely applied model of user acceptance and usage of information systems.²³ This stream of research has generally focused on the institutional setting. Yet, there is nothing suggesting that it cannot be used to study consumer behavior; this has been done in some studies²⁴. Only a small number of quantitative studies using TAM have been conducted but it has been stated that the method is a more useful alternative to determine richer information with a small number of subjects.²⁵

Another popular theory about use acceptance is *Theory of Planned Behavior* (TPB). Just like TAM, TPB provides a model to predict an individual's intention to use an Information System (IS).²⁶ TAM is said to be easier to apply than TPB with the drawback that it supplies more general information.²⁷ It is thus suitable for the data that is available to the authors of this thesis. The areas covered by TPB, such as subjective norms and perceived behavioral control, which are not covered in TAM in its original form, are covered to a large extent by later extensions to TAM.

The theory used in the studies mentioned above is known as Diffusion Theory. Essentially, Diffusion Theory analyzes different factors that affect the diffusion of innovations.

²¹ Rogers p. 221.

²² Lee et al. p. 753

²³ Lee et al p. 752.

²⁴ Yan et al.

²⁵ Lee et al p. 767.

²⁶ Mathieson p. 173.

²⁷ Mathieson p. 187.

2.2 Attributes of Innovation

2.2.1 Relative Advantage

Relative advantage is the advantage that the new innovation is perceived to have compared to its predecessor. The advantage can be observed in different dimensions such as economic, and social. The price of a product is interesting not only when it is new but also the development of the price affects the diffusion. An important social factor is status, owning something that is exclusive draws some people.²⁸ It has been proven to have a positive relation to utilization in a number of studies.²⁹ Mobile phones once carried such status that people who could not afford a real one carried empty shells. Still today, people can be seen flaunting the newest phones on the market.

Thus, it can be argued that even if mobile TV is not working perfectly from a technical viewpoint social status might help speeding up diffusion. If it is working well it might help phones using the function to be seen as relatively superior to phones without it. Mobile TV can also be compared with earlier solutions for watching TV on the move.

2.2.2 Compatibility

Compatibility is the perceived degree of consistency between an innovation and existing values, past experiences, and needs of the users. Existing values can be social as well as religious.³⁰ For example Amish people would not see the new Xbox360 as compatible since they are not to use electrical equipment. This can also be referred to as a tradition barrier.³¹ Past experience can be recent as well as older. Previous experience can also lead to incorrect usage of the new innovation; this leads to consumers who dislike the new innovation even though they would have loved it if they would have handled it correctly. Compatibility with needs is something that has to be observed carefully. As a company you have to be able to communicate what your product brings to the table in a way that users can recognize as important for their needs. A lot of users see innovations as a cluster rather than as single

²⁸ Rogers pp. 229-234.

²⁹ Thompson & Higgins p. 139.

³⁰ Rogers pp. 241-249.

³¹ Ram & Sheth p. 9.

innovations. Thus it is important that the innovation is bundled in a way that users see as compatible. Naming the innovation is also essential in order to avoid confusion.³²

Given the experience people have with stationary TV and mobile phones mobile TV could have a great level of compatibility. It will be introduced into a market that appreciates new technology.

2.2.3 Complexity

Complexity measures the degree of difficulty in understanding and using an innovation. The complexity of an innovation can be decreased as it evolves into a more user-friendly form.³³ The degree of complexity is negatively correlated to the rate of adoption.³⁴

User interviews can shed light on whether mobile TV is perceived to be complex or not. The complexity might be observed in the design of the service as well as the device.

2.2.4 Trialability

Trialability is the degree to which it is possible to experiment with an innovation without purchasing. High trialability is more important in earlier stages since no one has experience with the product at that stage. Laggards draw their conclusions from the trials of earlier adopters.³⁵

Mobile TV trialability can depend upon a number of factors. Identifying them can lead to a better understanding on how to market the service.

2.2.5 Observability

Observability is the degree to which others can observe the *results* of using an innovation. In technology the hardware part is generally easier to observe than the software part.³⁶

³² Rogers pp. 250-251.

³³ Rogers p. 257.

³⁴ Thompson & Higgins p. 139.

³⁵ Rogers p. 258.

³⁶ Rogers pp. 258-258.

When it comes to mobile TV the level of observability seems fairly clear, still since the product is not out on the market yet it can only be established through trials.

2.2.6 Comparison

In a study comparing the different factors a number of interesting results are found. For actual purchases, trialability was found to be the most salient part of the overall process. Delay of purchase was found to be caused mainly by a lack of compatibility with existing needs or a lack of relative advantage over the alternative product. Future expectations in those areas delayed the purchase. For product nonadoption, compatibility with existing values was found to be the most important factor.³⁷

2.3 Technology Acceptance Model (TAM)

2.3.1 Perceived Usefulness and Perceived Ease of Use

TAM suggests two main determinants that influence the decision to adopt information technology. The first determinant, perceived usefulness, is the extent to which the user believes the new technology will make it possible for him/her to perform a better job.³⁸ In this thesis this is interpreted as “making it possible to perform the desired task better”, for example feeling less bored during the commute between work and home.

The second determinant, perceived ease of use, refers to "the degree to which a person believes that using a particular system would be free of effort."³⁹ It is posited that all else being equal, an application perceived to be easier to use than another is more likely to be accepted by users.⁴⁰ The perception is often based on the factor complexity described above. It is recognized as an important factor in a number of studies.⁴¹

Between these two factors there is often a tradeoff. It has been found that the relationship between usefulness and usage is stronger than the relationship between ease of use and usage. Users are often willing to deal with some difficulty of use if the

³⁷ Lowrey p. 649.

³⁸ Davis p. 320

³⁹ Davis p. 320

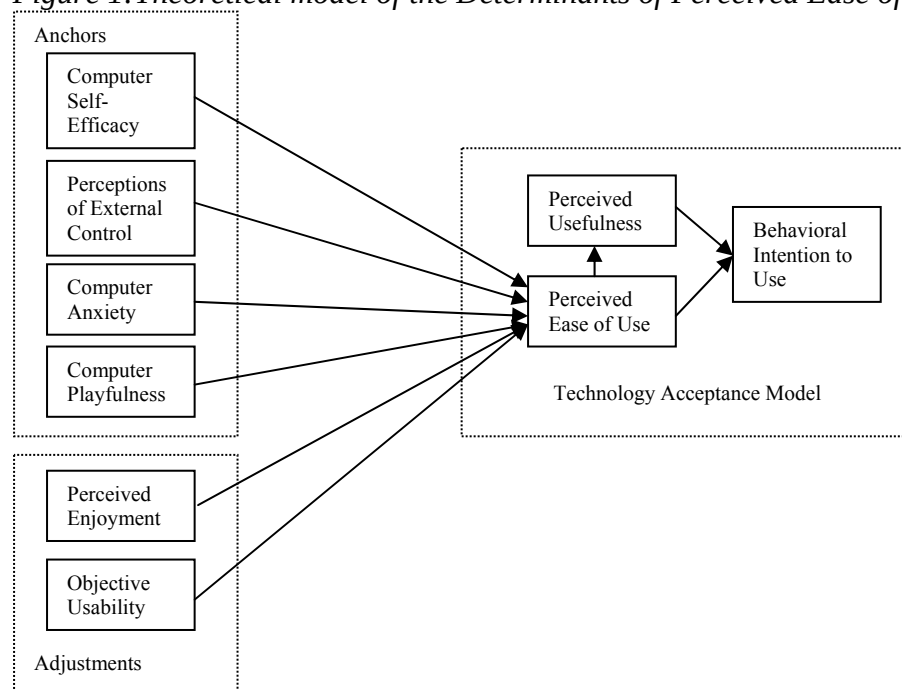
⁴⁰ Davis p. 320

⁴¹ Davis et al p. 1000

system provides a critical function to the user.⁴² It can be argued that both factors are related to the concept of relative advantage described above.

A number of studies have theorized the use of different extensions to the concepts of perceived usefulness and perceived ease of use. Venkatesh (2000) introduces a model for perceived ease of use based on anchors and adjustments.⁴³ The user will make evaluations based on prior experiences and general beliefs, anchors. These are divided into computer self-efficacy, perceptions of external control, computer anxiety, and computer playfulness.⁴⁴ As the user gains experience with the system it will adjust its perceived ease of use based on perceived enjoyment and objective usability.⁴⁵ An interesting finding is that the anchors are much stronger than the adjustments; usage can be predicted to a large extent without actually having users use the system.⁴⁶

Figure 1: Theoretical model of the Determinants of Perceived Ease of Use



Another paper extends TAM by adding computer self-efficacy as a direct antecedence of perceived ease of use and intention to use. Computer self-efficacy is the users judgment of his/her own capability to use a computer, which in turn may influence an

⁴² Davis p. 333.

⁴³ See Figure 1.

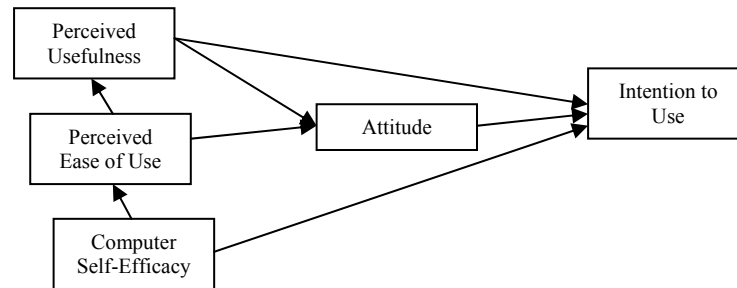
⁴⁴ Venkatesh p. 346

⁴⁵ Venkatesh. p. 350

⁴⁶ Venkatesh. p. 357

individual's perception of a technology's ease of use and acceptance decision (figure 2). Users with a weak sense of computer self-efficacy will be discouraged more easily by obstacles whereas users with a strong sense are more likely to persist.⁴⁷

Figure 2: Alternative Version of TAM



In a study of intention to use Mobile Internet the following factors were found to be important: attitude toward the service, perceived playfulness and perceived level of cost. The quality of the content was found to be more influential than the quality of the system when analyzing perceived usefulness. This suggests that network operators can control beliefs that directly influence the attitude and the behavioral intention.⁴⁸

2.4 Pricing of Mobile Services

As mentioned in section 2.2.1 Relative Advantage, pricing of innovations is a factor that affects diffusion. Research about pricing for mobile services has been scarce. In one article it has been shown that customers have large differences in price sensitivity levels. It is the customers with a moderate usage level that are the least price sensitive, and the customers with an intensive or low-end usage level that are most sensitive. It was also found that customer's price perceptions and innovativeness levels could accurately indicate price sensitivity.⁴⁹

2.5 Applications for Studying Mobile TV

As stated in the purpose section this thesis utilizes three questions in order to fulfill its purpose. Below is a summary of the theory, related to each question.

1. What consumer preferences can be discerned with regards to mobile TV?

Consumer preferences can be categorized according to the factors: relative advantage, compatibility, complexity, trialability, and observability. This will provide a

⁴⁷ Gong et al p. 367

⁴⁸ Cheong & Park p. 136

⁴⁹ Munnukka p. 72

framework for understanding the consumer preferences. The framework will enable a deeper analysis of the adoption of the technology.

2. To what extent is consumer behavior influenced by different technological characteristics in new mobile TV services?

Perceived usefulness and perceived ease of use are both influenced by how the technology actually works. Analyzing consumer behavior can gauge the level of these factors in the context of mobile TV.

3. What are the factors determining how consumers adopt mobile TV?

As stated above, the behavior of users is influenced by preferences and technology. When attempting to answer this question, the authors will not make use of any specific theory of those described above. Rather, the findings pertaining to this question will be combined with the points made under question one and two to serve as inspiration for formulating a number of potential future scenarios for mobile TV services.

This section has dealt with the theoretical tools needed for the analysis of the thesis. Before presenting the empirical material upon which the analysis is applied, the method will be discussed.

3 Method

This section describes the methodology used to conduct the study. It also describes the sources used in the study, and discusses the reliability and validity of the study.

3.1 Introduction

As of 2007, mobile TV is just beginning to enter consumers' minds as a real and relatable service, yet the technology is not commercially available, and the vast majority of consumers have no first-hand experience of mobile TV. This fact poses several challenges when attempting to attack such a new phenomenon from a research perspective. What little research is available must be complemented in some way in order to address the research questions posed in previous sections. Hence, this thesis makes use of both quantitative and qualitative data.

Working from this mixed approach, the authors have aimed to measure the effects discussed in previous sections. Conversely, a purely quantitative approach was assumed to provide insufficient depth in order to gain any satisfactory understanding of a phenomenon this new and as yet unexplored. User impressions of an hitherto unfamiliar service such as mobile TV are novel by nature and described in subjectively perceived terms that are difficult (if not impossible) to capture quantitatively. In addition, the explorative nature of this study and the research aims outlined previously provide an adequate foundation for applying qualitative methodology.

The quantitative data is secondary in nature and consists of a plethora of different sources, such as various business articles, company reports (both internal and external), press releases, and advertising material. This data has provided an initial overview of current mobile TV offerings, information regarding pilot studies, preliminary and final results from said studies, and more. With this data in mind, the authors have designed questions and scenarios that have been posed in the interviews described below.

The qualitative data is primary and draws upon four principal sources:

- Qualitative in-depth interviews with representatives of key industry actors
- A series of workshop discussions between industry actors
- A focus group interview with pilot end-users
- Qualitative in-depth interviews with pilot end-users

A more thorough description of these different sources follows below.

3.2 Sources of Primary Data

All subjects were informed of the objective of the study and given a presentation of its role in the larger research project. Furthermore, respondents were assured that their answers would be treated confidentially, and that any explicit reference to their person would only be included with their express permission.

The data from all sources has been given equal importance when conducting the analysis. That is, statements made by industry experts do not automatically outweigh statements made by consumers (or vice versa). This is due to the novel nature of the object of study and the consumer-oriented perspective of the thesis.

3.2.1 Interviews

In order to get a sense of what industry actors were thinking with regards to mobile TV, in-depth qualitative interviews were held with a number of representatives from different relevant companies (see list of references). Due to the explorative nature of the study, they were open-ended and unstructured in order to allow for complete freedom in the respondents' replies. The questions were scripted in advance and differed somewhat depending on the respondent and the company represented. The interviews were conducted at the respondent's office with both authors present (with one exception). Following established recommendations, the interviews took place in a location with minimum chance for disturbance like a meeting room or similar locale.⁵⁰ Due to scheduling issues one interview was held via telephone. The sessions were recorded using a digital field recorder and totaled 329 minutes.

3.2.2 Workshop

As mentioned in the introduction this thesis is part of a research project. To provide an empirical base for the project it was decided that a workshop would be organized

⁵⁰ Merriam, p. 88.

by the research group. A comprehensive, yet by no means complete, list of industry actors both central and peripheral to the production and delivery of mobile TV services was compiled following an extensive survey of the current market and its participants. This list included mobile network providers, TV broadcasters, content producers, media measurement companies, advertising agencies, potential corporate users, and more. A total of 60 key figures were identified and invited to partake in a workshop discussion. On November 30th 2006, 22 representatives from different relevant industries gathered to discuss the future and potential of mobile TV services.⁵¹

The discussants were split into three smaller groups, each led by a moderator, and presented with a set of prepared questions around which to freely interact, exchanging experiences and viewpoints. The sessions were conducted at Focus Inn's specialized facilities in Stockholm and recorded on DVD whilst simultaneously being monitored from an adjacent room as they happened.

The workshop sessions lasted a total of 4 x 45 minutes, with each segment dominated by a predefined theme. These were: technology, consumer behavior, content, and business models. There was a certain amount of overlapping with regards to topics of discussion, particularly towards the end, although this did in no way detract from the resulting insights.

3.2.3 Focus Groups

To augment the body of qualitative data gathered from the industry, a small focus group study was conducted to capture the views of the end-user. According to research literature, a number of 6-7 respondents is recommended to conduct an effective study.⁵² Due to unforeseen circumstances, the study was reduced to comprise but 3 respondents. In spite of this, sufficient interaction was generated to provide satisfactory input. All respondents were users of Tele2's pilot test and were participants in an earlier focus group study conducted by said company, at which they had been asked to voluntarily attend this study. Out of 14 positive replies, 5 confirmed their willingness to participate, however 2 were forced to back out at the last minute.

⁵¹ See References for a complete list of participants.

⁵² Jensen p. 85.

The focus group was also held at Focus Inn. One of the authors moderated the discussion and the other took notes from an adjacent room using a see-through mirror. The session was recorded on DVD.

A script was used by the moderator to stimulate discussion. The novel nature of mobile TV services give little indication for the respondents as to what is expected of them to say, which is sometimes regarded as a weakness of focus group studies⁵³. However, it was found that respondents had a well-defined idea of how they had perceived mobile TV services.

3.2.4 In-depth Interviews with End Users

As a final complementary component in the data gathering stage of the research, in-depth interviews were conducted with three end users who had all been given the opportunity to participate in pilot studies. A script made in advance was used. The questions were open-ended and unstructured in order to allow for complete freedom in the respondents' replies, due to the explorative nature of the study. The interviews were conducted at an office at the Stockholm School of Economics made available to the research project group. This is in order with established recommendations, prescribing that a location with minimum chance for disturbance like a meeting room or similar locale should be used.⁵⁴ One of the interviews was held via telephone due to the interviewee being in Canada. Both authors present during all three interviews. The interviews were recorded using a digital field recorder and totaled 83 minutes.

3.3 Sources of Secondary Data

The secondary data was initially gathered as a means to acquire an overview of the mobile TV phenomenon, and was later used as an inspiration for designing appropriate questions in gathering the primary data. The data ranges from a wide variety of sources and can roughly be grouped into a few categories, of which two are the most important. These are briefly described below.

3.3.1 Business Articles

This category holds the largest number of sources, even though most are shorter than five pages. They cover everything from expectations of future demand for mobile TV

⁵³ Jensen, p. 84.

⁵⁴ Merriam, p. 88.

to announcements of new services related to mobile TV. Together they reflect the status of mobile TV being a hot topic that is eagerly discussed in the media.

3.3.2 Pilot Study Reports

The main empirical source of secondary data for the analysis conducted in this thesis has been the reports issued in the wake of recently conducted pilot studies. Below follows a short description of each of the reports used.

3.3.2.1 bmco

The bulkiest report by far, this 239-page document published by bmcoforum⁵⁵ details the findings of 8 European pilot studies⁵⁶ in an attempt to “analyse and compare content, usage and service related results of mobile TV pilots to get a more detailed picture on relevant usage and user behaviour over time and locations”⁵⁷ In addition, the bcmo report includes figures from the South Korean market, where mobile TV services have been commercially available since 2005.

3.3.2.2 Teracom/MMS

In the first of two Swedish pilot studies cited in this thesis, Swedish media infrastructure provider Teracom collaborated with media researchers MMS and other partners to study mobile TV usage amongst consumers in Stockholm. 400 test pilots used the service free of charge over a period of four months in late 2006-early 2007. Their usage was monitored via viewing log software.

3.3.2.3 Viasat/Tele2

The second Swedish study referenced in this thesis was conducted by satellite broadcaster Viasat in cooperation with telecom provider Tele2. 64 users tested the service for 12 weeks in late 2006, during which viewer surveys were regularly distributed.

⁵⁵ bmcoforum is an international, non-profit industry consortium dedicated to the advancement of mobile TV services.

⁵⁶ For a complete list of participating companies, see Appendix B, Table 1: Overview.

⁵⁷ bmcoforum.

3.4 Reliability and Validity

Internal validity pertains to the question if the results of a study really represent reality. A number of strategies can be used to ensure internal validity of qualitative studies. This thesis has ensured internal validity through triangulation, “member check”, observation over a longer period of time, “horizontal review”, and “explanation of bias”.⁵⁸ The triangulation of methods used has been described above. Member check means that the informants review the findings and assess their credibility. This was done with the results from the workshop as a report was sent to the attendants. The authors have observed mobile TV over a longer period of time, the first pilot studies commenced in July 2004 and the last interview was held on 2007-02-12. Horizontal review means that colleagues will review the results, this was carried out within the frame of the research project. Any bias apparent to the authors of this thesis has been explained in the introduction section of the thesis.

Reliability pertains to the question whether the results will be the same if the study is replicated. For qualitative studies, reliability and validity are highly intertwined. Thus, methods to ensure reliability are similar to those suggested to ensure validity. Triangulation and “explanation of bias” was discussed above. The possibility to “follow in the same tracks” is another method suggested. It means that the study should include a thorough description of method so that other researchers can replicate the study.⁵⁹ As evidenced by the preceding section as well as certain other parts of this thesis, the authors of this study have made an attempt to ensure that this is possible.

External validity pertains to the question whether the results are possible to generalize. It has been argued that qualitative studies are hard to generalize for a number of reasons. Firstly, the study is dependent upon the respondents. Secondly, the phenomenon that is studied might be unique. Two methods suggested to ensure high external validity for qualitative studies is to give a “rich” description of the situation, and to analyze a number of cases rather than just one case.⁶⁰ This thesis aims to give a

⁵⁸ Merriam pp. 179-180.

⁵⁹ Merriam p.183.

⁶⁰ Merriam pp. 183-188.

rich description of the situation. The number of pilot studies analyzed and the number of people (users and professionals) interviewed can be seen as a number of “cases”. Generalizability should be good given the established delimitations, i.e. *within the field of mobile TV in Sweden*. Outside this phenomenon it could be hard to generalize, even though there might be some additional possibility to generalize within the domain of personal consumer technology.

4 Empirics and Analysis I

In this section, the empirical data is presented. As stated in the method section the primary data comes from: Qualitative in-depth interviews with key industry figures, a series of workshop discussions between industry actors, a focus group interview with pilot end-users, and qualitative in-depth interviews with pilot end-users. The main secondary data consist of results from pilot studies. The data is also analyzed on a general level. In Analysis II theories will be applied to the findings.

4.1 What consumer preferences can be discerned with regards to mobile TV?

Drawing upon the quantitative and qualitative sources mentioned above, it is possible to identify a number of trends in consumer choice and preference regarding mobile TV services. Among the many observations that can be made, this analysis will focus on those pertaining to four major concerns:

- Usage situation (Where?)
- Time, frequency and duration of use (When?)
- Content (What?)
- Willingness to pay (How much?)

This selection was made based upon a number of criteria. Firstly, these were the concerns mentioned in most nonacademic articles on the subject. Secondly, the discussion at the workshop tended to focus upon these concerns as well. Thirdly, these concerns were addressed in most of the pilot studies.⁶¹

4.1.1 Where?

Among the things that one notice first is how prone users are to watching mobile TV at home. In fact, this proved to be the most common place of usage in all pilots. The novelty factor might partially explain this behavior, as Korean data shows that home usage is at a much lower rate of usage.⁶² However, this could also be due to a number of other reasons, such as the stationary TV being broken or occupied by other family members, or simply a case of cultural differences. One of the interviewees stated that he used the phone as a second screen when watching TV; for instance being able to see when a goal is scored in a hockey game so he could switch channel and watch the

⁶¹ bmcoforum, Viasat/Tele2, and Teracom/MMS.

⁶² See Appendix B Table 2.

replay on his main TV. The same user reportedly also used the service whilst working in the kitchen.

The most anticipated usage situation for mobile TV is probably while on the move, and perhaps not so surprisingly, watching when commuting was very common during most pilot studies.⁶³ One should note, however, that coverage has been limited during these tests. For example, it is not possible to watch on the subway, indoor reception is semi-reliable at best, and often the picture will disappear while the consumer is watching in a moving vehicle. Thus, it can be assumed that usage during commuting might be even more popular when coverage and signal reliability improves. The same goes for viewing when traveling, e.g. in airports or on a country train, which was mentioned at the workshop. This is also supported by statements made by the participants in the focus group study. The respondents at the focus group had used the service in a number of places. One user said that he once used it in bed, and that felt very cozy. Later though, he said that he would never use it at home and that it had been a one-time experiment. Another user said he had never used it at home; he always used it on the move. If it was possible to use it while traveling, such as on the train from Stockholm to Gothenburg he would love that. Everyone agreed that they would use it a lot on the subway if possible. One user reported using the device a lot at home, due to his stationary TV breaking down. He also tried to watch on the bus but the picture kept disappearing when the bus accelerated. It could be argued that coverage in a large amount of places is necessary to attract different types of users.

4.1.2 When?

Viewing is generally spread pretty evenly throughout the day, demonstrating a wide range of usage situations.⁶⁴ Stationary TV is almost exclusively watched when at home, something which has solidified the traditional primetimes. The fact that some people even watched mobile TV at work and school during the pilots could be interpreted as a sign of how strong the desire to watch TV really is. The service is also used during breaks, on the move, and when waiting. This shows that people use mobile TV even when there is little time to spare. Thus entertainment, rather than just passing some time, seems to be the benefit offered. The difference in primetimes

⁶³ bmcoforum.

⁶⁴ See Appendix B, Table 4.

between stationary and mobile TV could result in a change of what material is broadcasted at what time during a period when the same channels are broadcast for both formats. More than 50% of users in the two pilots where the question was asked said that they would be interested in content especially made for mobile TV.⁶⁵

Overall, users also watch for a fair share of time, both per session as well as per day and per week.⁶⁶ This data suggests that users enjoy the service, even though the novelty factor may still play a part. However, figures from the Korean market show extensive usage even after its commercial launch; especially viewing per session was rather extensive.⁶⁷ Another figure that supports this notion is that a large number of pilot users said that they would recommend the service to others.⁶⁸

4.1.3 What?

The successful launch of any new medium is dependent on delivering an offering with attractive content. Initially, the Swedish pilot studies have all replicated regular TV programming, yet truly mobile TV content will most likely be a different beast altogether, given the conditions described in the previous two sections. The participants at the workshop mentioned live broadcast and news as the content with most potential in mobile TV. There is also some content that should fit well without any special editing, such as the latest goals from the Premier League. In addition, trailers for high profile movies could be appreciated, as it would be perceived as exclusive. It was very clear in the Finnish pilot study that live sports has great appeal. News also held a very strong position in the pilots.⁶⁹ One good way to increase perceived value according to the respondents at the focus group is to offer channels that fit well for mobile consumption, such as the Discovery Channel. Other types of content mentioned were news and music videos. The respondents also preferred VOD to broadcast, however in such a case pricing would be crucial. Short clips à la YouTube would be appreciated. The interactive service that the respondents thought could be most popular is purchasing of related goods, such as buying the soundtrack to the drama series you just watched. The notion of brand must also be taken into

⁶⁵ bmcoforum.

⁶⁶ See Appendix B, Table 3.

⁶⁷ See Appendix B, Table 3.

⁶⁸ See Appendix B, Table 7.

⁶⁹ See Appendix B: Table 5.

account. Mobile TV is a potential playing field for any number of new media actors. In all the trials, however, the same channels that are popular for stationary TV are popular for mobile TV. Viewers prefer the strong brands, built up with regular TV.⁷⁰ Interactivity was mentioned in two of the pilots. It was mentioned as something that should bring excitement; that it increases usefulness. However, Telefónica users also pointed out that ease of use when using interactivity is very important, the TV service should not be disrupted. Industry interviewees offered different views on the aspect of interactivity. Most believe that it will have a big impact on mobile TV consumption, especially in the younger segment,⁷¹ but not everyone is expecting to see it happen immediately with the launch of mobile TV services.⁷²

4.1.4 How Much?

A crucial point in making mobile TV commercially available is being able to construct adequate business models. Competition is likely to be fierce, and providers need to be in tune with consumers' willingness to pay for the service in order to reach a critical mass. Should mobile TV fail to reach this level of penetration during its initial run, chances are that an entire generation of potential customers will be scared off and thus "wasted". According to most data on the subject, users are indeed willing to pay for the service. In fact, this attitude reveals a readiness to pay a fairly high fee.⁷³ This also suggests that users are convinced about the usefulness of the service. Industry professionals and consumers agree that uncertainty regarding the final cost of the service needs to be minimized. The universally suggested pricing model from both is a flat monthly fee that allows the consumer unlimited access to a select number of channels. Anything other than this, e.g. charging by the minute or by unit of data transferred, is bound to create enough uncertainty to scare most consumers away from the service.

A relevant aspect of pricing is not only what other providers will charge for similar services, but also which type of media will compete for consumers' time and attention. When asked to identify the main competitors for mobile TV, both workshop and focus group participants mentioned free newspapers (Metro and others) and other

⁷⁰ Interview: Patrik Höljö.

⁷¹ Interviews: Fredrik Palm, Henrik Pålsson.

⁷² Interview: Patrik Höljö.

⁷³ The particulars of pricing are discussed below.

features in the mobile phones such as messaging and music. These are instantly available and usable in many of the same situations as mobile TV. Also, a newspaper or listening to music does not demand the complete attention of the user. Here it is important to note that in the pilots users actually used mobile TV in a lot of places where free newspapers usually are not offered, lessening the competitive effect. They even used it at times and in places where they said that they would probably not use it. Delivering a great service, users might use it almost everywhere. Judging from the pilot studies and the focus group users' statements, competition from stationary TV is mild to nonexistent, showing that different-sized screens have different purposes and complement each other without overlapping. This defines a space in consumers' lives in which providers can create value through delivering mobile TV services and charge accordingly. None of the users reported watching less stationary TV since starting the pilot.

This section has looked at consumer preferences by asking where users watch, when they watch, what it is that they watch, as well as how much they are willing to pay for the service. A summary of these findings is presented below in section 4.4. Next, the second research question is addressed.

4.2 To what extent is consumer behavior influenced by different technological characteristics in new mobile TV services?

When analyzing consumer preferences, it is very important to bear in mind the technological limitations as well as possibilities. It is then possible to create a service that is more likely to appeal to consumers. This section looks into how consumers perceive mobile TV in terms of what is offered, quality, hardware, and network coverage.

4.2.1 What Is Mobile TV?

It was agreed upon by the participants at the focus group that the technology in itself is not important. What is important is that users can recognize the technology and the rituals that accompany it. This is in keeping with views expressed by the industry.⁷⁴ In several pilot studies users used mobile TV in locations where they could not use their stationary TV, such as the bathroom, extending the reach of the well known ritual of

⁷⁴ Interview: Johan Rosenlind.

watching TV.⁷⁵ It was mentioned during the workshop and during industry interviews that existing TV companies are interested in mobile TV mainly as a bridge between the TV of today and the TV of the future, and that a new form of TV, where variations of VOD will be the main ingredient, will eventually take over from traditional broadcast TV.⁷⁶ It confirms the notion that strong brands are preferred, showing that this strategy has a solid foundation. Some of the participants also believed in the market for niche content as well. Given that distribution is already in place it could be lucrative to provide more specialized material. This is supported by the pilots where users prefer a wide selection of material.

4.2.2 Perceived Quality

Users perceive image quality differently both across and within the same studies. This shows that image quality might be an issue. However, in some studies almost all users are satisfied with the image quality.⁷⁷ This could imply that when the service goes live image quality should not be an issue. One of the focus group participants mentioned that picture quality has to meet a certain level; beyond that, people are pretty good at imagining the rest. Regardless, while consumers may forgive the occasional glitch in image transmission, the same is not true when it comes to sound. Humans cannot imagine sound as they can with images. Sound needs to be continuous and uninterrupted if the consumer is to give the service more than a few tries. If sound becomes choppy, consumers will grow increasingly uneasy and annoyed, thereby quickly losing interest. In a pilot study conducted by Swedish media company Viasat, pilot users had lots of complaints about the sound being too low.⁷⁸ Industry interviewees and participants at the workshop mentioned the lack of quality over 3G networks as one of the main reasons as to why broadcast technology is interesting for the companies.⁷⁹ In any case, users would need new handsets. One participant pointed out that camera phones became popular amongst the masses that do not care as much as the technology geeks when it comes to technology. Japanese teenage girls happily spent their money to be able to take pictures instantly whereas you will hardly see a real photographer wielding a camera phone. One of the respondents at the focus group

⁷⁵ bmcoforum.

⁷⁶ Interview: Henrik Pålsson.

⁷⁷ bmcoforum.

⁷⁸ Viasat/Tele2.

⁷⁹ Interviews: Johan Wahlberg, Henrik Pålsson.

stated that he rather carries his “real” digital camera than purchase a “camera phone”. However, this separation of functionality may soon become a thing of the past as handsets become increasingly like multimedia computers.⁸⁰

4.2.3 The Hardware

The respondents at the focus group agreed that the phone in the trial (a Samsung P910) was very good in terms of packing things together. Perhaps it was a bit bulky, but not too much. The way it is designed with a rotating screen was well received, and the fact that you just push the big TV button to start the service was appreciated. However, it was perceived as a trial version rather than a finished product. For instance, multitasking, such as writing an SMS while still having the TV function activated, was impossible. Also, an EPG would be desirable. There were a few main points that were mentioned as to why the phone and the service were not attractive on average. The service usually took 2-3 minutes to start. The minimum time was one minute, and it had happened that it took 10 minutes. This inhibited usage during short periods such as when waiting for someone. One user said “I would rather look out the window [than wait for the service to start]”.⁸¹ Channel switching was also slow, about 15 seconds. Also, battery life was very limited; the choice was basically either to make calls or to watch TV. All respondents complained about the size of the handset. The interviewed users of the Nokia N92 used in two other Swedish pilot studies both said that they could actually do with a smaller screen. One feature that was appreciated was the fact that the Nokia features an EPG. The Nokia users also thought that even though the battery life was a bit limited it was acceptable.

4.2.4 Network Coverage

None of the individually interviewed end users had high expectations about mobile TV before entering the pilot; they did not think that the technology was ready to deliver. Image quality was deemed to be very good by all three interviewees, although, they all had different experiences regarding reception quality. One user reported excellent overall coverage, including indoors. Another user reported average overall coverage, with virtually nonexistent indoor coverage. There were a few issues regarding sound quality. When reception was not so good the sound broke up,

⁸⁰ Interview: Johan Rosenlind.

⁸¹ Focus group: Nils A.

annoying the users, one user complained about high spikes hurting his ears. His comment was: “You’re punished immediately”.⁸²

This section has looked at different aspects of mobile TV technology and their impact on consumers’ perception of the service. A summary of the findings pertaining to this question may be found under section 4.4. The next section will address the third and final research question.

4.3 What are the factors determining how consumers adopt mobile TV?

People use new technology in different ways. The way they do this is dependent upon both previous experiences and beliefs. New services have to be packaged in a way that is simple for consumers to assimilate and adopt.

4.3.1 Helping the Consumer

One point that industry actors and all participants at the focus group agreed upon was that it has to be easy to use the service. Push one button and it is up and running.⁸³ A number of participants thought that this should also be a main point in marketing efforts. Users might have tried other technologies such as WAP-internet without being successful.⁸⁴ These users need to be persuaded that this new technology actually works without hassle. For the sake of these users, the name mobile TV is also important to use, no matter what technology is providing the service.

People steadily increase their use of media, its share of our waking life growing with each introduction of new media.⁸⁵ The participants at the workshop saw two implications from this on mobile TV. First, there should be room during the day for mobile TV. Second, this room can increase even more as mobile TV becomes part of social networking. Sites such as You Tube and MySpace are integrated more and more into people’s lives. Representatives from the mobile phone industry had clearly seen that a main driver for interactivity is other people’s actions. If someone posts a

⁸² End user interview: Fredrik S.

⁸³ Interviews: Johan Rosenlind, Joakim Strandqvist.

⁸⁴ Interview: Johan Rosenlind.

⁸⁵ <http://www.nordicom.gu.se>

picture of their baby others will follow suit.⁸⁶ These two observations might involve the two main points mentioned in the pilots, excitement and usefulness. However, some participants pointed out that this wears off as lot of users feel that “if all these other people post pictures I don’t have to do it”. During the workshop, a way that was mentioned to get users to easier access material is active content management. It has been proven to be very effective on websites, for example news that receives a lot of clicks will be moved up on the page. When making the switch to streaming media ideas like this are crucial. This shows that even if we move from broadcast towards VOD, industry representatives are confident that they can help out with choosing content for users.⁸⁷

4.3.2 Using New Technology

When asked about how they adopt new technology, one of the respondents said that he likes to learn how new things work. He said that this drives him to buy new things. Another respondent said that he likes to read about new technology and gadgets. But since he is a student he cannot afford to buy it most of the time. The pilot was an opportunity for him to get a nice new phone. Usually, he does not use a lot of the features in the phone but this time he bought a memory card to use the phone as an mp3 player. One respondent said that he plays a lot of games on his phone, usually when commuting. All three users at the focus group were previously using older Nokia models. One of them mentioned that he was very dissatisfied with the user interface of Motorola phones, and he was fairly dissatisfied with the Samsung interface. The same respondent buys new phones whenever his mobile phone carrier contract expires about every 18 months. The other respondents switch phones more rarely. One reason for this was that they do not think that most of the new features are useful. The respondents did not see themselves as early adopters. However, they did see themselves as interested in new technology. They all had a high awareness about technology, making them receptive to it. None of the respondents complained about it being too hard to understand how to use mobile TV. Either this means that it is very easy, or it means that the users are very good at handling new technology. New technology is something that all three individually interviewed end users said to be interested in, yet none of them buy gadgets just because they feel like it. They were all

⁸⁶ Workshop: Mark Jefford.

⁸⁷ Interview: Patrik Höljö.

positive to buying a phone supporting mobile TV the next time they will purchase a new one. However, they all said that they would not do it at the expense of other features and characteristics they have become accustomed to in a handset.

4.3.3 Pricing

All three users at the focus group had rather old phones before the trial began. This was mostly since they did not see the benefits of newer phones, but also because they thought that pricing for new services is unclear and too steep. From the pilots it could be seen that the level of pricing preferred, on average, was a bit above what the focus group respondents reported. Yet, they were prepared to pay given that the service is improved. All participants at the workshop believed that pricing methods have to be straightforward. It has been seen before that good mobile services have been hampered by bad pricing methods. A few participants also said that pricing should not confuse users when compared to what they pay for their home TV package. Others disagreed since they thought that it would be impossible to get people to pay in exactly the same way and in an amount that is comparable. From the pilots it can be seen that willingness to pay is pretty high⁸⁸, from 50 SEK to as high as 10 GBP. Users also liked the traditional approach with a package of channels. This was concurrent with industry views on the matter.⁸⁹ The respondents at the focus group were not heavy users of the Internet via mobile phone. One respondent said that he had started to use this feature when he noticed how well it worked on the phone in the trial. Still, he thought price was an issue. All respondents agreed that pricing for mobile TV has to be easy to interpret. One of the respondents once got a huge bill for surfing on his phone and never tried again. A charge for 30 SEK per month for a package of channels or 10 SEK per month for one channel was deemed to be reasonable. Whereas all three individually interviewed users thought that a package of channels similar to their cable TV package would be good, they did not have the same view on pricing. One user would probably not want to pay anything extra at all. Another would pay 50 SEK if coverage would be better. The third would pay 50 SEK without thinking, 80 SEK after some thought, and 100 SEK after thinking it through carefully.

⁸⁸ Viasat/Tele2. See also Appendix B Table 6.

⁸⁹ Interviews: Fredrik Palm, Per Holmkvist.

4.3.4 Observing Mobile TV

The users at the focus group reported that other people noticed the mobile phone. The respondents showed it to friends, and one respondent noted that once some girls who sat behind him on the bus were talking about it. The users who were interviewed also noticed that other people had shown interest in the handset when they were using it. One user said that it was mostly people who fit the typical stereotype of a tech nerd; a 28-year-old guy with fashionable glasses who asked. Another user said that all of his friends and family had asked a lot about the phone. In a lot of the cases it had to do with the fact that the phone looks different from other phones. Also, people wondered why they were just staring at the phone.

The preceding section has attempted to delineate the most important factors that determine how consumers are to adopt mobile TV. A summary of the results is presented below.

4.4 Summary of Analysis I

The following table contains a summary of the first analysis part. It is divided by the three questions investigated as well as the subheadings for each question.

What consumer preferences can be discerned with regards to mobile TV?

Concern	Main points from analysis
Where?	• At home • On the move • At work/school
When?	• Viewing distribution is subject to variation • Generally evenly distributed throughout the day • Strong desire to watch even when there is little spare time • The concept of primetime is challenged • Extensive viewing duration per session
What?	• News, sports and entertainment • Live content (especially sports) has great potential • Formats will evolve and establish themselves over time • Viewers appreciate strong, recognizable brands
How much?	• Majority of users are willing to pay for mobile TV services • Consumers seek minimal uncertainty regarding final cost • Suggested business model is a flat monthly fee

To what extent is consumer behavior influenced by different technological characteristics in new mobile TV services?

Concern	Main points from analysis
What Is Mobile TV?	• The rituals matter, not the technology • Strong brands are preferred • Potential market for niche content
Perceived Quality	• Generally good picture quality • Sound is important • The majority is satisfied with lower quality
The Hardware	• Easy access is key • Different experience with startup time and channel switching • Handsets are too large, smaller screen could be acceptable • Current battery life is a limitation
Network Coverage	• Differing experiences; some good, some bad • Network coverage did not affect image quality • Sound broke up due to bad reception

What are the factors determining how consumers adopt mobile TV?

Concern	Main points from analysis
Helping the Consumer	• Service must be easy to use • Call it mobile TV regardless of technology • Implement active content management
Using New Technology	• Old features need to remain intact
Pricing	• Pricing models need to be straightforward • Willingness to pay is high • Traditional package of channels is popular
Observing Mobile TV	• People passing by noticed the phone • Friends and family were all interested

5 Analysis II

In this section theory is applied to the insight gained in Analysis I. The section is divided by the different factors described in the theory section. At the end of this section there are three different scenarios, drawing upon Analysis I and II to predict the adoption of mobile TV.

5.1 Attributes of Innovation

5.1.1 Relative Advantage

Relative advantage is the advantage that the new innovation is perceived to have compared to its predecessor.⁹⁰ To assess the relative advantage of mobile TV one first has to look at what can be deemed as its predecessor. In this case there are two products: the analog portable TV, and earlier iterations of personal media players. On the economic dimension there is one thing that stands out: even in the long run the additional investment for mobile TV is zero, given that the user will buy a new cell phone anyway. In the short run, such a phone might cost more and a purchase might not be planned. Users in the trials were positive to buying a phone with mobile TV the next time they purchase a new phone. In the social dimension mobile TV holds a firm advantage over the analog portable TV. The latter lacks so many things that social status is hardly something you gain by brandishing one. A user at the focus group remembered using one at a friend's country house once, other than that it was not mentioned. In Analysis I it was found that users were using the service in a multitude of places. This indicates that users are not afraid to use it in public. The fact that a lot of people asked the users about the phone indicates that mobile TV might hold a social advantage.

5.1.2 Compatibility

Compatibility is the perceived degree of consistency between an innovation and existing values, past experiences, and needs of the users.⁹¹ A lot of energy has been put into making mobile TV compatible with consumers' values. In Analysis I it was described how the service is accessed by pushing a big button saying "TV". Once the service was started though, the experience differed between the users of different handsets. The Nokia had a distinct advantage over the Samsung with its modern EPG.

⁹⁰ Rogers p. 229.

⁹¹ Rogers p. 240.

This minimizes the risk for faulty usage since users are referring to their past experiences. Users are still not as used to on-demand content and thus there might still be a risk in offering such content. The regular TV channels are what people are used to seeing as TV. No matter whether being on-demand or broadcast, the service is named mobile TV. Industry professionals were unanimous that this should be the case in order to keep consumers from being confused. This is completely consistent with diffusion theory as it also helps creating a meaningful cluster. This is key since in general the quality of modern mobile TV is good enough to be seen as TV. The fact that a lot of users also watched at home during the pilots indicates that mobile TV might be too compatible with stationary TV; the users just see it as a small TV to use at home instead of as a portable TV. Yet, users also watched in a number of other places. People are used to doing things as listening to music when on the go, adding moving pictures works well within the frames of compatibility for most people.

5.1.3 Complexity

Related to the above argument about compatibility is the issue of complexity. Complexity measures the degree of difficulty in understanding and using an innovation.⁹² The measures taken to ensure compatibility have also made mobile TV less complex. Understanding mobile TV is not hard, push the button and it is up and running. Even though the technology behind it all is very complex, the interface that the user sees is very straightforward. When it comes to streaming technology there can also be portals with active content management as suggested in Analysis I. The level of complexity rather seems to ensue from the number of functions crammed into the phones. Users expressed that multitasking did not work well. They did not manage to get the phone perform in the way they wanted to. If even experienced users face such issues, less experienced users might easily be discouraged.

5.1.4 Trialability

Trialability is the degree to which it is possible to experiment with an innovation without purchasing.⁹³ It is fairly high for mobile TV. If using streaming technology, you can simply watch a clip to see if you like it. The respondents at the focus group as well as the users interviewed individually reported being asked about the phone regularly. At that moment they can show it to the person who asks who then gets an

⁹² Rogers p. 257.

⁹³ Rogers p. 258.

instant trial of broadcast mobile TV. In a mobile phone store one can also easily watch mobile TV when looking for a new phone. There is one problem though; this does not show performance under different circumstances. If you buy a mobile phone supporting broadcast mobile TV you will probably use it in a number of places. When just looking at it in a store or at a friend's phone you will not be able to see how it performs under different circumstances. Since mobile TV is not only hardware but also a service this lowers the level of trialability.

5.1.5 Observability

Observability is the degree to which others can observe the *results* of using an innovation.⁹⁴ The observability of mobile TV has already been touched upon above. Obviously it is easy to see when someone is using mobile TV. But, the theory also stipulates that it is the advantage of using something that should be observed. This might not be as easily done as you might not notice if the person who is watching enjoys it or not. In Analysis I it was found that live sports is the most popular content for mobile TV. During a live event it is easy to observe the joy of someone watching.

5.1.6 Summary of Attributes of Innovation applied to mobile TV

Attribute	Definition	Observation
Relative advantage	Perceived advantage compared to predecessor	Economic, social
Compatibility	Perceived degree of consistency between innovation and values, experiences, and needs	Service is recognizable due to similarities with stationary TV
Complexity	Degree of difficulty in understanding and using an innovation	Interface reduces perceived complexity; multitasking potentially problematic
Trialability	Degree to which it is possible to experiment with an innovation without purchasing	Demonstrations are easily given (though non-comprehensive)
Observability	Degree to which others can observe the results of using an innovation	May depend on content

5.2 Technology Acceptance Model (TAM)

5.2.1 Perceived Usefulness

In Analysis I it was shown that the main benefit of mobile TV is believed to be entertainment at a time when you have nothing else to do. When looking at perceived usefulness, the question then is whether mobile TV offers good entertainment

⁹⁴ Rogers p. 258.

compared to other alternatives. The data from the pilot studies shows that users do appreciate mobile TV to the extent that they were using it on average between 16 and 35 minutes per day.⁹⁵ Findings suggest that the quality of content is more influential than the quality of the system.⁹⁶ In the case of mobile TV this would mean that the important thing is to provide the content that users want, and that the platform is not as important. It was found in Analysis I that users find the picture quality to be good enough. It was also found that live sports was very popular. This is a form of content only available through TV and radio (apart from actually attending the event) making it apparent that usefulness is high for mobile TV. But also other forms of entertainment are well liked in this form; news was mentioned to be popular by industry experts as well as users. Research also shows that users are often willing to deal with some difficulty of use if the system provides a critical function to the user.⁹⁷ This might be the Achilles heel for mobile TV. As seen in Analysis I, none of the users saw mobile TV as something they prioritize; it is merely something used for a quick fix of entertainment. Thus, perceived ease of use needs to be further analyzed as this needs to be low since users will not be prepared to sacrifice a lot of time and energy for something with limited usefulness.

5.2.2 Perceived Ease of Use

As shown in the theory section, perceived ease of use is an antecedent to perceived usefulness. It was also shown that there are in turn a number of antecedents to perceived ease of use. These can be split into anchors (computer self-efficacy, perceptions of external control, computer anxiety, and computer playfulness), and adjustments (perceived enjoyment, and objective usability). In this case computer can be substituted for mobile phone. The users interviewed all appeared to rank highly when it comes to anchors. They did not have any doubt as to whether they would be able to master mobile TV. They were all regular users of different functions in their phones, and some of them used iPods and digital cameras. In the Viasat/Tele2 pilot 83 percent of the users had a digital camera, and 71 percent had a MP3-player.⁹⁸ This shows that the users in the pilot seem to be comfortable with gadgets of all kinds.

⁹⁵ See Appendix B, Table 8.

⁹⁶ Cheong & Park p. 136.

⁹⁷ Cheong & Park p. 333.

⁹⁸ Viasat/Tele2

Mobile phone penetration in Sweden today is at 92 percent.⁹⁹ TV penetration in Sweden is at 100 percent.¹⁰⁰ Consumers are used to using their mobile phones for many purposes, for example a digital camera is now seen as a standard part of a mobile phone. But there are services such as WAP that some users still might not be comfortable with. Mobile TV has to be easier to understand than that. The strategy suggested by professionals at the workshop and in interviews as the starting point for mobile TV, integrating TV in a way people are familiar with, minimizes anxiety for the consumers.

After some time of usage, the user will adjust his/her perceived ease of use as perceived enjoyment and objective usability is formed. In Analysis I it could be seen that the users enjoyed the service, although it was evident that there is a threshold where this is not enough to overcome some obstacles. When using broadcast as well as streaming technologies there is always some external control; if coverage is weak the service does not work well. If it happens too regularly, users will feel that the ease of use is low since they cannot just pick up the device and watch. Some users also reported that the objective usability fell as the pilot went on. As the novelty wore off, basically it was not as much fun anymore. This could also be seen in the Swiss pilot, where usage dropped from the first to the second stage.¹⁰¹ In Analysis I it was pointed out that the users at the focus group did not enjoy the multitasking abilities of the phone. If this problem is present in production units the ease of use will most certainly be perceived as low. But given that the users of the Nokia N92 did not complain about similar problems this seems to be an issue isolated to certain handsets.

5.2.3 Summary of TAM applied to mobile TV

Factor	Observation
Perceived Usefulness	High for attractive content, especially live events
Perceived Ease of Use	High if the user is comfortable with other gadgets and mobile functions; multitasking cumbersome on certain handsets

⁹⁹ PTS (2).

¹⁰⁰ http://www.mms.se/report_research_se.asp?p5=dir

¹⁰¹ See Appendix B, Table 3.

5.3 Possible Scenarios

Drawing upon the above results there are a number of possible scenarios for the diffusion of mobile TV, that is, how will users adopt mobile TV? Below, three such scenarios will be described. The purpose is to summarize the findings in a way that shows the different indications of direction, since the empirics and analysis cannot provide a unanimous answer. It is also possible that all three scenarios will be realized, but over a long period of time, similar to how mobile Internet is starting to take off after the failed launch of WAP. The scenarios are:

1. Mobile TV Fails Due to Technological and/or Service-Related Factors
2. Mobile TV Succeeds as an Independent Medium
3. Mobile TV as a Catalyst for Change

The scenarios have been constructed by weighing together quantitative and qualitative findings with theoretical connections made above.

5.3.1 Scenario 1: Mobile TV Fails Due to Technological and/or Service-Related Factors

The factors upon which the success of mobile TV hinges have been discussed in previous sections. They show that for mobile TV to prosper, a number of technological and service-related obstacles have to be overcome. There are a number of different companies involved in delivering mobile TV; Handset manufacturers, network operators, content creators and others all play a part. There are many potential candidates for the weakest link in the chain. What happens is that the attributes of innovation become very low if these obstacles are not addressed. Also, since perceived ease of use and perceived usability might be low initially due to factors inherent to the users it must seem to that the utmost is done to minimize problems pertaining to those factors.

Technical issues include long startup time, slow channel switching, and short battery life. The handsets must be attractive to users in terms of size, looks, and ease of use. Moreover, the ritual of watching television must be mirrored in the smaller interface. Also, there are a bunch of smaller bugs that need to be taken care of; the users already have phones that are great at the functions they mostly use. If these are not working satisfactorily together with the new features, consumers will ignore the feature altogether, or simply not buy the new handsets. Network coverage must be good, as

users want to use the service in any place. Streaming mobile TV does not offer good enough picture quality in the current 3G networks. Thus, broadcast networks seem to be a must for mobile TV to succeed. Yet, sound still seems to be an issue that needs to be resolved.

The preferred price was found to differ between markets. Generally it can be said that at least there is a will to pay, even when programming includes advertising. A price of 50 SEK is accepted by a large part of the consumers. Failing to meet this price-point, or otherwise generating consumer uncertainty regarding final cost of the service, mobile TV might be a hard sale.

Delivering a service that is not up to expectations might turn users away in the long term. The competition such as free newspapers is already well established; hence, there is no need to rush. The service must also provide consumers with attractive content, packaged in a way so that it is entertaining for the moment. This also applies to the number of channels being offered; as witnessed in the BT Movio pilot, a mere 4 channels is a tad low, as evidenced by the subsequent attitude survey.¹⁰² Furthermore, the disappointing sales once the service went commercial might be a sign of the same sentiment amongst consumers.¹⁰³

Securing broadcast and/or streaming rights to attractive content is intimately linked to this issue. Current rights packages commonly exclude web and mobile channels, making it increasingly difficult for content providers such as SVT to procure the desired content for use in all available media.¹⁰⁴ This does, however, provide new actors the opportunity to exploit this situation and secure these rights for themselves. Even so, as seen in the previous analysis, attracting a wide audience may prove difficult without a strong brand. Finally, all pilot tests have replicated the standard TV offering. It is therefore difficult to predict how content specifically tailored to mobile TV audiences will fare alongside regular TV programs.

¹⁰² bmco.

¹⁰³ <http://business.guardian.co.uk/story/0,,1991842,00.html>

¹⁰⁴ Interview: Johan Wahlberg.

5.3.2 Scenario 2: Mobile TV Succeeds as an Independent Medium

Mobile TV might have a bright future. Every advance, both when it comes to technical and service-related factors, will enhance the attributes of innovation. Once the deterring factors described in Scenario 1 are overcome, usage is likely to increase. Several indications for this were found in the above analysis, such as viewing duration and location.

From the bathroom to the bus, users watch mobile TV in a multitude of places, even though limitations in coverage dictate where people will watch. They will also watch at different times and for different amounts of periods. However, live content such as sports is preferred, even though it does not allow the users to choose when to watch, and the duration is often long.

The main benefit proposed is having access to entertainment at all times, regardless of location. At first, mobile TV is likely to reflect the current TV offering as a means to minimizing consumer uncertainty; when the handset starts showing moving images, the user will know what to expect. In time, as the service matures together with consumer experience, mobile TV will increasingly become an independent medium in the eyes of the consumer. In addition, mobile TV technology will be integrated with what consumers regard as constituting a mobile phone, just as with the camera and media player functions so far. In the beginning, these were hardly functions deemed to be compatible with mobile phones. Yet, as the functions became more refined they gained ground in the minds of consumers. At this time one can actually argue that a good camera phone holds a relative advantage over a compact digital camera.

Once mobile TV has defined itself as an independent medium, technology as well as content may take on a life of its own. It is possible that consumers will realize the full potential and flexibility of both broadcast and streaming services, using these technologies to create a custom offering tailored to their viewing needs and habits. Or, to describe it in a more theoretical manner, perceived usefulness increases. As users come to use the service in this way companies will be able to invest more in these solutions, further enhancing the ease of use. Should this scenario materialize, mobile TV may well eclipse traditional TV in terms of popularity and significance.

5.3.3 Scenario 3: Mobile TV as a Catalyst for Change

The empirical material offers little assistance in drawing any conclusions regarding the distant future, yet it does provide some suggestion as to where mobile TV could be heading once a successful launch has been made and consumers are familiar with the offering. Should such a launch be implemented, things could look quite different in a few years time.

Even though there is competition, mobile TV seems to have a place in consumers' media consumption. People watch in different places, at different times, and they do enjoy the content and quality that has been offered in pilot studies. As people use the service in new places, the well-known ritual of watching TV is expanded. The notion of primetime is also expanded as users can conveniently watch at more times in the day than before. Even though people mostly watch what you think they would (such as news and sports), to a limited extent, they also watch movies and documentaries. For many years there has been talk about the convergence of media. One driving force for convergence is the addition of new media. As Scenario 2 describes, mobile TV might become a strong medium on its own. Looking further into the future, it might get more and more intertwined with the Internet and stationary TV. For an understanding of this phenomenon, one can look at the development of mobile Internet. When using MSN on a mobile phone, are you using a phone messaging service or the Internet? If you call using Skype from your mobile phone, are you calling or using the Internet? Already today traditional broadcast giants such as CBS are making moves towards the Internet as well as mobile TV, indicating that the movement has already begun.¹⁰⁵

5.4 Conclusions

This section contains a condensed presentation of our final results, divided in accordance with the three research questions formulated in the introduction of this thesis.

1. What consumer preferences can be discerned with regards to mobile TV?

Consumers require a service that is recognizable and easy to use, that is when compatibility is high. They prefer to use mobile TV services in three primary

¹⁰⁵ <http://www.wired.com/entertainment/hollywood/news/2007/05/magcbs>

situations: at home, on the move, and at work/school. There is no preferred time of day in which users choose to watch, and viewing duration may range from seconds to hours. In general, consumers tend to favor content such as news, sports and entertainment provided by established channel brands. This type of content raises perceived usefulness in the eyes of the consumer. Willingness to pay is high, given that the cost is predictable and controllable, e.g. in the form of a flat monthly fee.

2. To what extent is consumer behavior influenced by different technological characteristics in new mobile TV services?

It has been concluded that the important factor determining consumer behavior is not technology, but rather the ritual of watching TV. Even so, some fundamental aspects need to be taken into account with regards to technology. For instance: image quality was rarely regarded as a problematic issue, however sound must always be near-perfect, lest consumers be severely annoyed. This is usually contingent of network coverage. In addition, the hardware needs to facilitate TV usage by way of conveniently sized handsets, quick startup times and channel switching, and adequate battery life. If these requirements are not met to a satisfactory extent, consumers may dismiss mobile TV altogether. This is supported by the theoretical notions of low complexity and high perceived ease of use.

3. What are the factors determining how consumers adopt mobile TV?

Mobile TV must be easy to use and easy to recognize. This cannot be measured on a scale, it is rather a prerequisite. Old features that consumers are used to need to remain intact, at the same time the users must perceive a relative advantage of using the new device. Again, the pricing has to be straightforward in order for consumers not to be confused. The price cannot be too high; about 50 SEK per month is deemed to be reasonable. For new technologies to spread the observability is important. As people see other people using mobile TV the level of interest will increase.

6 Discussion

The introduction of mobile TV services brings fundamental change to the deeply rooted cultural ritual of watching audiovisuals, giving rise to new patterns in media consumption and consumer behavior. This creates a challenging scenario of old vs. new being linked by technology. As consumers are offered the possibility to use mobile TV, actors from a wide range of industries potentially stand to profit from this. However, every market action must take the multitasking digital-age consumer into account. Not only must mobile TV prove itself as a useful technology towards consumers, it must also prove itself against an increasingly competitive landscape where different media fight over consumers' attention, be it free newspapers, mobile Internet, or even traditional TV. As previously noted, consumers are faced with an unprecedented range of choices regarding their daily media consumption. How can mobile TV enter this already crammed stage? The answer lies not primarily in the technology itself, but rather in the packaging of the service offering. As long as the handset is able to deliver reasonably good quality and network coverage, it is up to service providers to tailor a service that is recognizable, easy to use and clear on costs towards the consumer.

This thesis has aimed to investigate what principal factors guide consumers in their choice to consume mobile TV, and to suggest how mobile TV services are likely to be received by consumers. This has been done by examining quantitative data found in a number of international pilot studies and combining these with qualitative assessments gathered through workshop seminars, focus group discussions and in-depth interviews. The results have then been further scrutinized by applying innovation and technology acceptance theory, providing insight into what chances are for mobile TV to be successfully introduced to consumers. As has been shown in the preceding sections, interest in purchasing the service is relatively high, provided that specific requirements are fulfilled. These are both technological (e.g. terminal and screen size, image and sound quality, battery life and network coverage) and service-related (pricing models, channel offering, and – most crucial of all – attractive content). If these requirements are not met and offered with an acceptable and predictable price tag, users will most likely dismiss mobile TV as a technological fad, in which case it may well take many years before consumers are ready to embrace the

service. However, if mobile TV proves to be a hit from the start, it may well shape itself into an independent medium that is quite different from what users regard as TV today.

Increased mobility when watching is one of the most intriguing facets of mobile TV. It is somewhat surprising, therefore, that the most common place in which to watch mobile TV is at home. The reasons for this are unclear, but part of the answer may lie in the fact that consumers (particularly older users, one of the biggest viewer segments in the pilots) are still not fully “mobile” in their mindset when it comes to watching TV. Traces of the old ritual of watching traditional TV at home are likely to remain for quite some time after a successful service launch. In the long term, different viewing habits of younger users will most likely shape the medium over time, affecting content as well as usage situations.

6.1 Possible Critique of This Study

The results of this study have been aimed at the Swedish market with a strong emphasis on broadcast (DVB-H) technology. The empirics included in the analysis has been gathered from a wide range of sources in an attempt to cover as much ground as possible, however there are several aspects about this that limit the implications that can be drawn from the results. Firstly, the prohibitive costs of building mobile TV infrastructure have resulted in pilot studies that are limited in scope and thus unlikely to properly reflect how the service will be adopted on a nationwide basis. The lack of adequate network coverage for DVB-H is another shortcoming of the pilots that otherwise would have shown exactly how important (or unimportant) the underlying technology is to the consumer. Another limitation is the cultural differences between countries that render international research data somewhat unreliable when assessing the Swedish market. In addition, the authors’ own sources for qualitative data may be questioned, as they have been selected from an incomplete list of actors within an industry that does not lend itself to clear definitions. The small size of the focus group is another lamentable factor, although difficult to remedy given the circumstances at the time. A larger group may have given a wider range of opinions about the service. The same goes for the number of consumer interviewees. All focus group participants and consumer interviewees were

young males, albeit of different cultural background. A wider selection across gender and age groups would have been desirable.

6.2 *Suggestions for Further Research*

The conclusions reached generate a number of future research possibilities. This thesis has been written using a mostly qualitative approach, given the recency of mobile TV services. Yet, as mobile TV earns a space in consumers' minds, attitudes and perceptions may be measured quantitatively on a larger scale. This has already been done to some extent by network operators in their pilot studies, however with a strictly commercial focus. Realistically, a quantitative study with an academic focus is unlikely to be conducted before the service has been commercially available for some time, yielding its results somewhat "after the fact", yet of potential interest for future service development.

One may also choose to look at TV functionality in mobile phones in relation to it being present in other mobile devices. This would give an idea of how consumers value the mobile phone and/or other devices as the preferred carrier of audiovisual entertainment. An understanding of these preferences will be useful in shaping an attractive offering. Is the TV offering compatible with mobile phone usage in the long term? Should TV be bundled with telephony and/or mobile Internet, or should it be a separate entity delivered on a separate device?

An additional study may be conducted on the issue of pricing alone, and its effect on service adoption among consumers. As has been seen in this thesis, consumers are willing to pay for mobile TV services, yet the acceptable price range varies between different pilot studies. By introducing an academic perspective on pricing theory applied to mobile TV services, a deeper understanding of which factors influence consumers' choice to pay for mobile services in general can be gained.

Lastly, this study has looked at secondary data gathered from a wide variety of different geographical markets, yet its primary data, and the conclusions derived from it, pertain only to the Swedish market. Other markets, with differing levels of mobile services penetration and cultural values, may yield other results than those observed in this thesis.

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Post- och Telestyrelsen (PTS 2): *Svensk telemarknad första halvåret 2006*, 28 November 2006.

Teracom: *Test av TV i mobiltelefonen – Mellantidsresultat* published by MMS, 12 December 2006.

Viasat/Tele2: *DVB-H Mobile TV pilot Stockholm*, Bornäs Research, 16 January 2007.

7.3 Interviews with Industry Professionals

Per Holmkvist, CEO, Mobiento, 2007-01-24. Ca. 54 minutes.

Patrik Höljö, Business Director Content Services, Telia, 2007-01-30. Ca. 55 minutes.

Fredrik Palm, Project Manager, MTG Sweden, 2007-01-18. Ca. 41 minutes.

Henrik Pålsson, Director Consumer Lab, Ericsson, 2007-02-09. Ca. 29 minutes.

(Conducted via telephone)

Johan Rosenlind, Business Manager Multimedia Nordic region, Nokia, 2006-10-31. Ca. 44 minutes.

Joakim Strandqvist, Project Manager mobile TV, Teracom, 2007-01-17. Ca. 59 minutes.

Johan Wahlberg, Strategy Advisor, SVTi, 2006-10-25. Ca. 47 minutes.

7.4 Focus Group Interview 2006-12-20

Nils A, Christopher C, Mohammad S. Ca. 56 minutes.

7.5 End User Interviews

Daniel G, 2007-02-12. Ca. 17 minutes. (Conducted via telephone)

Johan H, 2007-02-12. Ca. 24 minutes.

Fredrik S, 2006-02-07. Ca. 42 minutes.

7.6 Workshop 2006-11-30

Group 1, morning session

Pontus Bergendahl, CEO, MMS

John Guthed, Project Manager, 12snap Lokomobil

Tomas Hedqvist, Analyst/consultant, Xlent Strategy

Peter Holmström, Director Mobile TV, Strix

Mark Jefford-Baker, Costumer Analyst, Ericsson Multimedia

Peter Siljerud, Analyst, Kairos Future

Maria Wiss, Business Developer, Kanal 5

Group 2, morning session

Anette Bohman, Director Mobile Services, TV 4

Aurelian Bria, PhD Researcher, Wireless@KTH

Jonas Hagblom, Technical Handler, Radio- och TV-verket

Per Holmqvist, CEO, Mobiento

Weje Sandén, Editor-in-chief, Veckans Affärer

Mattias Wiklund, Analyst Market Affairs, Post- och Telestyrelsen

Group 3, afternoon session

Carl-Axel Gustavsson, Media advisor, Kulturdepartementet

Jens Häger, Consultant, Mediavision

Patrik Höljö, Business Director Content Services, Telia

Björn Johansson, Analyst, SVTi

Henrik Pålsson, Director Consumer Lab, Ericsson

Pär Sundberg, CEO, OTW

Johan Wahlberg, Strategy Advisor, SVTi

Anders Willmes, System Developer, Interactive TV Arena

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<http://www.tre.se>

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8 Appendices

8.1 Appendix A: Results From the Teracom Pilot Study¹⁰⁶

What consumers think about various factors, and how they have used the service.

	Usage situation	Several times per day (%)	Daily (%)	Several times per week (%)
Usage situations (sorted by viewing frequency of users)	At home alone	8	11	17
	While waiting	3	9	24
	During lunch/breaks	5	12	12
	While commuting	4	7	16
	At home with others	4	7	12
	At work	3	7	9
	At restaurant/bar/café	2	4	9
	Outdoors/walking	1	5	9
	At school	1	3	3
	At the mall/in stores	1	1	4
	At country house	1	0	2
Viewing duration	35% of users think that it is ok to watch for an hour or more Only 4% think that it is impossible			
Image Quality	40 % perceive image quality as being worse than stationary TV 49 % perceive that it is the same 11 % perceive that it is better			
Sound Quality	32 % perceive sound quality as being very good 60 % perceive that it is good 7 % perceive that it is not so good 1 % perceive that it is bad			
Associations to mobile TV	Association	Yes (%)	Definitely (%)	Combined (%)
	Funny	42	23	65
	Cool	36	29	65
	Interesting	38	23	61
	Useful	31	21	52
	Attractive	31	21	52
Purchase intentions	Users were asked to predict future purchase of mobile TV, both with regards to themselves and other users			
	Time of purchase		Self (%)	Others (%)
	As soon as it is available		12	13
	When purchasing a new mobile phone		29	37
	Maybe sometime in the future		50	47
	Never		9	3
Channel preferences	Female users		Male users	
	1.	Kanal 5	1.	Canal+ Sport
	2.	TV4	2.	TV4
	3.	SVT 1	3.	SVT 1
	4.	Canal+ Sport	4.	Kanal 5

¹⁰⁶ Teracom/MMS.

8.2 Appendix B: International Pilot Studies (Europe)¹⁰⁷

8.2.1 Table 1: Overview

A list of the participating companies in the studies included in the bmco report.

Name	Country	Project partners
Bmco	Germany	Nokia Philips Vodafone Universal Studios Network Deutschland
BT Movio	UK	BT Movio Virgin Mobile
Canal+	France	Canal+ SFR Towercast Nokia
Finnish	Finland	Digita Elisa TeliaSonera MTV3 Nelonen YLE Nokia
O2	UK	O2 Arqiva
Swisscom	Switzerland	Swisscom
Telefónica	Spain	Movistar Abertis Telecom Nokia
Vodafone	Spain	Vodafone Abertis Telecom Nokia

8.2.2 Table 2: Usage Situations

An overview of the distribution of usage situations, comparing three popular situations.

Pilot	Usage situations		
	At home (%)	On the move (%)	At work/school (%)
Bmco	60	24	17
BT Movio	39	34	21
Canal+	50	14	12
Finnish ¹⁰⁸	X	X	X
O2	36	-	23
Swisscom	42	-	25
Telefónica	48	42	30
Vodafone	62	28	

¹⁰⁷ bmcoforum.

¹⁰⁸ The three usage situations were given as the top three in the Finnish studies.

8.2.3 Table 3: Frequency of Use

Comparison between the studies where frequency of use was measured.

Pilot	Frequency of mobile TV usage			
BT Movio	More than once per day	5 %	Once per week	22 %
	Once per day	16 %	Less than once per week	15 %
	Several times per week	34 %	Never	8 %
	Average number of viewings: 3.72 per week			
Finnish	Three identifiable user groups consisting of roughly 100 persons each			
	Type of user	“Heavy”	“Light”	“Other”
	Viewing frequency	About twice per week	About once per week	Very rarely
	Viewing duration	30-40 minutes	10 minutes	-
Swisscom	Percentage of total volume	≈ 85 %	≈ 10 %	< 5 %
	At least once a day	48 %	Usage decreased over time Reasons given by users were time restrictions and decreasing interest	
	Several times a week	42 %		
	Once a week	9 %		
	Did not answer	2 %		
Vodafone	Every day	39 %	Once in 2 week	1 %
	3 or more days per week	33 %	Once per month	0.4 %
	Once per week	5 %		
	78 % view on both weekends and weekdays			

8.2.4 Table 4: Viewing Times

Summary of the most popular viewing times from the pilots where it was measured, with some comments on the results.

Pilot	Most popular viewing times	Comments on viewing distribution
BT Movio	Before 9 am 6-8 pm	Fairly well spread over the course of the day
Canal+	9-10 am 1-2 pm 8-10 pm	-
Finnish	8-9 am 5-6 pm 9-11 pm	Spread evenly across the day, across weekdays, and slightly lower on weekends
O2	Before 9 am (22 %) Lunchtime (15 %) 6-8 pm (16 %)	Fairly evenly distributed
Swisscom	12-1 pm (18 %) 8-9 pm (14 %) 11 pm-12 am (15 %)	Clearly discernable peak times, usage at other times averaged 5.6 %
Telefónica	Lunch After work	Low usage in the morning, high after work and rest of the evening

8.2.5 Table 5: Content Preferences

List of preferred content, with share of users preferring the type of content when applicable.

Pilot	Specified genres			
Canal+	News, music, entertainment, documentaries, sports			
Finnish (with reasons why)	News:	Lets users stay informed; image quality is good when the picture is not moving fast		
	Sports:	Popular for live events when main TV is not available		
	Series:	Easy to recognize main characters; plots can be watched irregularly		
	Music:	Does not demand much attention		
	Films:	For long journeys		
O2	News	44 %	Movies	24 %
	Soaps	36 %	Comedy	22 %
	Music	32 %	Soccer	16 %
	Docs	25 %	Children's content	15 %
	Other sports	25 %	Drama	11 %
Swisscom	Magazines, series, news, documentaries			
Telefónica	Information/news	55 %	Children's content	15 %
	Series	37 %	Movies	11 %
	Music	37 %	No preference	28 %
	Sports	21 %		
Vodafone	Information/news	52 %	Sports	26 %
	Series	52 %	Movies	25 %
	Magazines/interviews	31 %		

8.2.6 Table 6: Willingness to Pay

A comparison on the willingness to pay, in some cases including a price estimate.

Pilot	Willingness to pay	
BT Movio	70 % would pay for the service in their current network (answered 4 or 5 on a 1-5 scale) 57 % would purchase a mobile phone that supports the service	
Canal+	68% were prepared to pay a monthly fee of 7 €	
Finnish	Half of the participants did not find a monthly fee of 10 € to be too high	
Swisscom (converted from CHF)	Free-to-air package	Pay TV package
	58 % unwilling to pay 3 % willing to pay 5.70-6.40 € 10 % willing to pay 4.50-5.10 € 20 % willing to pay 3.20-3.80 € 8 % gave no answer	79 % unwilling to pay 4 % willing to pay 5.70-6.40 € 5 % willing to pay 4.50-5.10 € 5 % willing to pay 3.20-3.80 € 7 % gave no answer
Telefónica	11 % would certainly pay for the service 44 % would possibly pay	
Vodafone	53 % were fairly interested 20 % were very interested - Mean acceptable price to pay was 10.76 GBP	

8.2.7 Table 7: Satisfaction

The pilots also evaluated different measurements of satisfaction and likelihood of recommendation amongst users.

Pilot	Satisfied above avg. (%)	Will likely recommend (%)	Believe mobile TV will be popular (%)
BT Movio	56	66	-
Finnish	-	-	58
O2	85	-	-
Telefónica	-	75	-
Vodafone	78	81	-

8.2.8 Table 8: Viewing Time

Average viewing time per session/day/week.

Pilot	Viewing time per session (mins)	Viewing time per day (mins)	Viewing time per week (mins)
BT Movio	18		66
Canal+		20	
Finnish		23	
O2	24		240
Telefónica		16	
Vodafone		35 (38 on weekends)	

8.2.9 Table 9: Conditions

Basic facts about the different trials.

Company	Duration	Number of Users	Number of TV Channels	Number of Radio Channels
Bmco	1.5 months	20	4	NA
BT Movio	6 months	1000	3	About 50
Canal+/SFR	6 months	500	14	4
Finnish Collaboration	3 months and 12 days	500	16	3
O₂	6 months	375	16	NA
Swisscom	2 months	100	16	NA
Telefónica	6 months	500	13	NA
Vodafone	4 months	300	13	NA

8.3 Appendix C: Commercial Data (South Korea)¹⁰⁹

Data from the South Korean market where mobile TV is a commercial service. The data shows user behavior in a number of key areas.

data shows user behavior in a number of key areas:			
Usage situations		S-DMB (%)	T-DMB (%)
	On public transportation	38	51
	At school/work	33	22
	At home	12	9
	In the car	11	7
	In the street	4	7
	Restaurant/café	3	4
Viewing hours	General		
	In spare moments	51 %	
	Going to and from work	27 %	
	When tired in the afternoon	12 %	
	At lunchtime	12 %	
	Around midnight	4 %	
	Detailed		
		S-DMB (%)	T-DMB (%)
	00.00-06.00	3	1
	06.00-09.00	7	9
	09.00-12.00	8	3
	12.00-15.00	26	27
	15.00-18.00	10	6
	18.00-21.00	31	36
	21.00-00.00	15	18
	Viewing duration	Per session	
Less than 5 minutes		3 %	
10-20 minutes		26 %	
20-30 minutes		22 %	
30-60 minutes		22 %	
More than 60 minutes		8 %	
Per day			
		S-DMB (%)	T-DMB (%)
Less than 30 minutes		48	53
31-60 minutes		32	36
More than 1 hour		22	11

¹⁰⁹ bmcoforum.