
Building loyalty in e-commerce: does consumer income matter?

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Abstract: In emerging markets, the rapid expansion of online retailing is mainly driven by new adopters from lower-income consumer segments. However, little is known about the behaviour of this group in online retail. This study evaluates the relationships between e-loyalty, e-satisfaction, e-trust and e-quality, paying particular attention to the moderating role of consumer income. Data were collected from a sample of 1,020 Brazilian consumers via a web survey and were analysed using structural equation modelling (SEM). Among the main results, this study finds that consumers from the higher-income group pay more attention to the quality of website information, while consumers from the lower-income group emphasise the importance of fulfilment. E-satisfaction is more important than e-trust in determining e-loyalty and these relationships are moderated by income. Online retailers should pay special attention to tailoring their promotional efforts to foster consumer loyalty according to different consumer income groups.

Keywords: loyalty; e-commerce; emerging markets; quality; satisfaction; trust; structural equation modelling; SEM; income moderation effect; Brazilian consumers; technology.

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1 Introduction

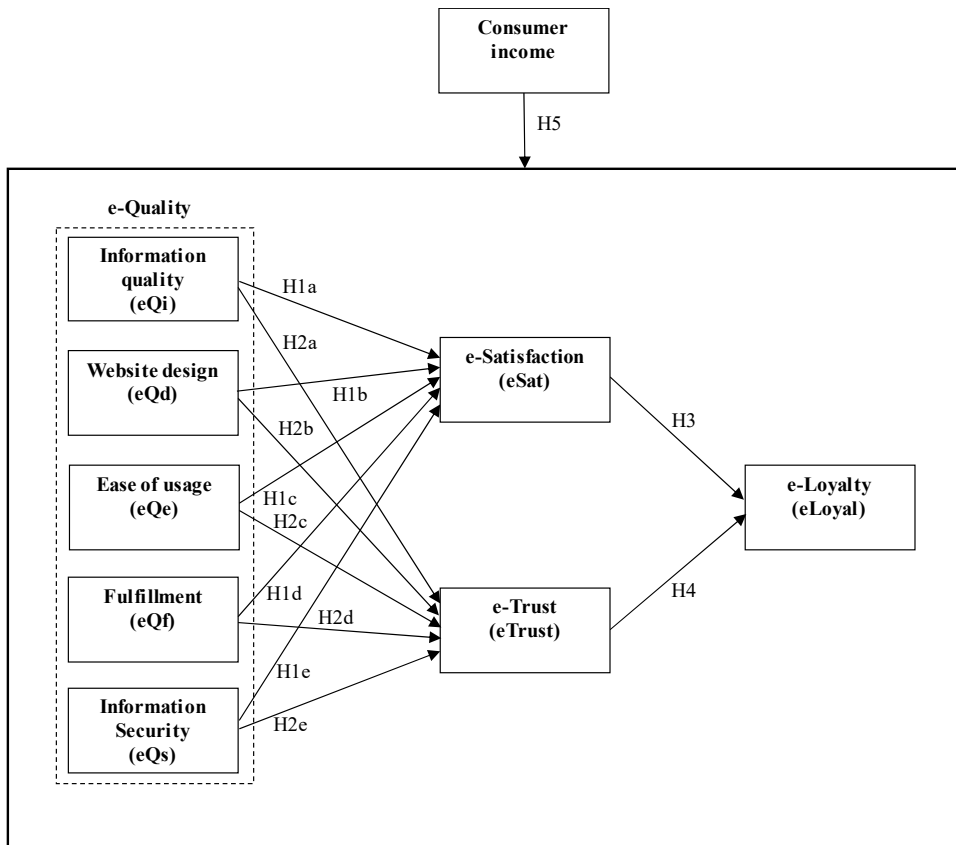
In emerging countries, the main drivers of e-commerce sales are the rapid growth of internet penetration, expanding consumer income and the aspirations of an emerging middle class (Euromonitor, 2015; Kumar, 2016). In Brazil, the number of online consumers reached 41.1 million in 2016 and it is predicted to climb to 82.1 million by 2020, a growth of nearly 100% (eMarketer, 2016). This market's expansion is mainly driven by new adopters from lower-income consumer segments (Osório, 2013; PayPal, 2013).

Compared to traditional retail, online retailing presents two additional challenges. First, there are lower costs for consumers when patronising and switching retailers (Fuentes-Blasco et al., 2010; Reichheld and Schefter, 2000); because the competitor is only one click away (Mithas et al., 2007), consumers have a lower propensity to become loyal. Second, consumers are more price-sensitive; thus, online retailers have to maintain

thin margins to compete, despite the sales growth in recent years (Kumar, 2016). Given this scenario, developing a better understanding of consumer behaviour becomes even more relevant for online retailers to determine the factors that increase e-loyalty and drive a better shopping experience.

To gain a better understanding of e-loyalty, several studies have proposed and tested models in which e-quality is considered an independent variable and e-satisfaction and e-trust are treated as mediators in the relationship between e-quality and e-loyalty (Chen et al., 2014; Christodoulides and Michaelidou, 2010; Cyr, 2008; Eid, 2011; Fang et al., 2016; Ladhari and Leclerc, 2013). Because of the high incidence of these variables – e-quality, e-satisfaction and e-trust – in studies that aim to understand e-loyalty, they were chosen for investigation in this paper. We refer to this model structure as the ‘e-loyalty model’ (see Figure 1).

Figure 1 Research model



The study also introduces income as a moderator variable and investigates how e-loyalty occurs in different income groups. When evaluating the process of building e-loyalty, does consumer income matter? Based on an e-loyalty model that evaluates the relationships between e-loyalty and its antecedents – e-quality, e-satisfaction and e-trust – this study investigates these relationships across consumer income groups. Our inclusion

of income as a moderator in this formulation makes a unique contribution to knowledge of e-loyalty.

When considering the e-loyalty model framework, researchers have compared the impact of each construct (e-satisfaction and e-trust) as determinants of e-loyalty. Most studies have taken place in developed countries with more individualist cultures, such as the USA, Canada and Germany, presenting e-satisfaction as the main predictor of e-loyalty (Chen et al., 2014; Fang et al., 2016; Ladhari and Leclerc, 2013; Safa and Ismail, 2013; Valvi and Fragkos, 2012). However, studies conducted in some emerging countries show different results regarding the comparative importance of these two antecedents. Cyr (2008) found that in China, e-trust plays an even more significant role than e-satisfaction. The lack of consensus in the existing research prompted this investigation into the relative weight of these two constructs in the Brazilian context. Previous qualitative studies concerning the behaviour of low-income consumers in Brazil have highlighted the key role of consumer trust in the retailer as a determinant of consumer loyalty (Osório, 2013; Parente et al., 2008). Therefore, it is possible that e-loyalty has different configurations for consumers of different cultures and income levels.

The objectives of this study are:

- 1 to test the e-loyalty model in an emerging country context
- 2 to evaluate the moderating effect of consumer income in the relationships presented in the e-loyalty model.

By filling these gaps, the contributions of this study are expected not only to expand the conceptual knowledge of e-loyalty, but also to offer managerial suggestions for online retailers with a view to increasing loyalty among their consumers from different income groups. The following sections of this paper present the theoretical framework, the research hypotheses and the proposed model. Subsequently, the method employed, the results and the conclusions are presented.

2 Literature review

The concept of consumer loyalty was originally based on the trade of physical goods (Toufaily et al., 2012). The definition of e-loyalty appeared later and consumer attitudes towards navigating a website were introduced into its conceptualisation (Allagui and Temessek, 2004). In exploring the concept of e-loyalty, some researchers have pointed out that consumer behaviour in the online environment is less stable over time than in a brick-and-mortar environment (Allagui and Temessek, 2004; Sénécal et al., 2005).

Toufaily et al. (2012) conducted a meta-analysis of articles on e-loyalty and analysed diverse consumer online loyalty settings. They found the following definitions of e-loyalty: the frequency of purchase from a particular website (Tarafdar and Zhang, 2008), the intention to make new purchases in the future (Luarn and Lin, 2003; Wallace et al., 2004), and the recommendation of a website to other consumers (Gefen, 2002). This study uses Gefen's (2002) definition, based on the research of Zeithaml et al. (1996), which integrates the previous definitions, namely that e-loyalty is the intention to continue doing business with the same online retailer and recommending that retailer to other consumers. Gefen's (2002) research assessed consumer e-loyalty to a particular

online retailer (Amazon) using the same methodological approach we chose for this study.

2.1 E-loyalty antecedents: e-quality, e-satisfaction, and e-trust

The quality of a website's services is defined as the actions performed by the website to enable efficient and effective consumer purchases and delivery of products and services (Zeithaml et al., 2002). In online retailing environments, website quality is a strong determining factor of consumer e-loyalty (Rafiq et al., 2013; Sousa and Voss, 2014; Swaid and Wigand, 2009) and increases consumer recommendations (Fassnacht and Köse, 2007; Ladhari, 2010). Aiming to measure the quality of services provided by websites, Zeithaml et al. (2002) studied the application of the SERVQUAL model (Parasuraman et al., 1988) in online contexts, i.e., e-SERVQUAL, which is composed of five dimensions: quality of information and content, graphic style or website design, ease of use or usability, fulfilment and security. This framework has been used to measure e-service quality (Boshoff, 2007).

Anderson and Srinivasan (2003) defined e-satisfaction as consumer satisfaction with previous experience in online retail, this being the outcome of consumer perception and judgment of certain aspects (different from those present in traditional retail stores), such as online convenience, merchandising, site design and financial security (Evanschitzky et al., 2004; Szymanski and Hise, 2000). E-satisfaction comprises the outcomes of consumers' evaluations regarding dimensions present in the definition of e-quality and Bhattacharjee's (2001) model posits e-quality elements that constitute e-SERVQUAL as influences on consumer satisfaction.

According to Morgan and Hunt (1994), trust exists in an exchange transaction when one party believes in the other's reliability and integrity and implies willingness to be vulnerable to the actions of the other party, who is expected to behave accordingly. Similar to trust, e-trust combines beliefs of

- 1 integrity, a set of principles that are considered acceptable
- 2 benevolence, which is the intention to do good
- 3 reliability, a group of skills, abilities and characteristics that allow one party to influence a specific field (Gefen, 2002).

In addition, confidence has been found to be even more important online than in an offline environment because the business transaction happens without physical contact between the parties (Lynch et al., 2001; Mukherjee and Nath, 2007).

2.1.1 Relationships between e-quality, e-satisfaction and e-trust

This section presents the five e-quality dimensions (information quality, website design, ease of use, fulfilment and security) and their relationship with e-satisfaction and e-trust, as proposed by several authors, the e-SERVQUAL dimensions being the basis for relating e-quality to e-satisfaction and e-trust; the resulting hypotheses form the basis of our research model (see Figure 1).

The dimension 'information quality' in online transactions is important for reducing transaction costs and is a meaningful benefit in shopping online (Ariely, 2000; Lynch and Ariely, 2000). When consumers evaluate a particular website, "hav[ing] enough

information to compare products and select them on the website appears as an important quality factor of the site" [Zeithaml et al., (2002), p.363]. User satisfaction is affected by information quality (Cheung and Lee, 2009). Thus, our first hypothesis is as follows:

H1a Perceived information quality is positively related to consumer e-satisfaction with the online retailer.

Information quality has been identified as an important factor in both retailers' confidence-building in e-commerce (McKnight et al., 2002) and consumer loyalty (Kim et al., 2004). Therefore:

H2a Perceived information quality is positively related to e-trust in the online retailer.

Another dimension of e-quality, website design, refers to the aesthetic arrangement of items on the website (Ladhari and Leclerc, 2013), or the way in which the colours, layout, photographs and other graphic features of the website are arranged. Researchers have evaluated the impact of website design on online purchasing (Ariely, 2000; Cyr, 2008; Montoya-Weiss et al., 2000), arguing that the better the website design, the better the quality of the website. Following this, we hypothesise as follows:

H1b The perceived quality of website design is positively related to consumer e-satisfaction with the online retailer.

Cyr (2008) also studied the relationship between e-trust and website design, finding that higher perceived quality of website design resulted in higher e-trust:

H2b The perceived quality of website design is positively related to consumer e-trust in the online retailer.

The third dimension of e-quality, ease of use, refers to the usability and accessibility of the website from the consumer's point of view, particularly when seeking information on it (Ladhari and Leclerc, 2013; Yoo and Donthu, 2001). This dimension of e-quality has been widely researched using the technology acceptance model (TAM), combining ease of use with technological adoption. Tarafdar and Zhang (2008) identified ease of use and website navigation as important antecedents of purchasing using e-commerce websites. Zeithaml et al. (2002) argued that the easier the website is for the consumer to use, the higher its quality from the consumer's viewpoint. Thus, higher perceived quality increases consumers' satisfaction and confidence (Chu and Yuan, 2013), as the following two hypotheses propose:

H1c Perceived ease of use is positively related to consumer e-satisfaction with the online retailer.

H2c Perceived ease of use is positively related to consumer e-trust in the online retailer.

Fulfilment is defined as the capacity to deliver a product or service accurately (Parasuraman et al., 1988). Thus, the greater the ability of a website to deliver on its commitments, the higher the quality of the website (Zeithaml et al., 2002). Thus, higher perceived quality through better fulfilment increases consumer satisfaction with (Au et al., 2008) and trust in the website, as described in the following hypotheses:

H1d The perceived quality of the retailer's fulfilment is positively related to consumer e-satisfaction with the online retailer.

H2d The perceived quality of the retailer's fulfilment is positively related to consumer e-trust in the online retailer.

Security is the last e-quality dimension. The definition of information security used in this study follows that employed by Parasuraman et al. (2005): information security is the degree of the online retailer's credibility in protecting consumers' personal information. In line with previous studies (Ladhari and Leclerc, 2013), the following hypotheses are proposed:

H1e The perceived security of consumer information in transactions made through the website is positively related to consumer e-satisfaction with the online retailer.

H2e The perceived security of consumer information in transactions made through the website is positively related to consumer e-trust in the online retailer.

Researchers have credited e-satisfaction with a decisive role in consumer loyalty (Gefen, 2002; Oliver, 1999; Safa and Ismail, 2013). Ladhari and Leclerc (2013), when evaluating loyalty to a financial services website, found that the impact of e-satisfaction on e-loyalty was five times higher than its effect on e-trust. E-satisfaction has been recognised as the major determinant of e-loyalty (Luarn and Lin, 2003; Safa and Ismail, 2013; Valvi and Fragkos, 2012; Wu, 2013). Given these findings, the following hypothesis was formulated:

H3 E-satisfaction mediates the relationship between e-quality dimensions (information quality, website design, ease of use, fulfilment and security) and e-loyalty.

Valvi and Fragkos (2012) presented a review of 62 conceptual models of e-loyalty and identified the concept of e-trust as an important determinant of e-loyalty. According to Huang (2008) and Ribbink et al. (2004), consumer confidence in online retail plays a very important role in determining e-loyalty. Therefore:

H4 E-trust mediates the relationship between e-quality dimensions (information quality, website design, ease of use, fulfilment and security) and e-loyalty.

2.2 *The role of income and culture*

As previously mentioned, e-trust in online retail is an important determinant of e-loyalty. E-trust is a crucial factor for lower-income consumers who buy from e-commerce websites (Osório, 2013). Research evaluating the relationships between e-loyalty and its antecedents – such as e-satisfaction, e-trust and e-quality – has tested the moderating effects of gender (Ladhari and Leclerc, 2013), culture (Cyr, 2008) and consumer nationality (Chen et al., 2014). Cyr (2008), for example, identified that in China, the only emerging country considered in that study, the e-trust construct played a greater role than in other countries (Canada and Germany). Previous research has identified that in collectivist cultures – or those that have more collectivist characteristics – confidence plays a greater role than in individualist cultures (Gefen and Heart, 2006; Hofstede, 1980). Given these findings, this study investigates whether in Brazil, a country with a collectivist culture, e-trust also plays a greater role than e-satisfaction in determining e-loyalty.

The literature has shown that consumer characteristics, including income, are important factors related to e-loyalty (Toufaily et al., 2012; Valvi and Fragkos, 2012).

However, despite its relevance, the role played by income in consumer e-loyalty has not been empirically tested. Moreover, despite the acknowledged importance of low-income consumers in the retail market (Barki and Parente, 2010), the influence of income has not been studied in relation to loyalty in online consumption.

Including lower-income consumers in e-commerce research to gain a better understanding of their behaviour and eventual differentiation from higher-income consumers is essential for developing actions aimed at fostering consumer loyalty. Following Ladhari and Leclerc (2013), who analysed the moderating role of gender in the e-loyalty model, this study introduces and assesses income as a moderating variable. Thus:

H5 The 'consumer income' variable moderates the relationships between e-quality dimensions, e-satisfaction, e-trust and e-loyalty.

The conceptual model of this study presented in Figure 1 summarises the previous discussion.

3 Research method

3.1 Data collection

To investigate e-loyalty and test the conceptual model, data were collected by means of a web survey. Based on the definitions of each construct (dimensions of e-quality, e-satisfaction, e-trust and e-loyalty), we adopted scales that reflect these concepts. All scales were applied in the context of online retailing and the e-quality scales used originated from the SERVQUAL model. The content validity (Kline, 2011) of the adopted scales was evaluated by five experts in marketing research.

The items, once translated into Portuguese, were submitted to six experts and six consumers for evaluation, to ascertain whether any revisions were necessary. Then, a pre-test of the data collection instrument was conducted with 151 respondents from both income groups (higher and lower). The respondents indicated their responses to each survey item on a 7-point Likert scale, according to their degree of agreement or disagreement. Table 2 shows the items used.

The invitation to participate in the web survey was sent by e-mail to 25,000 consumers registered on the database of a company specialised in studying shopping experiences during the second week of November 2014 and 1,020 valid replies were obtained. No financial incentive was offered. A total of 1,481 individuals began completing the questionnaire, but 399 were discarded because of incomplete or inconsistent answers and 62 were discarded because the consumer had not bought online in the six months prior to the survey. There was no control on the amount of consumers who actually opened the e-mail invitations. This approach to inviting consumers to take part in the study probably explains the low response rate.

For this study, consumers were distinguished according to income level (higher or lower). Social class and income are the two criteria that have been most often used in studies of consumer behaviour to divide the market based on consumption capacity (Kamakura and Mazzon, 2013; Sivadas, 1997). Both criteria were evaluated and presented similar results, but more strongly when the declared family income criteria was used, probably because of the characteristics of the sample – internet users mostly from

metropolitan areas with level of education above the national average. In view of the above, declared family income was the variable used in the analyses reported as it highlighted the differences in the e-loyalty model when both groups of consumers were considered.

3.2 *Sample characteristics*

Of the 1,020 respondents, 64.7% were women, 30.7% were younger than 30 years, 45.2% were between 30 and 39 years and 24.1% were older than 40 years, which reflects the profile of young online consumers in Brazil (Sebrae, 2016). All regions of Brazil were represented in the survey, with 61% of respondents living in the southeast, reflecting the concentration of the country's consumption. In all, 20% of the respondents had a monthly family income below R\$2,900 (about US\$750). Nearly all respondents (98.9%) had at least some college education.

Table 1 Descriptive statistics of respondents' profiles

<i>Variable</i>		<i>Frequency</i>	<i>Percentage</i>
Age	< 30 years	313	30.7
	30–39 years	461	45.2
	> 40 years	246	24.1
Gender	Male	660	64.7
	Female	360	35.3
Educational level	Until high school	11	1.1
	Some college	370	36.3
	College degree completed	639	62.6
Country region	Southwest	626	61.4
	Northwest	163	16.0
	South	117	11.5
	Central	82	8.0
	North	32	3.1
Monthly income	Less than R\$2,900	209	20.5
	R\$2,900 or more	811	79.5
Website	Americanas.com	151	14.8
	Mercado Livre	131	12.8
	Submarino	100	9.8
	Magazine Luiza	74	7.3
	Saraiva	67	6.6
	NetShoes	63	6.2
	Dafiti	46	4.5
	Ricardo Eletro	35	3.4
	Extra.com	34	3.3
	WalMart	31	3.0
	Ali Express	26	2.5
	Others	262	25.7

Table 2 Means and standard deviations of survey items

<i>Construct/dimension</i>	<i>Measure</i>	<i>Item code</i>	<i>Mean</i>	<i>SD</i>	<i>Scale references</i>	
E-quality	Information quality	The website provides accurate information.	eQ11	6.06	0.889	Ladhari and Leclerc (2013)
		The website provides timely information.	eQ12	6.02	0.886	
		The website provides relevant information.	eQ13	5.82	1.037	
		The website provides easy-to-understand information.	eQ14	5.94	0.975	
		The website provides detailed information about products and services.	eQ15	5.78	1.024	
Website design	The website is visually appealing.	eQd1	5.72	1.069		
	The website design is professional.	eQd2	6.01	0.895		
	The website design is innovative.	eQd3	5.06	1.398		
Ease of usage	The website is simple to use.	eQe1	6.07	0.849		
	The website enables me to get on to it quickly.	eQe2	5.89	1.037		
Fulfillment	The website offers clear menu items on each page.	eQe3	5.71	1.071	Fuentes-Blasco et al. (2010)	
	This online retailer delivers the order in the promised time.	eQf1	6.12	1.351		
	This online retailer's products are available for delivery within an acceptable time.	eQf2	5.97	1.116		
	This online retailer delivers what I buy quickly.	eQf3	5.87	1.425		
Information security	This online retailer makes accurate promises about product delivery.	eQf4	5.88	1.339		
	This online retailer protects information on my web-purchase behaviour.	eQs1	5.84	1.090		
	This online retailer does not share my personal details with other websites.	eQs2	5.42	1.392		
	This online retailer protects my credit card information.	eQs3	5.93	1.095		
	Based on my overall experience with this online retailer, I feel very satisfied.	eSat1	6.04	1.117		
E-satisfaction	My choice to use this online retailer was a wise one.	eSat2	6.17	1.011	Janda et al. (2002)	
	Overall, I am satisfied with the decision to use this online retailer.	eSat3	6.09	0.978		
	I think I did the right thing when I decided to use this online retailer for making my purchase.	eSat4	6.12	1.049		
	My overall evaluation of the services provided by this online retailer is very good.	eSat5	5.97	1.071		
	This online retailer is trustworthy.	eTrust1	6.19	0.873		
E-trust	I can trust this website.	eTrust2	5.94	1.009	Cyr (2008)	
	I trust the information presented on this website.	eTrust3	5.94	1.003		
	I would recommend this online retailer to others.	eLoyal1	6.14	0.997		
	I would encourage others to use this online retailer.	eLoyal2	5.98	1.111		
E-loyalty	I would consider this online retailer as first choice when buying.	eLoyal3	5.40	1.409	Gefen (2002)	
	I am inclined to do more business with this online retailer.	eLoyal4	6.01	1.091		

Analysing the shopping websites mentioned by the respondents, 38% of respondents cited one of the following three: Americanas.com (<http://www.americanas.com.br>), Submarino (<http://www.submarino.com.br>) and Mercado Livre (<http://www.mercadolivre.com.br>). These websites also have the highest volume of unique visitors in the Brazilian market (comScore, 2014). In terms of the type of products purchased, 76% of responses were concentrated in three categories: appliances/electronics, footwear/clothing/accessories and books. These categories also have the highest number of purchase requests according to a WebShoppers report by the company eBit Buscapé (eBit, 2014). Table 1 provides some descriptive statistics for the sample.

3.3 *Data analysis and discussion*

The data analysis employed structural equation modelling (SEM) with a maximum likelihood estimator. This data analysis method has also been used in other e-loyalty studies (see Butt and Aftab, 2013; Chen et al., 2014; Ladhari and Leclerc, 2013) and consists of fitting a model with multiple relations involving latent and observed variables. Estimation by means of maximum likelihood is based on covariance between the observed items and it is usually more robust than variance-based estimation, being proper for situations in which samples are large and hypotheses are well established in the literature (Zambaldi et al., 2014). Table 2 presents the means and standard deviations of the responses to the 30 items of the survey, each measured with a 7-point Likert scale.

3.4 *The measurement model*

Confirmatory factor analysis (CFA) procedures – a specific case of SEM used to validate the measurement of constructs – were used to evaluate the convergent and discriminant validity of the conceptual e-loyalty model (Figure 1). AMOS 24.0 for Windows (Arbuckle, 1995) was selected for the data analysis because of its updated graphical approach to model testing. The following steps guided this analysis:

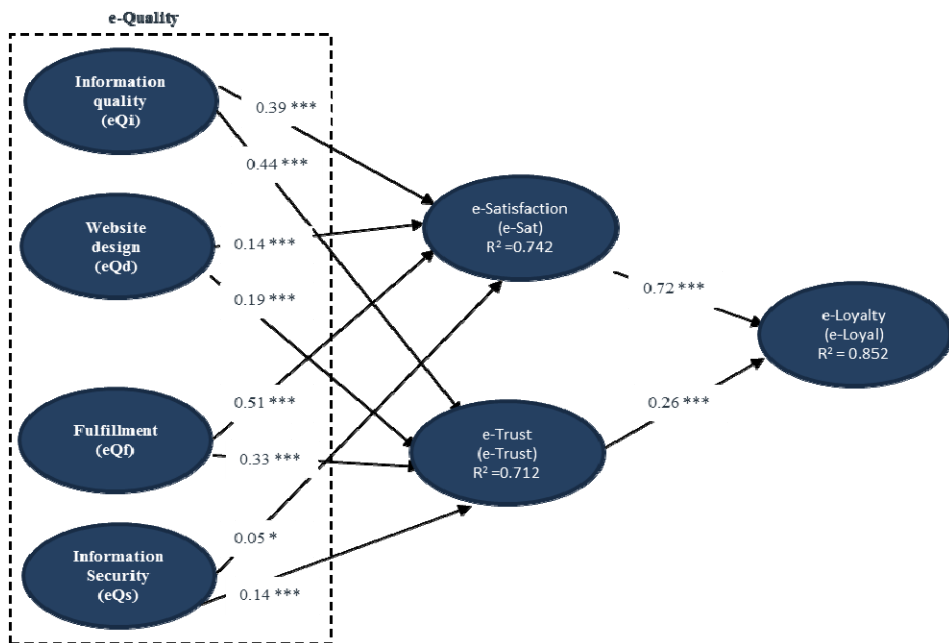
- *Factor loadings and convergent validity of items:* only the following variables had factor loadings with values below the reference value of 0.65 (Kline, 2011): information quality item 3 (eQi3 = 0.623), ease of use items 1 and 2 (eQe1 = 0.630; eQe2 = 0.463) and fulfilment item 4 (eQf4 = 0.616). The average variance extracted (AVE) of each construct was calculated according to Fornell and Larcker's (1981) recommendation that the AVE should be equal to or greater than 0.5. Only the eQe construct, with an AVE of 0.4, presented problems regarding the convergence of indicators.
- *Reliability tests:*
 - a Cronbach's alpha: only the eQe dimension presented a lower value (0.66) than the reference value (0.7) (Kline, 2011). All other constructs and dimensions had values above 0.7.
 - b Composite reliability: again, the eQe dimension displayed a value (0.66) below the reference value (0.7) Fornell and Larcker, 1981). All other constructs and dimensions had values above 0.7.

- *Discriminant validity*: the discriminant validity test was applied only to the e-quality construct dimensions because it was the only multidimensional construct in the model. It was performed by comparing the AVE with the square of the correlation coefficients between constructs (Fornell and Larcker, 1981). Except for eQe and eQd (design), all other dimensions presented discriminant validity. Of note is the high level of correlation between eQe and eQd, with a value of 0.868, suggesting that the eQe construct should be reassessed, especially considering its other issues regarding convergent validity and reliability.
- *Common method variance (Harman’s test)*: a one-factor Harman’s test was applied (Podsakoff and Organ, 1986) with a two-phase exploratory factor analysis comprising
 - a rotated solution
 - a single-factor solution.

In the rotated solution, factors with eigenvalues greater than 1.0 were selected and the variance explained by the first factor was less than 50% in both the rotated and single-factor solutions. No problems of common variance were identified, but the exploratory factor analysis suggested that the dimensions of eQd and eQe could be combined.

Given the considerations about the measurement model, we opted to exclude the eQe dimension and the eQi3 and eQf4 variables. After the exclusions were made in the initial model (Figure 1), the structural model was adjusted (Figure 2).

Figure 2 Analytic results – standardised (see online version for colours)



Notes: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

3.5 Structural model

A structural model was created to examine the hypothesised causal paths among the constructs by performing a simultaneous test (Figure 2).

A maximum likelihood solution was estimated, with the indicators of the structural model being reflective. Goodness-of-fit statistics were calculated and compared for the initial model and the adjusted model (without eQe), the results of which are as follows (initial model/adjusted model): goodness-of-fit index (GFI) = (0.870/0.873), normed fit index (NFI) = (0.905/0.913), incremental fit index (IFI) = (0.921/0.925), Tucker–Lewis index (TLI) = (0.910/0.913), comparative fit index (CFI) = (0.921/0.925) and root mean square error of approximation (RMSEA) = (0.067/0.075). The adjusted model (25 variables), which was more parsimonious, showed better adjustment indicators than the initial model (30 variables). Table 3 presents some model fit statistics.

Table 3 Model fit indices

Index	Measurement model		Adjusted model			Recommended value
	Initial model	Adjusted model	Mediation test	Moderation test		
			Without mediation	Higher-income group	Lower-income group	
CMIN	2,124.42	1,725.64	3523.55	1452.96	745.95	
DF	383	259	263	259	259	
p-value	<0.001	<0.001	<0.001	<0.001	<0.001	<0.05 (Kline, 2005)
CMIN/DF	5.547	6.663	13.398	5.610	2.880	<5.00 (Marôco, 2010)
GFI	0.870	0.873	0.797	0.868	0.777	Close to 0.95 (Byrne, 2010)
NFI	0.905	0.913	0.823	0.909	0.839	Close to 0.95 (Byrne, 2010)
IFI	0.921	0.925	0.834	0.924	0.889	Close to 0.95 (Byrne, 2010)
TLI	0.910	0.913	0.810	0.911	0.870	Close to 0.95 (Byrne, 2010)
CFI	0.921	0.925	0.834	0.924	0.888	Close to 0.95 (Byrne, 2010)
RMSEA	0.067	0.075	0.110	0.075	0.095	0.05 to 0.08 (Byrne, 2010)
N	1020	1020	1020	811	209	

After evaluating the measurement model, the eQe dimension was excluded; thus, H1c and H2c were not tested further.

4 Hypothesis testing

4.1 The effect of e-quality (H1 and H2)

For H1 and H2, the beta (β) coefficients were estimated to determine the relationships between the dimensions of e-quality and the e-satisfaction and e-trust constructs (see Table 4). The β coefficient estimates were all positive and significant. All p-values (except for H1e) were close to zero.

Table 4 Analytical results (non-standardised)

<i>Hypothesis</i>	<i>Relationship</i>		<i>β coefficient</i>	<i>S.E.</i>	<i>t</i>	<i>p value</i>
H1a	e-Qi	→ e-Sat	0.492	0.038	12.978	***
H1b	e-Qd	→ e-Sat	0.179	0.037	4.893	***
H1d	e-Qf	→ e-Sat	0.373	0.019	19.504	***
H1e	e-Qs	→ e-Sat	0.042	0.022	1.927	0.054
H2a	e-Qi	→ e-Trust	0.553	0.041	13.456	***
H2b	e-Qd	→ e-Trust	0.247	0.040	6.184	***
H2d	e-Qc	→ e-Trust	0.236	0.019	12.105	***
H2e	e-Qs	→ e-Trust	0.131	0.024	5.548	***
	e-Sat	→ e-Loyal	0.694	0.026	26.202	***
	e-Trust	→ e-Loyal	0.256	0.025	10.155	***

Note: ***p-value < 0.001.

Thus, H1a, H1b, H1d, H1e, H2a, H2b, H2d and H2e are supported. H1c and H2c were not tested.

4.2 The effects of e-satisfaction and e-trust: mediation test (H3 and H4)

To test the hypotheses regarding the mediating effects of the e-satisfaction (H3) and e-trust (H4) constructs on the relationship between the e-quality dimensions and e-loyalty, two models (with and without mediation) were estimated and their adjustment statistics were compared. The results were GFI = 0.873, NFI = 0.913, IFI = 0.925, TLI = 0.913, CFI = 0.925 and RMSEA = 0.075 for the model with mediation and GFI = 0.797, NFI = 0.823, IFI = 0.834, TLI = 0.81, CFI = 0.834 and RMSEA = 0.11 for the model without mediation (Table 3). The model fit statistics without mediation were worse than those for the model with mediation.

In addition, a test of the difference between the chi-squares of the two models (with and without mediation) was performed to test the hypothesis regarding the equality of the models. The models were in fact found to differ, so the hypothesis of equality for the models with and without mediation was rejected. The p-value of the equality-of-models test was lower than 0.001.

Thus, the hypotheses regarding mediation, H3 and H4, are supported.

4.3 *The role of income: moderation test (H5)*

The last hypothesis tested concerned the moderating effects of consumer income. Respondents' declared monthly income was used to separate them into two groups: lower income (monthly income between R\$1,019 and R\$2,899; 209 respondents) and higher income (monthly income greater than R\$2,900; 811 respondents). The decision to use these ranges was guided by the criteria adopted by a Brazilian government agency (SAE, 2013).

After the groups were determined, a chi-square test of difference between the two models was conducted to test whether consumer income moderates the relationships between the antecedents of e-loyalty. Thus, a multi-group analysis based on the two groups' declared monthly income was performed and goodness-of-fit indices for the groups were calculated (Bentler and Bonett, 1980). These were GFI = 0.868, NFI = 0.909, IFI = 0.924, TLI = 0.911, CFI = 0.924 and RMSEA = 0.075 for the higher-income group and GFI = 0.777, NFI = 0.839, IFI = 0.889, TLI = 0.870, CFI = 0.888 and RMSEA = 0.095 for the lower-income group. Analysing the model fit statistics the two models differed between the groups, which reinforced the hypothesis of moderation.

Another chi-square test of difference was performed, this time between the two models of higher- and lower-income groups; differences between the two models were found, supporting the hypothesis of moderation (p-value < 0.001).

Thus, H5 is supported.

Table 5 Estimated β coefficient

<i>Dimension/ construct</i>	<i>Construct</i>	<i>β coefficient intervals (estimated value $\pm 1.96 * SD$)</i>				<i>Comparison of intervals for both groups (higher and lower income)</i>
		<i>Higher-income group</i>		<i>Lower-income group</i>		
		<i>Min.</i>	<i>Max.</i>	<i>Min.</i>	<i>Max.</i>	
eQi	→ eSat	0.587	0.667	0.021	0.175	Different
eQi	→ eTrust	0.656	0.744	0.119	0.283	Different
eQf	→ eSat	0.390	0.440	0.621	0.731	Different
eQf	→ eTrust	0.219	0.219	0.534	0.644	Different
eQs	→ eSat	0.025	0.073	0.195	0.321	Different
eQs	→ eTrust	0.117	0.169	0.342	0.484	Different
eSat	→ eLoyal	0.627	0.685	0.779	0.921	Different
eTrust	→ eLoyal	0.253	0.311	0.057	0.187	Different

The 95% confidence intervals for each β coefficient were calculated for each group (see Table 5). The estimated ranges for values without intersection were classified as 'different', further reinforcing the hypothesis that income is a moderating variable. The first confidence intervals were calculated with both dimensions (eQi and eQd), but presented multi-collinearity. Consequently, two different analyses were calculated (model 1 – with eQi and without eQd; model 2 – with eQd and without eQi). Model 2 did not present differences, so only model 1 was considered for the analysis of results.

From these results:

- 1 Among the higher-income consumer group, information quality (eQi) was confirmed as the greater determinant of e-satisfaction and e-trust.
- 2 The lower-income stratum of consumers appeared to value fulfilment, which showed greater intensity as a determinant of e-satisfaction and e-trust, more than for consumers from the higher-income group. This may explain lower-income consumers' mistrust of online retailing (SPC Brasil, 2015).
- 3 E-security was the least important construct for consumers in determining e-satisfaction and e-trust, but it appears to be stronger among lower-income than among higher-income consumers.
- 4 In determining e-loyalty, e-satisfaction had greater weight than e-trust and this difference was more pronounced in the lower-income group.

As an antecedent of e-loyalty, the weight of e-trust was higher for the higher-income group of consumers.

Thus, with the exception of H1c and H2c, which could not be tested due to the exclusion of the eQe dimension, all other hypotheses are supported.

5 Concluding remarks

5.1 Academic implications

This study contributes to the understanding of e-loyalty in online retail by evaluating the behaviour of consumers belonging to different income groups. As has been found for other markets (Canada, Germany, China, Thailand, Taiwan and Saudi Arabia), the results of this study, conducted with a wide sample of 1,020 Brazilians, reinforce the applicability of the e-loyalty model as a useful framework for analysing and comparing e-loyalty. As expected, the dimensions of e-quality (information quality, website design, fulfilment and information security) positively affect e-satisfaction and e-trust, thereby influencing e-loyalty. As with most of the research done in other countries, e-satisfaction also seems to play a more substantive role in influencing e-loyalty than e-trust in Brazil, both for higher- and lower-income groups. Consumer income level does play a moderating role. While the dominant influence of e-satisfaction is stronger among the lower-income group, the smaller impact of e-trust is less pronounced among lower-income consumers. It is also revealing that the positive impact of fulfilment and information security on e-satisfaction and e-trust seems to be stronger for the lower-income group. This seems reasonable, as lower-income individuals may be less experienced online consumers and thus more sensitive in responding to risk mitigation messages. In contrast, the influence of information quality is more pronounced for the higher-income group. Due to the low level of literacy among lower-income Brazilians, it is reasonable to expect that individuals in the better educated, higher-income group would better value the detailed product information on retailers' websites.

5.2 Managerial implications

The managerial gains provided by this research draw on the moderating effect of income on the e-loyalty model relationships. Based on the findings of this study, online retailers should pay special attention to tailoring their promotional efforts to foster consumer e-loyalty according to different consumer income groups. For example, online retailers with an interest in growing their sales among lower-income consumers should emphasise safe delivery guarantees, as well as reinforcing aspects of information security in the online retailing environment. However, when addressing higher-income consumers, retailers should focus on providing quality information that is correct and up to date, as these aspects are valued by consumers from this group. In addition, e-satisfaction is a strong determinant of e-loyalty. Thus, managers should monitor this indicator in their operations and provide support to reduce dissatisfaction (Lu et al., 2012).

5.3 Limitations and possibilities for future research

This study has limitations that should be considered in interpreting the results; these limitations could also be addressed by future studies. For example, subsequent research could collect cross-sectional, longitudinal data to evaluate different moments in consumer online behaviour, such as seasonal events (Black Friday and Christmas), to offer a more comprehensive view of the e-loyalty phenomenon. Another limitation pertains to the impossibility of evaluating the hypotheses related to the ease-of-use e-quality dimension, which may be due to problems with the measurement model. Thus, by adjusting the scales of this dimension, new research could bring greater robustness to the results. Another possibility for future research is to survey a specific retailer, which could be among the largest retailers mentioned by consumers and industry surveys. A survey in partnership with a retailer could enrich this study's findings as it would enable verification of consumer behaviour rather than relying solely on what consumers report and allow for cross-referencing with data on purchases made. In addition, research evaluating online consumption by product category, selecting the most relevant categories as identified in this study (appliances/electronics, footwear/clothing/accessories and books) could help with understanding e-loyalty by product type, thereby further contributing to managerial knowledge based on income group. Such an analysis could evaluate e-loyalty related to the purchase of products with different degrees of consumer involvement.

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