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How to cite:

Anastasakis, Leonidas and Ellis-Chadwick, Fiona (2010). Exploring the adoption of interactive digital television services as a retail shopping platform. In: The Six Senses: the Essentials of Marketing: 39th EMAC Conference, 1-4 Jun 2010, Copenhagen, Denmark.

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Version: Accepted Manuscript

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# **Exploring the Adoption of Interactive Digital Television Services as a Retail Shopping Platform**

## **Abstract**

The aim of this research is to consider the possible effect of an emerging technology platform on the uptake of online shopping: interactive (digital) Television (iTV), which enables viewers to select a variety of viewing options, publicity materials, games, entertainment and more recently shopping. An augmented version of the original TAM is applied to this study. Two new constructs are considered namely access and awareness together with perceived ease of use, perceived usefulness, perceived enjoyment and security. The results show that indeed the augmented TAM can be used as a predictive model for the adoption of iTV as an online shopping platform. It is concluded that access, perceived ease of use, perceived enjoyment and perceived usefulness are significant factors to determine the consumers' behavioural intentions towards the use of digital TV as a new shopping platform. However, awareness and security are considered to be insignificant with no effect on consumers' behavioural intentions towards the new shopping medium.

## **Summary**

In this study an augmented version of the technology acceptance model (TAM) is applied to interactive TV shopping (iTV). By performing this we intend to determine the relevance of TAM as a predictive model for the adoption of iTV as an online shopping platform as well as identify the factors which are likely to affect consumer adoption of iTV.

**Keywords:** TAM model, Remote Shopping, Interactive Television

**Track:** *Track 12: New Technologies and E-Marketing*

## **1. Introduction**

The Internet's potential as an interactive shopping channel has provided retailers with a platform that alters the customers' shopping experience [Dennis et al, 2004; Evanschitzky et al, 2004]. The online shopping experience provides retail customers with access to extensive purchase information; instantaneous communication dialogues; extensive ranges of products

and services and an extremely rich and flexible new retail channel [omitted reference]. Furthermore, the success of the Internet as a retail channel has given retailers a mechanism to access wider target markets. However, accessing markets is only part of the problem there are challenges to be overcome; research has repeatedly proven that “*the consumers’ profile will strongly influence the extent to which a particular consumer segment is likely to engage with online shopping opportunities*” [omitted reference]. Indeed, age, income, lifestyle, education, and race are key elements of consumer classification variables that are likely to influence online behaviour (Hoffman *et al*, 2000) and whilst Internet usage has increased significantly, there are still many market sectors of the United Kingdom (UK) that do not use the Internet as a shopping channel.

The aim of this research is to consider the possible effect of an emerging technology platform on the uptake of online shopping: interactive (digital) Television (iTV), which enables viewers to select a variety of viewing options, publicity materials, games, entertainment and more recently shopping. Currently, in the UK, computer ownership is around 70 per cent, television ownership 97 per cent and iTV 84 per cent, which shows a significant rate of adoption as this technology only became available in 1999 (Quicke, 2009; BARB, 2009). Longstanding widespread ownership and familiarity of television technology could mean this platform might be more widely accepted as a remote shopping channel than the Internet, which is still less well understood by certain sectors of the UK population. As a shopping channel Interactive digital broadcasting is predicted to result in iTV becoming not only a source of entertainment but also a highly successful remote shopping platform. Furthermore, environmental influences: the UK Government’s initiative to switch off the analogue television signals in 2012, are driving consumer adoption of iTV services. The outcome is likely to be that iTV will be available in at least 97 per cent of UK households and hence consumers will have access to an additional shopping platform.

## **2. Conceptual Background and Research Model**

### *2.1 The technology acceptance model*

The Technology Acceptance Model (TAM) framework introduced by Davis (1989) is widely accepted as a robust and reliable framework to examine new technology adoption from a consumer perspective. Due to its wide scale applicability, the TAM has evolved and been extended to include a variety of additional factors that have proven relevant when studying the affect of the users’ intentions towards the adoption of new information technology applications and or systems. In the initial TAM model Davis, (1989) identified two factors as the antecedent to the users’ intention to adopt new technologies: 1) *perceived ease of use*, 2) *perceive usefulness*. Subsequent studies have extended this model adding, social, hedonic and nonhedonic factors. Childers *et al.* (2001) identified enjoyment as a strong predictor of attitude towards online shopping. Chen *et al.* 2002 criticises TAM for not including social factors on technology acceptance, which has been subsequently addressed by Perea y Monsuwe *et al.* (2004) by incorporating five exogenous factors to the original model: consumer traits, situational factors, product characteristics, history of previous online shopping experiences and trust.

TAM has been used for predicting the behaviour of online shoppers. Vijayasarathy (2004) presented an augmented version of the TAM to predict intentions towards online shopping. This version of TAM includes privacy, security, normative beliefs and self-efficacy together with ease of use and usefulness and the work concludes that compatibility, usefulness, ease of use and security are significant predictors of attitude towards online shopping while the

consumers intention to use online shopping was mainly driven by their attitude towards the new shopping medium, normative beliefs and self-efficacy. However, studies on the applicability of TAM in interactive shopping are almost non-existing. To our knowledge, Yu et al. (2005) is the only study where the TAM is considered as an appropriate model for the prediction of consumer intention towards interactive shopping. They concluded that seven factors: ease of use, usefulness, enjoyment, trust, and attitude, normative belief of family and friends and subjective norm could influence the adoption of interactive shopping. They also compare how the effect of these factors may vary according to the degree of consumers level of experience in using interactive shopping concluding that there are no strong evidence to support this.

This work has the following specific objectives:

1. to determine the relevance of TAM as a predictive model for the adoption of iTV as an online shopping platform
2. to identify the factors which are likely to affect consumer adoption of iTV

## 2.2 Hypotheses

According to Yu et al. (2005), the factors influencing consumers' adoption of technology can vary, depending on the technology, target consumers and context. As a result, *perceived usefulness* and *perceived ease of use* can partially explain consumers' adoption of interactive shopping. Furthermore, in order to predict the consumers' attitude towards digital TV as a new medium for interactive shopping it is important to extend the TAM framework to account for the special characteristics that the introduction of iTV could bring to the consumers' shopping experience. Television is generally accepted as a source of entertainment therefore the opportunity of using iTV as a shopping medium will also include the element of enjoyment. Additionally, the level of awareness of interactive shopping might be higher, which could affect consumers' attitude towards interactive shopping. Finally, security frequently cited as an important barrier to adoption of online shopping is also included in the adopted TMA model. Due to the hypothetical nature of the shopping experience since interactive shopping is not currently available in UK we omit the attitude from our model arguing that it is most likely that there will be a close correlation between attitude and behavioural intentions. Therefore, for this study, we propose an augmented version of TAM with six factors. (See Figure 1).

*Hypothesis 1. A consumer's perceived ease of use of interactive shopping has a positive effect on his/her behavioural intention to use it.*

*Hypothesis 2. A consumer's perceived usefulness of interactive shopping has a positive effect on his/her behavioural intention to use it.*

*Hypothesis 3. A consumer's perceived ease of use of interactive shopping will have a positive effect on his/her perceived usefulness of it.*

*Hypothesis 4. A consumer's perceived enjoyment of interactive shopping will have a positive effect on his/her behavioural intention to use it*

Performing online transactions is perceived as high risk with security as one of the most cited reasons for engaging to internet shopping and financial online transactions (Vijayasathy, 2004; Cheng et al, 2006). Although, the transactional procedures involved in using TV for interactive shopping are unclear it is anticipated consumers might have similar to their views about security based on experiences and reports about Internet shopping security. As security is considered an important influence in the Internet shopping environment the following hypothesis is considered.

*Hypothesis 5. A consumer's security concerns in interactive shopping will effect his/her behavioural intention to use it*

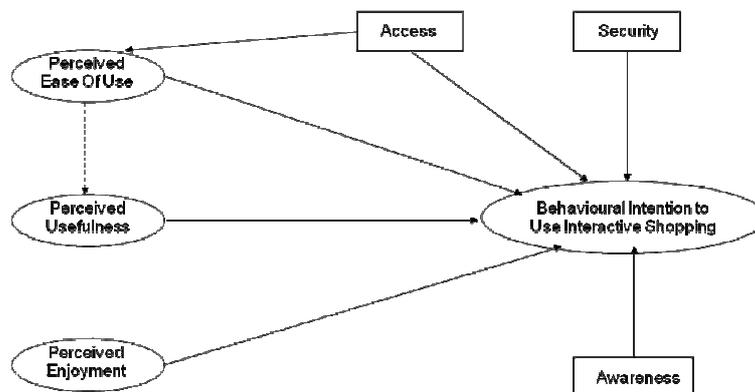
Online shopping can only take place if consumers have access to a computer, are computer literate and have Internet access. Smith (2006), show lack of access and reluctance to learn how to use computers as one of the most important barriers to Internet shopping. However, iTV shopping will be performed via a familiar platform (i.e. TV digital box) that most households in the UK have access to and therefore the pre-existing presence and availability of the medium could have a direct effect on the consumer's intention to use it as well as their perception on ease of use. Being familiar with the operation of the digital box as an integrated part of their TV experience could make consumers less technology phobic and it is possible this might also affect their perceptions of how easy is to use iTV as a shopping medium. Hypothesis 6 and 7 seek to verify the effect of access to iTV technology.

*Hypothesis 6: Access to a digital TV will affect consumer behavioural intention to use interactive shopping.*

*Hypothesis 7: Access to a digital TV will affect consumer's perception of ease of use of interactive shopping.*

It is anticipated that interactive shopping will be just one of the many services that the compulsory introduction of digital TV will bring to the UK consumers. As a result the level of awareness of interactive shopping will be higher than the current level of awareness for internet shopping. In that respect it is possible that consumers will feel less anxious to use their digital TV as their shopping medium. As a result, the following hypothesis is suggested to examine the effect of awareness on the consumer's behavioural intention to use interactive shopping.

*Hypothesis 8: Awareness will affect the consumer's behavioural intention to use interactive shopping.*



**Figure 1: Research Model**

### 3. Results

An online survey was conducted to test our proposed model. The UK population is amongst the most exposed to online shopping and therefore our target was mainly experienced online shoppers. For this reason we administer the online questionnaire to two online shopping dedicated web forums in the UK as well as purchasing an online database. After data cleansing in order to eliminate partially completed responses a total of 671 responses were used for analysis purposes. The majority of the questionnaire items were taken from previous research studies. However, since access and awareness are introduced to the TAM for the first time the corresponding item were derived from the authors and validated by two other colleagues with experience on both survey related studies as well as online shopping research.

A 7 point-Likert scale was used for all the items. Due to length restrictions the items are not included in this paper but are available upon request.

Following Anderson and Gerbing (1988) we first fitted a measurement model to the data using LISREL 8.8. The results of the measurement model are shown in table 1. Fit statistics for this model indicated a good fit to the data. To reduce the possibility of Type I and Type II errors, we used a range of fit statistics (Hu and Bentler, 1999). As shown all constructs displayed good reliability (minimum Composite Reliability= 0.90), and there is evidence of convergent validity (minimum AVE = 0.70) and discriminant validity as the AVE for each construct is greater than its squared correlation with any other construct (Fornell and Larcker, 1981). Since the results from the model indicated reliability and validity of the constructs under study, we ran the second stage structural model to test the hypotheses presented. The results of the structural model are shown in table 2. Once again the fit statistics employed indicate a good fit of the data, and five out of eight hypothesized relationships were supported.

**Table 1: Measurement model results**

<i>Construct</i>	<i>Composite Reliability</i>	<i>Average Variance Extracted (AVE)</i>	<i>Largest Squared Correlation</i>
Access	0.91	0.72	0.54
Awareness	0.95	0.86	0.49
Security	0.94	0.81	0.15
Perceived Enjoyment	0.94	0.73	0.68
Perceived ease of use	0.92	0.71	0.11
Perceived usefulness	0.92	0.70	0.68
Behavioural intentions	0.90	0.75	0.49

Chi Sq./d.f. = 1674.964/386 (4.36), RMSEA=0.77, CFI=0.978, GFI=0.841, NNFI=0.976

**Table 2: Structural Model Results**

<i>Hypotheses</i>	<i>Standardised Path Loadings</i>	<i>t-value</i>
H1: Perceived ease of use → Behavioural Intentions	-0.074	-1.585
H2: Perceived Usefulness → Behavioural Intentions	0.441***	10.643
H3: Perceived ease of use → Perceived usefulness	0.389***	8.163
H4: Perceived enjoyment → Behavioural Intentions	0.287***	5.515
H5: Security → Behavioural Intentions	0.052	1.385
H6: Access → Behavioural Intentions	0.209**	3.008
H7: Access → Perceived Ease of Use	0.301***	7.959
H8: Awareness → Behavioural Intentions	0.009	0.245

Chi Sq. / d.f. = 2294.287/391 (5.87), RMSEA=0.087, CFI=0.968, GFI=0.808, NNFI=0.965

\* significant at 5% (one-tailed), \*\* significant at 1% (one-tailed), \*\*\* significant at 0.1% (one-tailed)

For the constructs of perceived usefulness and enjoyment their affect on behavioural intention is very strong, which verify the results from other TAM related studies. Perceived ease of use has significant effect on perceived usefulness which is also in agreement with the majority of TAM studies but seems to be insignificant with regard to behavioural intentions. This is also the case for security where again its effect on behavioural intention is insignificant. With regard to access and awareness the former is a strong predictor for use of interactive shopping and has also a positive effect on perceived ease of use. However, awareness does not seem to be significant factor on consumers' intention to use interactive TV as a shopping platform.

#### 4. Discussion

In this study we want to explore the likelihood that interactive TV will be used as a shopping platform. We apply the TAM in the context of interactive TV shopping showing that indeed it can be considered as a valid model for explaining consumers behavioural intentions towards the use of interactive TV as a shopping platform. One important finding in this study is that access is indeed an important predictor of the consumers' intention to use interactive TV shopping. Having the shopping medium readily available is considered as an important factor for the consumers to experiment with interactive TV shopping. This is contrary to internet shopping where consumers need to have access to a computer as well as a reliable internet connection. Awareness on the contrary does not seem to be as significant as access. This should not come as a surprise since the effect of awareness on consumers' behavioural intentions can only be hypothesized at this stage of our research due to the fact that interactive TV shopping is not currently available to UK consumers. In the future when this service is introduced it will be more appropriate to assess the effect of awareness on consumers' behavioural intentions towards interactive shopping.

Another important finding of our study is the fact that security is not found to be barrier for the adoption of interactive TV. This should not come as a surprise taking into consideration that the majority of respondents were experienced online shoppers and therefore most likely to be driven by the advantages that online shopping brings to them. Furthermore, in Cheng et al 2006 where security is found to have a negative effect towards the use of internet banking it is reasonable to assume that due to the nature of the considered application (i.e. online banking) it is more likely for consumers to be more cautious with regard to security concerns. In our case where the majority of respondents are frequent online shoppers, they do not consider digital TV to be a higher risk shopping medium than the internet.

In conclusion, the technology acceptance model seems to be a reliable model for exploring the consumers' intentions towards the use of digital TV as a shopping channel. The fact that the UK consumers will have access to the shopping medium makes them more likely to experiment with it. It is clear that this outcome should be of great interest to retail managers and interactive shopping technology platform developers. It will help companies reposition their strategy as well as embrace digital TV as an additional shopping channel. It also helps identify the factors that consumers view as more important for the formulation of their intentions towards interactive TV shopping and therefore facilitate the development of the new medium.

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