Satisfaction determinants in the Greek online shopping context

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Abstract

Purpose – The purpose of this paper is to validate empirically the impact of seven literature-based constructs on customer satisfaction using a sample from the Greek online shopping context.

Design/methodology/approach – The authors test a set of hypotheses about the influence that the constructs have on overall satisfaction. Also tested are a set of hypotheses about the satisfaction influence on post-purchase behaviour.

Findings – The paper argues that product information quality and user interface quality have a significant impact on overall satisfaction, while service information quality, purchasing process, security perception and product attractiveness have only a positive impact. In addition, the findings reveal that customer satisfaction strongly affects post-purchase behaviour.

Research limitations/implications – The limited Greek respondent "tank" in combination with low internet and technology infusion in Greece, as well as the limited online market in Greece, are the study's main limitations. Common method bias through the use of Likert scales is also considered an important limitation.

Practical implications – The findings indicate some important determinants of customer satisfaction and present a satisfaction index, the score of which is a valid and objective measurement of e-commerce success.

Originality/value – This paper offers e-commerce practitioners an objective standard to measure quantitatively the success of a web store as well as a wide frame of reference for researchers to extend e-commerce research.

Keywords Electronic commerce, Internet shopping, Customer satisfaction, Customer loyalty, Greece

Paper type Research paper

Introduction

Many scholars in the field of electronic commerce and information systems regard the study of DeLone and McLean (1992) to measure the information systems success and efficiency as a major breakthrough in this field. Measurement of information systems' success is critical in order to understand the value of information systems management actions. DeLone and McLean's (1992) work about information systems success is based on information systems' interaction with humans and highlights IT managers' as well as users' roles in reaching high information system performance. Molla and Licker (2001) recognise the existing similarities between e-commerce systems and other information systems and exploit the possibilities of extending theories about information systems success to the e-commerce context. In general, according to Molla and Licker (2001), information system success should be regarded as the sum of two distinct parts:

(1) the quality of the information systems; and

(2) the impact of the individuals.

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In this study we focus on the role of individuals on a largely used modern information system, the worldwide web, and specifically electronic commerce, as Molla and Licker (2001) propose. First, we give some prevalent definitions of the satisfaction concept as presented in the literature. Then, we present the prevailing metrics that have been developed in order to quantify and measure satisfaction. Then, after presenting the most frequently discussed attributes of web stores, we test the influence of seven factors on overall satisfaction using a sample of 359 Greek online customers. Also, we propose a satisfaction index to measure the respondents' satisfaction levels along with their self-reported satisfaction. Finally we present the findings and a discussion of this study as well as some limitations of the research and some proposals for future research.

Defining satisfaction

The customer satisfaction literature confirms that the most direct determinant of satisfaction is expectation, followed by perceived performance (Kim, 2005). The value percept theory views satisfaction as an emotional response triggered by a cognitive evaluative process (Parker and Mathews, 2001). Earlier concepts, however, define satisfaction as an evaluative judgement concerning a specific purchasing decision (Oliver, 1997). Nevertheless, Swan and Combs (1976) were among the first to argue that satisfaction is associated with performance fulfilling expectations, while dissatisfaction occurs when performance falls below expectations.

Traditional models defining satisfaction implicitly assume that customer satisfaction is the result of cognitive processes, while more recent conceptual developments suggest that effective processes may also contribute substantially to the explanation and prediction of consumer satisfaction (Westbrook and Oliver, 1991).

Kotler (2000) states that satisfaction is a person's feelings of contentment or disappointment resulting from the comparison of a product's perceived performance, in relation to his expectations (Kotler, 2000). However, the hypothesis that satisfaction affects customers' future behaviour (revisit frequency and repeated purchase) is not only intuitively strong, but is also supported empirically by studies that explore a causal link between satisfaction, loyalty and profitability (see Fornell and Wernerfelt, 1987; Anderson *et al.*, 1994, among others).

Finally Van den Poel and Buckinx (2005) incorporate different types of predictors from previous studies and forecast e-customers' purchasing behaviour. Their model is a powerful online purchasing behaviour instrument offering a better way to classify customers according to their future online purchasing behaviour.

Measuring satisfaction

A variety of metrics have been developed for the quantification of e-commerce success such as page hits, views and conversion rates. Cho and Park (2001) in their study for the development of electronic commerce make an effort to produce a way of measuring the overall e-commerce satisfaction and develop the e-commerce user satisfaction index (ECUSI). Trying to illustrate various existing patterns within the online shopping environment they view e-customers from two main aspects:

(1) customers of a retail business; and

(2) users of information technology (Cho and Park, 2001).

Considering existing satisfaction measurement models to be inapplicable as they referred to conventional data processing or the end-user computing environment, Wang *et al.* (2001) produced a generally applicable instrument providing a common framework that offers the capability to analyse results and compare them with other studies (Churchill, 1979), using advanced statistical techniques. This tool can be particularly useful for comparing customer satisfaction among different web sites incorporating specific factors (customer support, security, ease of use, transaction and payment, information content, and innovation).

Kim (2005) in his study developed an index using a weighted summation model to measure satisfaction. Kim (2005) views e-customers not only as information systems' users but also as consumers. This study is considered by its author as the first step to integrate satisfaction literature, as it identifies a large set of variables retrieved by an extended literature review (see Bailey and Pearson, 1983; DeLone and McLean, 1992; Anderson *et al.*, 1994; Arnott and Bridgewater, 2002, among others) and produces a reliable instrument to quantify the satisfaction concept.

Online shopping attributes

Many studies explore web stores' attributes for successful online shopping performance (see Jarvenpaa and Todd, 1997; Lohse and Spiller, 1998; Szymanski and Hise, 2000; Liu and Arnett, 2000; Park and Kim, 2003, among others). The e-commerce literature converges on a general classification of web stores' attributes into four categories:

(1) *merchandise*, which includes product related characteristics such as assortment, variety and product information (Jarvenpaa and Todd, 1997);

(2) *customer service and promotions*, that is careful, continuous and useful communication with customers across geographic barriers (Lohse and Spiller, 1998);

(3) *navigation and convenience*, which is closely related to the user interface, layout, organisation features and ease of use (Szymanski and Hise, 2000); and

(4) *security perception*, which mainly deals with customers' trust and safety of transactions (Elliot and Fowell, 2000; Szymanski and Hise, 2000).

Based on this general classification we selected seven attributes of web stores and examined their impact on overall user satisfaction as well as on post-purchase behaviour. These attributes are:

(1) *product information quality* (Cho and Park, 2001), which refers to how sufficient, updated, easy to understand and consistent is the information that the site provides about its products;

(2) *user interface quality* (Cho and Park, 2001), which refers to the graphic layout of a web store, playfulness, convenience and ease of use menus and controls;

(3) *service information quality* (Cho and Park, 2001), which refers to how sufficient, updated, easy to understand and consistent the information that the site provides about its services is;

(4) *purchasing process convenience* (Kim, 2005), which refers to the easiness and convenience for a user to purchase a product;

(5) *security perception* (Cho and Park, 2001), which refers to safety, personal information management and payment security;

(6) *product attractiveness* (Kim, 2005) which refers to the availability and the popularity of products in a web store; and

(7) *user's participation* (Kim, 2005) which is based on the measurement of a specific user's experience shopping online combined with the time that this user spends online.

These attributes were used as constructs to develop our research framework and form the set of hypotheses that we examined.

In order to follow the above classification we should specify which attribute of this study relates to which one of the above categories. Product information quality is related to the merchandise category. Service information quality and product attractiveness are related to the customer service and promotions category. User interface quality, purchasing process convenience and user's participation are related to the navigation and convenience category. Finally security perception is clearly related to the security perception category.

According to Park and Kim (2003), product information quality is the most significant factor that mostly affects consumer satisfaction. This is because the quality of product information enables consumers to minimise searching and processing costs (Alba *et al.*, 1997). Park and Kim (2003) proved empirically the fact that accurate, updated and consistent information on a web store's products increases overall customer satisfaction. Following their conclusions we form the first hypothesis as follows:

H1. Product information quality is positively related to e-commerce customer satisfaction.

A pleasant, tasteful and playful layout of a web store as well as the convenience to navigate across its pages increases overall customer satisfaction (Park and Kim, 2003). User interface quality is a significant determinant of web customer satisfaction and is examined in many studies that deal with customer satisfaction (Kim, 2005). Triggered by this, we formulated the second hypothesis as follows:

H2. User interface quality is positively related to e-commerce customer satisfaction.

Consistency, accuracy and up to date information are also essential for the services that an on-line store provides (Fornell *et al.*, 1996). In the same way as product information quality and based on empirical examination that Fornell *et al.* (1996) provide, service information quality is also tested for positively affecting overall satisfaction in our study. Thus, the third hypothesis is as follows:

H3. Service information quality is positively related to e-commerce customer satisfaction.

It is imperative for an online store to offer a simplified, easy and quick purchasing process. The more convenient for a user this process is, the higher the satisfaction level is attributed to the web store (see Kim, 2005; Ho and Wu, 1999; Zviran *et al.*, 2006, among others). After this, the fourth hypothesis is formed as follows:

H4. Purchasing process convenience is positively related to e-commerce customer satisfaction.

Security is one of the most important concerns for online customers worldwide. Security credentials provided by an online store, privacy policy and trust are only some of the parameters of web shopping security. The more these parameters are developed in a web store, the higher the level of customer satisfaction (Corbitt *et al.*, 2003). Most of the studies about security incorporate this in their research framework and test its influence on satisfaction and trust (Park and Kim, 2003). Based on this we formed the fifth hypothesis as follows:

H5. Security perception is positively related to e-commerce customer satisfaction.

Generally it is more convenient for a user to find a number of different and popular products in a single web store. This way, users do not have to look in many web sites to buy different kinds of products (Kim, 2005). When a web store provides popular and varying products the overall satisfaction level is increased (Jarvenpaa and Todd, 1996). Based on the above statements the sixth hypothesis is formed as followed:

H6. Product attractiveness is positively related to e-commerce customer satisfaction.

Users' participation refers to the frequency of online purchasing while the amount of total purchases is a customer's online purchasing experience indicator (Corbitt *et al.*, 2003). The experience and involvement of a user with internet technology and e-commerce increases the overall satisfaction level (Lee, 1999). Boyer *et al.* (2006) in their study of the British online groceries market reveal that customer perceptions of overall satisfaction get better as they gain experience with the new method of ordering and receiving groceries. Thus, the seventh hypothesis is the following:

H7. Users' participation in e-commerce is positively related to e-commerce customer satisfaction.

According to Lightner (2003), there are several characteristics of an online shopping experience that may be related to the users' demographic data (Bellman *et al.*, 1999). Preferences in e-commerce sites are differentiated by age, education and income. Specifically as respondents increase in age, income or education the preferences impact of online shopping characteristics become less important, while reputation of the vendor rises. Preferences are much clearer for the mature affluent customers whose sensory impact is not affected by complicated and fancy design elements. This customer group is more concerned about products that meet their needs regardless of price. Conversely, younger and less affluent target groups are more concerned about product information and their sensory impact is more affected with sense invoking design (Lightner, 2003). This study shows that popularity of the products may be variable depending on the users' demographic profile. In the Greek context there is only limited e-commerce activity as compared to other European Union member states, so it is difficult to incorporate a user demographic analysis related to the experience, involvement and preferences. However, we outline the basic demographic profile of the body of respondents in order to illustrate our research's identity.

High overall satisfaction level with an online shopping experience increases revisit frequency and repurchase intention. Subsequently an increase in repurchase frequency is more likely. This hypothesis is strongly supported in the literature and this is the reason that most studies examine the interaction of research factors with satisfaction (see Kim, 2005; Park and Kim, 2003, among others). So the eighth, ninth, tenth and eleventh hypotheses are as follows:

H8. Overall satisfaction level from a web store is positively related to revisit frequency.

H9. Overall satisfaction level from a web store is positively related to repurchase frequency.

H10. Overall satisfaction level from a web store is positively related to revisit intention.

H11. Overall satisfaction level from a web store is positively related to repurchase intention.

Finally, it is expected that revisiting intention increases repurchase intention. This fact led us to test an extra hypothesis, so the twelfth hypothesis is as follows:

H12. Revisit intention is positively related to repurchase intention.

The research structure of the present study is outlined in Figure 1.

Research methodology

The instrument we used to investigate our model is an online questionnaire consisting of 31 satisfaction questions and seven demographic questions. The response structure

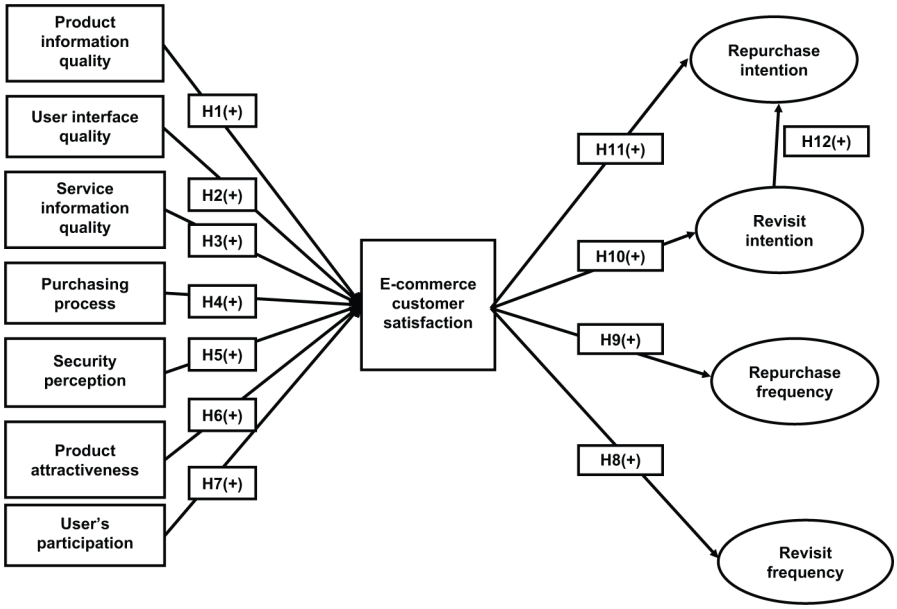

Figure 1.
The research model

of each question is a seven-point Likert scale. Furthermore, by measuring the importance that each respondent attributes to each item, we are able to produce a satisfaction score for each respondent. This score represents an estimation of the overall satisfaction and gives us the opportunity to verify the accuracy of the self-reported satisfaction, which is somewhat vulnerable due to common Likert scale conception bias. This is because of the different ways each respondent values his level of satisfaction on Likert scale, depending on his conception of satisfaction, for example an e-customer could be more easily satisfied than another from a web store. Five more items are used to measure purchasing behaviour. These are revisit and repurchase intention as well as revisit and repurchase frequency, and help us to make inferences about post-purchase behaviour.

This instrument was developed using a set of items mainly retrieved from the studies of Kim (2005) and Park and Kim (2003), after adjusting many of them to fit the Greek language's linguistic features. Lists of items from other studies are also employed so as to produce a more precise estimation of each construct. The questionnaire was pre-tested through a pilot survey among the students of the MSc in Finance and Financial Information Systems at the campus of TEI of Kavala. After this test some verbal adjustments were made to several items, while some items were eliminated for being misinterpreted by respondents, having notional similarities among them and due to verbal inapplicability in the Greek language.

Greek residents who had made at least one online purchase in their lifetime from a Greek online store were asked to evaluate their most recent online shopping experience. This way seven well-known Greek online stores were evaluated, representing the majority of online shopping activity in Greece. This method was important for our study because we reached desired objectivity and sample representation. Data were collected through 1,826 e-mail invitations that were sent to member customers of popular Greek online stores. The e-mail invitations were sent out in July 2007, while reminder e-mails were sent in August 2007. Finally, from the total of 1,826 e-mail invitations, 390 responses were collected, 359 of which were usable and valid (response rate: 20 per cent). Responses were categorised according to the respondents' residence, age, working status, monthly income and level of education (Table I). A quota placement on age and residence was set in order to follow the typical Greek internet user profile[1], to the extent that this was possible. Specifically, the distribution of respondents among the age brackets and districts of residence is consistent with the corresponding distributions from the e-metrics survey. So, our sample is actually an imitation of the e-metric.

Our dataset of responses was processed using the Statistical Package for Social Sciences (SPSS) version 12.0. A missing value analysis was performed using the series mean method in order to replace missing values and minimise bias. Also a questionnaire tracking method was used in order to edit and check the coding process but also to minimise coding errors.

Two different variables are used to measure satisfaction. The first is the degree of satisfaction that each respondent reports from his own web shopping experience, measured on a seven-point Likert scale (self-reported satisfaction). The second variable follows Kim's (2005) proposed index and uses a score that is calculated for each respondent as a sum weighted average of all the respondents' answers and the significance of each item for every respondent (index based satisfaction). This index is calculated for all items and has the following algebraic form:

Characteristic	Per cent
Gender	
Male	66.6
Female	33.4
Age	
15-24	23.4
25-34	36.3
35-44	32
45-54	5.3
55-64	2.1
65 +	0.9
Income per month (€)	
≤400	4.3
401-800	15.8
801-1,200	18.6
1,201-1,600	33.8
1,601-2,000	21.8
≥2,001	5.7
Working status	
Self-employed	16.5
Employees (in office)	40.3
Other employees (not in office)	32.1
Student	9.4
Unemployed	1.7
Time spent per logon (in hours)	
<1	7.5
1-2	21.7
2-3	27.3
3-5	24.8
5 +	18.7
Times per week	
<2	5.6
3-4	13.1
5-14	21.4
14-21	30.9
21 +	29

Table I.
Respondent profile

$$\text{Index based satisfaction} = \sum_{1}^{n} (R_i \times I_i),$$

where R_i is the response of respondent i for the specific item and I_i is the importance of this item for respondent i, both measured on seven-point Likert scales. This product is divided by seven, so as to be consistent with the seven-point Likert scale.

The mean of index-based satisfaction is 4.79, while the mean of self reported satisfaction is 5.76. The correlation between self-reported satisfaction and index based

satisfaction is 0.929 and is significant at the 1 per cent level, which is strong evidence that Kim's (2005) satisfaction measurement is reliable and consistent with self-reported satisfaction's score. Moreover, we consider Kim's (2005) satisfaction measurement reliable, because its standard deviation is 0.582, while self-reported satisfaction's standard deviation is 0.621, which indicates more volatility. Finally, the reliability of this index is also proved by the *t*-value test that was performed in order to examine the equality of means ($t358 = 77.898$, $p > 0.000$) (Table II).

Findings

The ratio between the responses and the total amount of variables is 12:1 and is primary evidence for acceptable sample size adequacy (Parasuraman *et al.*, 1988). Furthermore, a high Kaiser-Meyer-Olkin score of 0.803 as well as acceptable Bartlett sphericity test statistics ($p = 0.000$) strongly validate the sample size adequacy.

With acceptable results from the sample adequacy tests, we dropped two items because they extracted unacceptable communalities of 0.309 and 0.419 respectively, significantly lower than the lowest accepted value of 0.5. The 29 remaining items were submitted to a principal components factor analysis using Varimax rotation in order to assess their discriminate validity and convergence was achieved in five iterations. The resulting seven factors produced strong factor loadings. The seven factors proved reliable since they yielded Cronbach's α values greater than 0.549, while five out of seven factors yielded values greater than 0.71. Finally, the seven resulting factors explain 64.731 per cent of the total variance. The seven resulting factors are:

(1) product information quality;
(2) user interface quality;
(3) service information quality;
(4) purchasing process convenience;
(5) security perception;
(6) product attractiveness; and
(7) user's participation.

Factor and reliability results are shown in Table III.

In order to examine the validity of the set of the 12 hypotheses developed we conducted a series of correlation tests. For this purpose Pearson's correlation coefficient is employed, the significance of which indicates the dependence strength between the resulting factors and overall satisfaction. The validity of the hypotheses is tested for both index-based satisfaction and self reported satisfaction with the bivariate correlations method of SPSS version 12.0 (Table IV).

Table II.
Means comparison

Satisfaction	*n*	Mean	SD	*t*-value	Significance (two-tailed)	Paired samples test *T*	Significance	Mean	SD
Index-based	359	4.79	0.582	155.932	0.000				
Self-reported	359	5.74	0.621	175.118	0.000	77.898	0.000	0.944	0.230

Table III. Factor and reliability analysis

Factor name	Items	Factor loadings	Cronbach's α	Variance explained	Communalities extraction
Factor 1: Product information quality	Updated	0.757	0.923	17.322	0.594
	Sufficient	0.936			0.877
	Easy to understand	0.891			0.796
	Consistent	0.630			0.513
	Playful	0.881			0.783
	Relevant	0.857			0.742
	Reliable	0.814			0.683
Factor 2: User interface quality	Convenient to order a product in evaluated store	0.680	0.830	11.269	0.532
	Convenient navigation in evaluated store	0.866			0.735
	Appropriate use of colour in evaluated store's interface	0.715			0.607
	Convenient to search for a product in evaluated store	0.829			0.707
	Tasteful screen layout and design of evaluated store	0.709			0.537
Factor 3: Service information quality	Updated	0.791	0.839	10.864	0.650
	Sufficient	0.858			0.753
	Consistent	0.648			0.520
	Playful	0.845			0.728
	Relevant	0.754			0.593
Factor 4: Purchasing process convenience	Convenient arrangement of products	0.758	0.705	7.043	0.586
	Easy to manage shopping basket	0.811			0.685
	Sufficient usage directions	0.781			0.650
Factor 5: Security perception	Effective guidance to correct entry errors	0.664	0.585	6.108	0.563
	Protection of payment information	0.758			0.595
	Proper management of private information	0.722			0.581
Factor 6: Product attractiveness	Satisfactory product categories amount	0.843	0.549	5.242	0.747
	Satisfactory availability percentage	0.752			0.602
Factor 7: User's participation	Online purchases	0.783	0.645	6.883	0.687
	Value of online purchase	0.747			0.574
	Percentage of electronic to total purchase	0.689			0.504

Hypotheses	Pearson coefficient for satisfaction Index-based		Self-reported		Outcome
H1	0.544	(0.000)	0.503	(0.000)	Supported
H2	0.315	(0.000)	0.297	(0.000)	Supported
H3	0.254	(0.000)	0.228	(0.000)	Supported
H4	0.205	(0.000)	0.209	(0.000)	Supported
H5	−0.050	(0.643)	−0.025	(0.341)	Not supported
H6	0.209	(0.000)	0.180	(0.000)	Supported
H7	0.176	(0.000)	0.179	(0.000)	Supported
H8	0.898	(0.000)	0.837	(0.000)	Supported
H9	0.894	(0.000)	0.834	(0.000)	Supported
H10	0.788	(0.000)	0.740	(0.000)	Supported
H11	0.663	(0.000)	0.640	(0.000)	Supported
H12	0.567	(0.000)			Supported

Note: All correlations are significant at the 0.01 level (two-tailed)

Table IV.
Hypotheses tests

In order to observe the impact of each construct to overall satisfaction, several regression analyses were performed, first examining index-based satisfaction and then self-reported satisfaction. In both cases the seven constructs that emerged from factor analysis are used as independent variables. Regressions were performed using the enter method. By the examination of index based satisfaction, a significant model emerged ($F_{7.351} = 68.030$, $p < 0.0005$) with an adjusted R^2 of 0.567. Regression of self reported satisfaction with the independent constructs produced a model with a relatively less predictive power ($F_{7.351} = 50.442$, $p < 0.0005$). Adjusted R^2 in the case of the self-reported satisfaction model is 0.492. Furthermore, multi-collinearity diagnostics revealed that there is no autocorrelation between the constructs. More specifically, tolerance scores[2] for all the variables are greater than 0.159, while there are no extremely large VIF scores[3] for both index-based and self-reported satisfaction. In addition, the Durbin-Watson scores are also acceptable for both satisfaction variables (index based and self reported). Specifically the Durbin-Watson scores are 1.750 ($d > d_u$) for index-based satisfaction and 1.811 ($d > d_u$) for self-reported satisfaction, which also indicates no evident autocorrelation in both cases. The same conclusion can be extracted from the correlation matrix, since there are no significant correlations between predictors, again in both index based satisfaction and self-reported satisfaction.

The constructs that seem to significantly influence overall satisfaction (for both index-based and self-reported satisfaction) are product information quality ($\beta = 0.544$, $t = 15.6$, $p = 0.000$), user interface quality ($\beta = 0.315$, $t = 9.0$, $p = 0.000$), service information quality ($\beta = 0.254$, $t = 7.2$, $p = 0.000$), purchasing process ($\beta = 0.205$, $t = 5.8$, $p = 0.000$), security perception ($\beta = 0.203$, $t = 5.8$, $p = 0.000$) and product attractiveness ($\beta = 0.176$, $t = 5.0$, $p = 0.000$), which has a weaker impact. E-commerce participation is not significant and has no impact at all on overall satisfaction ($\beta = -0.050$, $t = -1.4$, $p = 0.148$) (Appendix 2).

Finally, β standardised coefficients for both index-based and self-reported satisfaction as well as their significance, is another proof for the hypotheses'

validity. Specifically, *H1* ($\beta = 0.544$, $p < 0.0005$), *H2* ($\beta = 0.315$, $p < .0005$), *H3* ($\beta = 0.254$, $p < 0.0005$), *H4* ($\beta = 0.205$, $p < .0005$), *H5* ($\beta = 0.203$, $p < 0.0005$) and *H6* ($\beta = 0.176$, $p < 0.0005$) are supported by the data, while *H7* ($\beta = -0.050$, $p = -1.448$) is not supported by the data.

The results from the regression of index-based satisfaction and self-reported satisfaction with revisit frequency as dependent variable revealed a significant predictive power for this regression model ($F_{1.357} = 833.003$, $p < 0.0005$) and produced an adjusted R^2 of 0.807 for index-based satisfaction and 0.700 for self reported satisfaction. The Durbin-Watson scores are 1.941 ($d > d_u$) for index-based satisfaction and 2.137 ($d > d_u$) for self-reported satisfaction. These results are also a strong indication for the validity of *H8* for both index-based ($\beta = 0.898$, $p < 0.0005$) and self-reported satisfaction ($\beta = 0.837$, $p < 0.0005$).

Furthermore, regression of index-based satisfaction and self-reported satisfaction with repurchase frequency as a dependent variable also revealed a high predictive power ($F_{1.357} = 1,423.382$, $p < 0.0005$) and produced an adjusted R^2 of 0.799 for index-based satisfaction and 0.696 for self-reported satisfaction. The Durbin-Watson scores are 1.965 ($d > d_u$) for index-based satisfaction and 2.171 ($d > d_u$) for self-reported satisfaction evidence of no autocorrelation. The results of this regression are strong evidence for the validity of *H9* for both index-based ($\beta = 0.894$, $p < 0.0005$) and self-reported ($\beta = 0.834$, $p < 0.0005$) satisfaction.

Regression of index-based satisfaction and self-reported satisfaction with revisit intention as the dependent variable revealed a high predictive power ($F_{1.357} = 433.359$, $p < 0.0005$) and produced an adjusted R^2 of 0.620 for index-based satisfaction and 0.547 for self- reported satisfaction. The Durbin-Watson scores are 1.903 ($d > d_u$) for index-based satisfaction and 2.055 ($d > d_u$) for self-reported satisfaction, showing no evident autocorrelation. This result provides strong support to *H10* for both index-based ($\beta = 0.788$, $p < 0.0005$) and self- reported ($\beta = 0.740$, $p < 0.0005$) satisfaction.

Finally, the regression of index-based satisfaction and self-reported satisfaction with repurchase intention as a dependent variable revealed a high predictive power ($F_{1.357} = 247.558$, $p < 0.0005$) and produced an adjusted R^2 of 0.439 for index-based satisfaction and 0.408 for self-reported satisfaction. The Durbin-Watson scores are 1.937 ($d > d_u$) for index-based satisfaction and 1.956 ($d > d_u$) for self-reported satisfaction. This regression validated *H11* for both index-based ($\beta = 0.663$, $p < 0.0005$) and self-reported ($\beta = 0.640$, $p < 0.0005$) satisfaction.

The results of this study provide support for almost all of the 12 research hypotheses. Although some relationships were not strongly supported by the data, in general the research model seems to hold well. Product information quality and user interface quality are highly related to overall customer satisfaction. Service information quality, purchasing process convenience, security perception and product attractiveness are also positively correlated to satisfaction. On the other hand, e-commerce participation does not seem to have any impact on overall satisfaction. Additionally, findings reveal some significant effects of satisfaction on customer's post purchase behaviour. Specifically it seems that a high level of overall satisfaction leads to a significant increase in customers' revisit and repurchase intention. Similarly, revisit and repurchase frequency are both highly connected to overall satisfaction.

Discussion

In this study we examine a set of seven literature-oriented online satisfaction characteristics for their effect on e-customers' overall satisfaction following our proposed research framework. For this purpose, we use a 28-item questionnaire to quantify online customers' level of satisfaction. Furthermore, we examine the effect of satisfaction on customers' post-purchase behaviour through revisit and repurchase intention and revisit and repurchase frequency. We focus on the dual character of e-commerce users, both as customers of a retail store and users of information technology. Specifically, we view customer satisfaction mainly through its marketing perspective but also highlight the use of information technology in retail business. Therefore, we attempted to mix the marketing management principles with information technology, combining satisfaction measures from both the information systems field and the customer behaviour field. The product of this mix was a human-oriented theoretical research framework to describe users' satisfaction, where the use of computers and the retail purchasing is integrated into a single act emphasising the human element.

Our findings are somewhat consistent with the findings by other researchers. Specifically we found the same strong effect that product and service information quality as well as user interface quality and security perception have on overall satisfaction that Park and Kim (2003) found in the their study about information satisfaction. Furthermore the link of information satisfaction and site commitment that Kim (2005) found is also proved in our study through the relationship of satisfaction with repurchase and revisit intention.

Our results are also consistent with Kim's (2005) findings that revealed strong relationships of product information, customer service, site design and process convenience with overall self-reported satisfaction and repurchase intention. In addition, we challenged Kim's (2005) study by testing the effects of the examined constructs both on self-reported satisfaction and index-based satisfaction (Cho and Park, 2001), after comparing the results of the two distinct forms of this variable and proved that the index-based satisfaction is a reliable measure.

Finally our index-based satisfaction results are consistent with Cho and Park's (2001) results that proved that their e-commerce user satisfaction index (ECUSI) is internally reliable as an index for the level of customers' satisfaction with internet shopping sites. Moreover our study is consistent with Cho and Park (2001), in that quality of product information, good site design, satisfaction with purchasing process, ease of use and provision of additional information services are directly linked to overall e-customer satisfaction.

Conclusions, implications and future research

This research contributes to literature in a number of ways. At first, it sets a frame of reference for online shopping research in Greece, as it is the first of its kind conducted exclusively in this geographical area. Secondly, it contributes to existing research by enhancing Kim's (2005) online satisfaction framework and incorporating Cho and Park's (2001) index-based satisfaction, which is proved to be a valid measure that minimises possible bias of self-reported satisfaction. Thirdly, as existing research in customer satisfaction and electronic commerce is incorporated in the proposed satisfaction index (Cho and Park, 2001), it is suitable for extended methodological

refinement and improvement of validity. Therefore, this index is a valuable generalisable instrument that can be used as a research benchmark in all online retail contexts.

Our findings are also useful for practitioners in many ways. At first they provide a quantifying index to measure customers' satisfaction based on several customer satisfaction parameters. Based on this index they can infer countable implications about their customers' satisfaction building on that. Index-based satisfaction is also a reliable and valuable feedback tool that helps practitioners have a concrete view of their stores' performance. Furthermore, the link of satisfaction and revisit and repurchase intention and frequency respectively provide practitioners with a prediction of customers' post-purchase behaviour and an inverse opportunity if this prediction is negative. Therefore our research framework reveals strengths and weaknesses to focus on in order to improve negative shopping experiences, prevent unfortunate post-purchase behaviour, and ultimately maintain and increase clientele.

Although our findings are useful, several limitations may have caused minor bias. First, the sample is restrained on responses only from the Greek geographic area that may have slightly affected the tests' results. Moreover, the low internet penetration in Greece makes the task of gathering a statistically sufficient number of valid responses quite difficult. Specifically, Greece ranked last among the European Union countries in terms of internet use, as only one fifth of the total population used the internet in 2006. Additionally only 70 per cent of the total number of internet users have made at least one online purchase in their lifetime while the broadband internet access rate in 2006 was only 4 per cent of the total population (Eurostat, 2006). Consequently, apart from the lack of respondents' variance, we also faced a lack of organisational variance, which might confirm a possible distortion of the result. Finally, the use of self-reported Likert scales includes the possibility of common method bias because of potential demand effects (i.e. respondents try to guess the researchers' intention or respondents may perceive the strength of each point on the Likert scale in a different manner).

For future research, despite the wide literature review that was used in this study, the testing of more constructs that are proven to influence overall customer satisfaction and buying behaviour is imperative. For example, including factors such as price would improve the model's explanatory power and provide the chance to test the effect of price sensitivity on purchasing behaviour. Further research should also be focused on using different datasets to reveal biases that may be caused by a confined dataset composition retrieved only from a specific geographic area. Different datasets could also serve as an opportunity for comparisons among different contexts. Furthermore, we propose a more focused consumer behaviour analysis in buyers of specific products and services. Such research would reveal differences in consumer behaviour according to product diversification. Additionally, this study leaves significant room for research regarding the link between satisfaction and post-purchase behaviour. Finally, more research should be done towards understanding and establishing both sides of information systems success, information systems quality and user satisfaction.

Notes

1. According to the e-metrics survey among 31,889 Greek internet users conducted by the market research company A.G.B. Nielsen in collaboration with the Information Society Observatory in December 2006.
2. The closer to zero the tolerance score is, the stronger the relationship with other variables.
3. An extremely large VIF value of a variable related to the other variables indicates multicollinearity.

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(The appendices follow overleaf.)

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Appendix 1. Questionnaire

Product Information quality	Updated
	Sufficient
	Easy to understand
	Consistent
	Playful
	Relevant
	Reliable
User interface quality	Convenient to order a product in evaluated store
	Convenient navigation in evaluated store
	Appropriate use of colour in evaluated store's interface
	Convenient to search for a product in evaluated store
	Tasteful screen layout and design of evaluated store
Service information quality	Updated
	Sufficient
	Consistent
	Playful
	Relevant
Purchasing process	Convenient arrangement of products
	Easy to manage shopping basket
	Sufficient usage directions
E-commerce participation	Online purchases
	Value of online purchase
	Percentage of electronic to total purchase
Security perception	Effective guidance to correct entry errors
	Protection of payment information
	Proper management of private information
Product attractiveness	Satisfactory product categories amount
	Satisfactory availability percentage

Table AI.

Appendix 2. Coefficients

Constructs	Index-based satisfaction					Self-reported satisfaction				
	Unstandardised		Standardised			Unstandardised		Standardised		
	B	SE	Beta	*T*	Significance	B	SE	Beta	*T*	Significance
(Constant)	4.791	0.020		237.0	0.000	5.735	0.023		245.5	0.000
Product information quality	0.317	0.020	0.544	15.6	0.000	0.312	0.023	0.503	13.3	0.000
User interface quality	0.183	0.020	0.315	9.0	0.000	0.184	0.023	0.297	7.8	0.000
Service information quality	0.148	0.020	0.254	7.2	0.000	0.141	0.023	0.228	6.0	0.000
Purchasing process	0.119	0.020	0.205	5.8	0.000	0.130	0.023	0.209	5.5	0.000
E-commerce participation	−0.029	0.020	−0.050	−1.4	0.148	−0.015	0.023	−0.025	−0.65	0.515
Security perception	0.118	0.020	0.203	5.8	0.000	0.111	0.023	0.180	4.7	0.000
Product attractiveness	0.103	0.020	0.176	5.0	0.000	0.111	0.023	0.179	4.7	0.000

Table AII.