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# The Influence of Shopping Website Design on Consumer's Intention to Buy Online: The Case of 3D vs. 2D Online Book Stores

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## ABSTRACT

As increasing number of consumers take their business on-line, retailers try to gain competitive advantage through innovative design of their electronic storefronts. In the last few years, more and more three dimensional online stores (3D) have become an alternative to the more traditional two dimensional ones (2D). The goal of this study is to examine the influence of shopping website design (3D vs. 2D websites) on consumer's intention to buy online. We draw from research in electronic commerce, web-site design, technology acceptance and psychology, and propose a model that seeks to explain the influence of online store front design on shopping outcomes through of such mediators as user perceptions and cognitive absorption. The proposed model offers useful insights to researchers and practitioners alike.

**Keywords:** absorption, website, design, intention to buy, TAM

## INTRODUCTION

The rise of the Internet in the 1990s has dramatically changed social and business practices. As on-line shopping has become a viable and often preferred alternative to visiting traditional brick and mortar stores, retailers' websites play an increasingly important role in attracting and retaining customers. Studies show that the design of online storefronts has a significant influence on sales (Lohse and Spiller, 1998). As a result, companies are trying to gain competitive advantage through innovative web site designs that are intended to improve customer experience. While the choice of individual design elements, such as color, font and graphics have been shown to be important in shaping customer experiences and influencing consumers' online shopping behavior (Web, 2010), practitioners and researchers are becoming increasingly interested in more holistic constructs to describe web site design. The atmosphere of a website, defined as "the conscious design of space to create certain buyer effects, specifically, the designing of buyer environments to produce specific emotional effects in the buyer that enhance purchase probability" (Kotler, 1973-1974, p.50) is one such holistic construct. Atmospheric cues have been shown to affect the emotional and cognitive states of online shoppers and thus influence buyers' intentions (Eroglu, Machleit and Davis, 2003).

Enabled by development in information technology and infrastructure, recently a number of retailers turned to 3-dimensional (3D) designs of their electronic storefronts to replicate the shopping atmosphere of traditional shopping venues. Unlike 2-dimensional (2D) websites, 3D websites allow customers to move through a 3-dimensional store in a manner similar to playing a computer game and select and view products in a manner which imitates shopping in a brick-and-mortar store. While the idea of 3D websites is intuitively attractive, little research has been done to investigate the link between the dimensionality of the web-site design and shopping behaviors. Among the notable exceptions are the study of the effect of website dimensionality on brand equity and user intention (grounded in the theory of flow) (Nah, Eschenbrenner and DeWester, 2010), and the empirical investigation of the relationship between image interactivity on intention to buy and other psychological and perceptual factors (Fiore, Jin and Kin, 2005).

This paper seeks to extend the aforementioned research and to develop an integrative conceptual model that helps to understand the relationship between of the dimensionality of a web-site and online shopping behaviors. Drawing on three distinct theoretical perspectives, Kaplan's theory of environmental preferences, the technology acceptance model and the theory of cognitive absorption, we seek to address the following research questions:

1. What is the relationship between the dimensionality of a website and customer perceptions regarding the usefulness, ease of use and playfulness of the website?
2. What is the relationship between the dimensionality of a website and cognitive absorption experienced by the consumers while using the website?
3. What is the relationship between the dimensionality of a website and shopping-related outcomes such as intentions to examine more products and intentions to purchase goods from the website?

In the rest of the paper we provide an overview of key theoretical frameworks and constructs used in the development of the conceptual model, develop the conceptual framework and formulate testable research hypotheses. We conclude with implications for theory and practice and directions for future research.

## **LITERATURE REVIEW**

The literature review is organized as follows: we first discuss the key shopping outcomes examined in this study, including buying intentions, intentions to return to the website, and intentions to examine more products. Next, we briefly introduce the key frameworks and constructs used in our theory development: (1) Kaplan's theory of environmental preferences, (2) technology acceptance model and how it is applied in the context of e-commerce and (3) research on cognitive absorption and how it pertains to the use of information technology.

### **Shopping Outcomes**

Significant research has been devoted to the study of online shopping-related outcomes and their antecedents. While much of this research is concerned with buying intentions as an outcome of interest, other outcomes have been studied such as conversion and retention of online shoppers (Kuan, Bock and Vathanophas, 2006). While the intention to buy is still viewed as a highly important outcome, research suggests that consumers' use of shopping websites is not limited to making purchases. A typology of shopping strategies proposed by Moe (2003) suggests that consumers' on-line behavior may be driven by one of the following shopping strategies: the directed buying strategy (the shopper knows what he/she wants to buy and will do it immediately), the search and deliberation strategy (the shopper acquires more information for a later decision), the hedonic browsing strategy (the shopper is engaged in exploratory search behavior but will buy immediately if interested in a product), and knowledge building strategy (the shopper is not considering buying any product, but is collecting market information). Among these strategies, two are likely to lead to immediate purchase behavior, the directed buying strategy and the hedonic browsing strategy. In this study we focus on the two related outcomes: buying intentions (which corresponds to the directed buying strategy) and intentions to examine more products (which correspond to the hedonic browsing strategy).

While research suggests that shopping-related outcomes are influenced by a variety of factors, including trust, information characteristics, and product characteristics (Limayem, Khalifa and Frini, 2000; Gefen, Karahanna and Straub, 2003), in this research we focus on such antecedents as website dimensionality, user perceptions about the website (perceived ease of use and perceived usefulness) and cognitive absorption.

### **Kaplan's Theory of Environmental Preferences**

Kaplan's research on environmental preferences offers unique insights into human perceptions of 2D and 3D environments. Based on a series of experiments, Kaplan and his colleagues (1998) proposed a preference matrix that identifies preferences in visual representations for understanding and exploration of the environment. The preferences are based on four characteristics of the visual representation including coherence, complexity, legibility and mystery. Coherence represents the organization of an image into clear areas, whereas complexity is related to the richness of the elements in a setting (e.g. pictures are rich in content). Legibility is related to distinctiveness (e.g. pictures are easily perceived with clarity), and mystery is related to as the desire to explore the environment. Thus coherence and legibility help to understand the environment, while complexity and mystery encourage exploration. The model suggests that 3D environments are associated with higher complexity and mystery, whereas 2D environments are associated with higher degree of coherence and legibility. As the move to 3D exploded in the last years in cinematography and computer interface design, Kaplan's framework offers a particularly useful perspective for investigating the effect of the dimensionality of shopping websites on consumers' shopping behaviors.

### **Technology Acceptance Model**

In information systems (IS) literature several theories help explain users' intentions to use an information system, and offer valuable insights into intentions of online consumers to conduct a purchase using a website. These include the theory of planned behavior (Ajzen, 1991), the theory of reasoned action (Fishbein and Ajzen, 1975), and technology acceptance models (Davis, 1989; Davis, Bagozzi and Warshaw, 1989; Venkatesh, Morris, Davis and Davis, 1989). The common thread

across these theories is that user perceptions (such as perceived ease of use and perceived usefulness) lead to intention to use a system.

The original technology acceptance model (TAM) (Davis, 1989) states that perceived ease of use and perceived usefulness influence individuals' attitude towards using a system, which in turn influences intentions to use the system (Davis, 1989). The attitude construct was subsequently dropped in the parsimonious formulation of TAM (Venkatesh et al., 1989). The model also proposes that perceived ease of use influences perceived usefulness. Perceived ease of use is related to the individual's perception of the physical and mental effort required to user the system, while perceived usefulness represents the extent to which a user believes that using a particular system enhances his/her task performance. In the context of e-commerce, perceived ease of use and perceived usefulness have been found to be significant predictors of intentions to buy online (Vijayarathy, 2004; Klopping and McKinney, 2004; Lee, Fiore and Kim, 2006; Koufrais, 2002). In this paper we conceptualize usefulness in relation to specific shopping-related task, searching for a specific product and browsing products. Thus we distinguish between usefulness for finding a specific product and usefulness for exploring new products.

### **Cognitive Absorption and Playfulness**

While the various TAM-based models were found most useful in explaining utilitarian use of IT, concepts of cognitive absorption and playfulness have been found instrumental in explaining hedonic use of information technology, such as playing computer games, using social networking applications, etc. Absorption represents an alteration in attention, and is defined as "a disposition to enter under conducive circumstances psychological states that are characterized by marked restructuring of the phenomenal self and world" (Tellegen, 1992). In the context of IS use, absorption has been defined as a state of deep involvement with software (Agarwal and Karahanna, 2000). Agarwal and Karahanna (2000) identify five dimensions of absorption: temporal dissociation (the inability to register the passage of time while engaged in interaction), focused immersion (the experience of total engagement where other stimuli are ignored), heightened enjoyment (the pleasure for the interaction), control (the belief of the user that he is in control of the situation), and curiosity (the extent to which experience provoke curiosity). Following Agarwal and Karahanna (2000) we define absorption as a state of deep involvement with a website characterized by temporal disassociation, focused immersion, heightened enjoyment, control and curiosity.

The concept of playfulness was first investigated in relation to child behavior (Lieberman 1965) and defined as an internal predisposition to bring a playful quality to interactions with the environment in different situations. Webster and Martocchio (1995) adopted the definition of playfulness as the degree of spontaneity when interacting with microcomputers. For this study we define playfulness as the degree of spontaneity when interacting with an online store website design. Several studies show support for playfulness and absorption as antecedents of perceived ease of use and perceived usefulness (TAM), and behavioral intentions (Agarwal and Karahanna, 2000; Schwartz et al., 2009; Saade and Bahli, 2005).

### **CONCEPTUAL MODEL AND RESEARCH HYPOTHESES**

Building on the Kaplan's matrix of environmental preferences, technology acceptance research and cognitive absorption research, we propose a model that relates the dimensionality of a website to users' perception of the website usefulness and ease of use as well as the users feeling of playfulness and cognitive absorption. Users' perceptions of the website usefulness and ease of use, as well as their feeling of playfulness and cognitive absorption, are then related to such shopping outcomes as buying intentions and intentions to examine more products.

Drawing on Kaplan's research on visual representations, we propose that 2D websites are associated with higher degree of coherence and legibility than 3D websites. As such, 2D websites will be perceived as easier to use than 3D websites. Furthermore, as legibility and cohesiveness make it easier to understand the environment, 2D websites will be perceived as more useful in searching for a particular item.

Thus we hypothesize:

H1: Websites with 2D design will be perceived as more useful for finding a specific product than websites with 3D design.

H2: Websites with 2D design will be perceived as easier to use than websites with 3D design.

Further drawing on Kaplan's research, we argue that because of the need to navigate through a 3-dimensional environment, 3D websites will be associated with higher degree of complexity and mystery. In addition, 3D websites appear to give online shopper the feeling of being in a place with atmosphere similar to real stores. In real stores, people may display a tendency to enjoy and explore the store, rather than buying a particular book and immediately leaving the store. As complexity and mystery were found to encourage exploration, we hypothesize:

H3: Websites with 3D design will be associated with higher degree of playfulness than 2D websites.

H4: Websites with 3D design will be associated with higher degree of absorption than 2D websites.

H5: Websites with 3D design will be perceived as more useful for exploring new products than websites with 2D design.

According to cognitive absorption research (Agarwal and Karahanna, 2000; Thomas, 2006) the level of cognitive absorption is positively influenced by the playfulness of the system. As playfulness is associated with spontaneity, the system which is perceived as playful is likely to encourage a variety of system use behaviors. Variety seeking behavior research suggests that more variety in peoples' activities is associated with more engagement in those activities (McAlister and Pessemier, 1982). Therefore, we hypothesize:

H6: Higher degree of playfulness will be associated with higher degree of absorption.

Cognitive absorption is characterized by temporal disassociation, focused immersion and perceived control over the situation, they are likely to perceive lower levels effort involved in the use of the system. In addition, as users spend more time with the system they are likely to become more experienced using the system and consequently perceive the system as easy to use. Cognitive absorption is also likely to lead to higher perceived usefulness of the system due to the cognitive dissonance and self-justification mechanisms (Festinger 1957, Staw 1981). As users realize that they have spent more time than expected using the system, they will try to alter (inflate) their perceptions of the benefits they received from using the system, thus leading to higher perceived usefulness. Thus, consistent with extant on research cognitive absorption, perceived ease of use and usefulness (Agarwal and Karahanna, 2000; Schwartz et al., 2009), we hypothesize:

H7: Higher degree of absorption will be associated with higher perceived usefulness (both in finding specific products and exploring new products).

H8: Higher degree of absorption will be associated with higher perceived ease of use.

Building on the technology acceptance model (Davis 1989), we also hypothesize are relationship between perceived ease of use and usefulness:

H9: Higher perceived ease of use will be associated with higher perceived usefulness.

As temporal absorption is characterized by temporal disassociation, consumers experiencing cognitive absorption are likely to spend more time on a website, and thus are more likely to examine more products. In addition, research suggests that the longer the amount of time spent online, the greater are the chances of making a purchase online (Cheol and Jong-Kun 2003). Thus we hypothesize:

H10: Higher degree of absorption will be associated with stronger intentions to examine more products.

H11: Higher degree of absorption will be associated with stronger intentions to buy online.

H12: Intention to inspect more products will influence intention to buy online.

Existing research yields contradictory results on the relationship between perceived usefulness, perceived ease of use and intentions to buy (Gefen and Straub 2000 and Koufaris 2002, Van der Heijden et al. 2003). Here we conceptualize usefulness in relation to a specific task, as usefulness for finding a specific product and usefulness for exploring new products. If consumers perceive the website as useful in finding specific products, they will be likely to use the website to find the products they need and thus will be more likely to buy online. If consumers perceive the website as useful in exploring new products, they will be likely to use the website to identify products they need and thus will be more likely to buy online. Similarly, if the consumers find the website difficult to use, they are likely to identify other venues for finding and buying the products they need. Therefore we hypothesize;

H13: Perceived usefulness positively influences intention to buy online.

H14: Perceived ease of use positively influences intention to buy online.

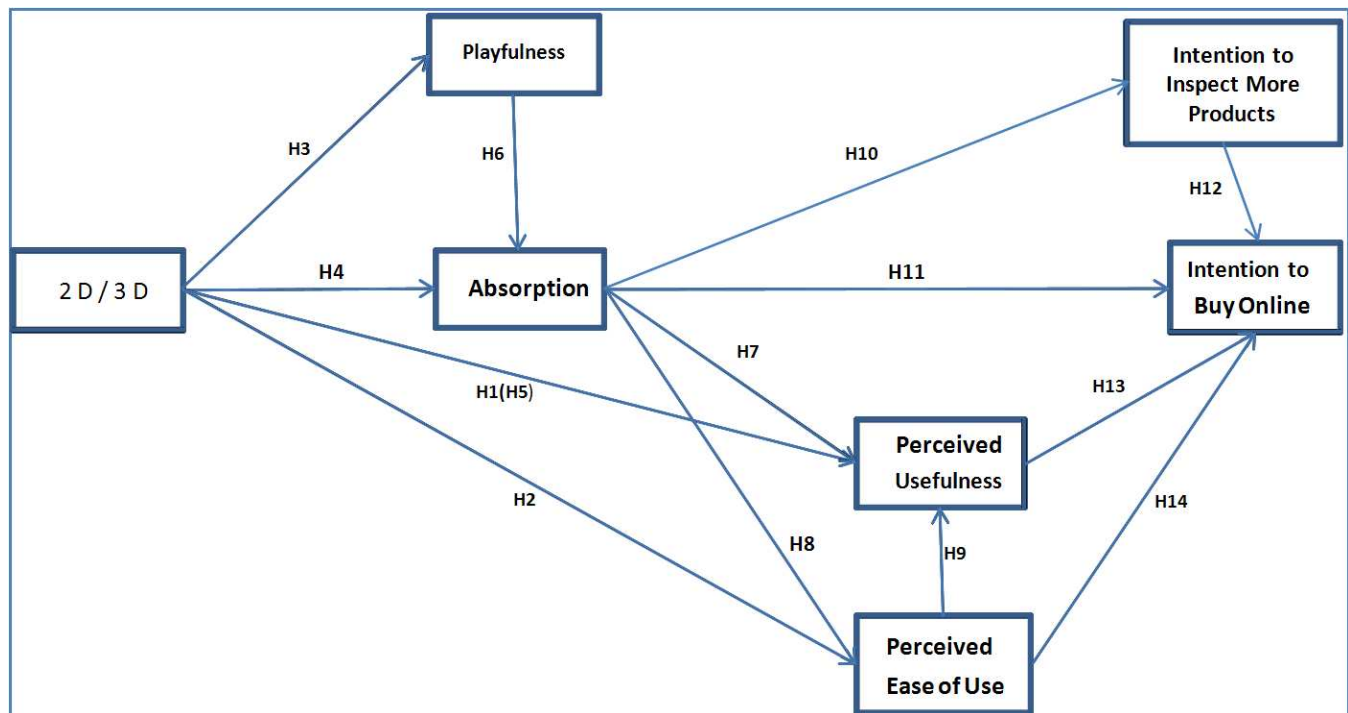


Figure 1. The Complete Research Model

## LIMITATIONS AND FUTURE RESEARCH

In this paper we developed a comprehensive conceptual model which explains how the dimensionality of websites influences user perceptions, experiences and shopping outcomes. The theoretical significance of the proposed model is that it relates several existing models used to explain shopping behavior and links them to specific attributes of website design. Another contribution of the model is that it distinguishes between perceived usefulness of the website in relation to two different tasks, finding a specific product and exploring new products.

As the next step in future research, empirical testing of the model needs to be undertaken. It may be particularly interesting to examine the explanatory power of the constructs associated with the two different underlying theoretical frameworks, TAM and cognitive absorption theory. Testing of the model can be conducted using a quasi-experimental design using existing shopping websites; however such websites would need to be matched in terms of product availability and product pricing. If supported, the model will provide guidance for online retailers with regard to designing their websites.

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