Telematics and Informatics 33 (2016) 860–871

Contents lists available at ScienceDirect

Telematics and Informatics

journal homepage: www.elsevier.com/locate/tele

# Identifying key drivers and bottlenecks in the adoption of E-book readers in Korea

Dongnyok Shim [a], Jin Gyo Kim [b], Jörn Altmann [a,*]

[a] Technology Management, Economics, and Policy Program, College of Engineering, Seoul National University, 1 Gwanak-Ro, Gwanak-Gu, 08826 Seoul, South Korea
[b] Graduate School of Business, Seoul National University, 1 Gwanak-Ro, Gwanak-Gu, 08826 Seoul, South Korea

ARTICLE INFO

*Article history:*
Received 1 September 2015
Received in revised form 28 December 2015
Accepted 29 December 2015
Available online 30 December 2015

*Keywords:*
Innovation adoption theory
Hierarchy of effect model
Innovativeness
Multivariate probit model
Dedicated E-book reader
Digital media
Digital goods

ABSTRACT

This study seeks to describe the dynamic effects of innovation characteristics and consumer innovativeness as conditioned by consumer decision making in the Korean E-book reader market. Dedicated Korean E-book readers have received little research attention over the last few years, as consumers' interest in E-book readers has not been as high as was expected. This study identifies the barriers and bottlenecks impacting Korean consumers' adoption of dedicated E-book readers based on the theories of innovation adoption and consumer behavior. Our estimation results indicate that complexity was the main bottleneck blocking the adoption of dedicated E-book readers in every decision-making stage (cognitive–affective–behavioral), whereas observability was the driver stimulating adoption in every stage. Moreover, the relative advantage of dedicated E-book readers is significant only in the affective stage, while compatibility is meaningful only in the behavioral stage. The results of this study provide useful guidelines to help marketers and engineers design dedicated E-book readers and promote them in Korea.



## 1. Introduction

As Internet-capable mobile and smart devices continue to be diffused throughout the market, the number of advanced devices equipped with multiple functionalities quickly increases (Gebregiorgis and Altmann, 2015; Haile and Altmann, 2016a; Haile and Altmann, 2016b; Reeves et al., 1999). This breakthrough technology allows users to read text across a variety of devices, such as tablet PCs, smartphones, and dedicated electronic book readers ("E-book readers" hereafter). An E-book reader (often also called an "E-book device" or "'E-reader") is a dedicated electronic device designed primarily for reading digital books and periodicals. It uses e-ink technology to display content (Burk, 2001). This E-book technology emerged in the early 1990s with the expectation that it would pose a serious threat to the traditional print publishing industry (Catenazzi, 1997; Shin, 2011).

In the wake of the successful introduction of Kindle (the Amazon E-book reader and E-book reader application for multipurpose devices), the PWC (2013) reported an increase in global sales of E-book content of almost 33.6% in 2013 over the previous year. Reflecting this trend, the proportion of E-books available in U.S. libraries increased almost twofold, from 38.3% in 2007 to 67.2% in 2011, according to the American Library Association's public Library Funding and Technology Access Study (American Library Association, 2012). This increase in the demand for E-book content paralleled the skyrocketing sales of new reading devices in the U.S.

* Corresponding author.
*E-mail addresses:* sk4me@snu.ac.kr (D. Shim), jingkim@snu.ac.kr (J.G. Kim), jorn.altmann@acm.org (J. Altmann).

http://dx.doi.org/10.1016/j.tele.2015.12.009
0736-5853/

However, the market for E-book readers in Korea has not yet taken off. In fact, E-book readers such as SAM, Paper, Crema, and Papyrus (released by Kyobo/iRiver, Ridibooks, Yes24, and Samsung, respectively) have failed to gain popularity in Korea. Samsung Electronics even withdrew from the E-book reader market completely. Experts have argued that Korea, where growth in smart devices has been high, is entering an era in which users read E-books on non-dedicated devices directly without having passed through an era, as in the U.S., in which users read from dedicated E-book readers (Sim, 2011).[1] Korean E-book readers have received little research attention, as consumers' interest in E-book readers has not been as high as was expected. Experts in the Korean publishing industry speculate that the E-book reader market is small due to a complex function of the difficulty-of-use and a low familiarity with the readers. Given the low adoption of E-book readers in Korea relative to that in the U.S., we pose the following research question: What makes Korean consumers hesitate to adopt E-book readers?

The purchase of an E-book reader can be described in terms of the sequential stages of the decision-making process, but only a few attempts have been made to identify the bottlenecks or drivers in the stages of the adoption process. For instance, a consumer may be aware of E-book readers (e.g., their functionalities) but may not be interested in them. Other consumers may be interested in them but unwilling to buy one. Thus, consumers can get stuck in any of the decision-making stages. Following a similar line of research, Jung et al. (2012) empirically tried to identify the factors affecting E-book reader awareness, interest, and intention to use, but they overlooked the fact that innovation adoption is a sequential decision-making process (Lavidge and Steiner, 1961) and were thus unable to reliably describe the impact of the independent variables in their empirical model.

Consumers perceive different benefits and drawbacks of E-book readers as they follow the stages of adoption decision making. Furthermore, consumers with different motivations and who perceive different innovation characteristics are likely to show different adoption behaviors. Little is known about what factors lead to the use of E-book readers or make users hesitate to adopt them during the decision making process. To fill this gap, we propose a framework for capturing the relationship between the factors (e.g., innovation characteristics, consumer innovativeness, and message characteristics) that affect E-book adoption and consumer's cognitive, affective, and behavioral reactions. Furthermore, in estimating the proposed framework, we identify the bottlenecks and drivers of E-book reader adoption in the Korean market during the decision-making stage. This appears to be the first study to empirically model the dynamic impact of consumer and innovation characteristics on consumers' sequential decision-making stages.

The rest of this paper is organized as follows. Section 2 reviews the literature on established theories of innovation adoption factors and purchase decision making. Section 3 presents our research design and methodology, covering the proposed research framework, the data used, and details about the analysis methodology. Section 4 shows the empirical analysis results. Finally, Section 5 concludes the paper with a discussion of its implications and some concluding remarks.

## 2. Theoretical background and literature review

### 2.1. Hierarchy of decision-making process

Consumers in the real world do not immediately decide whether to purchase a new product after obtaining information about it. Rather, they experience a series of hierarchical and sequential stages before reaching a decision (e.g., to purchase). The hierarchy of effects model was developed to explain these sequential stages. This theoretical model, proposed by Lavidge and Steiner (1961), is used to describe the accumulated effect of advertising on consumer purchase decision making. The model involves sequential stages, beginning with the product's arrival in the target customers' awareness, passing through purchase intention, and terminating in the actual purchase. The term "hierarchy" denotes the sequence of steps a consumer follows from the initial exposure to a product (or advertisement) to the purchase decision.

Innovation researchers have developed a similar model—the innovation decision process model—to explain the relative impact of the knowledge–persuasion–decision components (Rogers, 2003). The validity of the hierarchical decision-making model for the innovation decision process was first proved by an Iowa study (Beal and Rogers, 1960), in which most respondents recognized that they had passed through a series of stages, from awareness and knowledge to an adoption decision. Fig. 1 describes the hierarchy of effect model.

According to the hierarchy of effect model and innovation decision process model (see Fig. 1), consumers at the cognitive stage form beliefs about a product by accumulating knowledge about its attributes (i.e., knowledge stage). Next, in the affective stage, consumers evaluate these beliefs and form a feeling about the new product (i.e., persuasion stage). Later, in the behavioral stage, consumers engage in behavior such as product adoption or rejection based on their evaluation (i.e., decision stage) (Ray et al., 1973). This theoretical background on the hierarchical stages of innovation adoption shows that the drivers or bottlenecks affecting the intention to adopt an innovation differ across the stages.

Despite the theoretical and empirical evidence that consumer decision making occurs in stages and that consumers' reactions to innovation adoption can change at any stage due to drivers or hurdles, most studies ignore this hierarchical and sequential process while identifying the factors affecting adoption. For example, (Chan-Olmsted and Chang, 2006) studied digital television adoption, comparing the factors affecting awareness with those affecting the intention to adopt digital television. They found significant differences between the factors' influences on adoption and intention to use. Jung et al. (2012)

[1] "E-book craze hits S. Korea," *The Hankyoreh.*