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Acceptance of online audio-visual cultural heritage archive services: a study of the general public

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Abstract

Introduction. This study examines the antecedents of user acceptance of an audio-visual heritage archive for a wider audience (i.e., the general public) by extending the technology acceptance model with the concepts of perceived enjoyment, nostalgia proneness and personal innovativeness.

Method. A Web-based survey was used to collect data to test the extended technology acceptance model in explaining intention to use. A representative sample consisting of 205 respondents was used.

Analysis. The conceptual model is evaluated using structural equation modelling. The evaluation entailed an assessment of the measurement model including its reliability, validity and model fit, and an examination of the structural model.

Results. Perceived enjoyment better predicts the users' acceptance than perceived usefulness does. Nostalgia has a strong effect on behavioural intention to use the service. Moreover, the results show no significant result regarding personal innovativeness in information technology.

Conclusions. The acceptance of an audio-visual heritage archive service is mainly determined by its hedonic characteristic (enjoyment) rather than its instrumental value (usefulness). This result is intriguing in relation to prior archive and digital library research. Additionally, nostalgia is successfully introduced within the technology acceptance model.

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Introduction

Television has existed for approximately sixty years. The longevity of television has triggered an awareness of its importance to nations' cultural heritages and archive institutions have been established. The provision of access to these archives gives a political justification to the public funding of audio-visual heritage archiving and has also been a shared goal within the archival community ([Yakel and Kim 2005](#)). It is also the *raison d'être* of archiving, and the status of the profession depends to a large extent on how well it is done ([Edmondson 2004](#)).

Despite the alleged potential of audio-visual heritage archive content to reach wide audiences ([Comité des Sages 2010](#)), services aimed at unlocking the archive content struggle to do so. The reason for this is that audio-visual heritage archive services are built from a technological perspective ([Ongena et al. 2012](#)) instead of from a user perspective. The end-user is often an unheard voice ([Jean et al. 2011](#)). Consequently, the question has arisen as to which services can be developed to reach the desired audiences. Existing literature provides few insights into users' needs regarding such services. Since digital repositories require continuous evaluation to determine their quality and new directions for growth ([Zuccala and Oppenheim 2008](#)), research on individuals' use of audio-visual heritage archive services and, thus, a better understanding of user behaviour, is needed to guide business models and consumer analyses. The goal of this research is to explore factors influencing the acceptance of a prospective online audio-visual heritage archive service by the general public.

This research addresses the antecedents of user acceptance of audio-visual heritage archive services. A theoretical understanding of individuals' use of these services can benefit archive institutions implementing new services. This study adopts the technology acceptance model as a theoretical framework. This model has been widely cited for predicting and explaining user behaviour and information technology use. Supported by a substantial number of empirical studies, the technology acceptance model has been proven for a variety of artefacts and, therefore, is considered the most influential and most commonly used model for explaining the adoption of information systems ([Lee et al. 2003](#)).

This study aims to conduct a theoretical and empirical analysis to explain factors influencing individuals' intention to use an online audio-visual heritage archive service. The purpose of this study is threefold. The first objective is to propose and validate the technology acceptance model specific to the context of an audio-visual heritage archive service. Secondly, we investigate whether such a service is used because of its utilitarian characteristics (usefulness) or its hedonic characteristics (enjoyment). Finally, we identify the factors that determine individuals' intention to use such a service by extending the technology acceptance model with the constructs of *nostalgia proneness* and *personal innovativeness* in the domain of information technology.

This paper proceeds as follows. The next section elaborates on the theoretical basis of the proposed model. The subsequent section introduces the additional constructs mentioned above and posits hypotheses. The methodology section then describes the sample and measures used. The penultimate section details the results of the study. The final section discusses the study's limitations.

Theoretical background

Audio-visual heritage domain

Television and cultural programming have shared a symbiotic relationship since the introduction of the television. In Europe, cultural programming is traditionally seen as the primary reason to legitimize the

establishment of public broadcasting service, which should be an influential factor in cultural reproduction and renewal ([Blumler 1993](#)). The cultural value played the lead in public broadcasting service's explicit cultural and educational mission, which contributed to the development of national identities and civic morality ([Van den Bulck 2001](#)). In contrast to Europe, in the United States the commercial sector has dominated the television system, which is mainly advertising-supported. To attract viewers for advertisers, private networks have cultivated a taste for popular culture and entertainment. Lovers of the arts relied on the Public Broadcasting Service, previously National Education Television ([Evens et al. 2010](#)).

The audio-visual material gained more attention by governmental institutions and triggered the establishment of national audio-visual heritage archives. These archive institutions were given the responsibility to preserve the audio-visual material. Plans to digitise audio-visual heritage archives were funded by large donations from government bodies motivated by the need for cultural preservation ([Courtois et al. 2010](#)) and large proportions of European government-funded projects have been focused on audio-visual heritage ([Manžuch 2009](#)). As the analogue carriers on which the content was once stored were rapidly decaying, plans to digitise ageing and fragile analogue holdings emerged along with an explosion of digital content. Research and development, therefore, focused on technical issues in preserving large quantities of video material in digital format. In contrast to analogue content, digital content is easily moved over networks and international standards already exist for digital content ([Hooper-Greenhill 1995](#)). The digital format, therefore, became a much cheaper way to preserve audio-visual materials ([Tanner and Deegan 2003](#)). Moreover, digital content is interoperable, searchable and flexible ([Oomen et al. 2009](#)) and offers users the possibility of more flexible and powerful search techniques ([Barnett 1998](#)) than analogue content.

Hence, in a similar manner to photographic archives ([Conway 2010](#)), audio-visual heritage organizations are transforming large portions of archive content by digitizing the analogue material, and transcribing and augmenting metadata. While digitisation is occurring for conservation reasons, it also enables online access to audio-visual content ([Wright 2007](#)). Media professionals can already access such content in the Netherlands and efforts have been initiated to broaden access. The audio-visual heritage material in the archive can be meaningful and useful for a variety of user groups ([Oomen et al. 2009](#)). The video material that is stored in the archive is valuable to, for example, media professionals ([Huurnink et al. 2010](#)), educational institutions ([Michael et al. 2009](#)) and broadcasters themselves. Furthermore, information and communication technologies are considered to be a driver for making Europe's heritage and cultural creations available to a wider number of citizens ([Commission of the European Communities 2005](#)).

The recent advent of attention to the cultural value of television content led to the novel domain that can be labelled as the audio-visual heritage domain. In general, a domain can be defined as a collection of all informational entities about a specific subject ([Hjørland and Albrechtsen 1995](#)). In our case, these entities include artefacts like moving images and recorded sound. In short: audio-visual media. Audio-visual media are relatively new compared to printed media and were often referred to as 'non printed materials' ([Fønss-Jørgensen 1998](#)). These audio-visual documents are part of a larger concept, which can be characterized as audio-visual heritage. The connotations and scope of this concept vary across cultures, countries and institutions ([Edmondson 2004](#)). Based on a definition by the Australian National Film and Sound Archives, Kofler ([1991](#)) proposed the most comprehensive and exhaustive delineation of the subject of concern. The following definition is proposed:

The audio-visual heritage of [the country] shall include, but not be limited, to the following;

(a) Recorded sound, film, television or other productions comprising moving images and/or recorded sound created or released within [the country] or by or with nationals of [the country] and/or with any other relevance to [the country], whether or not primarily intended for public release.

(b) Objects, materials, works and intangibles relating to the moving image and recorded sound media, whether seen from a technical, industrial, cultural, historical or other viewpoint; this shall include material relating to [the country's] film, television, broadcasting and sound recording industries such as literature, scripts, stills, posters, advertising materials and artefacts such as technical equipment and costumes.

(c) It also includes such concepts as the perpetuation of obsolescent skills and environments associated with the presentation and reproduction of these media documents.

Technology acceptance model

Originating in cognitive psychology and such theories as the theory of reasoned action ([Fishbein and Ajzen 1975](#)) and the theory of planned behaviour ([Ajzen 1991](#)), the technology acceptance model has proved to be a valid and adequate framework to explain users' behaviour regarding the (intended) use of information technology and related services. The model has predominantly been used in adoption research, which led to extensions of the framework labelled TAM2 ([Venkatesh and Davis 2000](#)) and even TAM3 ([Venkatesh and Bala 2008](#)). Although the technology acceptance model has been criticised ([Benbasat and Barki 2007](#); [Bagozzi 2007](#)), the model has been valuable in the information science field ([Goodhue 2007](#)) and is the most widely cited explanatory model of individuals' acceptance of specific technological innovations ([Ortega Egea et al. 2007](#)). Hence, over the years, the technology acceptance model has proved to be a valid and adequate model to explain users' behaviour.

According to the initial technology acceptance model, the adoption of an information technology system is determined by users' intention to use the system, which in turn is determined by users' attitude towards the system. This attitude is influenced by two salient perceptions about the system: perceived ease of use and perceived usefulness of the system. It is argued that the latter factor also has a direct impact on the behavioural intention to use the system. Perceived usefulness is described as the extent to which a person believes that the use of the system enhances productivity, performance and/or effectiveness. Perceived ease of use is defined as the extent to which a person believes that using the system will be effortless. When a person gives high ratings to both utility factors, it is likely that s/he will adopt and use the system. Figure 1 depicts the constructs in the model and the relationships among them.

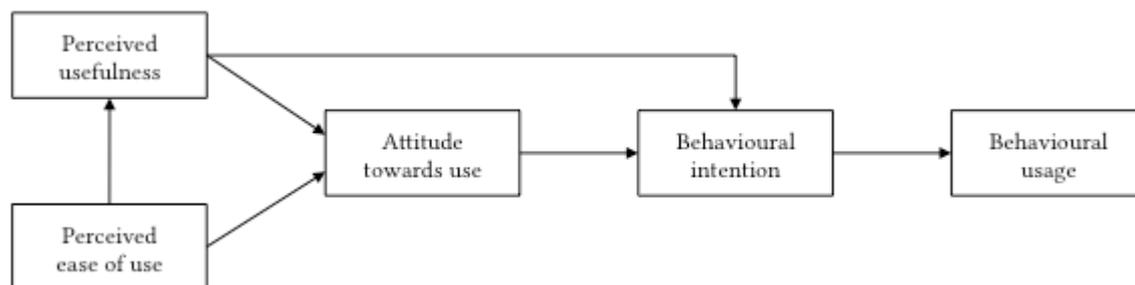


Figure 1: Technology acceptance model

The technology acceptance model has been applied in a variety of domains, extending well beyond the initial scope of the computer software studied by Davis ([Davis 1989](#)). It has been found to have explanatory power in a wide range of studies, initially in organizational contexts (e.g. [Igarria et al. 1997](#)) and later in domestic contexts (e.g. [Hu et al. 1999](#)). A variety of information systems have been studied, including systems related to e-commerce ([Koch et al. 2011](#)), e-mail ([Karahanna and Limayem 2000](#)), groupware ([Malhotra and Galletta 1999](#)) and the Internet ([Gefen and Straub 2000](#)). More recently and relevant to our context, the model has been applied to YouTube use ([Yang et al. 2010](#)), user acceptance of Web-based subscription databases ([Kim 2006](#)), use of a digital library ([Hong et al. 2002](#); [Thong et al. 2002](#); [Heinrichs et al. 2007](#)), and digital archive usage ([Hong et al. 2011](#)) and even more specifically open access digital libraries ([Tsakonias and Papatheodorou 2008](#)). In these cases, the model has been found valuable in explaining the use of the researched artefacts. Although the literature is extensive, researchers have called for additional efforts to extend the model's theoretical validity and empirical applicability by examining it in different contexts using different artefacts or technologies ([Hartwick and Barki 1994](#); [Hu et al. 1999](#)).

There are three rationales for adopting the technology acceptance model as a base model for the prediction of audio-visual heritage archive service use. First, its statistical power of technology acceptance model to explain individuals' intention to use information technology is greater than or at least similar to that of competing theories. For instance, the technology acceptance model proved to have a greater

explained variance than the theory of planned behaviour ([Mathieson 1991](#); [Lin 2007](#)) and the expectation-disconfirmation theory ([Premkumara & Bhattacharjee 2008](#)). Second, the technology acceptance model is the most parsimonious models ([Lin 2007](#)). Moreover, Davis ([1989](#)) developed standard measurements for the constructs within the technology acceptance model model. This means that the application of the model has minimal procedural costs and therefore requires the least amount of effort. Third, being a parsimonious model, technology acceptance model permits a smaller sample size ([Luo et al. 2011](#)). Therefore, we view the model as an adequate and powerful model for the prediction of audio-visual heritage archive service acceptance from a technological perspective.

Research model and hypotheses

Perceived usefulness

The intention to use an information system is to a large extent motivated by the users' perceived usefulness of the system ([Davis et al. 1989](#)). Individuals use digital libraries when they find the systems useful to their information needs or search tasks ([Hong et al. 2002](#)) and this has been recorded on a numerous of occasions ([Wilson 1997](#)). Thus, archives and libraries are often used for utilitarian purposes, and studies show a significant correlation between perceived usefulness and user acceptance (e.g., [Thong et al. 2002](#); [Tibenderana and Ogao 2008](#); [Miller and Khera 2010](#); [Heinrichs et al. 2007](#)). It is, however, unclear if this is also the case regarding audio-visual heritage archives. As this study uses the theoretical foundations of the technology acceptance model, the following relationship is hypothesised:

H1: Perceived usefulness has a positive influence on behavioural intention.

Perceived enjoyment

Perceived usefulness pertains primarily to the extrinsic motivations of users ([Teo et al. 1999](#)). Various studies, however, argue that system use is determined not only by extrinsic motivations, but also by intrinsic motivations (e.g. [Vallerand 1997](#); [Lee et al. 2007](#)), as shown, for instance, in the context of a multimedia messaging service ([Lee et al. 2007](#)). Moreover, audio-visual heritage material can relate to the hedonic needs of the user as it extends the availability of earlier broadcasted programmes. The term hedonic is used to denote systems that aim to provide self-fulfilling value to the user and to encourage prolonged use, whereas utilitarian systems aim to provide instrumental value for productive use ([Van der Heijden 2004](#); [Sun and Zhang 2006](#)). Therefore, perceived enjoyment is considered a better predictor than perceived usefulness with regard to hedonic information systems ([Van der Heijden 2004](#)). To investigate whether use of an audio-visual heritage archive service implicates extrinsic motivations (perceived usefulness) or intrinsic motivations (perceived enjoyment), this study postulates an additional hypothesis about the relationship between perceived enjoyment and behavioural intention.

Intrinsic motivations are considered to enhance the thoroughness of cognitive processing and lead to increased perceptions of the extrinsic motivations variable ([Bagozzi et al. 1999](#)). It is argued, therefore, that perceived enjoyment positively affects perceived usefulness. Although the association between these two constructs is understudied ([Yi and Hwang 2003](#)), previous research has found significant results regarding this relationship ([Venkatesh et al. 2002](#); [Yi and Hwang 2003](#); [Li et al. 2005](#)). Consistent with earlier research, this study posits a significant positive relationship between perceived enjoyment and perceived usefulness in the context of an audio-visual heritage archive service.

H2: Perceived enjoyment has a positive influence on behavioural intention.

H3: Perceived enjoyment has a positive influence on perceived usefulness.

Perceived ease of use

In the context of online applications, the ease of use is described as the extent to which users believe that

the use of the application is free of effort ([Vijayasathy 2004](#)). With the advent of Web 2.0, online applications contain interaction-enabled characteristics that facilitate, for instance, more engaging Website displays ([Harrison and Barthel 2009](#)). An online audio-visual heritage archive service must be easy to learn and use in order to encourage adoption. Therefore, consistent with earlier studies ([Sun and Zhang 2006](#)), we postulate hypotheses that assume correlations among the ease of use and the two constructs of perceived usefulness and perceived enjoyment. Moreover, we hypothesise that there is a direct relationship between perceived ease of use and behavioural intention ([Mathieson 1991](#); [Venkatesh 2000](#)).

H4: Perceived ease of use has a positive influence on behavioural intention.

H5: Perceived ease of use has a positive influence on perceived usefulness.

H6: Perceived ease of use has a positive influence on perceived enjoyment.

Personal innovativeness

The concept of personal innovativeness regarding information technology influencing individuals' behaviour regarding innovations has been widely used in diffusion research ([Rogers 1995](#)). The construct is conceptualised to characterise individuals as people who adopt innovations at an early stage deemed early adopters and thus innovative. The construct is used to segment users based on the time of adoption ([Rogers 1995](#)). A major limitation of this measurement is the fact that it uses an *ex post* descriptor of use behaviour ([Agarwal and Prasad 1998](#)). Subsequent personal innovativeness studies focused on measuring the construct directly ([Goldsmith and Hofacker 1991](#)) and incorporated it in technology acceptance theories ([Agarwal and Prasad 1998](#)). The basic idea is that individuals possessing high levels of personal innovativeness are expected to develop more positive attitudes towards new technologies ([Lewis et al. 2004](#)) and, therefore, have a greater intention to use them. Initially, personal innovativeness was found to be an indirect and thus a moderate, or mediate, determinant of use of new technology ([Agarwal and Prasad 1998](#)). More recently, personal innovativeness has been re-conceptualised as a direct determinant of behavioural intention ([Yi et al. 2006](#)). The concept of personal innovativeness is used particularly in the context of mobile services ([Mao et al. 2005](#)). Because audio-visual heritage archive services are currently in experimental phases, and their introduction to the market is still in its infancy, we assume that the early adopters, who have an innovative attitude towards technology, are more likely than others to intend to adopt new technologies. Based on this assumption, we propose:

H7: Personal innovativeness has a positive influence on behavioural intention.

Nostalgia proneness

Nostalgia, a topic that has been researched for many years, has been associated with homesickness and seen as a mentally repressive compulsive disorder ([Fodor 1950](#)). It was only in the latter part of the twentieth century that nostalgia acquired a separate conceptual status ([Wildschut et al. 2006](#)). Over the past decade, interest has grown regarding nostalgia and consumption experiences. Founded in psychology literature, nostalgia is currently defined as more than simply a memory. Rather, the memory embodies a sentimental desire for an idealised past that no longer exists ([Davis 1979](#)). Essentially, nostalgia reflects a positive emotional experience and enhances this self-positivity; it is generally defined as '*a positively toned evocation of a lived past*' ([Davis 1979](#): 18). These emotions are induced by negative experiences of the present or negative perceptions of the individual's life situation ([Goulding 2001](#)) and change with the time in the individual's life ([Baker and Kennedy 1994](#)).

An expanding body of literature addresses the concept of nostalgia. Studies found that consumers' yearning for and inclinations about the past, i.e., nostalgic feelings, affect consumers' preferences ([Schindler and Holbrook 2003](#)) and intentions to purchase nostalgic products ([Routledge et al. 2008](#)). For instance, consumers form lifelong attachments to the styles of popular music that they encountered in their late teens and early twenties ([Holbrook and Schindler 1989](#)). Consumers also show enduring

preferences for movie stars and films that they experienced in their youth ([Holbrook and Schindler 1994; 1996](#)). Recently, studies found significant correlations between nostalgia proneness, charitable giving ([Merchant et al. 2011](#)) and consumer brand attitude ([Muehling and Pascal 2011](#)). However, although the knowledge base regarding nostalgia has broadened, empirical research on the subject is confined to the fields of advertising and consumer psychology ([Holak and Havlena 1998; Schindler and Holbrook 2003](#)). We consider the concept of nostalgia in relation to the audio-visual heritage archive because cultural institutions seek to induce nostalgia through selectively retaining aesthetic, scientific, and historical cultural artefacts ([Belk 1988](#)). Based on these considerations, we posit:

H8: Nostalgia proneness has a positive influence on behavioural intention.

Figure 2 depicts the different hypotheses derived from previous research and the extension as proposed. The research model applies behavioural intention to use as an indicator of user acceptance. Studying behavioural intention as an indicator of user acceptance is in line with previous studies using the model ([Agarwal and Karahanna 2000; Chau 1996; Gefen and Straub 2000; Jackson et al. 1997](#)). Moreover, the service examined in this study does not currently exist; therefore, its actual usage cannot yet be measured.

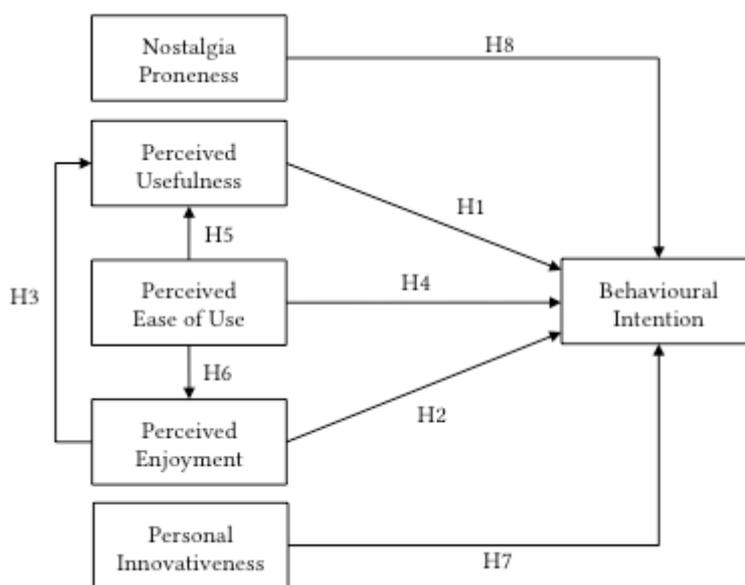


Figure 2: The research model

Research methods

Measurement

We designed the survey instrument using validated multi-item scales from previous research as a means of assessing the theoretical constructs of an extended technology acceptance model model and by using the scales of perceived usefulness, perceived ease of use, and behavioural intention to use the audio-visual heritage archive service from Davis ([1989](#)) and Davis, Bagozzi and Warshaw ([1989](#)). To develop the concept of nostalgia proneness we used items from Zimbardo and Boyd (1999). Their *time perspective inventory* consists of fifty-six items measuring attitudes toward the past, present, and future. Because we are interested in attitudes towards the past that reflect the nostalgia proneness, we selected and administered a subset of eight items that had good face validity in terms of capturing the sentiment of nostalgia proneness ([Routledge et al. 2008](#)). To measure the personal innovativeness we adopted items from previous research ([De Marez and Verleye 2004](#)), which are used by others (e.g., [Bouwman et al. 2007](#)), and are based on the work of Agarwal and Prasad ([1998](#)), who conceptualised personal innovativeness in the domain of information technology. The scales are slightly altered to fit the context of this study. The final list of items in the questionnaire is shown in the [Appendix](#). All of the scales were slightly modified to suit the context of the audio-visual heritage archive service

Data collection

A professional panel organization was hired to collect our data. Respondents were all aged eighteen and over and able to fill out the questionnaire between May 2 and May 6, 2011. The respondents were presented with the screenshot of a possible online service that included basic features, such as searching, browsing and streaming of clips. To increase the item responses, all questions were mandatory. Out of the total 228 respondents, 205 questionnaires were used, with 23 excluded because of incomplete responses. In the sample, the ratio of men to women was approximately equal (47.8% vs. 52.2%), which does not significantly deviate from the population ($\chi^2=0.13$, $p>0.05$). Approximately 25% were under the age of thirty-five, and 56.1% had a full-time or part-time job. Both variables indicated no significant differences compared to population statistics ($\chi^2=4.75$, $p>0.05$; $\chi^2=4.59$, $p>0.05$). Approximately 66% of the respondents were married, and 26.3% had children with their current spouse, which also shows no significant difference as compared to the population ($\chi^2=9.35$, $p>0.10$). Table 1 provides the complete set of descriptive statistics in the respondents' demographic profile. Based on these figures we consider the sample representative of the Dutch Internet population ([CBS 2011](#))

Table 1: Descriptive statistics of respondents' characteristics (N = 205)
(Note: * $p > 0.10$, ** $p > 0.05$.)

Items	Frequency	Percentage	χ^2
Sex			0.13**
Male	98	47.8%	
Female	102	52.2%	
Age			4.75**
18 - 25	25	12.2%	
26 - 35	26	12.7%	
36 - 45	31	15.1%	
46 - 55	43	21.0%	
> 56	80	39.0%	
Occupation			4.59**
Full-time/part-time job	115	56.1%	
No work (householder/pension/entitlement)	74	36.1%	
Student	16	7.8%	
Household			9.35*
Single without children	57	27.8%	
Single with children	13	6.3%	
Married or cohabiting without children	81	39.5%	
Married or cohabiting with children	54	26.3%	

Analysis and results

The proposed model is evaluated using structural equation modelling. This is a powerful second-generation multivariate technique for analysing causal models with an estimation of the two elements of a causal model: measurement and structural models. The measurement model of confirmatory factor analysis is used to test whether the constructs have sufficient reliability and validity. Moreover, fit indices are assessed to investigate the model fit of the data. The structural model is used to investigate the strength and directions of the relationships among the theoretical constructs. This study uses SPSS AMOS (analysis of a moment structures) to assess the measurement model and the structural model.

Measurement model

To determine the internal consistency reliability of the measures, we analysed the data using SPSS AMOS. Initially, items related to nostalgia did not meet the criteria, and these items were subsequently removed. Both the Cronbach's alpha and the scale composite reliability were computed to measure the internal consistency of the measurement model. As shown in Table 2, all Cronbach's alphas and composite reliabilities are high and therefore comply with the recommended minimum value of 0.6 ([Hair et al. 2009](#); [Bagozzi and Yi 1988](#)).

Analysis of factor loadings and the average variance extracted is included in the test to measure the convergent validity of each construct. Using confirmatory factor analysis, a single factor model was defined for each of the constructs. In total, the measurement model consists of six latent constructs detailed by 22 items. The constructs encompass perceived usefulness (PU), perceived ease of use (PEOU), perceived enjoyment (PE), behavioural intention (BI), personal innovativeness (PIIT) and nostalgia proneness. Because all the loading coefficients on the factors present acceptable values (see Table 3) and the average variances extracted meet the threshold of 0.5 (see Table 2), the convergent validity of the constructs is considered adequate ([Fornell and Larcker 1981](#)).

Table 2: Internal consistency reliability and convergent validity
(Note: SD = standard deviation, SCR = scale composite reliability,
AVE = average variance extracted.)

Construct	Mean	SD	# items	Cronbach's alpha	SCR	AVE
Perceived usefulness	2.81	1.46	4	0.947	0.944	0.810
Perceived enjoyment	4.61	1.68	3	0.960	0.960	0.890
Perceived ease of use	4.20	1.39	4	0.945	0.940	0.796
Nostalgia proneness	4.86	1.20	3	0.789	0.795	0.568
Personal innovativeness	3.23	1.56	3	0.945	0.947	0.857
Behavioural intention	4.83	1.36	5	0.951	0.963	0.841

Table 3: Descriptive statistics and factor loadings of items

Construct	Item	Mean	SD	Factor loading
Perceived usefulness	PU1	2.95	1.50	0.809
	PU2	2.69	1.44	0.879
	PU3	2.91	1.51	0.851
	PU4	2.69	1.41	0.917
Perceived enjoyment	PE1	4.68	1.69	0.909
	PE2	4.54	1.76	0.939
	PE3	4.60	1.78	0.929

Perceived ease of use	PEOU1	4.19	1.38	0.850
	PEOU2	4.14	1.45	0.861
	PEOU3	4.26	1.36	0.880
	PEOU4	4.20	1.38	0.840
Nostalgia proneness	NP1	4.68	1.46	0.740
	NP2	4.86	1.41	0.757
	NP3	5.05	1.43	0.617
Personal innovativeness	PIIT1	3.61	1.74	0.864
	PIIT2	3.06	1.61	0.929
	PIIT3	3.01	1.58	0.918
Behavioural intention	BI1	4.67	1.54	0.859
	BI2	4.72	1.42	0.889
	BI3	4.75	1.45	0.906
	BI4	5.08	1.40	0.876
	BI5	4.93	1.47	0.819

Discriminant validity is investigated by comparing the shared variances among the constructs with the average variance extracted from each separate construct. The initial technology acceptance model and proposed model included a mediating role for attitude. The construct of attitude is, however, excluded from further analysis due to insufficient discriminant validity. Thus, the covariance between attitude and behavioural intention to use the service is very high. Moreover, recent studies emphasised that the salient beliefs in the model are not fully mediated by the construct of attitude. The construct was therefore excluded from the model ([Kim 2006](#); [Agarwal and Karahanna 2000](#); [Gefen et al. 2003](#)). Similarly, this study excluded the construct of attitude as a mediating variable. Table 4 presents the square root of the average variance extracted shared among the constructs and their measures (in-diagonals) and their inter-construct correlations (off-diagonals). The figures show a lower shared variance among the constructs than the average variance extracted from the individual constructs. Consistent with Fornell and Larcker ([1981](#)), this confirms the discriminant validity of the measurement model. In sum, the measurement model demonstrates adequate reliability, convergent validity, and discriminant validity.

Table 4: Discriminant validity

Construct	PU	PE	PEOU	NP	PIIT	BI
Perceived usefulness (PU)	0.90					
Perceived enjoyment (PE)	0.41	0.94				
Perceived ease of use (PEOU)	0.42	0.61	0.89			
Nostalgia proneness (NP)	-0.43	-0.11	-0.20	0.75		
Perceived innovativeness (PIIT)	0.31	0.31	0.37	-0.37	0.93	
Behavioral intention (BI)	0.31	0.62	0.51	0.04	0.21	0.92

Although method biases in the information systems domain are less problematic than in other disciplines ([Malhotra et al. 2006](#)), the possibility of common method bias is a potential problem with single-respondent data ([Premkumara and Bhattacharjee 2008](#)). This is the case because both the dependent and focal explanatory variables are perceptual measures derived from the same respondent ([Podsakoff et al. 2003](#)). A Harman's single-factor test is conducted to test for common method bias. The test determines whether a substantial amount of common method variance is present in the data sample. Either a single factor emerges from the factor analysis, or one general factor accounts for the majority of the covariance in the independent and dependent variables ([Podsakoff and Organ 1986](#)). In this study, the five factors together accounted for 85% of the total variance; the first (largest) factor did not account for a majority of the variance (40%). Thus, no general factor is apparent. We therefore assume that common method

variance is not of great concern and thus is unlikely to confound the interpretations of results.

The model fit refers to how well the model fits the set of observations. Because structural equation modelling is used to test causalities in the proposed model, multiple indices indicating the fitness of the model were extracted from AMOS. Various fit indices exist and can be extracted from the statistical package. To assess the fit of both models, we included the Tucker-Lewis index, the normed fit index, the comparative fit index, the root mean squared error of approximation, and the standardised root mean square residual. Neither the goodness of fit index nor the adjusted goodness of fit index is used in this study; there is current consensus not to use these measures because they are affected by the sample size (Sharma *et al.* 2005). As shown in Table 5, all values of the fit indices are within the accepted thresholds (Hu and Bentler 1999; MacCallum *et al.* 1996), demonstrating a reasonable fit between the data and the proposed models. Therefore, we consider the models to fit.

Table 5: Overall model fit indices of the research model

Fit index	Recommended criteria	Obtained value
χ^2/df	< 3	1.693
Tucker-Lewis index	> 0.90	0.966
Normed fit index	> 0.90	0.932
Comparative fit index	> 0.90	0.971
Root mean squared error of approximation	< 0.08	0.059

Structural model

The results of the structural equation modelling analysis are provided in Figure 3. The figure presents the hypothesised positive relationships among the research variables. The values in parentheses represent the t-values, and the R^2 show the explained variance for that construct. As can be seen in Figure 3, the R^2 for behavioural intention is 0.46, indicating that perceived usefulness, perceived enjoyment, perceived ease of use, nostalgia proneness and personal innovativeness together explain 46% of the variance in behavioural intention.

Perceived usefulness appears to have no significant effect on behavioural intention. In contrast, the path between perceived enjoyment and behavioural intention is significant ($\beta=0.46$, $p<0.01$). We therefore reject our first hypothesis; however, hypothesis 2 is supported. Moreover, this study proposed a positive relationship between perceived enjoyment and perceived usefulness. As Figure 3 shows, the third hypothesis (H3) is supported by the data ($\beta=0.25$, $p<0.01$).

The data show that the three hypotheses regarding perceived ease of use are significant. Perceived ease of use thus significantly affects perceived usefulness ($\beta=0.27$, $p<0.01$), perceived enjoyment ($\beta=0.61$, $p<0.01$), and behavioural intention ($\beta=0.21$, $p<0.01$). The exogenous variable perceived ease of use moreover explains 25% of the variance in perceived usefulness and 37% of the variance in perceived enjoyment. Therefore, hypotheses 4, 5 and 6 are supported.

Nostalgia proneness has a significant effect on behavioural intention ($\beta=0.17$, $p<0.01$). As a result, the eighth is supported. Personal innovativeness is indicated to have no significant effect on behavioural intention. Thus, the seventh hypothesis is rejected.

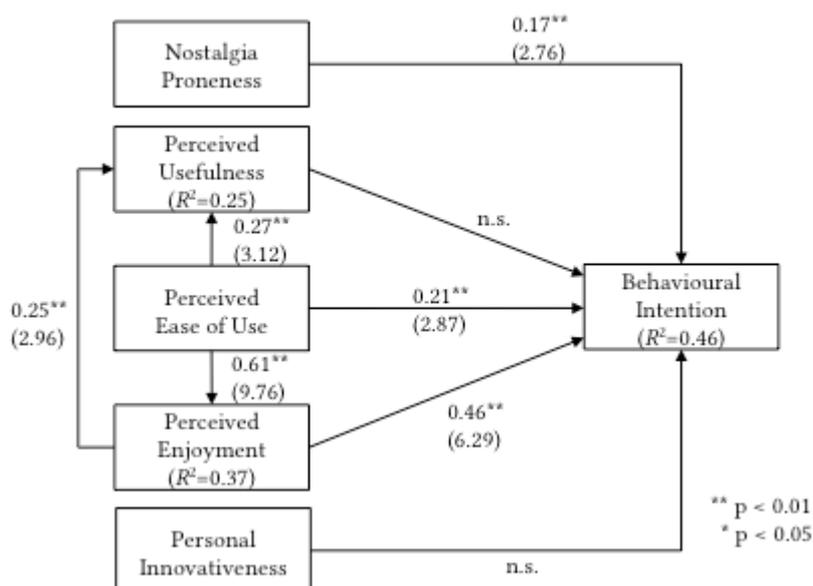


Figure 3: Results of structural modelling analysis

Discussion

To the best of our knowledge, this is the first study that investigates the antecedents of user acceptance of an audio-visual heritage archive service. The technology acceptance model was tested and extended to include consideration of additional factors (nostalgia and personal innovativeness) relevant to an audio-visual heritage archive service. The study provides a better understanding of the determinants concerning user adoption of audio-visual heritage archive services.

Before discussing the scientific and practical implications of this study, we stress some limitations. First, the fact that the service we investigated did not yet exist caused inadequate answering by respondents with limited ability to empathise. Second, in this study an online panel is utilized. Although it is argued that online research respondents are not very typical of the general population ([Stafford and Gonier 2007](#)), external validity is demonstrated by key demographical factors. Third, the construct of nostalgia proneness had a low number of retaining items compared to the initial construct, which consisted of eight items. Further research should emphasise a valid and reliable measurement scale in relation to technology acceptance theories. Fourth, a longitudinal investigation of the factors that determine consumers' adoption of audio-visual heritage archive services in a domestic context would be useful after such a service is introduced. This study was only able to investigate the individuals' intention to use the service and could not evaluate actual usage. Research on the development of audio-visual heritage archives has so far yielded little knowledge about the actual uses of the content, similarly to image digital libraries ([Conway 2009](#)). Fifth, further research should focus on the users of audio-visual archives to identify the most immediate beneficiaries of archives ([Conway 1986](#)). Although user groups are identified ([Oomen et al. 2009](#)), further study of the characteristics of these users is needed to develop services that suit the particular user needs. To enhance the understanding of user acceptance of audio-visual heritage archive services, future research can also include additional variables. Furthermore, it should be noted that this study measures the variance in self-reported use and thus not actual use as is the case with most technology acceptance model studies ([Legris et al. 2003](#); [Chuttur 2009](#)). Moreover, these self-reported measures are perceptions of the respondents. Jacobson ([2011](#)) showed in her research that there could be a gap between the perceptions of users and the eventual actual use. In sum, the results should be considered in light of these limitations.

To examine antecedents for the use of an online audio-visual heritage service, the technology acceptance model was adopted as a base model. The results of this study did not display a significant correlation

between perceived usefulness and behavioural intention, in contrast to a vast amount of prior research that used this model ([Gefen et al. 2003](#)), including research that specifically examined the acceptance of online video ([Yang et al. 2010](#)). Our results suggest that potential consumers do not adopt an audio-visual heritage archive service primarily because of its utility. Perceived enjoyment, however, shows a significant result in relation to behavioural intention. This finding is consistent with earlier studies concerning intrinsic antecedents (e.g. [Yi and Hwang 2003](#)). More specifically, this result supports the idea that perceived enjoyment is a better predictor than utility of the adoption of hedonic information systems (Van der Heijden 2004). Additionally, this study confirms the correlations among perceived ease of use and the constructs of perceived usefulness, perceived enjoyment and behavioural intentions found in prior literature ([Sun and Zhang 2006](#); [Luo et al. 2011](#)). In sum, the use of audio-visual heritage archive services is determined by intrinsic antecedents and thus relates to consumers' sybaritic needs and the services' ease of use. The technology acceptance model is therefore less applicable to audio-visual heritage archives than in prior archive research ([Heinrichs et al. 2007](#)). Further research should focus on dismantling the construct of enjoyment in order to examine its underlying foundations.

In addition to perceived enjoyment, the extension of technology acceptance model also involved the concepts of nostalgia and individual innovativeness. Nostalgia proneness directly influences the intention to use such a service. Further research examining nostalgic content in the studied information technology should therefore include this proneness in relation to memorable images. Although most hypotheses were supported, the results concerning the personal innovativeness construct were surprising. Prior research shows a significant role for this construct in new technologies and services, such as mobile services ([De Reuver et al. 2011](#)); this study, however, found that personal innovativeness had no significant role in influencing behavioural intention. One reason for the insignificance of this construct may be that audio-visual heritage archives are perceived as old and stuffy and thus can be viewed as the opposite of innovativeness, thus the stronger relationship with nostalgia proneness. The latter decreases the need for an innovative attitude for the use of services in audio-visual heritage archives. Therefore, new services or technology, i.e. innovations, do not always require the inclusion of personal innovativeness; the need for personal innovativeness varies depending on the context of the innovation.

These findings have implications for archive institutions that include audio-visual heritage content. Given the significant role of perceived enjoyment in relation to the non-significant role of perceived usefulness, a different perspective on audio-visual heritage archives is needed to enhance their accessibility and broaden their use. Archives and libraries emphasise their instrumental value, whereas audio-visual content mainly implicates individuals' epicurean needs. We therefore suggest studying services that explicitly appeal to these hedonic needs, such as online games or video-on-demand via television, rather than focusing on search engines that support the quest for information. The results also show that perceived ease of use is a factor in the acceptance of audio-visual heritage archive services. From a managerial perspective, then, it is important to convince users that an audio-visual heritage archive service is clear, adequate and comprehensible, and thus easy to use. Another key finding is the significance of nostalgia proneness in relation to behavioural intention. Audio-visual heritage archive services are recommended to take these sentimental feelings into account in service design and marketing campaigns. Triggering users' sentimentality is therefore a key element for providers of services in the audio-visual cultural heritage domain. We also stress the relationship between personal innovativeness and behavioural intention. The alleged potential is reflected by the non-significance of the construct of personal innovativeness. Although services are still in an experimental stage, their use is not limited to innovators, which is an affliction common to many other innovations. Furthermore, early and late majorities ([Rogers 1995](#)) are expressing interest in online audio-visual heritage archive services.

Conclusion

This study applied an extended version of the technology acceptance model in the context of online audio-visual heritage services that include perceived enjoyment, nostalgia proneness, and personal innovativeness. The proposed model enhances the understanding of online audio-visual heritage services use. We verified the effect of perceived enjoyment and nostalgia proneness on the intention to use such a

service. We rejected the hypotheses concerning perceived usefulness, personal innovativeness and behavioural intention to use the online service. The results thus suggest that the level of pleasure and nostalgic feelings primarily motivates prospective users of online audio-visual heritage services. Our results also expand upon previous efforts to develop adoption theories. Further theory expansion may be performed to provide an avenue for identifying additional or mediating factors or developing theoretical frameworks with potential to advance our understanding of technology acceptance in the context of audio-visual heritage as this is yet an uncharted area of research.

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Appendix: Measures and questionnaire

The broadcast archive of Sound and Vision includes almost all the television programmes of the public broadcasting channels (Ned1, Ned2, Ned3) since the introduction of television in the Netherlands. The archive includes more than 700,000 hours of radio, television, film and music that is supplemented daily with recent broadcasts. In the future it will be possible to watch all the television programmes from the past sixty years.

Imagine a service with a limited but representative sample of the broadcast archive Sound and Vision. You can view short clips (about 5 minutes) with news, sport, but also fiction and entertainment programs. The basic service offers average preview quality (e.g., YouTube). With the service it is possible to find movies, make a list of favourites to view from recommendations from other users. Furthermore, fragments can be shared via e-mail or social networking (e.g. Facebook). Comments can be added to each clip to exchange experiences with the program. You can see below an example of how such a service might look.

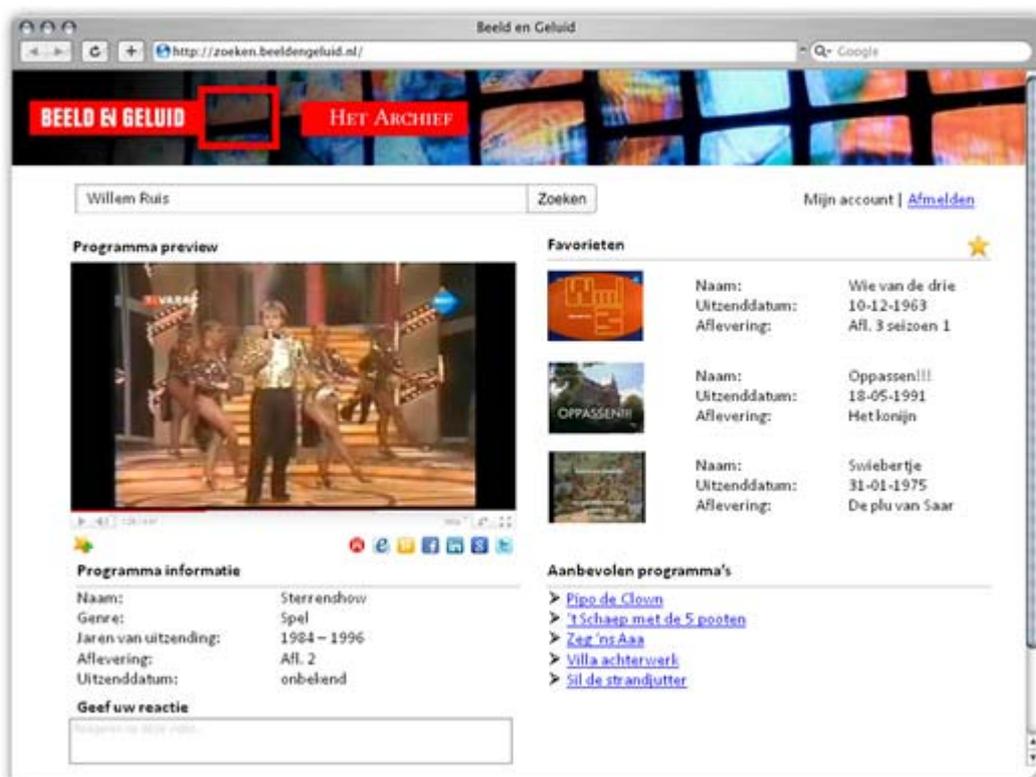


Figure 4: Screenshot of the audio-visual archive service prototype [Dutch]

**To what extent do you agree with the following statements in relation to the described service?
(1=Strongly disagree, 5=Strongly agree)**

Behavioural intention

- The development of the audio-visual heritage archive service is a good idea.
- The development of the audio-visual heritage archive service should be stimulated.
- I would use the audio-visual heritage archive service.
- I would frequently use the audio-visual heritage archive service in the future.
- I would recommend others to use the audio-visual archive service.

Perceived usefulness

- Use of the audio-visual heritage archive service enhances the quality of my life or work.
- Use of the audio-visual heritage archive service increases the productivity of my life or work.
- Use of the audio-visual heritage archive service can help me in my life or work.
- Use of the audio-visual heritage archive service increases the effectiveness of my life or work.

Perceived enjoyment

- It is likely that I will use the audio-visual heritage archive service to relax.
- It is likely that I will use the audio-visual heritage archive service to have a good time.
- It is likely that I will use the audio-visual heritage archive service because it is fun.

Perceived ease of use

- It is easy to find the appropriate clips in the audio-visual heritage archive service.
- It is easy to learn how use the audio-visual heritage archive service.
- It is easy to use the audio-visual heritage archive service in general.
- It is easy to use the audio-visual heritage archive service how I would like it.

To what extent do you agree with the following statements? (1=Strongly disagree, 5=Strongly agree)

Nostalgia proneness

- I often think of what I should have done differently in my life.
- I think about the good things that I have missed out on in my life.
- I think about the bad things that have happened to me in the past.

Personal innovativeness

- I always want the latest technology.
- I want one of the first to try out new services.
- I am one of the first to use new technologies.

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