E-services and physical fulfillment: How e-loyalty is created

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Keywords

E-quality, E-loyalty, E-fulfillment

Abstract

Most transactions initiated online are completed by some form of physical fulfillment, i.e. the delivery of the goods to the customer's doorstep. In previous studies, website performance or e-service quality was found to be an important antecedent of customer satisfaction and loyalty. In traditional settings, physical fulfillment is considered an important driver of customers' behavioral intentions. In the present study, combined effects of online and offline service components on customer responses are modeled and tested. A survey of online customers across four industries has generated important insights into the absolute and relative importance of two physical fulfillment dimensions. In the surveyed industries physical fulfillment appears to be at least as important as website performance. The role of third party logistics providers ensuring offline value and joy is substantiated.

Introduction

Loyal customers are crucial to business survival, especially in an electronic commerce context (Reichheld and Schefter, 2000). Acquiring customers via the Web is costly and since the competition is just a mouse click away, customer e-loyalty appears essential in an economic as well as a competitive sense. A better understanding of e-loyalty, its antecedents and its consequences is underway (e.g. Anderson and Srinivasan, 2003; Srinivasan *et al.*, 2002). Recent studies have explored the effects of e-service quality on loyalty of online customers (Srinivasan *et al.*, 2002; Van Riel *et al.*, 2004) by extending the ideas of Zeithaml *et al.* (1996) on traditional service quality.

In traditional services, both functional and technical quality evaluations (Grönroos, 1984) have been shown to influence customer satisfaction and patronage behavior simultaneously. In an online setting, consumers are thought to base their repurchase decisions on complex evaluations of the full service offer (Grönroos *et al.*, 2000; Porter, 2001). Most transactions initiated online are completed by some form of physical fulfillment. Until now, the unique complementary roles of website performance and physical fulfillment have been neglected in most empirical studies of customer e-loyalty (Wolfinbarger and Gilly, 2003). In an online setting the question can be raised whether online companies should invest in the further development of online quality functions, or give priority to improving offline fulfillment (Lee and Whang, 2001). In the present study, effects of online quality and offline fulfillment on customer responses are modeled by extending existing e-quality models (Liljander *et al.*, 2002; Zeithaml *et al.*, 2000). Analogous to the distinction made in service research between measurable efficiency and effectiveness in the eyes of the individual customer (e.g. Dubé and Menon, 2000; Surprenant and Solomon, 1987), we differentiate between the dimensions of value and joy, both online and offline. The extended model, which includes offline fulfillment, is validated with a substantial cross-national survey of e-customers, in four different online industries.

The paper is structured as follows. First, a conceptual framework is developed. Hypotheses are formulated on the combined effects of online quality and offline fulfillment on customer satisfaction and customer loyalty. The empirical study and its results will be presented next. The paper will conclude with a discussion of managerial and theoretical implications.

Development of a conceptual framework

In contrast with traditional business situations, online customers typically do not interact with individuals. Instead, they interact with seller organizations through a

user interface which enables them to initiate the desired transactions themselves. Previous research already identified the user interface to be a key determinant of online service quality (Grönroos *et al.*, 2000). Two factors that are important in this respect are website aesthetics and website navigation (Zeithaml *et al.*, 2000). The aesthetics and looks of a website have been referred to as the 'e-scape' (Gummerus *et al.*, 2004; Van Riel *et al.*, 2004). The e-scape is comparable to the traditional servicescape (Bitner, 1990, 1992) and reflects how information is presented through the use of colors, layout, pictures, and font size and style. Websites with adequate navigation quality consistently enable users to easily find what they want, via a dependable and well performing search engine, offering fast and logical maneuverability (Jeong and Lambert, 2001; Liljander *et al.*, 2002; Zeithaml *et al.*, 2000). An attractive e-scape creates an online environment that is likely to be more effective in facilitating website navigation. Indeed, early research on text comprehension showed significant differences between font types (Povlton, 1969). More recent studies in industrial ergonomics (e.g. Myung, 2003; Wang *et al.*, 2003) show effects of text-background color combinations and line-spacing on website comprehension and usability. Therefore, it is hypothesized that an attractive e-scape contributes to perceptions of website navigation quality:

H1: A positive relationship exists between perceived quality of the website e-scape and perceived quality of website navigation.

In turn, websites incorporating adequate navigation functionality are likely to provide more value to customers than websites that are difficult to navigate. This is in line with previous research indicating that navigational quality is a key facilitator of online customer satisfaction with e-services (Liljander *et al.*, 2002). Consequently, it is hypothesized that:

H2: A positive relationship exists between perceived quality of website navigation and online value perceptions.

The service quality dimension of reliability is often proposed to be one-dimensional (Zeithaml *et al.,* 2000). However, it has been difficult to establish a single factor with sufficient discriminant validity due to the inherent ambiguity in the use of the term (e.g. Van Riel *et al.,* 2001). In an e-commerce context, reliability is often referring to a functional quality dimension and at the same time to the reliability of the information content provided on the site. This problem can be mitigated by covering functional reliability of the website by navigation, as has been done in this study. The reliability of the information provided on the website is operationalized as accuracy. Accurate websites provide visitors with information that is considered useful and reliable, most likely to occur effectively when the information is provided in an attractive manner. The relationship between text difficulty and perceived accuracy has been reported by Weaver III and Bryant (1995). Similar to website navigation, it is expected that the e-scape can also function as a facilitator of website accuracy perceptions:

H3: A positive relationship exists between perceived quality of the website e-scape and perceived website accuracy.

In turn, analogous to offline service quality, e-service accuracy perceptions are likely to evoke higher value perceptions in the eyes of the customer, as posited in the following hypothesis:

H4: A positive relationship exists between perceived website accuracy and online value perceptions.

The ability to customize website appearance and offerings to customer requirements is considered one of the key benefits of using technology in services (Bitner *et al.*,

2000). Similar to the SERVQUAL dimension of empathy, customers expect to be allowed, or even encouraged to make adaptations based on their personal preferences and needs (Bitner *et al.*, 2000), increasing the fit between the self and the website. Customization will likely influence the joy experienced with the e-service. Therefore, it is hypothesized that:

H5: A positive relationship exists between perceived website customization and online joy perceptions.

When interacting with an online seller, it is crucial that users receive adequate and timely support in case of any questions or problems. This corresponds to the traditional SERVQUAL dimension of responsiveness as identified by Zeithaml *et al.* (1996). It is expected that responsiveness to potential requests or problems will improve perceptions of online joy:

H6: A positive relationship exists between perceived website responsiveness and online joy perceptions.

The relationship between perceived service quality and customer satisfaction is perhaps the most studied phenomenon in services research. This relationship is generally confirmed in traditional service settings (cf. Dabholkar, 1995). Satisfaction with websites was found to be positively influenced by website quality (Bhattacherjee, 2001), and website quality attributes (Chen *et al.*, 2002; Chen and Wells, 1999; Kim and Stoel, 2004; Szymanski and Hise, 2000; Yang *et al.*, 2003; Yang *et al.*, 2001). In a setting in which a website is one of the principal interfaces between the customer and the firm, it can be expected that:

H7: A positive relationship exists between perceived online value and overall customer satisfaction.

And

H8: A positive relationship exists between perceived online joy and overall customer satisfaction.

In an e-commerce setting, physical fulfillment was recognized as an important antecedent of customer response, such as satisfaction and loyalty (Wolfinbarger and Gilly, 2003; Zeithaml *et al.*, 2000). Traditionally, satisfaction is conceptualized as consisting of rational as well as emotional components (Oliver, 1996). This distinction is thought to be equally applicable to transactions that are initiated online and finalized offline by a physical fulfillment process. Online, rational components relate to e-quality dimensions such as website navigation and responsiveness. Website design and feelings evoked are associated with emotions. With respect to physical fulfillment, rationality pertains to perceptions of timely and adequate delivery of the product, i.e. offline value. The experience of actually receiving the ordered product is likely to evoke feelings of joy and pleasure, i.e. offline joy. It is hypothesized that:

H9: A positive relationship exists between perceived offline value and overall customer satisfaction.

And

H10: A positive relationship exists between perceived offline joy and overall customer satisfaction.

Customer satisfaction is expected to be positively related to customer loyalty (e.g. Liljander and Strandvik, 1995; Zeithaml *et al.*, 1996). In a study comparing online versus offline environments, Shankar *et al.* (2003) found the positive relationship between satisfaction and loyalty to be even stronger online than offline.

H11: A positive relationship exists between overall customer satisfaction and customer loyalty.

Finally, assurance, or the level to which an organization is able to instigate trust in the customer, is an important SERVQUAL dimension in offline environments. Online, assurance has been found to be a relevant factor as well (Zeithaml *et al.*, 2000), conceivably more important than offline; online customers are less able to scrutinize employees or the physical facilities of the organization with which they do business (Reichheld and Schefter, 2000). Consequently, assurance must be established in other ways, for example through guarantees and statements of privacy protection (Auh *et al.*, 2003). It has been argued that trust should be designed into online experiences in order to make customers loyal (Schneiderman, 2000). Therefore, website assurance can be expected to promote customer satisfaction and loyalty. It is hypothesized that:

H12: A positive relationship exists between perceived website assurance and overall customer satisfaction.

And

H13: A positive relationship exists between perceived website assurance and customer loyalty.

The hypotheses are summarized in the conceptual framework presented in Figure 1. Further details on the empirical study conducted to validate the framework will be provided in the next section.

[INSERT FIG. 1 HERE]

Empirical study

Research setting and sample design

To validate the conceptual framework, cross-sectional data were collected through an online survey, focusing on four different online industries; books & CD's, computer hardware & electronics, computer software, and airline travel tickets. Around 400 invitations to participate in the online survey were sent out, while each invitation

included a request for further distribution. In order to increase the response rate, participants were rewarded with a 5 Euro gift voucher. Respondents had 2 weeks time to participate, generally considered to be a proper timeframe for generating enough useful responses (Ilieva *et al.*, 2002).

In total, 150 usable responses were generated. Of these responses, 110 came from male and 40 from female participants. Five respondents were older than 54 years, 8 were between 45 and 54, 8 between 35 and 44, 47 between 25 and 34, and the remaining 82 respondents were aged under 25. The sample consisted predominantly of higher educated respondents; 112 participants were university-educated, 19 were college-educated. The majority (60%) of the responses concerned perceptions about industries with a strong tangible component (books & CD's, computer hardware), while 40% concerned more intangible services (computer software, travel services).

Questionnaire design

The items used to measure the constructs in the conceptual framework were based on previous research by Liljander *et al.* (2002), Van Riel *et al.* (2004), and Gummerus *et al.* (2004). Extra questions were included to cover the offline fulfillment dimension. The descriptive statistics and measurement items can be found in Table 1.

[PLEASE INSERT TABLE 1 ABOUT HERE]

Methodology and analytical results

Both the measurement model and the structural model were estimated by means of Partial Least Squares (PLS) (cf. White *et al.*, 2003). For three reasons PLS is considered to be the most appropriate analysis technique for the current study. First, PLS makes no distributional assumptions (Fornell and Cha, 1994). As can be concluded from Table 1, the distributions of the data are characterized by significant deviations from normality. Hence, PLS is preferred over ML-based estimation

methods which assume normally distributed data. Second, PLS is particularly suitable for situations where the parameter-to-sample size is relatively small (Cassel *et al.*, 2000). Third, based on the correlations between constructs presented in Table 2, multicollinearity might form a potential problem in interpreting the estimation results. The use of PLS avoids this possible problem, as PLS results have been shown to be very robust against multicollinearity (Cassel *et al.*, 2000).

[PLEASE INSERT TABLE 2 ABOUT HERE]

Although PLS estimates the measurement and structural model simultaneously, a PLS model is typically analyzed and interpreted sequentially in two stages (Hulland, 1999; White *et al.*, 2003). First, the measurement or outer model is evaluated in terms of reliability and validity. Second, the structural or inner model is assessed. This sequence produces reliable and valid measures of constructs before attempting to draw conclusions about inter-construct relationships (Plouffe *et al.*, 2001).

Results measurement model

Reliability

Inspection of the individual item loadings presented in Table 1 indicates that all items load higher than 0.50 on their respective construct, thereby providing support for a high degree of individual item reliability (Hulland, 1999; White *et al.*, 2003). Jöreskog's (1971) measure of composite reliability is used to assess the internal consistency of items hypothesized to measure a single construct (cf. Fornell and Larcker, 1981). Table 2 shows that the items measuring the constructs can be considered internally consistent, as in all instances all composite reliability values exceed the 0.70 guideline suggested by Nunnally and Bernstein (1994).

Validity

Within-method convergent validity of the constructs is provided by inspection of each construct's average variance extracted figure. As all average variance extracted values are above 0.50, it can be stated that the within-method convergent validity of the constructs used in this study is acceptable (Chin and Newsted, 1999). In addition, discriminant validity is assessed by means of Fornell and Larcker's (1981) test of average trait variance extracted. As for all construct pairs the square of the average variance extracted from the traits exceed the correlation between the two respective constructs, evidence for the presence of discriminant validity is provided (cf. Chin, 1998).

Results structural model

The empirical results for the structural model are presented in Table 3. Overall, our model shows a good fit to the data as evidenced by the significant F-values. The t-values accompanying the individual coefficients are obtained via a bootstrap procedure consisting of 500 runs (White *et al.*, 2003).

[PLEASE INSERT TABLE 3 ABOUT HERE]

The statistical significance of all individual relationships provide strong empirical support for our conceptual framework. Starting on the left hand side, the design of the e-scape appears to have a strong positive impact on both navigation (β = 0.41; t = 6.22) and accuracy (β = 0.50; t = 8.98). In turn, navigation and accuracy have a significant influence on perceived online value (navigation: β = 0.39; t = 6.58 / accuracy: β = 0.32; t = 5.36). With regard to online joy, our analysis reveals that online joy is determined by both customization (β = 0.23; t = 2.90) and responsiveness (β = 0.38; t = 5.78). E-quality perceptions with regard to assurance

was found to directly influence overall satisfaction (β = 0.19; t = 3.53) and loyalty (β = 0.18; t = 3.14).

Concerning the effect of the various online and offline performance perceptions on overall satisfaction, the data support all hypothesized effects. In order of decreasing importance, variance in overall satisfaction seems to be determined by: offline value (β = 0.34; t = 7.10), online value (β = 0.31; t = 6.04), online joy (β = 0.19; t = 3.72) and offline joy (β = 0.16; t = 3.92). Overall satisfaction has a strong positive influence on customer loyalty (β = 0.63; t = 12.92).

Conclusion and implications

While expressing concern about "the last mile" (Esper *et al.*, 2003), existing literature on e-services and logistics has largely neglected the relative importance of the offline dimension (Lee and Whang, 2001). The objective of this study was to determine the relative contribution of online quality and offline fulfillment in creating overall customer satisfaction, and hence loyalty. Our findings regarding e-quality dimensions were consistent with earlier studies on e-services (e.g. Liljander *et al.*, 2002; Zeithaml *et al.*, 2000), explaining over 60% of the variance for online value and joy combined. Secondly, offline fulfillment is at least as important in determining overall satisfaction as online quality. Specifically, offline value appears to rank slightly higher than online value, while online joy slightly outranks offline joy. The proposed model combining online and offline components shows a very good fit and explains 75% of the variance in customer satisfaction. Thirdly, a significant relationship was found between overall customer satisfaction and loyalty, confirming earlier work of Liljander and Strandvik (1995) and Zeithaml *et al.* (1996). Overall, it appears that offline fulfillment is the area where companies should focus a large proportion of their resources. Companies

should carefully assess their present approaches, including the use of third party logistics.

Suggestions for further research

A comprehensive approach is needed and careful evaluation of how value and joy are created as part of the total e-experience is required. The importance of physical fulfillment in effecting customer satisfaction and loyalty levels for different online services certainly needs further investigation. The distinction made between value and joy for both online quality and offline fulfillment seems a useful approach for future studies. Measuring joy, whether online or offline, is perhaps more challenging since joy could change with each consecutive purchase. Further study could generate more precise indicators, helping companies to address their customers' needs most effectively. Finally, the role of third party logistics providers ensuring offline value and joy is another fruitful line of research.

Fig. 1: Conceptual framework

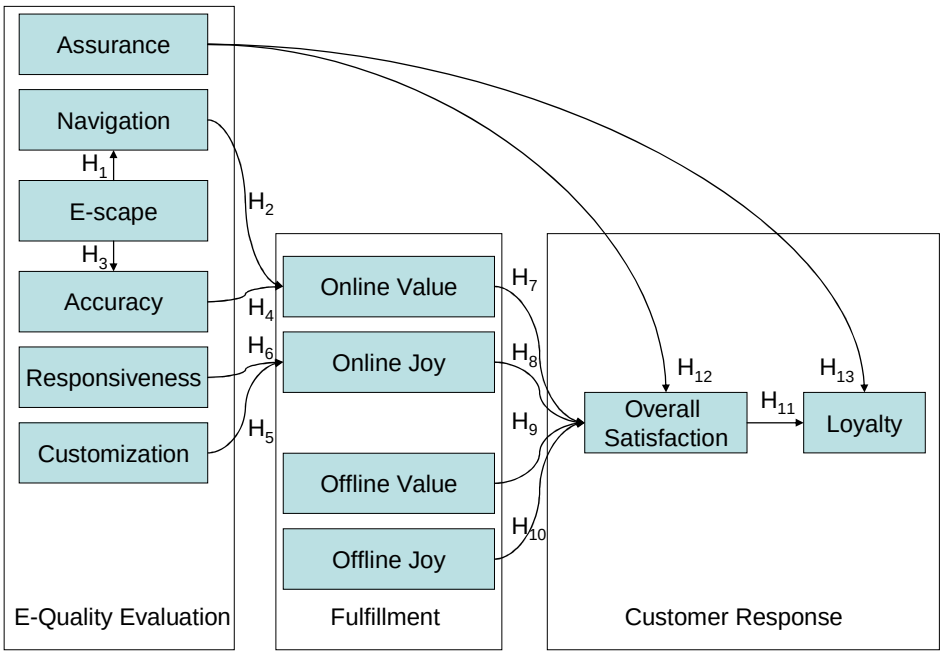

Table 1: Descriptive statistics on item level

	Items	Mean	St. dev.	loading	t-value	z –value[1] skewness	z-value[1] kurtosis
Navigation	Easy access to all services	5.59	0.98	0.72	15.26	5.99	6.05
	Pages download quickly	5.37	1.26	0.70	14.84	5.61	1.64
	Web site user friendly	5.47	1.07	0.79	22.69	3.78	1.26
	Searching is easy	5.42	1.34	0.74	16.00	5.55	0.89
	Navigation is easy	5.17	1.35	0.69	16.83	5.38	1.36
E-scape	Info attractively displayed	5.21	1.16	0.88	42.42	2.79	0.54
	Layout and colors appealing	5.05	1.24	0.86	31.74	2.77	0.88
	Satisfied with design	5.02	1.15	0.88	35.09	2.27	0.39
Responsiveness	Easy to get in touch	4.65	1.42	0.84	27.85	1.49	1.01
	Interested in feedback	4.25	1.51	0.81	20.36	0.29	1.86
	Reply quickly to requests	4.67	1.30	0.80	15.31	1.54	0.09
Customization	Interested in personal needs	4.54	1.51	0.75	11.83	1.31	1.82
	Payment / delivery methods	5.31	1.28	0.68	8.01	3.59	0.05
	Adapted to personal needs	4.72	1.32	0.87	28.69	1.82	0.66
Assurance	Handling personal info	4.88	1.28	0.83	31.79	1.50	1.26
	Secure with personal info	4.73	1.61	0.94	101.17	2.97	1.99
	Trust security / privacy	4.70	1.55	0.91	60.94	2.70	1.37
Accuracy	Useful info on company	4.50	1.32	0.73	15.90	0.99	1.21
	Quality / detailed info	5.08	1.20	0.80	26.09	3.76	0.40
	Useful info on services /prod	4.92	1.23	0.78	24.40	3.47	0.79
	Useful info after-sales /war	4.50	1.35	0.71	14.02	2.94	0.72
Online value	Valuable online services	5.16	1.16	0.85	30.34	2.50	0.17
	Time online well spent	5.06	1.27	0.86	36.97	1.45	1.52
	Website adds value	5.10	1.21	0.88	50.46	2.40	0.50
Online joy	Enjoy surfing site	4.98	1.33	0.89	49.88	2.46	0.72
	Comfortable surfing site	5.47	1.17	0.89	30.94	5.51	4.18
Offline value	Delivery speed	5.25	1.25	0.74	15.10	4.29	2.21
	Delivery promises kept	5.43	1.18	0.85	28.02	5.84	4.86
	Reliable distribution system	5.35	1.12	0.83	26.79	4.68	3.54
	Prompt order confirmation	5.71	1.18	0.76	18.39	5.55	2.20
	Detailed / specific invoice	5.46	1.21	0.72	12.66	2.80	1.66
	State in which delivered	5.68	1.25	0.70	13.85	6.73	4.83
Offline joy	Happy when receive order	5.35	1.25	0.91	57.10	3.66	0.19
	Happy with way receive	4.98	1.27	0.87	20.24	2.20	0.30
Satisfaction	Satisfaction with delivery	5.46	1.13	0.67	15.50	3.62	1.79
	Satisfaction with company	5.33	1.09	0.81	27.07	2.37	0.28
	Satisfaction with full offer	5.50	0.84	0.85	36.72	2.55	1.85
	Satisfaction with online serv	5.51	0.99	0.84	43.47	3.64	1.21
	Satisfaction with offline serv	5.50	0.98	0.84	36.30	2.09	0.96
Loyalty	Prefer this company	4.79	1.51	0.82	22.60	3.01	0.65
	Use same website again	5.39	1.26	0.87	41.69	4.94	2.09
	Recommend to others	5.40	1.16	0.79	21.88	4.16	1.54

[1] Absolute z-values are presented. Significant skewness / kurtosis if absolute z-value > 1.96.

Table 2: Descriptive statistics on factor level

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
(1) Navigation	**0.73**											
(2) E-scape	0.37	**0.87**										
(3) Responsiveness	0.44	0.31	**0.74**									
(4) Customization	0.48	0.28	0.37	**0.77**								
(5) Assurance	0.42	0.35	0.49	0.47	**0.89**							
(6) Accuracy	0.43	0.47	0.44	0.42	0.45	**0.75**						
(7) Online value	0.52	0.38	0.40	0.38	0.43	0.49	**0.86**					
(8) Online joy	0.55	0.50	0.44	0.36	0.47	0.50	0.58	**0.89**				
(9) Offline value	0.47	0.15	0.43	0.37	0.39	0.42	0.43	0.42	**0.77**			
(10) Offline joy	0.37	0.12	0.25	0.24	0.32	0.23	0.31	0.25	0.31	**0.89**		
(11) Satisfaction	0.59	0.38	0.52	0.50	0.59	0.54	0.69	0.62	0.69	0.49	**0.81**	
(12) Loyalty	0.53	0.32	0.51	0.45	0.55	0.44	0.50	0.57	0.52	0.43	0.71	**0.83**
Mean	5.40	5.09	4.52	4.86	4.77	4.75	5.10	5.23	5.48	5.16	5.46	5.19
St. dev	0.87	1.03	1.14	1.05	1.32	0.95	1.01	1.10	0.91	1.11	0.80	1.08
Composite reliability	0.85	0.91	0.86	0.81	0.92	0.84	0.90	0.88	0.90	0.88	0.90	0.87
Average variance extracted	0.53	0.76	0.66	0.59	0.80	0.57	0.74	0.79	0.59	0.79	0.65	0.69

All correlations are significant at the .05 level. Square root values of average variance extracted on the diagonal.

Table 3: Results structural model

	Relationship	Coefficient	t-value	p-value	Conclusion	R^2	F-value	p-value
(1)	E-scape → Navigation	0.41	6.22	< 0.0001	Fail to reject H_1	15.8%	38.656	< 0.0001
(2)	E-scape → Accuracy	0.50	8.98	< 0.0001	Fail to reject H_3	24.2%	65.768	< 0.0001
(3)	Navigation → Online value	0.39	6.58	< 0.0001	Fail to reject H_2	37.2%	60.717	< 0.0001
	Accuracy → Online value	0.32	5.36	< 0.0001	Fail to reject H_4			
(4)	Customization → Online joy	0.23	2.90	0.0041	Fail to reject H_5	25.1%	34.349	< 0.0001
	Responsiveness → Online joy	0.38	5.78	< 0.0001	Fail to reject H_6			
(5)	Assurance → Satisfaction	0.19	3.53	0.0005	Fail to reject H_{12}	75.2%	122.503	< 0.0001
	Online value → Satisfaction	0.31	6.04	< 0.0001	Fail to reject H_7			
	Online joy → Satisfaction	0.19	3.72	0.0003	Fail to reject H_8			
	Offline value → Satisfaction	0.34	7.10	< 0.0001	Fail to reject H_9			
	Offline joy → Satisfaction	0.16	3.92	0.0001	Fail to reject H_{10}			
(6)	Satisfaction → Loyalty	0.63	12.92	< 0.0001	Fail to reject H_{11}	56.1%	130.985	< 0.0001
	Assurance → Loyalty	0.18	3.14	0.0019	Fail to reject H_{13}			

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