ACCEPTANCE OF E-BOOK READING APPLICATIONS – SCALE DEVELOPMENT AND VALIDATION

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Abstract
Purpose – The paper develops and validates an instrument that explores users' attitudes and intentions to use mobile e-book reading applications (Apps) on smartphones and tablets and appraises users' perceptions of such Apps as a value-added service complementing travel experience.
Design/Methodology/Approach – The process of development, purification and psychometric validation of the proposed measurement scale is presented. The scale is an extension of the Technology Adoption Model integrating the Innovation Diffusion Theory, Theory of Planned Behaviour and value-added service. After the pilot testing and scale purification, quantitative data were collected using an online highly structured self-administered questionnaire. Statistical tests were applied to analyse the proposed measurement scale's validity, reliability and dimensionality.
Findings – The applied confirmatory factor analyses yielded in 15 innovation attributes items, categorised under different dimensions, confirming the scale's psychometric characteristics. Given that it is an exclusively student-centred study, its application and interpretation of the obtained results should be treated within its limitations.
Originality of the research - The study proposes a useful measurement instrument assessing users' attitudes and intentions to use e-book reading Apps on mobile devices. This study is intended to stimulate further research which should include larger samples and further develop and validate the proposed measurement instrument by including the relevant aspects that were not administered within this study, but might be useful to provide deeper understanding of the multiple contributions of mobile Apps, which could benefit Croatia as a tourist destination and all its stakeholders.
Keywords e-book, mobile reading applications, mobile devices, scale development, quantitative research

INTRODUCTION

Mobile technologies increasingly permeate tourists' travel experience. They are used not only to prepare for and to report after the travel experience but also during travel (Wozniak et al., 2016; De Reuver et al., 2016; Wang et al., 2016). Roaming charges have been banned within European Union in 2017 and wireless connections have become a common amenity in hotels, apartments and many public places thus facilitating the spill over effects from mobile technology usage in daily life into travel (De Reuver et al., 2016). E-book reading has significantly increased since 2007 when they started gaining popularity (McGuire and O'Leary, 2012), also because of a wide variety of devices supporting e-books; they can be read on desktop computers and e-readers but also on tablets and smartphones. The share of e-books read or in general media time on smartphones is increasing while the popularity desktop computers for these purposes is

diminishing (Zickuhr and Rainie, 2014; Bosomworth, 2015). All this points to a great e-books potential for the tourism and travel industry.

This paper shall discuss the development and validation of an instrument exploring users' attitudes and intentions to use mobile e-book reading applications (Apps) on smartphones and tablets and to appraise users' perceptions of such Apps as a value-added service complementing tourists' travelling experience.

This introduction is followed by literature review and the methodology section describing the development process of e-book reading Apps and the development, purification and psychometric validation of measurement scales. Extensive literature review of theories explaining technology acceptance was applied to explore the existing measurement scales that access respondents' perceptions of personal innovativeness, perceptions of Apps' innovation attributes, respondents' adoption intention and their perceptions of Apps' potential benefits for tourists coming to Croatia.

Finally, research results are given followed by a concluding discussion and references.

1. LITERATURE REVIEW

E-books became more popular since 2007 when the general population started to consider that „books" might come in pixels rather than pages (McGuire and O'Leary, 2012). It is also the year that Apple released the first generation of the iPhone, which streamlined popularity of various devices such as smartphones and smart pads. Dependence on mobile technology is growing and has a huge influence on digital media consuming. Mobile digital media time (51%) surpassed desktop and laptop digital media time (42%) for 2 years in a row (Bosomworth, 2015). The increase in mobile usage may explain the increase in mobile reading. In 2011, 41% of all e-book readers read e-books on e-readers, 23% on tablets, 42% on computers, and 28% on cell phones. In 2014, e-book reading on tablets and e-readers surged, respectively at 55 and 57%. Reading e-books on computers decreased to 29% by 2014, while reading on cell phones rose to 32% (Zickuhr and Rainie, 2014).

Computer reading thus continued to decline, while mobile reading seems to be the future. The use of e-books already has an impact on student's education and their productivity by improving reading comprehension and by increasing motivation and engagement. Some studies show that e-books have a positive influence on academic achievement (Tonkery, 2010; Rieders, 2011; Brown, 2012; Dixon, 2012). One of the reasons is that most of the classic literature is located in the public domain and is free of charge (Brown, 2012; Stephens, 2012). Number of studies found a positive correlation between reading comprehension and the use of electronic reading platforms (Horne, 2012; Ciampa, 2012; Brown, 2012; Huang et al., 2012).

The empirical and theoretical literature concerning perceived value-added services and mobile Apps is growing. According to the authors' best knowledge, there is still only a limited understanding of factors influencing users' attitudes and willingness to use e-book reading Apps. It is hard to imagine tourism without wireless and mobile

connectivity and for today's tourists that has become a basic need. Mobile services and applications have gained general acceptance and the use of mobile Apps on smartphones and tablets for reading e-books has become a new trend and a leading form of media consumption (Brown, 2001; Dickinson et al., 2014). Tourism industry is among the most service-oriented industries and among the most prospering industries. Due to the increasingly competitive tourism marketplace, customer oriented products and services and adding extra value to them is one of the key concepts of successful differentiation (Portolan, 2015).

The most frequent marketers' questions relate to defining the value of products and services in order to satisfy the consumers and provide a greater value added services (Berry, Seiders and Grewal, 2002; Portolan, 2015). Wood (1996) argues that added value can be considered as consumer's benefit, rather than a certain amount of money, while Reilly (2003) claims that the added value has both quantitative and qualitative characteristics that create customers' positive feelings about products and services. Mobile devices enable their users to install and use the Apps based on their interests, needs and preferences. Due to its capability to link people to remote information sources, exchange location-based data and social information, it became a "powerful tool for tourists" (Dickinson et al., 2014).

Organizational stakeholders in smart tourism destinations have to know about drivers and inhibitors of tourists' smartphone behaviour. The smartphone typically is the main or only digital link while tourists are on the go within the destination and therefore constitutes "a cornerstone for virtually linking the tourist to the network of tourism stakeholders, thereby enabling the virtual co-creation of experiences without spatiotemporal constraints" (Wozniak et al., 2016). As smartphones are increasingly incorporated in consumers' day-to-day routines and there are spill over effects from smartphone use in daily life into travel (De Reuver et al., 2016). The use of Internet-based technologies in different stages of travel increasingly goes mobile (Wang et al., 2016).

This study stems from the Davis, Bagozzi and Warshaw's (1989) Technology acceptance model (TAM) as the main idea for users' acceptance of e-book reading Apps and expanded it with Rogers' (2003) Innovation diffusion theory (IDT), Ajzen's (1991) Theory of planned behavior (TPB), concepts of convenience and availability proposed by Berry et al. (2002) and perception of value-added service (Portolan, 2015).

Both TAM and TPB root from Ajzen and Fishbein's (1980) Theory of reasoned action were developed to predict individuals' behaviour based on their attitudes and behavioural intentions. In TAM, "perceived usefulness" and "perceived ease of use" are considered as predictors of usage intentions that closely relate to IDT's concepts of "relative advantage" and "complexity" according to Venkatesh et al. (2003). Thus, in the given context, a model that consists of two main constructs that derive from Rogers' IDT, i.e. "personal innovativeness" and "perceived innovation attributes" is proposed, determining the constructs of "adoption intention" adapted upon TPB and "perception of value-added service" adopted from Portolan (2015).

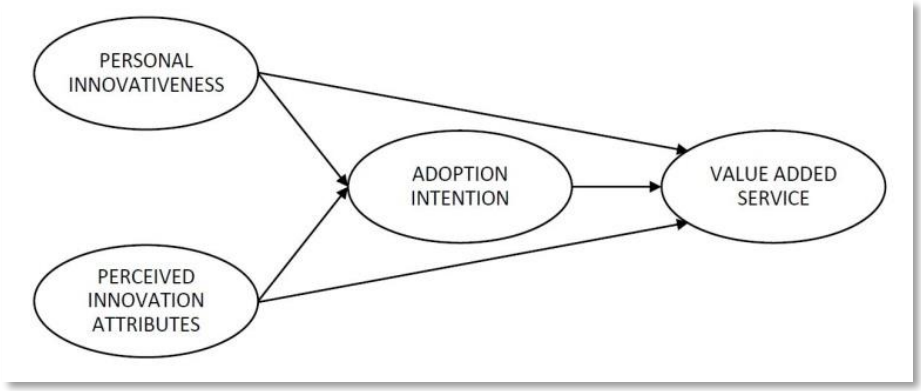
2. METHODOLOGY

In this section of the paper, the development process of e-book reading Apps measurement scale was described. The design of posited multidimensional measurement scale derived from prior studies, following the suggestions for scale development procedures (Lewis et al., 2005; DeVellis, 2003; Gerbing and Anderson, 1988).

2.1. Development Process of the e-book reading Apps Scale

Preceding to scale development for the proposed model shown in Figure 1, the extensive literature review of theories explaining technology acceptance was applied to explore the existing measurement scales that access respondents' perceptions of personal innovativeness (i.e. respondents' digital devices ownership and their general IT and e-books usage habits), perceptions of Apps' innovation attributes (e.i. relative advantage, compatibility, convenience, complexity, trialability and availability), respondents' adoption intention (awareness, interest and intention to use) and their perceptions of Apps' potential benefits for tourists coming to Croatia.

Figure 1: **Conceptual Framework**



Source: Authors

The first version of the e-book reading Apps scale was developed as a 39-item structured questionnaire using 5-point Likert type scale items, single and multiple response items and open-edned items (see Table 1). The questionnaire also contained a section with demographic variables.

According to Hill (1998), a convenient sample of 20 students was recruited for pilot testing and items refinement as being appropriate research subjects according to Peterson and Merunka (2014), to get an insight of the study resources' adequacy and for scale purification and improvement.

After validating the respondents' recommendations and responses accessed by the pilot questionnaire, psychometric evaluation including item analysis, internal consistency and scale reliability, the Exploratory Factor Analysis (EFA) using Principal Components

Analysis (PCA) with Varimax rotation was conducted using Statistical Package for Social Sciences (SPSS 23,0) to examine the construct validity, reduce the number of items and to test the underlying dimensions of the construct (Conway and Huffcutt, 2003). The EFA involved initial tests of item reliability using the item communalities with a cutting point value of 0,5 and Kaiser-Meyer-Olkin Measure (KMO) to ascertain the suitability of the data for structure detection (Kline, 2005), as shown in Table 1. The results of the EFA show a high KMO value of 0,807 indicating suitability of the data for structure detection.

Cronbach's alpha value for the initial 39-items scale was 0,769 which is above the recommended minimum of 0,7 (Hair et al., 2010), demonstrating good reliability (DeVellis, 2001).

Table 1: **EFA of E-book Reading Apps Scale**

Construct	Code	Item	Source	CE
Personal Innovativeness				
Digital devices ownership	PI1	Please check the items that you currently own (please check all that apply): smartphone, laptop or desktop computer, tablet computer and e-book reader.	Jung et al. (2012)	0,779
Travel and vacation behaviour	PI2	During travel and vacation I carry along (please check all that apply): smartphone, laptop or desktop computer, tablet computer and e-book reader.	Jung et al. (2012)	0,517
	PI3	During travel and vacation I connect to Internet using (please check all that apply): payed roaming service, prepayed mobile internet package, using local free Wi-fi, I do not use Internet during travel and vacation.	Meštrović and Jakominić Marot (2017)	0,734
	PI4	Please rate the importance of availability of free local Wi-fi during travel and vacation.	Meštrović and Jakominić Marot (2017)	0,727
E-books usage	PI5	I have used e-books in the past.	Chu (2003)	0,784
Devices	PI6	I have used e-books on following (please check all that apply): smartphone, laptop or desktop computer, tablet computer and e-book reader.	Chu (2003)	0,785
Sources	PI7	I have used e-books (please check all that apply): available from the library, purchased myself, borrowed from someone (e.g. a friend), downloaded for free.	Chu (2003)	0,638
~~Self-efficacy~~	~~PI8~~	~~I am a teachie.~~	Dabholkar and Bagozzi (2002)	~~0,278~~
	~~PI9~~	~~It is easy for me to understand and use new functions on devices.~~	Dabholkar and Bagozzi (2002)	~~0,346~~
	~~PI10~~	~~I have no difficulty in handling new device.~~	Dabholkar and Bagozzi (2002)	~~0,471~~
Perceived innovation attributes				
Relative advantage	ADV1	Please check all e-books advantages (please check all that apply):		0,787

Construct	Code	Item	Source	CE
		They are available around the clock	Chu (2003)	
		They offer timely access to new titles	Chu (2003)	
		They have helpful features (e. g. annotations, bookmarking, highlighting, links to dictionaries/thesaurus, backlit screen, adjustable fonts)	Chu (2003)	
		No relevant paper book titles are available	Chu (2003)	
		They are searchable	Chu (2003)	
		They allow easy navigation (e. g. hyperlinked table of contents)	Chu (2003)	
		They are versatile in providing print-on-demand, short run or high demand titles	Chu (2003)	
		They save space	Chu (2003)	
		They are eco-friendly	Chu (2003)	
		They allow e-archive and sharing	Chu (2003)	
		Other	Chu (2003)	
	~~ADV2~~	~~Using e-book reading Apps on my smartphone/tablet enhances my prestige.~~	Moore and Benbasat (1991)	~~0,196~~
Compatibility	COMPAT1	Using my smartphone/tablet for reading e-books is consistent with my lifestyle	Moore and Benbasat (1991)	0,877
	COMPAT2	Using my smartphone/tablet for reading e-books is my favorite manner of reading.	Moore and Benbasat (1991)	0,748
	COMPAT3	Using my smartphone/tablet for reading e-books satisfies my current needs in reading.	Moore and Benbasat (1991)	0,851
Convenience	CONV1	My smartphone/tablet enables me to download information/content quickly when reading.	Berry et al. (2002)	0,882
	CONV2	Using smartphone/tablet for reading saves my effort in reading	Berry et al. (2002)	0,819
	CONV3	Using smartphone/tablet enables me to find and read information and content quickly.	Berry et al. (2002)	0,756
	CONV4	I value the convenience to use such an application for free via my smartphone and/or tablet.	Berry et al. (2002); Mathwick et al. (2001)	0,822
Complexity	COMPL1	I do NOT like to use e-books because (please check all that apply):		0,810
		No relevant e-book titles are available	Chu (2003)	
		They need special equipment (e.g. e-book readers or computers with network access)	Chu (2003)	
		They could mean additional cost on my side	Chu (2003)	
		e-books from different sources are not compatible or interchangeable	Chu (2003)	
		There are not many e-book titles I would like to read yet	Chu (2003)	
		They are hard to read and browse	Chu (2003)	
		They cause concerns about copyright	Chu (2003)	

Construct	Code	Item	Source	CE
		Other reasons	Chu (2003)	
	~~COMPL2~~	~~E-book reading Apps are not easy to use.~~	Moore and Benbasat (1991)	~~0,421~~
	~~COMPL3~~	~~Interacting with e-books is not as understandable as paper-based books.~~	Moore and Benbasat (1991)	~~0,362~~
Trialability		Although I have not used e-books that much, I would like to:		
	TRIAL1	Examine some titles where available	Chu (2003)	0,937
	TRIAL2	Purchase an e-book title myself	Chu (2003)	0,957
	TRIAL3	Download a free e-book title myself	Meštrović and Jakominić Marot (2017)	0,970
	TRIAL4	Wait till more relevant titles become available;	Chu (2003)	0,974
	TRIAL5	Other	Chu (2003)	0,562
Availability	AVAIL1	I value the possibility to use such a free App via my smartphone and/or tablet.	Berry et al. (2002); Mathwick et al. (2001)	0,860
	~~AVAIL2~~	~~I am satisfied to have an opportunity to use a free App that enables me to enjoy free e-books on my smartphone and tablet while on vacation.~~	Meštrović and Jakominić Marot (2017)	~~0,399~~
Adoption Intention				
Awareness	AWA1	I heared about the free e-book reading application "Croatia Reads".	Dupagne (1999)	0,520
	~~AWA2~~	~~I am aware of the given possibility to use this free e-book reading App while on vacation in Croatia.~~	Meštrović and Jakominić Marot (2017)	~~0,412~~
Interest	INTER1	I am intrested in reading free e-books on my smarthpone/tablet.	Dupagne (1999)	0,615
	INTER2	I am intrested in free e-book reading Apps.	Dupagne (1999)	0,887
Intention to use	INTENT1	Assuming that I have a free access to e-books through this App I intend to use it.	Ajzen and Fishbein (1980); Davis et al. (1989)	0,874
	INTENT2	I want to experience the free App "Croatia Reads" in order to access free e-books.	Dupagne (1999); Hsu et al. (2007)	0,894
	INTENT3	Given that I have access to free e-books through this app, I predict I would prefer to use it rather than carrying paper books along on my vacation.	Dupagne (1999) and Hsu et al. (2007)	0,857
Perception of value-added service (VAS)				
	VAS1	Please rate the importance of this free App that enables all people to enjoy for free more than 100.000 e-books on their smartphones and tablets while on vacation, as an extra value of Croatian tourist offer.	Adapted upon Portolan (2015)	0,706
	~~VAS2~~	~~The free e-book reading Apps tackle my positive feelings and extend my whole travel experience.~~	Reilly (2003)	~~0,367~~
	~~VAS3~~	~~The free e-book reading Apps add an additional non-price value to Croatian tourist offer that enables~~	Adapted upon Portolan (2015)	~~0,256~~

Construct	Code	Item	Source	CE
		~~people to enjoy free e-books on their smartphones and tablets while on vacation.~~		
Initial reliability statistics				
Total 39 items - Cronbach's Alpha Reliability				0,769
Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO)				0,807
Bartlett's Test of Sphericity (df: 756, Sig.: 0,000)				4611,362
Initial total variance explained				64,201

Note: Communalities Extracted (CE) below the acceptable value of 0,5 are striked-through

Source: Authors

While the signifficance of the Bartlett's test of sphericity (X2: 4611,362, df: 756, Sig.: 0.000) indicated that the variables are not unrelated thus being appropriate for structure detection, the the initial communalities extracted (CE) indicated ten (10) unreliable items with CE below the acceptable value of 0,5 (i.e. striked-through items in Table 1) that were eliminated.

Marketing literature recommends the use of multiple-indicator variables (Churchill, 1979; Bergkvist and Rossiter, 2007) and denounces the use of single-indicator constructs which overlook the reliability of the measurement instrument, while Petrescu (2013) argues that single-item indicators can be used in marketing research, especially in circumstances when the use of multiple-item measures is not possible. Correspondingly, Bergkvist and Rossiter (2007) found single-item measures being as valid as multiple-item measures widely employed in advertising and consumer research. Aaccordingly, Baumgartner and Homburg (1996) proposed the use of Structural Equation Modelling (SEM) as designed to avoid specifically the obstacles of this kind and provided the evidence that SEM was used in marketing studies exploring structural relations between constructs measured by single-indicator constructs.

Although the Confirmatory Factor Analysis (CFA) requires a minimum of three items in a factor model “to provide minimum coverage of the construct’s theoretical domain” (Hair et al. 2010, 676), it was decided to include all remaining items of the scale in further analysis in order to access all dimensions of the proposed reserch framework, despite some constructs resulted as single-item measures, namely the subscale named “Relative advantage”, “Availability”, “Awareness”, “Complexity” and “Perception of value-added service” (VAS) and two-items measures (i.e. the subscale named “Interest”). Accordingly, the final 29-item e-book reading Apps measurement scale was decided to be convenient for further study.

After confirming the reliability and acceptability of the proposed measurement model showni in Figure 1, Partial Least Squares (PLS) Structural Equation Modelling (SEM) using SmartPLS 3.0 software was used as proposed by Baumgartner and Homburg (1996), to examine the relationship between the concepts of the proposed measurement model as an appropriate method that explores structural relations in models that include both multidimensional and single-dimensional constructs.

2.2. Sampling and Data Collection

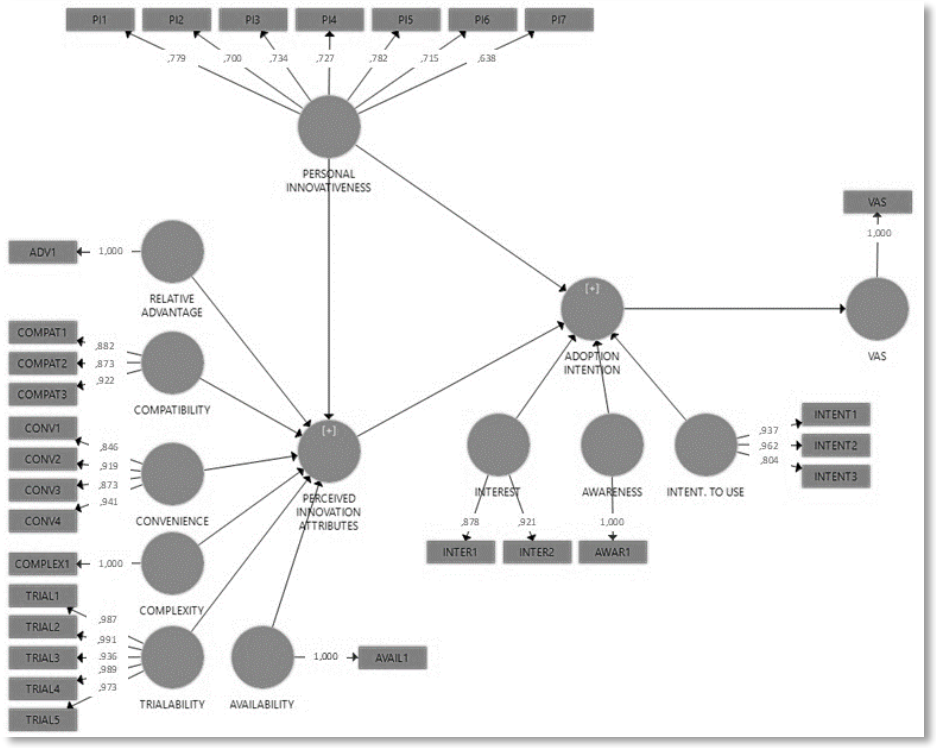
At the end of the winter semester of academic year 2016/2017, during the period of two months, data were collected using an anonimous 29-item structured self-administered online questionnaire using Google Docs Forms distributed to University of Rijeka Departments' students. Since prior studies suggest that university students should represent an apropriate sample for relevant studies (Pornsakulvanich, Haridakis and Rubin, 2008), being part of the young tourist segment recognized as an "increasingly growing segment of the global travel market" (Richards and Wilson 2003, 6) that "represents the market of the future" (Vukić, Kuzmanović and Stanković 2014, 1), a convenience sampling was used to access the data. The response rate was 30,26 %, 279 complete and usable questionnaires returned for further analysis (Meštrović and Jakominić Marot, 2017), resulting as satisfactory sample size for the research in the marketing area (Parasuraman, Zeithaml and Berry, 1988; Marković, 2006).

From the total number of respondents, 203 (72.8%) were female and 76 (27.2%) were male, 205 respondents were undergraduate students (73.5%) and 74 were graduate students (26.5%), there were 120 ICT students and the rest of them (56.9%) were enrolled in other study programmes, i.e. biotechnology, mathematics and physics (Meštrović and Jakominić Marot, 2017). The mean age of respondents was 22.

2.3. Structural Equation Modelling

To explore the derived dimensions from EFA and to assess the psychometric properties of the proposed measurement model shown in Figure 1, Partial Least Squares (PLS) Structural Equation Modelling (SEM) was applied and the results were generated as shown in Figure 2. All loadings achieved the required level, thus no item deletion and modification was required.

Figure 2: **Structural Model and Factor Loadings of Measurement Scale**



Source: Authors

Following the recommendations of Hair et al. (2010), the e-book reading Apps measurement scale evaluation consisted of the Internal Consistency (Cronbach's Alpha), Composite Reliability (CR), Convergent Validity (Average Variance Extracted, (AVE)) and the Discriminant Validity (Heterotrait-Monotrait values (HTMT)).

Cronbach's alpha value for the entire model achieved satisfactory value of 0,79 and all subscales' Cronbach's alphas achieved values above the threshold value of 0,70 recommended by Hair et al. (2010), except the subscale "Personal innovativeness" which achieved the value of 0,653 as shown in Table 2.

Table 2: **Construct Reliability and Validity**

Construct	Cronbach's Alpha	CR	AVE
PERSONAL INNOVATIVENESS	0,653	0,705	0,503
PERCEIVED INNOVATION ATTRIBUTES	0,896	0,729	0,605
RELATIVE ADVANTAGE	n.a.	1,000	1,000

Construct	Cronbach's Alpha	CR	AVE
CONVENIENCE	0,808	0,864	0,644
COMPATIBILITY	0,868	0,922	0,797
TRIALABILITY	0,930	0,938	0,784
COMPLEXITY	n.a.	1,000	1,000
AVAILABILITY	n.a.	1,000	1,000
ADOPTION INTENTION	0,828	0,885	0,585
INTENT. TO USE	0,779	0,876	0,710
INTEREST	0,768	0,895	0,810
AWARENESS	n.a.	1,000	1,000
VAS	n.a.	1,000	1,000
TOTAL SCALE:	**0,790**	**0,984**	**0,659**

Source: Authors

The measurement scale's composite and convergent reliability analysis resulted in acceptable CR values above the 0,7 and AVE values above the threshod value of 0,5 (Hair et al., 2010), ranging from 0,503 to 0,810. The overall AVE for all items was 0,659 thus indicating adequate composite and convergent validity, as shown in Table 3. The retrieved Standardized Root Mean Square Residual (SRMR), i.e. absolute measure of fit, achieved the value of 0,071 (Henseler et al., 2014), HTMT value lower than 0,90 (Gold et al., 2001) confirmed the discriminant validity, internal consistency and the reliability of of the proposed measurement model.

DISCUSSION AND CONCLUSION

The main objective of the study was to design and validate a multidimensional instrument that explores users' attitudes and intentions to use mobile e-book reading Apps on smartphones and tablets and to assess users' perceptions of the mobile e-book reading Apps as a value-added service complementing their travelling experience, based on the framework of prior research. The paper introduced the process of development, purification and psychometric validation of the proposed e-book reading Apps measurement scale created as an extension of the Technology Adoption Model and integrates the Innovation Diffusion Theory, Theory of Planned Behaviour and value-added service.

The EFA resulted in 15 innovation attributes items categorised under 6 dimensions, namely: relative advantage, compatibility, convenience, complexity, trialability and availability; 6 adoption intention items categorised under 3 dimensions (i.e. awareness, interest and intention to use); 7 personal innovativeness items and 1 item measuring respondents' perceptions of Apps' added value. In order to confirm scale's psychometric characteristics, since the EFA yielded a model that included both multidimensional and single-dimensional constructs, PLS SEM was applied as an appropriate approach to

explore the structure and examine the relationship between the concepts of the proposed measurement model.

The results of the study suggest a good model fit, confirming the proposed measurement scale's validity, reliability and dimensionality, thus contributing to the existing literature on IT and mobile Apps acceptance theories, while proposing an useful measurement instrument that accesses users' attitudes and intentions to use mobile e-book reading Apps on mobile devices and appraises users' perceptions of the mobile e-book reading Apps as a value-added service that complements their travelling experience.

This study is intended to stimulate further research which should include larger samples and further develop and validate the proposed measurement instrument by including the relevant aspects that were not administered within this study, but might be useful to provide deeper understanding of the multiple contributions of mobile Apps, which could benefit Croatia as a tourist destination and all its stakeholders.

This exclusively student-centred study used a convenience sample of four public higher education settings in Croatia. Given that it took into consideration only the students' perception, its application and interpretation of the obtained results should be treated within its limitations.

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