



INTR
21,3

326

Received 11 March 2010
Revised 5 February 2011
Accepted 9 March 2011

Virtual store layout effects on consumer behaviour

Applying an environmental psychology approach in the online travel industry

Emmanouela E. Manganari

Department of Economics, University of Patras, Athens, Greece

George J. Siomkos and Irini D. Rigopoulou

Department of Business Administration, Athens University of Economics and Business, Athens, Greece, and

Adam P. Vrechopoulos

*Department of Management Science and Technology,
Athens University of Economics and Business, Athens, Greece*

Abstract

Purpose – The purpose of this paper is to examine the virtual store layout's perceived ease of use effects on consumer behaviour and the perceived differences of two layout patterns most commonly used in air travel web sites (i.e. grid and freeform layout).

Design/methodology/approach – Data were collected through a laboratory experiment from a total of 241 students at a business school. Structural equation modeling (SEM) was used to evaluate the research model and test the research

Findings – Results confirm and extend available knowledge regarding virtual store layout effects on shopper responses. However, findings imply that layout pattern affects perceived pleasure and not ease of use in the investigated sector. Additionally, the study confirms the moderating role of atmospheric responsiveness.

Practical implications – Managers should consider and apply the optimal level of ease of use at their web stores' virtual layout to facilitate and yet engage consumers during their online trip.

Originality/value – In the context of e-tailing, past research examined store layout effects on consumer behaviour mostly through a Technology Acceptance Model (TAM) approach. Elaborating on these research insights, the present research attempt employs an environmental psychology approach measuring the effects of perceived layout on consumer behaviour in the online travel industry through the S-O-R paradigm perspective.

Keywords Consumer behaviour, Virtual work, Online access, Travel, S-O-R paradigm

Paper type Research paper



1. Introduction

The transition from “brick-and-mortar” retailing to “click-and-mortar” or “pure-play” environments along with the emergence of online experiences as the next step in the progression of economic value (Pine and Gilmore, 1998), generates further managerial and

The authors gratefully acknowledge the Editor and the two anonymous reviewers for their constructive comments during the review process.

research attention in online retail contexts. E-tailers' concern is not limited to convincing consumers about the separate functional aspects of the online store (e.g. security, reliability, and effectiveness) but rather heavily relies on the fact that e-tailing effectiveness depends to a great extent on interface design (Burke, 2002; Davis *et al.*, 2008).

The online store environment lacks some of the qualities of the traditional retail store and possesses some other, which are absent in the traditional store (e.g. customization capabilities). Manganari *et al.* (2009) proposed that the online store environment consists of four components:

- (1) virtual layout and design;
- (2) virtual atmospherics;
- (3) virtual theatrics; and
- (4) virtual social presence.

The present study focuses on the examination of the effects of the first component (i.e. the virtual layout) on consumer behaviour.

The design and development of the virtual store layout is very important since the layout directs consumer online navigation. A plethora of studies underline the role of navigation as a key driver of online purchases (Pearson *et al.*, 2007; Melián-Alzola and Padrón-Robaina, 2006; Pratt *et al.*, 2004).

Prior studies have shown that the layout's ease of use influences shoppers' perceptions of quality of (Montoya-Weiss *et al.*, 2003), evaluation of (Davis, 1993) and attitude toward the store (Childers *et al.*, 2001). Although several studies have shown direct or indirect positive effects of layout's perceived ease of use on consumer behaviour and overall online channel effectiveness, there are also a few studies that resulted in different research conclusions.

Specifically, layout's perceived ease of use did not appear to affect consumer attitude toward using an online print magazine (Srisuwan and Barnes, 2008), did not drive perceived value in an online music setting (Chu and Lu, 2007) and was, interestingly, negatively related to the perception of a competent apparel web site (Cho and Fiorito, 2009).

Along these lines, two prior studies identified the effects of virtual layout patterns on consumer behaviour, using the Technology Acceptance Model (TAM). Specifically, Vrechopoulos *et al.* (2004) examined the differences between the established layout patterns from conventional retailing (i.e. grid, freeform and racetrack) after a necessary transformation of their design logic into the e-tailing context. Similarly, Griffith (2005) examined the difference between the grid and the freeform layout.

Although the perceived ease of use is often confronted solely as a positive feature and a "must have" of online stores, empirical evidence demonstrates that more research should be conducted in different settings. Elaborating on the findings of these studies, the goal of the present paper is twofold. Specifically, the first objective of the present study is to test the effects of the perceived ease of use of the virtual layout of an air travel company on consumer behaviour by applying the stimulus – organism – response (S-O-R) framework (Mehrabian and Russell, 1974), while the second one is to test the differences between the grid and the freeform layout pattern (i.e. the ones transformed by Vrechopoulos *et al.*, 2004 from conventional retailing) using experimental data.

2. Background literature

2.1 Stimulus – Organism – Response framework

The S-O-R (Stimulus-Organism-Response) paradigm (Mehrabian and Russell, 1974) has been extensively used in studies that measure the effect of the perceived online store features on consumer responses (Jeong *et al.*, 2009). The S-O-R paradigm states that the environmental stimuli influence consumers’ internal states, which in turn influence consumers’ overall responses. In addition, consumers’ internal states mediate the relationship between the stimulus and individuals’ responses. However, based on the established theory, atmospheric responsiveness constitutes a personal characteristic that may cause moderating effects and, therefore, should be considered separately. Specifically, previous findings support the moderating effect of atmospheric responsiveness between the stimulus and the organism parts of the S-O-R model (Eroglu *et al.* 2003).

Donovan and Rossiter (1982), who are the first that applied the S-O-R paradigm in retail contexts, claimed that the Mehrabian-Russell model focuses in the intervening variables, while taking a more general approach regarding the stimulus factors. That is, the issue of the stimulus classification is not addressed by Mehrabian and Russell (1974). In the e-tailing literature, one can find different approaches undertaken in using the S-O-R paradigm. Some authors use consumers’ assessments of the stimuli in order to represent the stimulus part of the model (e.g. Chang and Chen, 2008; Jang and Namkung, 2009; Koo and Ju, 2010), while others use actual stimuli (e.g. Kim and Lennon, 2010; Wang *et al.*, 2010). The present study adopts the S-O-R paradigm by using the perceived online store layout as the environmental Stimulus (S). Consumer pleasure and attitude reflect the Organism (O) variable, which intervene between the online layout’s perceived ease of use and consumer Responses (R) (i.e. satisfaction and trust). Satisfaction is a variable that commonly represents the R variable (Figure 1). Trust is included as a variable representing consumers’ response since trust is a crucial enabling factor in online transactions (Gefen *et al.*, 2003). As far as the research hypotheses of the present paper are concerned (presented in section 3), *H1-H4* refer to the application of the S-O-R paradigm, *H5* refers to the moderating effect of atmospheric responsiveness while *H6* refers to the differences between two specific virtual layout patterns (i.e. grid and freeform layout).

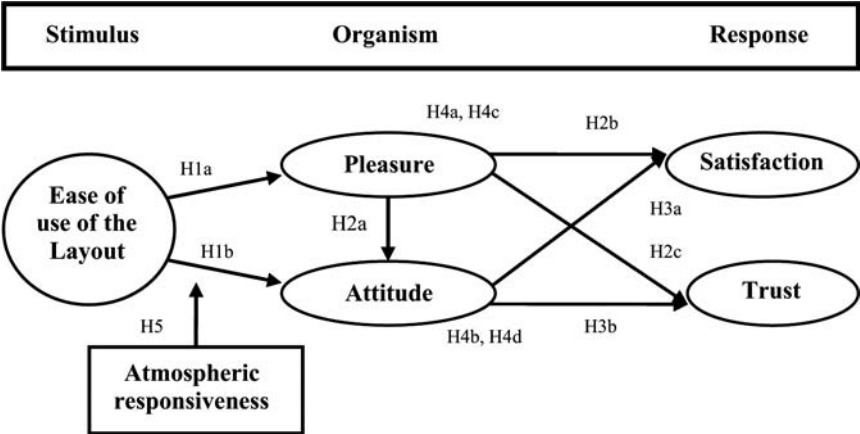


Figure 1.
The research model

2.2 Virtual layout, perceived ease of use and alternative layout patterns

Although the research on online store atmosphere counts only ten years, several empirical studies showed that the decision regarding the use of the virtual layout (Griffith, 2005; Vrechopoulos *et al.*, 2004), web-atmospherics (Fiore and Kelly, 2007; Gorn *et al.*, 2004; Wu *et al.*, 2008), virtual theatrics (Fiore *et al.*, 2005; Fortin and Dholakia, 2005; Martin *et al.*, 2005), and virtual social presence (Krasnikolakis and Vrechopoulos, 2009) have specific and measurable effects on shopping outcomes.

The virtual layout can serve at any point in time to both facilitate and impair navigation (Childers *et al.*, 2001). Online stores and their perceived layout in particular, developed based on user-based design principles, result in greater levels of satisfaction (Muylle *et al.*, 2004; Zviran *et al.*, 2006). De Wulf *et al.* (2006) established the link between the web sites' organization structure and users' satisfaction and trust.

The three major layout types are the grid, the freeform and the racetrack layout (Levy and Weitz, 2008). According to Vrechopoulos *et al.* (2004) in the grid layout, shoppers navigate the online store through a hierarchical structure (i.e. product category ↔ product subcategory ↔ end-product). That is, users need to pass through a hub or use the back-forward bar in order to visit the product categories. The grid layout is more appropriate for planned purchases compared to the other two layout patterns (Nath, 2009). In the freeform layout, shoppers can reach their desired products at once, by utilizing the multiple links provided at each search outcome web page of the store (e.g. either through the use of a search engine or by selecting any of the items/options permanently displayed on every page). The use of the freeform layout is more suited for browsing and leisurely store navigation. The racetrack layout uses two online "corridors" on each web page and guides consumers to navigate through specific paths of the store in order to reach their desired products. In the racetrack layout pattern, direct access is possible only to neighbouring categories.

3. Research hypotheses and operationalization

3.1 Research hypotheses

Perceived ease of use is defined as "the degree to which a person believes that using a particular system would be free of effort" (Davis, 1989, p. 320). According to Huang (2008) perceived ease of use was the strongest predictor of e-consumer attitudes followed by perceived usefulness, irritation and entertainment. Montoya-Weiss *et al.* (2003) found that perceived ease of use of the virtual layout positively relates to the perceived online store quality, which in turn influences overall satisfaction and online store use.

Pleasure, arousal, and dominance (PAD) are three dimensions that capture the individual's affective states within an environmental setting (Mehrabian and Russell, 1974). Russell and Pratt's (1980) modification deletes the dominance dimension, while previous research demonstrate that, compared to arousal, pleasure is a better predictor of consumers' responses (Huang, 2003; Mummalaneni, 2005). The present study focuses merely on consumers' pleasure from the PAD framework. Eroglu *et al.* (2003), in their seminal research on the effects of online store environment on consumer responses, added consumer attitude as an organism variable. Perceived ease of use positively affects users' attitude toward using the internet, which in turn influences users' future use of the internet (Castaneda *et al.*, 2009). The present study combines previous perspectives and adopts consumers' pleasure and attitude toward the store as the intervening variables. Thus, *H1* is formulated as follows:

H1a. Perceived ease of use of the virtual layout positively affects consumers' pleasure with the online store.

H1b. Perceived ease of use of the virtual layout positively affects consumers' attitude toward the online store.

Pleasure ranges from extreme pain or unhappiness to extreme happiness or ecstasy (Huang, 2003). Fiore (2002) examined the effect of pleasure from a catalogue page on consumers' global attitude, while Eroglu *et al.* (2003) found that the level of pleasure during the online shopping trip influences shoppers' attitude. Prior research suggests that the level of pleasure experienced during an online shopping trip positively affects consumers' satisfaction, their overall approach behaviour (Eroglu *et al.*, 2000, 2003) and their trust in the online store (De Wulf *et al.*, 2006). Similarly, Mummalaneni (2005) claims that pleasure influences consumers' satisfaction, expressed intention of loyalty and the number of items purchased. Therefore, we hypothesize that:

H2a. Consumers' pleasure with the online store positively affects their attitude toward the store.

H2b. Consumers' pleasure with the online store positively affects their satisfaction with the store.

H2c. Consumers' pleasure with the online store positively affects their trust toward the store.

In this research, attitude refers to consumers' overall affect-based assessment of the online store based on their shopping experience (Fiore, 2002). That is, the authors have used the global attitude perspective in order to capture consumers' overall liking or disliking of the online store. In the context of e-tailing, the online atmosphere does indeed have an impact on consumers' attitude toward the online store, which in turn affects consumers' satisfaction and approach/avoidance behaviour (Eroglu *et al.*, 2001). Consumers' attitude is a significant predictor of e-satisfaction (Huang, 2008). Perceived web site quality influences consumers' trust to the e-tailer (McKnight *et al.*, 2002). In this research line, Martínez-López *et al.* (2005) showed that attitude is an important determinant of trust in the context of internet shopping. Similarly, Delgado-Ballester and Hernández-Espallardo (2008) found that consumers' attitude toward the online store, positively affects their initial trust. Thus, we hypothesize that:

H3a. Consumers' attitude toward the online store positively affects their satisfaction with the store.

H3b. Consumers' attitude toward the online store positively affects their trust toward the store.

As mentioned before, the present study applies an environmental psychology approach by applying the S-O-R paradigm in studying the effects of perceived virtual store layout's ease of use on consumers' responses. Eroglu *et al.* (2003) were the first that empirically verified that the online store environment affects consumers' responses through the intervening effect of their attitude and pleasure experienced during the online visit. Pleasure acts as a mediator between the web site organization and shoppers' satisfaction (De Wulf *et al.*, 2006). Thus, we hypothesize that:

-
- H4a.* Shoppers' pleasure during their online navigation mediates the relationship between the virtual layout's perceived ease of use and satisfaction.
 - H4b.* Shoppers' attitude toward the store during their online navigation mediates the relationship between the virtual layout's perceived ease of use and satisfaction.
 - H4c.* Shoppers' pleasure during their online navigation mediates the relationship between the virtual layout's perceived ease of use and trust.
 - H4d.* Shoppers' attitude toward the store during their online navigation mediates the relationship between the virtual layout's perceived ease of use and satisfaction.

Grossbart *et al.* (1975) claimed that studies that combine consumers' perceptions and consumers' personality characteristics result in better predictions of consumer behaviour. Atmospheric responsiveness is the degree to which the quality and the physical characteristics of the shopping environment affect consumers' purchase decisions (McKechnie, 1974). Grossbart *et al.* (1990, p. 226) defined atmospheric responsiveness as "the tendency to base patronage decisions on store's physical design and condition and alter shopping behaviour because of crowding". Atmospheric responsiveness is an individual trait that has been used in prior research as a moderating variable. Prior studies propose that atmospheric responsiveness moderates the effect of online stimuli on consumers' internal states, where the stimulus can be represented either by a high task-relevant cue or a low task-relevant cue (Kim *et al.*, 2009; Manganari *et al.*, 2009). Additionally, Eroglu *et al.* (2003) found that atmospheric responsiveness moderates the relationship between the perceived online store atmosphere and consumers' internal states. In this research line, the current study extends the moderating effect of atmospheric responsiveness to the relationship between the perceived ease of use of the virtual layout and consumers' internal states. Similarly, we hypothesize that:

- H5a.* Atmospheric responsiveness moderates the relationship between the perceived ease of use of the virtual store layout and online shoppers' pleasure.
- H5b.* Atmospheric responsiveness moderates the relationship between the perceived ease of use of the virtual store layout and online shoppers' attitude toward the store.

The second goal of this research is to examine the differences between the two most commonly used layout patterns in the context of the online travel industry. Based on prior research, the grid layout stimulates more positive overall consumer shopping outcomes (Griffith, 2005). The grid layout is significantly easier to use than either the freeform or the racetrack layout, while the freeform layout is, by a small margin, more entertaining (Vrechopoulos *et al.*, 2004). Griffith (2005) found that the grid layout leads to a more positive attitude toward the e-tailer and generates more positive inferential thoughts. Nath (2009) stressed that the grid layout allows for more efficient shopping and more efficient scanning of products in cases where the shopper is in a strict goal-oriented shopping trip. Similarly, Massara and Pelloso (2006) showed that the grid layout is better suited for task-oriented shoppers, while the freeform layout is better suited for shoppers that are in more relaxed shopping condition. Roy *et al.* (2001) linked ease of use with users' perceived trust and claimed that ease of navigation is an important factor for assessing web site trustworthiness. In this study, the experimental

setting involves an online store of an airline company. Given that visiting the online store of an airline company is typically a goal-directed shopping trip and building on previous research findings we assume that, the grid layout pattern will result in more favourable consumers' overall responses (i.e. perceived ease of use, attitude, satisfaction and trust), but lower levels of pleasure compared to the freeform layout. Thus, we hypothesize that:

- H6a.* Online stores employing the grid layout, compared to the ones employing the freeform layout, lead to greater levels of perceived ease of use of the layout.
- H6b.* Online stores employing the grid layout, compared to the ones employing the freeform layout, lead to lower levels of pleasure.
- H6c.* Online stores employing the grid layout, compared to the ones employing the freeform layout, lead to more positive attitude toward the retailer.
- H6d.* Online stores employing the grid layout, compared to the ones employing the freeform layout, lead to greater levels of satisfaction.
- H6e.* Online stores employing the grid layout, compared to the ones employing the freeform layout, lead to greater levels of trust toward the retailer.

3.2 Operationalization

Consistent with Montoya-Weiss *et al.* (2003), the measurement of the online layout's perceived ease of use is based on the notion of ease of use in the technology adoption literature (Davis, 1989, 1993; Venkatesh and Davis, 2000). Pleasure is measured with the Mehrabian and Russell (1974) seven-point semantic differential scale. The attitude toward the online store scale is adapted from Chattopadhyay and Basu (1990) and trust from De Wulf *et al.* (2006). Satisfaction and atmospheric responsiveness were drawn from prior research on online store environment (Eroglu *et al.*, 2003). Appendix 1 (Table A1) presents the constructs' items.

4. Research setting and sampling

This study employs a laboratory experimental design. Previous experimental research mainly focuses on the field of online apparel, online electronic devices, online bookstores and online grocery. However, despite the growth of online travel literature, little research emphasis has been given on the comprehension of consumer behaviour in regard to the qualities of online travel stores (Morrison *et al.*, 2004). To that end, an online store for a fictitious air travel company, named iFLY, was developed in the laboratory and served as the vehicle of the present research attempt. We decided to employ a laboratory instead of a field experiment in order to eliminate the effects from prior experience as well as brand effects. Besides, as always, it is very difficult to convince a retailer to offer a real store for experimental purposes.

The online store was designed and developed in two different "layout versions": one employing the grid layout and the other the freeform layout (Appendix 2, Figure A1). The development of the two alternative virtual layout patterns follows the design concepts of Ghosh (1994) and Vrechopoulos *et al.* (2004). It should be clarified, that the present study does not employ the racetrack layout. According to the current business practice very few companies in the travel industry employ the racetrack layout pattern in their online stores, while the majority of them employ the grid, the freeform or a mixed grid-freeform layout pattern. Also, the study of

Vrechopoulos *et al.* (2004) in online grocery retailing proved that the racetrack layout is the least desirable one by consumers. All other variables (e.g. product images, colour scheme, animation, fonts, etc.) were kept the same, in order to ensure that the layout of the online store is the only differentiating factor (i.e. eliminate other potential influencing factors).

A between-groups laboratory experiment was employed in order to eliminate learning effects. Participants were randomly assigned to one of the two experimental online stores in a university laboratory. An offline mode was preferred to ensure consistency of speed. Each participant was given an instructional leaflet, a research questionnaire and a personalized Visa card from a fictitious bank, in order to make his/her purchases from the specific online store. Subjects were asked to suppose that they had at their disposal 300€ and they could spend this amount of money in order to buy airline tickets from the specific online store. Participants were instructed to browse the online store for as long as they needed. After the completion of their shopping trip, subjects filled out the questionnaire. A prize draw was offered as an incentive for participation. A total of 241 students from a business school (sampling frame) were randomly chosen to participate in the laboratory experiment. Of these, 49 per cent visited the online store with the grid layout pattern and 51 per cent visited the online store with the freeform layout pattern. Of the participants, 50.6 per cent were male and 49.4 per cent were female. The majority (54.8 per cent) of the sample was between 21-24 years old, 30.3 per cent of the participants was between 18-20 years, 13.7 per cent between 25-29 years old, and a mere 1.2 per cent were older than 29 years old. Students were both undergraduate (51.5 per cent) and postgraduate (49.2 per cent).

5. Results

5.1 Assessment of reliability and validity

The measurement model was checked in order to evaluate reliability and validity of the constructs. Overall, the measurement model exhibits satisfactory fit with the data collected ($\chi^2 = 332.05$; $df = 142$, CFI = 0.93, IFI = 0.93, PGFI = 0.65, RMSEA = 0.07). Construct reliability was assessed through Cronbach's alpha (Cronbach, 1951; Nunnally, 1978) and composite reliability (Bagozzi and Yi, 1988; Fornell and Larcker, 1981). To improve reliability, items were removed when necessary to refine the scale. In accordance with Nunnally (1978) Cronbach's alpha was greater than 0.70 for all measures. As indicated in Table I, the Rho-coefficients for internal consistency are above the threshold of 0.60 (Bagozzi and Yi, 1988).

Construct	Composite Reliability	AVE	Correlation Matrix				
			1	2	3	4	5
1 Ease of use of the Layout	0.72	0.53	0.79 ^a				
2 Pleasure	0.68	0.51	0.16 [*]	0.81 ^a			
3 Attitude	0.77	0.61	0.19 [*]	0.21 [*]	0.85 ^a		
4 Satisfaction	0.80	0.61	0.35 [*]	0.29 [*]	0.39 [*]	0.88 ^a	
5 Trust	0.80	0.61	0.19 [*]	0.14 [*]	0.24 [*]	0.47 [*]	0.92 ^a

Notes: ^aCronbach's Alpha. AVE = Average Variance Extracted. ^{*} Statistical significant at 0.01 level; ^{**} statistical significant at 0.05 level

Table I.
Assessment of reliability and validity

Average variance extracted (AVE) was also estimated to assess convergent validity. The AVE for each construct is greater than the variance attributable to its measurement error (i.e. 0.50), thus demonstrating convergent validity (Chin, 1998). Finally, discriminant validity is assessed after Fornell and Larcker (1981). The AVE for each construct exceeds the absolute value of the squared correlations involving the construct. Thus, results demonstrate convergent and discriminant validity. Table I provides summary statistics.

5.2 Model testing

The study employs structural equation modeling in order to test the research hypotheses *H1-H5*. The model fit is assessed against widely published and recognized criteria (Hair *et al.*, 1998; Byrne, 1998; Jöreskog and Sörbom, 2003). Measures of Absolute fit ($\chi^2 = 370.95$; $df = 143$), Comparative fit index (CFI = 0.91), Incremental fit (IFI = 0.92) and Parsimonious fit (PGFI = 0.64) and Root mean square of approximation (RMSEA = 0.08) reflect a satisfactory fit between the model and the data. Thus, the research model is a satisfactory representation of the sample data. All but one of the paths featured strong, positive and significant values. Table II summarizes standardized path coefficients.

The impact of the virtual layout's perceived ease of use on consumers' pleasure and attitude is statistically significant, indicating substantial support for *H1*. The positive effect of pleasure on consumers' attitude and satisfaction is significant, but the effect of pleasure on consumers' trust is not significant. Thus, the results support *H2a* and *H2b* but not *H2c*. Consumers' attitude toward the store positively relates to both consumers' satisfaction and trust. Hence, the results confirm *H3a* and *H3b*.

5.3 Testing for mediating effects

H4 posits that consumers' pleasure and attitude toward the online store mediate the effect of the perceived ease of use of the virtual store layout on consumers' responses (i.e. satisfaction and trust). According to Baron and Kenny (1986), a variable functions as a mediator when the following conditions are met:

- variations in the levels of the independent variable significantly account for variations in the mediating variable;
- variations in the mediator significantly account for variations in the dependent variable;

Parameter	Mediating model	Constrained model
Ease of use of the layout → pleasure	0.41 *	0.51 *
Ease of use of the layout → attitude	0.31 *	0.46 *
Ease of use of the layout → satisfaction	0.34 *	0.75 *
Ease of use of the layout → trust	0.26 *	0.60 *
Pleasure → attitude	0.34 *	0.20 *
Pleasure → satisfaction	0.22 **	
Pleasure → trust	0.12	
Attitude → satisfaction	0.41 *	
Attitude → trust	0.36 *	

Table II.
Structural standardized
estimates

Notes: * Statistical significant at 0.01 level; ** statistical significant at 0.05 level

- variations in the levels of the independent variable significantly account for variations in the dependent variable; and
- the strength of the relationship between the independent variable and the dependent variable reduces when the presumed mediator is added to the model.

Following the propositions of Baron and Kenny (1986), this study employs the three-variable system in order to test the mediating effects of consumers' internal states.

Because the effect of pleasure on trust is not significant, this study examines the mediating effect of pleasure only on the relationship between the layout's perceived ease of use on satisfaction and the mediating effect of attitude on the relationship between the layout's perceived ease of use on satisfaction and trust. The first three conditions are satisfied in the original structural model.

Thus, the structural equation model was re-estimated by constraining the direct effect of pleasure on satisfaction and the direct effect of attitude on satisfaction and trust. The fourth condition is also met. The positive effect of the perceived ease of use of the layout on satisfaction is significant, but the magnitude of the relationship is reduced in the mediating model. Similarly, the effect of the virtual layout's perceived ease of use on trust is significant, but the magnitude of the relationship is reduced in the mediating model (see Table II). Therefore, pleasure and attitude mediate the effect of perceived ease of use of the layout on satisfaction, while consumers' attitude toward the online store mediates the effect of perceived ease of use of the layout on trust. Finally, the χ^2 difference between the two models inspects whether the mediating model constitutes a significant improvement over the constrained model. Indeed, the difference between the mediating ($\chi^2_{(143)} = 370.95$) and the constrained model ($\chi^2_{(147)} = 442.39$) is significant ($\chi^2_{d(4)} = 71.45$, $p < 0.01$). Hence, the results support *H4a*, *H4b*, *H4d*, while *H4c* is not supported.

5.4 Testing for moderating effects

Multi-group confirmatory factor analysis is conducted in order to test the moderating effect of atmospheric responsiveness in the research model (Baron and Kenny, 1986). Using a median split technique on atmospheric responsiveness, the sample is classified into two groups: respondents with high and respondents with low atmospheric responsiveness. Rigorous pre-tests verify that the changes in regression coefficients are due to group differences and not due to measurement error (Jöreskog and Sörbom, 1993). After establishing measurement invariance in the measurement model, structural invariance is examined.

Table III shows the results of the hypotheses' testing in terms of the changes in standardized *b* coefficients (from the low to the high group) in the presence of the moderating variable. Results indicate that atmospheric responsiveness moderates the

	Low atmospheric responsiveness (<i>n</i> = 119)	High atmospheric responsiveness (<i>n</i> = 113)
Ease of use of the layout → pleasure	0.51 *	0.27 **
Ease of use of the layout → attitude toward the store	0.47 *	0.30

Notes: * Statistically significant at 0.01 level; ** statistically significant at 0.05 level

Table III.
Standardized structural
coefficients

relationship between the perceived ease of use of the virtual store layout and consumers' attitude toward the store. Contrary, results reveal no evidence of the moderating effect of atmospheric responsiveness in the relationship between the perceived ease of use of the virtual store layout and pleasure. Hence, the findings provide support for *H5b* but not *H5a*.

The effect of the perceived ease of use of the layout on consumers' attitude is significant for the group of respondents with low atmospheric responsiveness, while not significant for the group of respondents with high atmospheric responsiveness. Table IV summarizes the findings regarding research *H1-H5*.

5.5 Testing alternative virtual layout pattern effects

Independent samples *t*-test analysis is used to examine *H6*. Supportive of *H6b*, results indicate that respondents visiting the freeform layout (compared to the grid layout) experienced a greater proportion of pleasure ($t = -2.86, df = 239, p < 0.05$). However, results demonstrate that the differences in respondents' perceived ease of use ($t = -0.69, df = 239, p > 0.05$), attitude toward the retailer ($t = 0.30, df = 239, p > 0.05$), satisfaction ($t = -1.37, df = 239, p > 0.05$), and trust ($t = -1.04, df = 239, p > 0.05$) are not significant between the two different layout patterns (i.e. grid and freeform).

Thus, the results support *H6b* but not *H6a, H6c, H6d, and H6e* (Figure 2).

6. Discussion

The empirical study generally confirms the hypothesized model and the relevant theory from which the model's hypotheses were derived. Specifically, the perceived ease of use of the virtual store layout influences consumers' internal states (i.e. pleasure and attitude) which in turn influence consumers' online responses. Thus, the empirical findings highlight the importance of the layout's perceived ease of use and that of consumers' pleasure and attitude in shaping online shopping behaviour.

Hypothesis	Support
<i>Direct effects</i>	
H1a Ease of use of the layout → Pleasure	Supported
H1b Ease of use of the layout → Attitude	Supported
H2a Pleasure → Attitude	Supported
H2b Pleasure → Satisfaction	Supported
H2c Pleasure → Trust	Supported
H3a Attitude → Satisfaction	Supported
H3b Pleasure → Trust	Supported
<i>Mediating effects</i>	
H4a Ease of use of the layout → Satisfaction (mediator: pleasure)	Supported
H4b Ease of use of the layout → Satisfaction (mediator: attitude)	Supported
H4c Ease of use of the layout → Trust (mediator: pleasure)	Unsupported
H4d Ease of use of the layout → Trust (mediator: attitude)	Supported
<i>Moderating effects of atmospheric responsiveness</i>	
H5a Ease of use of the layout → Pleasure	Unsupported
H5b Ease of use of the layout → Attitude	Supported

Table IV.
Summary of significant
results

However, concerning the effects of the two layout patterns (i.e. grid versus freeform layout), the study reports differences only in the level of pleasure experienced by online shoppers. More specifically, consumers navigating in the freeform layout pattern experienced higher levels of pleasure compared to those navigating in the grid layout pattern. Contrary to Vrechopoulos *et al.* (2004), the current research supports that the differences between the grid layout and the freeform layout in terms of their perceived ease of use are not significant. Similarly, Griffith (2005) reports that the grid virtual layout leads to more positive consumers' attitude toward the retailer. However, the present study reveals no statistically significant difference in consumers' attitude attributed to the virtual layout pattern.

These findings may be explained by examining the nature of shopping habits among different sectors and corresponding store layout types in conventional and online retailing. Specifically, while in the context of conventional grocery retailing, consumers visit the "physical" grocery store and navigate through its layout in order to locate their shopping list products, in the conventional travel industry the situation as far as consumer "navigation" within the "brick-and-mortar" travel agency is, apparently, completely different (i.e. in this sector "distance shopping" through the telephone was actually the case for a big proportion of consumers many years before the web emergence). However, in the online context where extensive and advanced information search and self-service mechanisms are provided, the layout pattern may not affect perceived ease of using of the store and attitude toward the store.

Moreover, consumers' familiarization (internet's diffusion) with online navigation through different layout patterns may imply that now it's very easy for them to use various layout types and, therefore, their attitude toward the store is not affected by this manipulated variable (i.e. layout) but from other store selection criteria (e.g. prices, promotions, delivery options, customer service, etc.). Although several years ago, consumers' perceptions (i.e. ease of use, usefulness) and attitudes toward the retailer were greatly dependent on the layout pattern employed by any given store, nowadays these differences may no longer be significant. This argument especially holds for mature online contexts like the case of the present study (i.e. intangible goods: web travel services) where the diffusion of online shopping is very high and, therefore, users are somehow experts in using web sites and companies spent a lot of time, money and effort to design a customer friendly online environment. In other words, over the years, consumers become more and more accustomed with online navigation, develop skills in navigating through different layout patterns and thus, perceived ease of use may not vary according to the layout pattern each different store employs. A recent study, conducted by Flavián *et al.* (2009) that also resulted in no significant differences between layout types in terms of usability, may be regarded as supportive of this rationale.

Hypothesis	Constructs	Findings	
H6 _b	Pleasure	FREEFORM	Affected by virtual layout pattern Freeform >> Grid
		GRID	
H6 _a	Ease of Use	FREEFORM GRID	Not affected by virtual layout pattern
H6 _c	Attitude		
H6 _d	Satisfaction		
H6 _e	Trust		

Figure 2.
Independent samples *t*-test
for H6

Another possible explanation of these findings could be attributed to the student sample of the study in the sense that all subjects participating in the experiment are quite familiar with technology and, therefore, they do not face any particular problems in navigating through any given layout type. It should be underlined, however, that the two layouts employed by the laboratory store's alternative versions were developed following the basic human computer interaction (HCI) design guidelines (Dix *et al.*, 1998) in order to ensure that potential differences will not be attributed to basic design mistakes but to the core design differences that exist among the two layout types (i.e. grid versus freeform).

7. Contribution, limitations and future research

The key contribution of the present study is the empirical examination of the virtual layout effects (in terms of perceived ease of use) on consumer behaviour along with the investigation of any potential differences between alternative layout patterns (i.e. grid and freeform) in terms of a series of important consumer behavioural dimensions. It should be reminded that prior studies focus on measuring the influence of the virtual store layout on consumer behaviour by applying the Technology Acceptance Model (TAM) model, while the present study applies the S-O-R paradigm. The major outcome from this work is that the perceived ease of use of the virtual store layout does indeed make a difference in the current research setting, while the layout pattern has limited effect on consumers' responses. More explicitly, although the perceived ease of use of the virtual layout influences consumers' internal states and their overall responses toward the online store, the differences between the two layout patterns (i.e. grid and freeform) are limited to the level of the pleasure experienced by the online consumer.

Several clear and straightforward managerial implications emerge from the present research effort. Virtual retailers should focus on enhancing the online experience by developing easy to use and pleasant web sites in order to elicit favourable consumers' perceptions, attitudes and behaviours. The online store should strike the balance between facilitating consumers navigation and keeping them excited and involved. In particular, the virtual store layout should address consumers' need for speed, convenience, ease of use and usefulness (Levy and Weitz, 2008) especially in online stores where consumers mainly exhibit goal-oriented behaviour (e.g. e-grocery, e-travel, e-ticket stores).

Combining the present findings with those of prior studies, one can stress the need to discern between different shopping orientations and different layout patterns. Although there are some common principles, as mentioned above, that should apply in online stores, one can claim that the grid layout is better suited for goal-directed shoppers, that consider that an efficient shopping trip does not involve browsing around the store, while the freeform is better suited for entertainment seekers or shoppers that may browse the store in a more relaxed mode of navigation that is not solely restricted to the completion of a purchase. Given that the layout pattern does not result in significant differences in terms of the ease of use, attitude, satisfaction and trust, e-tailers may use both types of layout or a combination of the two layout types, depending on the product category or the shoppers' orientation (i.e. goal-oriented versus entertainment seekers). This may also apply in online stores like e-groceries and online malls that have a wide variety of product categories that may require different search procedures.

Although perceived ease of use cannot be attributed to the layout pattern (at least for the experimental application), pleasure experienced during the online navigation is

higher for individuals visiting the freeform layout compared to individuals visiting the grid layout. Taking into account that the level of pleasure has carry-over effects on subsequent behaviour (Menon and Kahn, 2002), the freeform layout may result in more positive behavioural outcomes through the evocation of higher levels of pleasure. Higher levels of pleasure can also result in variety-seeking behaviour (Kahn and Isen, 1993). Thus, the freeform layout may direct consumers in examining more products or services offered by the online retailer. This finding has enormous implications for impulse purchases (hedonic consumption) which constitute an emerging problem for several online sectors (e.g. e-grocery shoppers tend to use predefined shopping lists and do not spend time navigating through the online store). This implication may guide retailers to proceed to the appropriate B2C communication actions towards increasing the weight consumers attach to the “pleasure” criterion when they select a travel web site.

One should also note that although many e-tailers today offer the ability to the users to customize the layout and other design cues based on their preferences (i.e. consumer control), empirical evidence demonstrates that consumers tend to maintain the default/first version of the online store (Breugelmans *et al.*, 2007). Accordingly, even in the case where customization is enabled, the default/first option has a great impact on consumers’ responses.

Two limitations are evident. The first limitation of the study involves the representation of consumers’ affective states solely by the pleasure dimension, leaving the other two dimensions (i.e. arousal and dominance) aside. The student sample can also be regarded as a limitation in the attempt to generalize the findings and implications to the population of online shoppers. However, the utilization of a student sample constitutes a common research practice especially for the web where the majority of users belong to young age groups.

The current research addresses Eroglu *et al.*’s (2003) proposition to examine the effects of specific online cues on shoppers’ responses. Future research should examine the effects of other atmospheric cues, such as online crowding, online scent (applicable through a telematic machine) and online taste (applicable through an “e-tongue”) which have received very limited research attention until recently. Similarly, the addition of the flow concept (Csikszentmihalyi, 1997) in consumers’ internal states as a measure of consumers’ experiential evaluation of the online store deserves future empirical research.

Future research can also embrace the examination of virtual layout effects in the presence of other non atmospheric qualities of the online store (e.g. customer services, promotions, etc.). Another interesting future research direction involves the measurement of the congruency and interaction between the brand and the online store environment. Finally, given the rapid diffusion of multi-channel retailing, future research should investigate the effects of atmospherics, web-atmospherics, m-atmospherics (mobile atmospherics), v-atmospherics (virtual reality atmospherics) and t-atmospherics (interactive digital TV atmospherics) on consumer behaviour employing an intersectional approach.

References

- Bagozzi, R.P. and Yi, Y. (1988), “On the evaluation of structural equation models”, *Journal of the Academy of Marketing Science*, Vol. 16 No. 1, pp. 74-94.
- Baron, R.M. and Kenny, D.A. (1986), “The moderator-mediator variable distinction in social psychological research: conceptual, strategic, and statistical considerations”, *Journal of Personality and Social Psychology*, Vol. 51 No. 6, pp. 1173-82.

- Breugelmans, E., Campo, K. and Gijsbrechts, E. (2007), "Shelf sequence and proximity effects on online grocery choices", *Marketing Letters*, Vol. 18 Nos 1/2, pp. 117-33.
- Burke, R.R. (2002), "Technology and the customer interface: what consumers want in the physical and the virtual store", *Journal of the Academy of Marketing Science*, Vol. 30 No. 4, pp. 411-32.
- Byrne, B.M. (1998), *Structural Equation Modelling with AMOS: Basic Concepts, Application and Programming*, Lawrence Erlbaum Associates, Mahwah, NJ.
- Castaneda, A.J., Firas, D.M. and Rodriguez, M.A. (2009), "Antecedents of internet acceptance and use as an information source by tourists", *Online Information Review*, Vol. 33 No. 3, pp. 548-67.
- Chang, H.H. and Chen, S.W. (2008), "The impact of online store environment cues on purchase intention: trust and perceived risk as a mediator", *Online Information Review*, Vol. 32 No. 6, pp. 818-41.
- Chattopadhyay, A. and Basu, K. (1990), "Humor in advertising: the moderating role of prior brand evaluation", *Journal of Marketing Research*, Vol. 27 No. 4, pp. 466-76.
- Childers, T.L., Carr, C.L., Peck, J. and Carson, S. (2001), "Hedonic and utilitarian motivations for online retail shopping behavior", *Journal of Retailing*, Vol. 77 No. 4, pp. 511-36.
- Chin, W.W. (1998), "Issues and opinion on structural equation modelling", *MIS Quarterly*, Vol. 22 No. 1, pp. 7-16.
- Cho, H. and Fiorito, S. (2009), "Acceptance of online customization for apparel shopping", *International Journal of Retail & Distribution Management*, Vol. 37 No. 5, pp. 389-407.
- Chu, C-W. and Lu, H-P. (2007), "Factors influencing online music purchase intention in Taiwan: an empirical study based on the value-intention framework", *Internet Research*, Vol. 17 No. 2, pp. 139-55.
- Cronbach, L.J. (1951), "Coefficient alpha and the internal structure of tests", *Psychometrika*, Vol. 16 No. 3, pp. 297-334.
- Csikszentmihalyi, M. (1997), *Finding Flow: The Psychology of Engagement with Everyday life*, Basic Books, New York, NY.
- Davis, F.D. (1989), "Perceived usefulness, perceived ease of use and user acceptance of information technology", *MIS Quarterly*, Vol. 13 No. 2, pp. 319-39.
- Davis, F.D. (1993), "User acceptance of information technology: system characteristics, user perceptions and behavioral impacts", *International Journal of Man-Machine Studies*, Vol. 38 No. 3, pp. 475-87.
- Davis, L., Wang, S. and Lindridge, A. (2008), "Culture influences on emotional responses to online store atmospheric cues", *Journal of Business Research*, Vol. 61 No. 8, pp. 806-12.
- De Wulf, K., Schillewaert, N., Muylle, S. and Rangarajan, D. (2006), "The role of pleasure in web site success", *Information and Management*, Vol. 43 No. 4, pp. 434-46.
- Delgado-Ballester, E. and Hernández-Espallardo, M. (2008), "Building online brands through brand alliances in internet", *European Journal of Marketing*, Vol. 42 Nos 9/10, pp. 954-76.
- Dix, A., Finlay, J., Abowd, G. and Beale, R. (1998), *Human Computer Interaction*, 2nd ed., Prentice-Hall Europe, London.
- Donovan, R.J. and Rossiter, J.R. (1982), "Store atmosphere: an environmental psychology approach", *Journal of Retailing*, Vol. 58 No. 1, pp. 34-57.
- Eroglu, S.A., Machleit, K.A. and Davis, L. (2000), "Online retail atmospherics: empirical test of a cue typology", in Evans, J.R. and Berman, B. (Eds), *Retailing 2000: Launching the New*

-
- Millennium. Proceedings of the 6th Triennial National Retailing Conference, Academy of Marketing Science and the American Collegiate Retailing Association*, Vol. 2000, pp. 144-50.
- Eroglu, S.A., Machleit, K.A. and Davis, L.M. (2001), "Atmospheric qualities of online retailing: a conceptual model and implication", *Journal of Business Research*, Vol. 54 No. 2, pp. 177-84.
- Eroglu, S.A., Machleit, K.A. and Davis, L.M. (2003), "Empirical testing of a model of online store atmospherics and shopper responses", *Psychology and Marketing*, Vol. 20 No. 2, pp. 139-50.
- Fiore, A.M. (2002), "Effects of experiential pleasure from a catalogue environment on approach responses toward fashion apparel", *Journal of Fashion Marketing and Management*, Vol. 6 No. 2, pp. 122-33.
- Fiore, A., Jin, H. and Kim, J. (2005), "For fun and profit: hedonic value from image interactivity and responses toward an online store", *Psychology and Marketing*, Vol. 22 No. 8, pp. 669-94.
- Fiore, S.G. and Kelly, S. (2007), "Surveying the use of sound in online store: practices, possibilities and pitfalls for user experience", *International Journal of Retail & Distribution Management*, Vol. 35 No. 7, pp. 600-11.
- Flavián, C., Gurrea, R. and Orús, C. (2009), "The effect of product presentation mode on the perceived content and content quality of web sites", *Online Information Review*, Vol. 33 No. 6, pp. 1103-28.
- Fornell, C. and Larcker, D.F. (1981), "Evaluating structural equation models with unobservable variables and measurement error", *Journal of Marketing Research*, Vol. 18 No. 1, pp. 33-50.
- Fortin, D.R. and Dholakia, R.R. (2005), "Interactivity and vividness effects on social presence and involvement with a web-based advertisement", *Journal of Business Research*, Vol. 58 No. 3, pp. 387-96.
- Gefen, D., Karahanna, E. and Straub, D.W. (2003), "Trust and TAM in online shopping: an integrated model", *MIS Quarterly*, Vol. 27 No. 1, pp. 51-90.
- Ghosh, A. (1994), *Retail Management*, The Dryden Press, Philadelphia, PA.
- Gorn, G.J., Chattopadhyay, A., Sengupta, J. and Tripathi, S. (2004), "Waiting for the web: how screen color affects time perception", *Journal of Marketing Research*, Vol. 42 No. 2, pp. 215-25.
- Griffith, D.A. (2005), "An examination of the influences of store layout in online retailing", *Journal of Business Research*, Vol. 58 No. 10, pp. 1391-6.
- Grossbart, S.L., Hampton, R., Rammohan, B. and Lapidus, R.S. (1990), "Environmental dispositions and customer response to store atmospherics", *Journal of Business Research*, Vol. 21 No. 3, pp. 225-41.
- Grossbart, S.L., Mittelstaedt, R.A., Curtis, W.W. and Rogers, R.D. (1975), "Environmental sensitivity and shopping behaviour", *Journal of Business Research*, Vol. 3 No. 4, pp. 281-94.
- Hair, J.F., Anderson, R.E., Tatham, R.L. and Black, W.C. (1998), *Multivariate Data Analysis*, Prentice-Hall, Englewood Cliffs, NJ.
- Huang, E. (2008), "Use and gratification in e-consumers", *Internet Research*, Vol. 18 No. 4, pp. 405-26.
- Huang, M. (2003), "Modeling virtual exploratory and shopping dynamics: an environmental psychology approach", *Information and Management*, Vol. 41 No. 1, pp. 39-47.
- Jang, S. and Namkung, Y. (2009), "Perceived quality, emotions, and behavioral intentions: application of an extended Mehrabian-Russell model to restaurants", *Journal of Business Research*, Vol. 62 No. 4, pp. 451-60.

- Jeong, S.W., Fiore, A.M., Niehm, L.S. and Lorenz, F.O. (2009), "The role of experiential value in online shopping: the impacts of product presentation on consumer response towards apparel web site", *Internet Research*, Vol. 19 No. 1, pp. 105-24.
- Jöreskog, K.G. and Sörbom, D. (1993), *Lisrel 8: A Guide to the Program and Applications*, SPSS, Inc, Chicago, IL.
- Jöreskog, K.G. and Sörbom, D. (2003), *LISREL 8.5: User's Guide*, SPSS Statistical Software, Los Angeles, CA.
- Kahn, B.E. and Isen, A.M. (1993), "The influence of positive affect on variety seeking among safe, enjoyable products", *Journal of Consumer Research*, Vol. 20 No. 2, pp. 257-70.
- Kim, H. and Lennon, S.J. (2010), "E-atmosphere, emotional, cognitive, and behavioural responses", *Journal of Fashion Marketing and Management*, Vol. 14 No. 3, pp. 412-28.
- Kim, J.-H., Kim, M. and Lennon, S.J. (2009), "Effects of web site atmospherics on consumer responses: music and product presentation", *Direct Marketing: An International Journal*, Vol. 3 No. 1, pp. 4-19.
- Koo, D.-M. and Ju, S.-H. (2010), "The interactional effects of atmospherics and perceptual curiosity on emotions and online shopping intention", *Computers in Human Behavior*, Vol. 26 No. 3, pp. 377-88.
- Krasnikovlakis, I. and Vrechopoulos, A. (2009), "Setting the research agenda for store atmosphere studies in virtual reality retailing: an interdisciplinary approach", paper presented at Mediterranean Conference on Information Systems, Athens.
- Levy, M. and Weitz, B. (2008), *Retailing Management*, McGraw-Hill, New York, NY.
- McKechnie, G.E. (1974), *Manual for the Environmental Response Inventory*, Consulting Psychologists Press, Palo Alto, CA.
- McKnight, D.H., Choudhury, V. and Kacmar, C. (2002), "The impact of initial consumer trust on intentions to transact with a web site: a trust building model", *Journal of Strategic Information Systems*, Vol. 11 Nos 3/4, pp. 297-323.
- Manganari, E.E., Siomkos, G. and Vrechopoulos, A. (2009), "Store atmosphere in web retailing", *European Journal of Marketing*, Vol. 43 Nos 9/10, pp. 1140-53.
- Martin, B.A.S., Sherrard, M.J. and Wentzel, D. (2005), "The role of sensation seeking and need for cognition on web-site evaluations: a resource matching perspective", *Psychology & Marketing*, Vol. 22 No. 2, pp. 109-26.
- Martínez-López, F.J., Luna, P. and Martínez, F.J. (2005), "Online shopping, the standard learning hierarchy, and consumers' internet expertise: an American-Spanish comparison", *Internet Research*, Vol. 15 No. 3, pp. 312-34.
- Massara, F. and Pelloso, G. (2006), "Investigating the consumer-environment interaction through image modelling technologies", *International Review of Retail, Distribution & Consumer Research*, Vol. 16 No. 5, pp. 519-31.
- Mehrabian, A. and Russell, J. (1974), *An Approach to Environmental Psychology*, MIT Press, Cambridge, MA.
- Melián-Alzola, L. and Padrón-Robaina, V. (2006), "Tangibility as a quality factor in electronic commerce B2C", *Managing Service Quality*, Vol. 16 No. 3, pp. 320-38.
- Menon, S. and Kahn, B. (2002), "Cross-category effects of induced arousal and pleasure on the internet shopping experience", *Journal of Retailing*, Vol. 78 No. 1, pp. 31-40.
- Montoya-Weiss, M.M., Voss, G.B. and Grewal, D. (2003), "Determinants of online channel use and overall satisfaction with a relational, multichannel service provider", *Journal of the Academy of Marketing Science*, Vol. 31 No. 4, pp. 448-58.

- Morrison, A.M., Taylor, S.J. and Douglas, A. (2004), "Web site evaluation in tourism and hospitality: the art is not yet stated", *Journal of Travel and Tourism Marketing*, Vol. 17 Nos 2/3, pp. 233-51.
- Mummalaneni, V. (2005), "An empirical investigation of web site characteristics, consumer emotional states and online shopping behaviors", *Journal of Business Research*, Vol. 58 No. 4, pp. 526-32.
- Muyile, S., Moanaert, R. and Despontin, M. (2004), "The conceptualization and empirical validation of web site user satisfaction", *Information and Management*, Vol. 41 No. 5, pp. 543-60.
- Nath, C.K. (2009), "Behaviour of customers in retail store environment – an empirical study", *The XIMB Journal of Management*, Vol. 6 No. 2, pp. 63-74.
- Nunnally, J.C. (1978), *Psychometric Theory*, McGraw-Hill, New York, NY.
- Pearson, J.M., Pearson, A. and Green, D. (2007), "Determining the importance of key criteria in web usability", *Management Research News*, Vol. 30 No. 11, pp. 816-28.
- Pine, B.J. III and Gilmore, J.H. (1998), "Welcome to the experience economy", *Harvard Business Review*, Vol. 76 No. 4, pp. 97-105.
- Pratt, J.A., Mills, R.J. and Kim, Y. (2004), "The effects of navigational orientation and user experience on user task efficiency and frustration levels", *Journal of Computer Information Systems*, Vol. 44 No. 4, pp. 93-100.
- Roy, M.C., Dewit, O. and Aubert, B.A. (2001), "The impact of interface usability on trust in web retailers", *Internet Research: Electronic Networking Applications and Policy*, Vol. 11 No. 5, pp. 388-98.
- Russell, J.A. and Pratt, G. (1980), "A description of the affective quality attributed to environments", *Journal of Personality and Social Psychology*, Vol. 38 No. 2, pp. 311-22.
- Srisuwan, P. and Barnes, S.J. (2008), "Predicting online channel use for an online and print magazine: a case study", *Internet Research*, Vol. 18 No. 3, pp. 266-85.
- Venkatesh, V. and Davis, F.D. (2000), "A theoretical extension of the technology acceptance model: four longitudinal field studies", *Management Science*, Vol. 46 No. 2, pp. 186-204.
- Vrechopoulos, A.P., O'Keefe, R.M., Doukidis, G.I. and Siomkos, G.J. (2004), "Virtual store layout: an experiment comparison in the context of grocery retail", *Journal of Retailing*, Vol. 80 No. 1, pp. 13-22.
- Wang, Y.J., Hernandez, M. and Minor, M.S. (2010), "Web aesthetics effects on perceived online service quality and satisfaction in an e-tail environment: the moderating role of purchase task", *Journal of Business Research*, Vol. 63 Nos 9/10, pp. 935-42.
- Wu, C., Cheng, F. and Yen, D.C. (2008), "The atmospheric factors of online storefront environment design: an empirical experiment in Taiwan", *Information Management*, Vol. 45 No. 7, pp. 493-8.
- Zviran, M., Glezer, C. and Avni, I. (2006), "User satisfaction from commercial web sites: the effect of design and use", *Information and Management*, Vol. 43 No. 2, pp. 157-78.

Corresponding author

Emmanouela E. Manganari can be contacted at: eem@aueb.gr

Construct	Items	Number of items
Ease of use of the virtual layout	The store layout that I have visited is easy to use It is easy to become skilful at using the store layout I have just visited Learning to operate the store layout I have just visited is easy My interaction with the store layout I have just visited is clear and understandable It is easy to interact with the store layout I have just visited	5
Pleasure	Happy – Unhappy Bored – Relaxed Pleased – Annoyed Contented – Melancholic	4
Attitude	I like the online store that I saw I think it is a good store I think it is a nice store	3
Satisfaction	I enjoyed visiting this store I was satisfied with my shopping experience at the store I would recommend the store to other people I am willing to “go the extra mile” to visit this web site again	4
Trust	This brand/company gives me a feeling of trust This brand/company gives me a trustworthy impression I have trust in this brand/company	3
Atmospheric responsiveness	When I go shopping, I pay attention to the store “environment” Things like music, colours, lighting in a store make a difference to me in deciding which store I will shop I find myself making shopping decisions based on how the store looks Store décor influences my decision about where I shop	4

Table AI.
Construct items

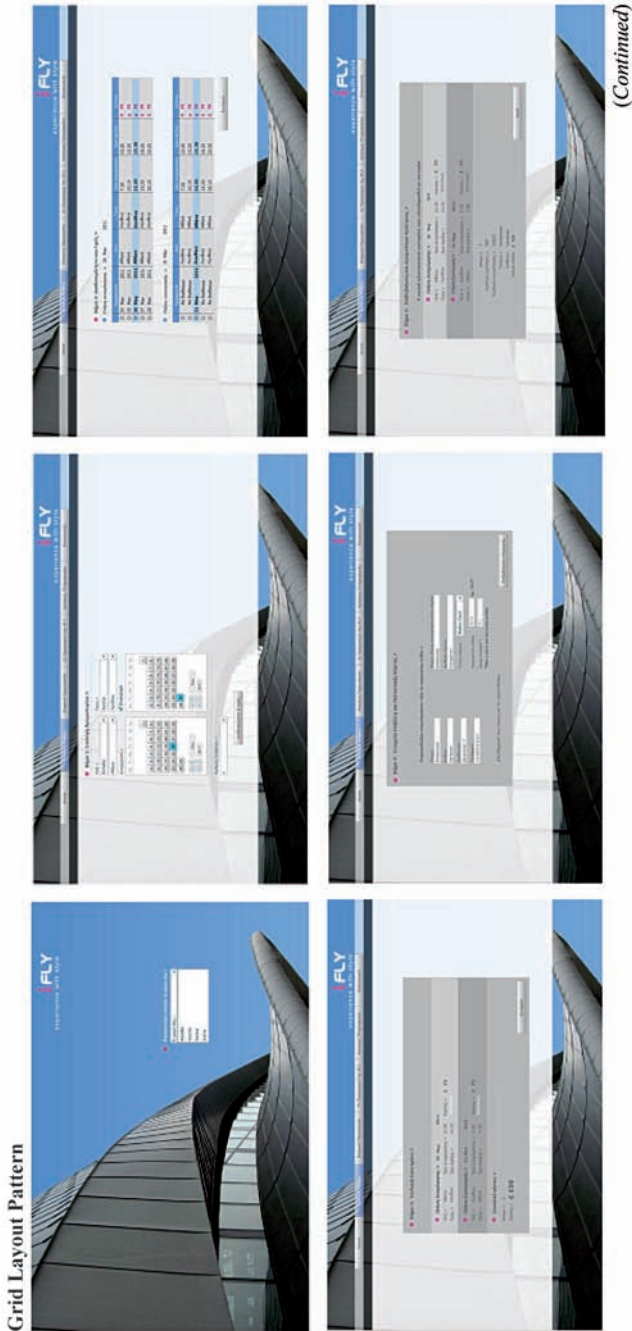


Figure A1.
The online stores

Figure A1.

