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Understanding the Impact of Product and Website Quality on Online Purchases

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The Art of Appeal in Electronic Commerce: Understanding the Impact of Product and Website Quality on Online Purchases

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Abstract

Purpose – This study advances product appeal and website appeal as focal psychological mechanisms that can be invoked by business-to-consumer (B2C) e-commerce sites to mitigate problems of information asymmetry via signaling to bolster consumers' purchase intention under the influence of trust.

Design/methodology/approach – Survey approach was employed to validate our research model.

Findings – Website appeal partially mediates the positive effect of product appeal on consumers' purchase intention. Trust in e-commerce sites not only increases purchase intention directly, but it also reinforces the positive relationship between website appeal and purchase intention while attenuating the positive relationship between product appeal and purchase intention. Service content quality, search delivery quality, and enjoyment are confirmed as positive antecedents of website appeal whereas diagnosticity and justifiability are established as positive antecedents of product appeal.

Research implications – This study not only delineates product and website appeal as complementary drivers of consumer purchase on e-commerce sites, but it also derives five signals that aid in bolstering both product and website appeal. Trust is revealed to exert a moderating influence on the impact of product and website appeal on purchase intention.

Practical implications – Practitioners should prioritize their resource allocation to enhance qualities most pertinent to product and website appeal. E-commerce sites should offer product-oriented functionalities to facilitate product diagnosticity and reassure consumers of their purchase decisions.

Originality/value – This study distinguishes between product and website appeal as well as between their respective antecedents. It also uncovers how trust can alter the effects of both website and product appeal on consumers' purchase intention.

Keywords: Signaling theory, E-commerce, information asymmetry, product appeal, website appeal

1. INTRODUCTION

Contemporary business to consumer (B2C) e-commerce sites strive to match their brick-and-mortar counterparts in terms of conversion rates (Becerra and Korgaonkar, 2011). Due the anonymity of online transactions coupled with the spatial and temporal displacement intrinsic to e-commerce sites (Xiao and Benbasat, 2011), it is not uncommon for consumers to be concerned about the risks involved in transacting with unknown e-retailers (Gefen, 2002a; Gefen *et al.*, 2003a; Kim *et al.*, 2008) and the uncertainty associated with product quality (Jiang and Benbasat 2004). Consequently, e-commerce sites must not only replicate the shopping experience of brick-and-mortar stores (e.g., Wells *et al.*, 2011), they must also present their product offerings in an appealing fashion (e.g., Jiang and Benbasat, 2007a). These efforts have culminated in the rapid growth in e-commerce sales, which more than doubled the rate of growth of their brick-and-mortar counterparts (Tamimi and Sebastianelli, 2015). However, the continued growth of e-commerce is impeded by the *information asymmetry* inherent in the transactional relationship between consumers and e-retailers. Consumers generally do not possess *perfect* information prior to purchase (Biswas and Biswas, 2004) and thus can only indirectly assess the quality of products offered on e-commerce sites via the latter's web interface (Jiang and Benbasat, 2004). Even for experienced consumers, uncertainty regarding product quality remains a valid concern (Williams, 2013). Information asymmetry hence deters consumers from committing to online purchase, which in turn limits e-commerce's market penetration. In the fourth quarter of 2016, e-commerce retail sales only accounted for 8.3% of total sales[1]. In this study, we seek to unleash the potential of e-commerce by confronting the problem of information asymmetry in online transactions.

Signaling theory has been espoused by researchers as a fitting theoretical lens for comprehending how information asymmetry can be alleviated (Connelly *et al.*, 2010; Spence,

[1] Sales statistics are retrieved from: https://fred.stlouisfed.org/series/ECOMPCTSA.

2014). Signaling theory holds that insiders (signalers) can deliberately communicate to outsiders (receivers) unobservable attributes of an artifact, a process termed as signaling (Connelly *et al.*, 2010; Spence, 2014). Guided by signaling theory, scholars have investigated how information cues (i.e., signals related to the true quality of product offerings) conveyed by an e-commerce site alleviate information asymmetry between consumers and e-retailers by facilitating the former's evaluation of unobservable product attributes (Spence, 2014). Prior research has identified several aspects of e-commerce sites (e.g., reliable payment and user-friendly interface) that can be signaled to induce consumers' purchase behavior (Van Der Heijden *et al.*, 2003). Likewise, past studies have uncovered product-related properties, such as diagnosticity, that can be signaled by e-commerce sites to promote sales (Jiang and Benbasat, 2004). Yet, research to-date does not distinguish between product and service related qualities that can be conveyed to consumers in e-commerce context. Insomuch as the quality of e-commerce sites consists of product quality (Wells *et al.*, 2011) and website (service) quality (Al-Debei *et al.*, 2015), we extend prior research by postulating the existence of distinct signaling processes for product and website (service) qualities.

Besides accentuating the underexplored parallel signaling processes, this study examines how these two signaling processes can be leveraged by e-commerce sites to entice consumers to make purchase decisions. To this end, this study draws inspiration from advertising literature that has attested to *appeal* as a key indicator of the effectiveness of transmitted information cues or signals in conveying the latent qualities of a given product (Johar and Sirgy, 1991). Indeed, *appeal* resonates with *signaling theory* as it captures the positive psychological effect evoked by signaling product attributes to consumers. We also draw from past studies of e-commerce examining the visual appeal of websites, which shed light on how visual appeal enhances the aesthetics and relational rewards of e-commerce sites (Campbell *et al.*, 2013; Wells *et al.*, 2011). In this study, we advance extant literature on e-commerce by adopting a

broader concept of *appeal* to denote the ability of an e-retailer to invoke positive feelings and stimulate the cognition or emotions of consumers (Yeshin, 1998). As e-commerce sites can bolster their appeal by conveying positive attributes of their product offerings and website functionalities, we further delineate the concept of appeal into *product appeal* and *website appeal* in order to investigate how these two distinct signaling processes, both independently and in tandem, shape consumers' purchase intentions.

Prior research has testified to the pivotal role of trust in alleviating consumers' concerns when engaging in online purchases (Al-Debei *et al.*, 2015; Becerra and Korgaonkar, 2011; Gefen, 2002a; Kim *et al.*, 2008). A variety of measures have been introduced to foster and sustain consumers' trust, which include building brand equity (Biswas and Biswas, 2004; Kim *et al.*, 2008, 2004), ensuring information quality (Kim *et al.*, 2008; Rahimnia and Hassanzadeh, 2013), investing in advertisements (Aiken and Boush, 2006; Biswas and Biswas, 2004), offering warranties (Aiken and Boush, 2006), safeguarding privacy (Kim *et al.*, 2008), securing third-party endorsements (Aiken and Boush, 2006; Biswas and Biswas, 2004; Kim *et al.*, 2008; Özpolat and Jank, 2015), and utilizing electronic Word-of-Mouth (Al-Debei *et al.*, 2015). In accordance with *warranting theory*, consumers' trust in e-commerce sites dictates their perceptions of the reliability of quality-related signals emitted by these sites (Chua and Banerjee, 2015; Walther and Parks, 2002). Conceivably, consumers' purchase intentions are driven by the extent to which their positive feelings about e-commerce sites are induced by trustworthy signals that are costly to manipulate (Walther and Parks, 2002). An in-depth appreciation of how trust influences the impact of product and website appeal on consumers' purchase decision is hence long overdue and constitutes a noteworthy venture.

We endeavor to address the following research questions in this study:

- What qualities can be signaled by an e-commerce site to enhance its product and website appeal?
- How do product and website appeal affect consumers' purchase intentions?

- How does trust influence the impact of product and website appeal on consumers' purchase intentions?

To provide answers to the abovementioned research questions, we build on signaling theory to construct a research model (Connelly *et al.*, 2010; Spence, 2014) that posits how *product* and *website appeal* can be induced by signaling product- (i.e., diagnosticity and justifiability) and website-related qualities (i.e., service content quality, service delivery quality, and enjoyment) respectively. Furthermore, drawing on warranting theory (Walther and Parks, 2002), we postulate that the positive effects of *product* and *website appeal* on *purchase intentions* are subjected to the influence of consumers' trust in e-commerce sites as signalers.

The remainder of this paper is organized as follows. In the next section, we not only introduce signaling theory along with warranting theory, both of which form the theoretical foundation for this study, but we also review extant literature on appeal. We then construct our research model together with testable hypotheses. Next, we outline our methodology for data collection and analysis. We then present the results of our data analysis before concluding with a summary of core findings and their implications for theory and practice.

2. THEORETICAL BACKGROUND AND LITERATURE REVIEW

2.1 Signaling Theory

Undesirable outcomes may emerge when transacting parties involved in a market exchange make decisions on the basis of imperfect information (Pavlou *et al.*, 2007). This problem of information asymmetry is more pronounced in e-commerce because consumers, being estranged from e-retailers, have limited means of assessing the quality of products prior to purchase (Biswas and Biswas, 2004; Spence, 1973). High levels of information asymmetry in e-commerce settings may amplify consumers' risk perceptions (Biswas and Biswas, 2004) and correspondingly, diminish their intentions to purchase from e-commerce sites.

Signaling theory was proposed by Spence (1973) as a conceptual lens for tackling information asymmetry between two transacting parties (e.g., buyers and sellers) in a market

interaction (Spence, 2014). To reduce buyer uncertainty, signaling theory posits that sellers may send pre-purchase signals about product quality (Kirmani and Rao, 2000). A signal is a discernible cue that is intended to convey information about unobservable attributes of an entity (Kirmani and Rao, 2000; Rao *et al.*, 1999). Entrepreneurship studies, for example, have considered how private equity (Janney and Folta, 2006), and earnings (Michael, 2009) drive the decisions of potential investors. Likewise, prior research in e-commerce has investigated how brand equity (Chu *et al.*, 2005), diagnosticity (Pavlou *et al.*, 2007), service quality (Gefen, 2002b), social presence (Pavlou *et al.*, 2007), third-party assurances (Song and Zahedi, 2007), and website quality (Wells *et al.*, 2011) dictate online consumption behaviors.

Two research streams have scrutinized the effects of signaling in e-commerce (cf. Connelly *et al.*, 2010; Kirmani and Rao, 2000; Wells *et al.*, 2011). One stream of research has investigated how signals of credibility—including advertising investments (Aiken and Boush, 2006; Biswas and Biswas, 2004), reputation (Biswas and Biswas, 2004; Kim *et al.*, 2004), and third-party endorsements (Aiken and Boush, 2006; Biswas and Biswas, 2004)—lower consumers' risk perceptions and increase their trust in e-commerce sites. This line of research applied signaling theory to explain how *moral hazard*, which arises from consumers' lack of trust in e-commerce sites due to information asymmetry, can be circumvented by conveying signals about the latter's trustworthiness. In comparison, the other stream of research has emphasized how branding (Chu *et al.*, 2005), diagnosticity (Pavlou *et al.*, 2007), social presence (Pavlou *et al.*, 2007), and website quality (Wells *et al.*, 2011) positively influence consumers' purchase intention. Studies belonging to this research stream have shown that firms can resolve scenarios of *adverse selection* (i.e., situations in which consumers have to make decisions without adequate assessment of product quality due to information asymmetry) by conveying quality-related signals to inform consumers (Kirmani and Rao, 2000).

A signaling process typically comprise three focal elements, namely *signaler*, *signal*, and *receiver* (Connelly *et al.*, 2010). Extrapolated to our study, *signalers* are e-commerce sites that possess information about their product offerings (e.g., Kirmani and Rao 2000), which may be inaccessible to consumers (Connelly *et al.*, 2010). *Signals* are information cues conveyed by the e-commerce sites (Connelly *et al.*, 2010; Wells *et al.*, 2011) whereas *receivers* are consumers who rely on these signals to assess product and website quality (Connelly *et al.*, 2011; Rao *et al.*, 1999). Because the ultimate goal of signaling for e-commerce sites is to convey affirmative information cues about the quality of their product offerings and the hosting sites (Kirmani and Rao, 2000; Wells *et al.*, 2011), this study hence differentiates between *product* and *website appeal* to capture consumers' interpretations of positive signals about product and website quality respectively.

2.2 Appeal

Two research streams have investigated the effects of appeal in e-commerce. The first research stream focuses on how the design of e-commerce sites fosters *visual appeal*, which in turn reinforces consumers' positive beliefs about and attitudes toward the sites. Specifically, Cyr *et al.* (2009) found that human images on an e-commerce site generated image appeal that positively influenced consumers' trust in the website. Campbell *et al.* (2013) and Wells *et al.* (2011) bore witness to visual appeal as a crucial determinant of the aesthetics and relational rewards associated with e-commerce sites. In the same vein, we contextualize the notion of *appeal* from advertising literature to e-commerce sites and define ***website appeal*** as the *ability of an e-commerce site to evoke positive feelings and stimulate the cognition or emotions of individuals with respect to its service quality* (Yeshin, 1998).

In contrast, the second research stream explores how e-commerce sites can enrich *product appeal*. In an experiment involving a sports watch shopping website, Jiang and Benbasat (2004) documented the positive effects of functional and visual control on consumers' perceptions of

diagnosticity and flow. Similarly, Jiang and Benbasat (2007a) reported how the functional mechanisms of online product presentation (i.e., vividness and interactivity) improved the allure of listed products. Since the main purpose of an e-commerce site is to promote its products and encourage purchases (Jarvenpaa *et al.*, 2000), ***product appeal***, defined herein as the *ability of an e-commerce site to evoke positive feelings and stimulate the cognition or emotions of individuals with respect to the products listed on the site* (Yeshin, 1998), is instrumental in inducing consumers' purchase intention. Despite the importance of *product* and *website appeal* in e-commerce, there is a paucity of studies that have examined these concepts in-depth, much less investigate the impact of *product* and *website appeal* in tandem within the online transactional environment.

2.3 Warranting Theory

Walther and Parks (2002) introduced warranting theory to describe how individuals distinguish among multiple signals on the basis of their confidence in the reliability and trustworthiness of these signals. Transplanting warranting theory onto online information seeking, Chua and Banerjee (2015) asserted that individuals are inclined to trust information cues that are more costly to fabricate. In e-commerce, scholars have demonstrated that credible cues (e.g., product images) are more effective in persuading consumers to engage in purchase behaviors (Van Der Heide *et al.*, 2013). In this study, we draw on warranting theory (Walther and Parks, 2002) to explore the role of *trust* in influencing the impact of *product* and *website appeal* on consumers' purchase intentions.

3. RESEARCH MODEL AND HYPOTHESIS DEVELOPMENT

3.1 Relationship between Product and Website Appeal

Product acquisition is the dominant value afforded by e-commerce sites (Lee *et al.*, 2003). If consumers deem the products listed on an e-commerce site to be appealing, they are more likely to develop positive feelings towards the site (Gefen and Straub, 2000). Prior research has

revealed that the provision of interactive product-oriented functionalities on an e-commerce site heightened consumers' involvement (Jiang *et al.*, 2010), so much so that the site was regarded by consumers to be much more useful (Jiang and Benbasat, 2007b). Conceivably, consumers tend to attribute their positive feeling about the products to the merits of the hosting e-commerce site, leading to a spillover effect from *product appeal* onto *website appeal*:

> ***Hypothesis 1***: Product appeal of an e-commerce site positively influences its website appeal.

3.2 Consequences of Product and Website Appeal

Purchase intention reflects *consumers' intention to make purchases on an e-commerce site*. Past studies have confirmed that a high-quality e-commerce site is more likely to prompt consumers to make purchases on the site (Gefen *et al.*, 2003b; Van Der Heijden *et al.*, 2003; Wells *et al.*, 2011, Javornik, 2016). We hence anticipate that *website appeal* will alleviate consumers' concerns about transacting with an e-commerce site, thereby increasing their intention to purchase from the site:

> ***Hypothesis 2***: Website appeal of an e-commerce site positively influences consumers' purchase intention.

Product appeal encompasses consumers' positive attitude towards a given product, and drives their intention to purchase the product (Ajzen and Fishbein, 1980). Jiang and Benbasat (2007a) demonstrated that positive attitudes toward the product, induced via interactive and vivid product presentation, increase consumers' *purchase intention* on an e-commerce site. Wells *et al.* (2011) also maintained that online consumers tend to purchase products that they deem to be enticing. We thus expect that *product appeal* will mitigate consumers' concern about receiving undesirable products from an e-commerce site, which in turn increases the former's intention to purchase from the site:

> ***Hypothesis 3***: Product appeal of an e-commerce site positively influences consumers' purchase intention.

3.3 Antecedents of Website Appeal

According to Grönroos (1984), service quality is not only indicative of the performance (or outcome) of a service, but it is also reflective of the means by which this outcome is delivered to consumers. Taking into account both utilitarian and hedonic aspects of service quality, Sánchez-Hernández *et al.* (2009) put forward a taxonomy of hotel service quality that consists of three distinctive components: *service content quality*, *service delivery quality*, and *relational*/*emotional service quality*. This study thus adopts *service content quality* and *service delivery quality* to encapsulate the *utilitarian* aspect of e-commerce service quality, and *enjoyment* (i.e., proxy for *emotional service quality*) to reflect the *hedonic* aspect of e-commerce service quality.

3.3.1 Service content quality

Past studies have conceptualized service content quality as the extent to which a consumer is convinced that an e-commerce site will facilitate the accomplishment of his/her online shopping task (Hampton-Sosa and Koufaris, 2005). Accordingly, we define ***service content quality*** as *consumers' perception regarding the effectiveness of service content provided by an e-commerce site in facilitating their online shopping activities* (Tan *et al.*, 2013; Van der Merwe and Bekker, 2003). In this sense, service content quality can be signaled via website functionalities implemented to facilitate product searches, streamline online purchases, and promote interactions among consumers as well as between consumers and e-retailers. Hampton-Sosa and Koufaris (2005) have alluded to the positive relationship between *service content quality* and *website appeal* for e-commerce sites. Accordingly, we hypothesize that:

> ***Hypothesis 4***: Service content quality of an e-commerce site positively influences its website appeal.

3.3.2 Service delivery quality

To alleviate information asymmetry in the e-commerce context, an e-commerce site can convey *service delivery quality* via signaling. Consumers are interested in not only the service

content of e-commerce sites, but also how such content is delivered (Grönroos *et al.*, 2000). Indeed, superior service content is worthless if it cannot be efficiently accessed by consumers (van Riel *et al.*, 2001). In this study, we define ***service delivery quality*** as *consumers' perception regarding the efficiency of delivering service content by an e-commerce site* (Tan *et al.*, 2013). *Service delivery quality* has been established in prior research as a focal dimension of e-service quality (Zeithaml *et al.*, 2000), and empirically validated as a vital determinant of consumers' positive receptivity towards e-commerce sites (Al-Debei *et al.*, 2015). We thus expect that an e-commerce site, which exhibits *service delivery quality*, will enhance consumers' perception of *website appeal*:

> ***Hypothesis 5***: Service delivery quality of an e-commerce site positively influences its website appeal.

3.3.3 Enjoyment

Whereas service content and delivery quality reflect the *utilitarian aspect* of *website quality* (Tan *et al.*, 2013), an e-commerce site can also signal *hedonic elements* to enhance its website appeal. According to Davis and Bagozzi (1992), enjoyment, in relation to technology, refers to the degree to which "*using the [technology] is perceived to be enjoyable in its own right, apart from any performance consequences that may be anticipated*" (p. 1113). In this study, we defined ***enjoyment*** as *consumers' perception that their activities on an e-commerce site are pleasurable*. It represents the affective dimension of e-commerce service quality that supplements any anticipated utilitarian outcomes (Parboteeah *et al.*, 2009). Davis and Bagozzi (1992) found that *enjoyment* fosters users' positive attitudes toward technology. *Enjoyment* has also been validated as an important antecedent of individuals' favorable attitudes towards online banking (Pikkarainen *et al.*, 2004), learning (Saadé and Bahli, 2005), and retailing (Ahn *et al.*, 2007, Huang, 2016). We therefore expect that a highly enjoyable e-commerce site will increase consumers' perception of *website appeal*:

> ***Hypothesis 6***: Enjoyment of an e-commerce site positively influences its website appeal.

3.4 Antecedents of Product Appeal

Signals related to product quality can be communicated to consumers via product-oriented functionalities implemented by an e-commerce site. These signals, in turn, can mitigate information asymmetry inherent in e-commerce transactions and bolster consumers' perceptions of product appeal (or quality) (Kirmani and Rao, 2000).

Connolly and Zeelenberg (2002) advanced the *Decision Justification Theory* (DJT) to explain why consumers regret their decisions. DJT postulates two essential components of decisional regret: (1) *cognitive* evaluation of a decision against select criteria, and; (2) *affective* attribution of self-blame for making erroneous choices (Connolly and Zeelenberg, 2002). In accordance with DJT, two types of product quality related signals can be conveyed to facilitate consumers' cognitive evaluation of their decisions and relieve their feeling of self-blame.

3.4.1 Diagnosticity

The first type of signal is *diagnosticity*, which refers to *consumers' belief regarding the degree to which the shopping experience facilitates their evaluation of product quality* (Kempf and Smith, 1998). In line with DJT, a high level of *diagnosticity* facilitates consumers' cognitive evaluation of a given product, thereby enhancing their perception of product appeal (Connolly and Zeelenberg, 2002). In prior research, perceived *diagnosticity* has been found to be positively associated with consumers' cognitive evaluation of product quality (Jiang and Benbasat, 2007a; Kempf and Smith, 1998). E-commerce sites may convey signals about product diagnosticity to consumers in order to improve the latter's confidence in assessing products, reduce their perceptions of product risk, and generate positive attitudes towards products listed on the sites (Jiang and Benbasat, 2004; Kempf and Smith, 1998). An e-commerce site can emit signals of *diagnosticity* by delivering *Virtual Product Experience* (VPE) to allow consumers to remotely inspect product offerings (Jiang and Benbasat, 2004). VPE can be realized through the implementation of: (1) interactive visual controls (which enable

consumers to manipulate product images through moving, rotating, as well as zooming in and out of product images), and; (2) functional controls (which permit consumers to explore and experience different product features or functions). Arguably, the diagnosticity of consumers' shopping experience can be bolstered by elevating their knowledge of products listed on the e-commerce site (Huang, 2016; Lee and Choeh, 2016), which in turn enhances the product appeal of the site:

> ***Hypothesis 7***: Perceived diagnosticity of consumers' shopping experience on an e-commerce site positively influences its product appeal.

3.4.2 Justifiability

The second type of signal related to product quality concerns the notion of *justifiability*, which refers to *consumers' perception that a choice was made "on a defensible basis, supported by convincing arguments or using a thoughtful, comprehensive decision process"* (Reb and Connolly, 2010, p. 1405). Reb and Connolly (2010) confirmed that perceptions of decision *justifiability* significantly reduces the intensity of consumers' *anticipated regret* even when they were confronted with undesirable outcomes arising from their decisions. An e-commerce site can emit signals of *justifiability* through multiple means (e.g., positive user-generated reviews and recommendations) to alleviate consumers' feeling of self-blame and induce positive sentiments towards products of interest (Connolly and Zeelenberg, 2002). We therefore expect that a high level of decision *justifiability* will increase consumers' perception of product appeal on an e-commerce site:

> ***Hypothesis 8***: Perceived justifiability of potential purchase decisions made on an e-commerce site positively influences its product appeal.

3.5 Direct and Moderating Influence of Trust

Past studies have examined *trust* as an indicator of mitigated *moral hazard* that arises from information asymmetry in e-commerce (Aiken and Boush, 2006; Biswas and Biswas, 2004; Kim *et al.*, 2004). *Trust* is "*a psychological state comprising the intention to accept vulnerability based on positive expectations of the intentions or behaviors of another*"

(Rousseau *et al.*, 1998, p. 395). Trust is a critical aspect of e-commerce transactions because consumers generally lack the means to properly assess e-retailers' dependability and integrity. Continuous two-way interaction, which is central to trust-building, is hindered in online setting (Reichheld and Schefter, 2000). *Trust* has a positive impact on consumers' *purchase intention* by: (1) ruling out e-retailers' opportunistic behavior during online transactions, and; (2) reducing the complexity in consumers' decision making process (Gefen *et al.*, 2003b). To build trust, an e-commerce site may signal its trustworthiness to reduce consumers' risk perceptions and increase their purchase intentions (Jarvenpaa *et al.*, 2000). Examples of trustworthiness signals include advertising investments (Aiken and Boush, 2006; Biswas and Biswas, 2004), reputation systems (Biswas and Biswas, 2004; Kim *et al.*, 2004), third-party endorsements (Aiken and Boush, 2006; Biswas and Biswas, 2004), and warranties (Aiken and Boush, 2006). The positive influence of *trust* on consumers' purchase intentions has been consistently validated in prior research (Gefen *et al.*, 2003b). Thus, we hypothesize that:

> ***Hypothesis 9***: Trust in an e-commerce site positively influences consumers' purchase intention.

Signals are not always reliable. False signaling refers to the mismatch between the quality conveyed by a signal and the true underlying quality of an entity (Kirmani and Rao, 2000). Consistent with warranting theory (Walther and Parks, 2002), consumers' *trust* in an e-commerce site, induced by trustworthiness signals, will boost their confidence in the accuracy of quality signals conveyed by an e-commerce site to communicate the unobservable quality of the site and its product offerings (Lu *et al.*, 2016). Trustworthiness signals thus enhance the positive effects of quality signals on consumers' intention to purchase from the site. Accordingly, we expect that trust in an e-commerce website will reinforce the positive effects of product and website appeal on consumers' purchase intentions:

> ***Hypothesis 10***: Trust in an e-commerce site reinforces the positive relationship between website appeal and consumers' purchase intention.

Hypothesis 11: Trust in an e-commerce site reinforces the positive relationship between product appeal and consumers' purchase intention.

4. RESEARCH METHOD

To validate our hypothesized relationships, data was gathered via an online survey questionnaire to elicit consumers' beliefs and attitudes in an e-commerce context.

4.1 Measurement Development

We derived the measurement items for our survey questionnaire based on an extensive review of extant literature. All measurement items are reflective, meaning that they are affected by the underlying latent construct being measured (Petter *et al.*, 2007). Measures for *purchase intention* were adapted from Adelaar *et al.* (2003) and Bart *et al.* (2005). Adhering to standard psychometric procedures and consistent with the theorization of appeal in advertising literature (Yeshin, 1998), we developed measures for both *product* and *website appeal*. *Trust* was measured via items adapted from Cyr *et al.* (2009) and Hassanein and Head (2006). Whereas measures for *service content quality*, *service delivery quality*, and *enjoyment* were elicited from Hampton-Sosa and Koufaris (2005), *diagnosticity* was measured by items obtained from Jiang and Benbasat (2004, 2007a). Finally, we developed measures for *justifiability* according to Reb and Connolly's (2010) work on decision justifiability. Table 1 summarizes the measurement items employed in the present study.

4.2 Survey Administration

With assistance from a marketing research firm, we recruited 423 members from a panel of existing e-commerce consumers to participate in our survey via invitation emails. Each respondent was rewarded with points that could be utilized to trade for gift vouchers or other prizes. We were able to diversify the demographic makeup of our sample and ensure that each respondent answered the questionnaire based on their shopping experience on an e-commerce site they frequented in the past six months. Among the 423 responses, 130 responses were

discarded due to incomplete answers, leaving a final sample of 293 valid data points for analysis. Descriptive statistics of the sample are summarized in Table 2.

To confirm that nonresponse bias is not a threat to our data analysis, we conducted chi-square test between our sample demographics and those documented in Tan *et al.* (2016). As depicted in Table 2, the demographic distribution is comparable across the two studies, indicating that our sample was not plagued by nonresponse bias.

- Insert Table 1 here -

5. DATA ANALYSIS AND RESULTS

SmartPLS 2.0.M3 (Ringle *et al.*, 2005) was employed to validate the measurement and structural properties of our research model (Hair *et al.*, 2010). The size of our sample (i.e., 293) well surpasses the minimum threshold required by SmartPLS 2.0 M3, which is five times the number of indicators of the construct with most indicators (i.e., 100) (Hair Jr *et al.*, 2016).

5.1 Measurement Model

All loadings of measurement items on their corresponding constructs exceed 0.7 (see Table 1). Furthermore, the Cronbach's alpha and composite reliability of each construct are higher than 0.7, indicating satisfactory internal consistency (see Table 3).

- Insert Table 2 here -

Table 1 shows that items display high factorial loadings on the construct they are supposed to measure (above recommended threshold of 0.7) (Hair *et al.*, 2010) and low factorial loadings on unrelated constructs. Moreover, the items demonstrate discriminant validity since: (1) no problem with cross-loading exists; (2) the Average Variance Extracted (AVE) for each construct exceeds the threshold of 0.5 (see Table 3) (Fornell and Larcker, 1981), and; (3) the square-root of the AVE for each construct is greater than its correlation with any other construct (see Table 3).

- Insert Table 3 here -

Common Method Bias (CMB) was first assessed by applying Harman's single-factor test (Podsakoff *et al.,* 2003) and result suggests that CMB is not a threat to our study. We then applied the statistical remedy for common method bias (Podsakoff *et al.,* 2003) by introducing a non-related latent method factor into our structural model to account for the plausible influence of common method. Results indicate that the statistical significance of the path coefficients remain relatively constant (see Figure 1).

5.2 Structural Model

Hypothesized relationships in our research model were validated through PLS analysis. Figure 1 depicts the analytical result of our structural model[2].

As depicted in Figure 1, both website appeal (β = 0.433, $p < 0.001$) and product appeal (β = 0.100, $p < 0.1$) exert significant positive effects on consumers' purchase intention. As predicted, service delivery quality (β = 0.086, $p < 0.01$), enjoyment (β = 0.289, $p < 0.001$), and product appeal (β = 0.509, $p < 0.001$) have positive and significant impact on website appeal. Likewise, diagnosticity (β = 0.339, $p < 0.001$) and justifiability (β = 0.289, $p < 0.001$) positively influence product appeal. Finally, the positive relationship between trust and purchase intention (β = 0.187, $p < 0.001$) as well as the reinforcing effect of trust (β = 0.189, $p < 0.001$) on the relationship between website appeal and purchase intention are corroborated. Contrary to our expectations, however, the positive relationship between service content quality and website appeal is non-significant. Trust also exhibits an unexpected negative moderating effect (β = -0.147, $p < 0.05$) on the relationship between product appeal and purchase intention. With the exception of Hypotheses 4 and 11, all our hypotheses are substantiated by the empirical evidence.

- Insert Figure 1 here -

[2] Standard errors were calculated by using a bootstrapping process with 500 resamples.

5.3 Unexpected Findings

We conducted post-hoc analysis to explore why the relationship between *service content quality* and *website appeal* is non-significant. We analyzed an alternative model by removing the path from *product appeal* to *website appeal* (see Figure 2), which gave rise to additional insights. First, the relationship between *service content quality* and *website appeal* becomes significantly positive ($\beta = 0.212$, $p < 0.001$). Also, the positive effects of both *service delivery quality* ($\beta = 0.161$, $p < 0.001$) and *enjoyment* ($\beta = 0.492$, $p < 0.001$) on *website appeal* are strengthened. Finally, the variance explained in *website appeal* decreases from 66.9% to 54.5%. These findings suggest that *product appeal* may have partially accounted for consumers' assessment of *service delivery quality* and *enjoyment* while accounting fully for the impact of *service content quality* on *website appeal* (Huang, 2016). Since the value of an e-commerce site lies in its ability to facilitate consumers' online shopping, we submit that any e-commerce site is only as appealing as its listed products. While the provision of functionalities supporting product acquisition (i.e., e-commerce service content) is important, it only matters if the e-commerce site is able to support consumers in making purchase decisions. Results of pseudo-*F* test exposes that the variance explained in *website appeal* is significantly reduced when the effect of *product appeal* is excluded (see Table 4). Additional pseudo-*F* tests reveal that, while the variance explained in *purchase intention* decreases significantly when the effect of *website appeal* is excluded from data analysis, excluding *product appeal* will not lead to a significant drop in the variance explained in *purchase intention* (see Table 4). Taken together, the aforementioned results imply that although *product appeal* does not significantly affect *purchase intention*, it is a salient predictor of *website appeal* while impacting *purchase intention* indirectly.

- Insert Figure 2 here -

- Insert Table 4 here -

6. DISCUSSION

This study yields several unexpected findings. First, there is no discernible relationship between *service content quality* and *website appeal*, and supplementary analysis reveals that the effect of *service content quality* on *website appeal* is suppressed by *product appeal*. Second, *trust* is found to attenuate (rather than reinforce) the positive effect of *product appeal* on *purchase intention*. Due to the positive relationship between consumers' *familiarity* with an e-commerce site and their *trust* in this site (Kim *et al.*, 2008), the unexpected negative moderating effect of *trust* may be explained by the reduced tendency of experienced consumers with high trust in an e-commerce site (Gefen *et al.*, 2003a) to carefully assess products listed on the site prior to purchase. In contrast, inexperienced consumers with low trust in an e-commerce site (Jarvenpaa *et al.*, 2000) might rely on product-oriented functionalities to a greater extent in order to alleviate their concerns about product risk.

6.1 Implications for Theory and Practice

This study contributes to e-commerce research on three fronts. First, extending signaling theory, we draw on the concept of appeal from advertising literature to not only distinguish between *product* and *website appeal* in order to capture consumers' positive interpretation of product- and service-related qualities signaled by e-commerce sites, but to also investigate the effects of both product and website appeal on online consumption. Compared to past studies that concentrate primarily on *website appeal* (Campbell *et al.*, 2013; Tamimi and Sebastianelli, 2015; Wells *et al.*, 2011), we demonstrate that the appeal of e-commerce sites is not founded solely on the availability of functionalities to aid consumers in product acquisition. Rather, consumers also take into account whether products offered on the site are appealing. Consequently, an alternate way of enhancing website appeal is to bolster the appeal of listed products over and beyond improving acquisition functionalities. Moreover, in contrast to prior research that alluded to the criticality of *product appeal* (e.g., Wang *et al.*, 2016), findings from

our study also suggest that product appeal, by itself, does not drive purchase intentions. Enhancing the appeal of products may not encourage consumer purchase if e-commerce sites do not offer complementary functionalities that facilitate the product acquisition process. Our study thus expands on extant literature by establishing both *product* and *website appeal* as indispensable drivers of consumers' purchase intention in e-commerce.

Second, we have identified five quality related factors from prior research that can be signaled by e-commerce sites to enhance their *product* and *website appeal*. While *service content quality*, *service delivery quality*, and *enjoyment* embody utilitarian and hedonic aspects of e-commerce service quality, *diagnosticity* and *justifiability* are synonymous with cognitive and emotional cues aimed at conveying product-related qualities. Results reveal that these qualities can significantly enhance consumers' perception of *product* and *website appeal*, thereby culminating in their increased intention to purchase from e-commerce sites.

Finally, guided by *warranting theory* (Walther and Parks, 2002), our inquiry into the moderating role of *trust* unveiled that while consumers' *trust* in e-commerce sites intensifies the positive influence of *website appeal* on their *purchase intention* (by building consumers' confidence in the reliability of signals), it concurrently mitigates the positive impact of *product appeal* on *purchase intention*. This could be due to the inclination of experienced shoppers to refrain from in-depth evaluation of product quality before purchase. This is a novel observation that has not been reported in past studies, and it sheds light on the differential role *trust* plays in moderating the relationships between the two types of *appeal* and *purchase intention*.

Our findings also offer invaluable insights to practitioners by sensitizing them to strategies that can be formulated to enhance consumers' perceptions of product and website appeal. Employing our theoretical model as guiding principles, e-retailers can better channel their resources to signal qualities most pertinent to *product* and *website appeal*. For example, to bolster consumers' perceptions of *website appeal*, e-commerce sites could: (1) offer

sophisticated product search features to ensure high *service content quality*; (2) provide navigation guidance to induce high *service delivery quality*, and; (3) elaborate on product recommendations to heighten *enjoyment*. Furthermore, because *product appeal* (e.g., whether products are presented in an appealing manner) shapes consumers' assessment of the *service content quality* of e-commerce sites as uncovered through our post-hoc analysis, e-commerce sites should offer product-oriented functionalities (e.g., virtual product presentation) to induce *product appeal*, especially for those consumers who have yet to trust the sites. Lastly, in light of the unique role *trust* plays in reinforcing the effect of *website appeal* while attenuating the impact of *product appeal* on *purchase intention* (Lu et al., 2016), e-commerce sites can attract new consumers with product-oriented functionalities that render products more appealing while retaining existing ones by making it easier and more enjoyable for them to source for and acquire desired products.

6.2 Limitations and Future Research

There are two caveats in our study that should be addressed in future research. First, this study does not explicitly prescribe actionable design guidelines. Because prior research has already highlighted actionable design guidelines for realizing product and website appeal (Wells *et al.*, 2011), these guidelines can be combined with our empirical findings to generate design prescriptions for enhancing the appeal of e-commerce sites. Second, online purchase behavior can be investigated from a diversity of theoretical viewpoints (Van Der Heijden *et al.*, 2003). In the present study, we attempted to construct a parsimonious research model by building on the signaling theory. While our research model explained 49.4% of the variance in consumers' purchase intention, we still urge future studies to explore online consumption through other theoretical lenses in order to proffer a more comprehensive and holistic appreciation of this phenomenon.

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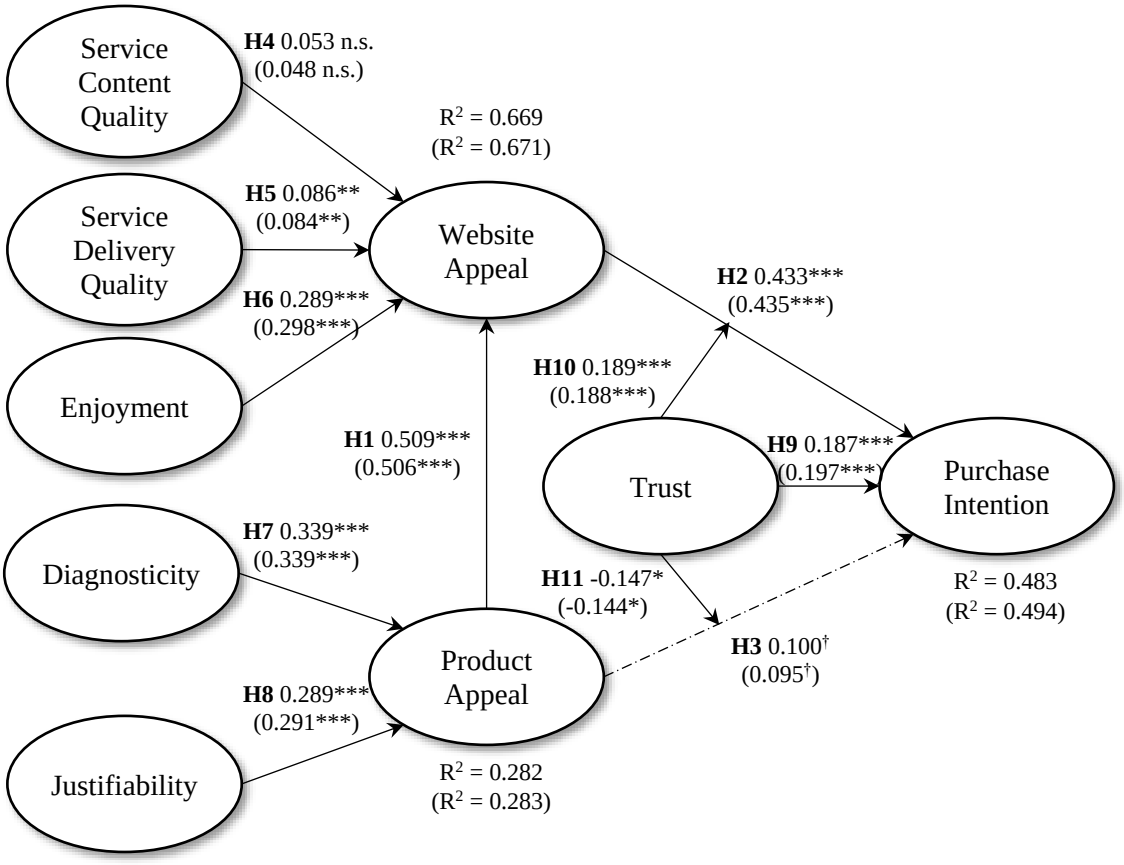
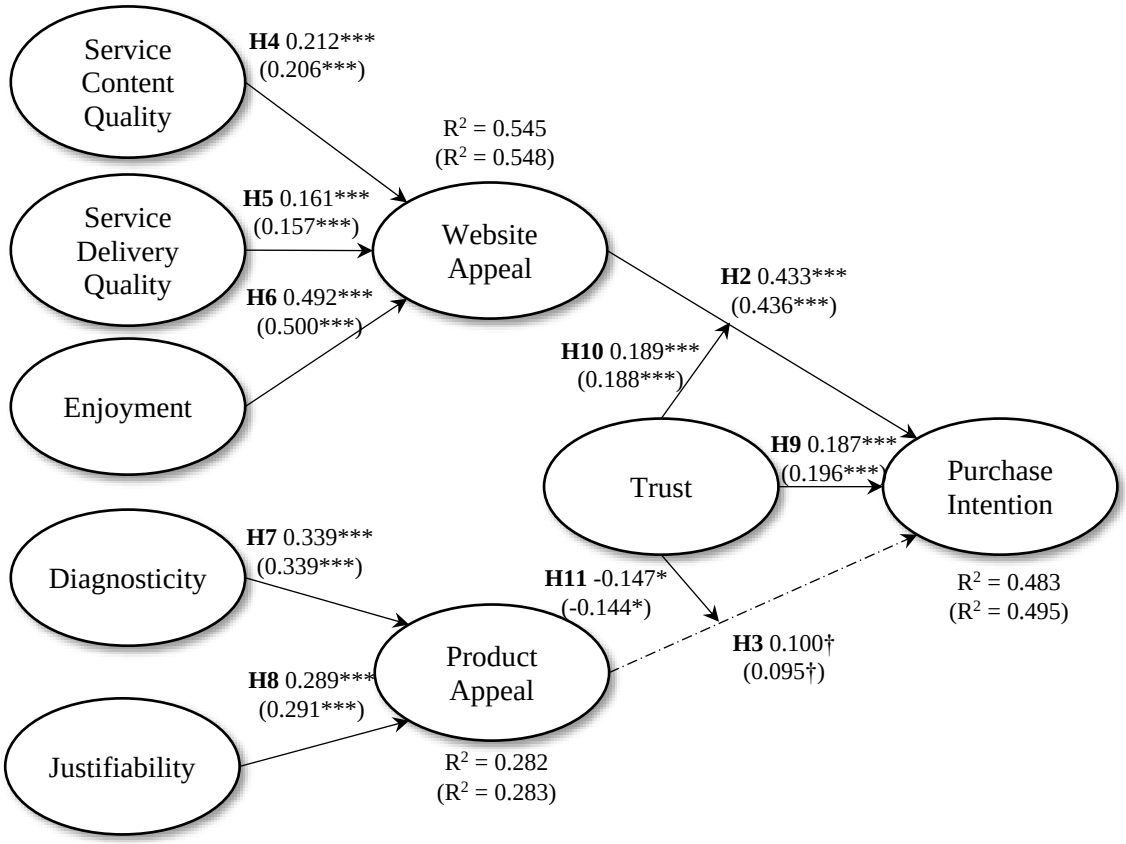
Figures and Tables



Note: Path coefficients without controlling for CMB are shown in brackets; *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$, † $p < 0.1$.

Figure 1. Results of Structural Model Analysis (*N* = 293)



Note: Path coefficients without controlling for CMB are shown in brackets; *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$, † $p < 0.1$.

Figure 2. Alternative Model (*N* = 293)

Table 1. Details and Loadings of the Measures		
Construct	***Measurement Items* (7-point Likert scale)**	***Loading***
Purchase Intention (PI)	I intend to (once again) make a purchase from the website (Adelaar *et al.*, 2003).	**0.938**
	I would (once again) make a purchase from the website (Bart *et al.*, 2005).	**0.917**
	I plan to (once again) make a purchase from the website.	**0.929**
Website Appeal (WA)	Shopping on the website is appealing.	**0.913**
	Shopping on the website is pleasing.	**0.943**
	Shopping on the website is attractive.	**0.909**
	Shopping on the website is charming.	**0.934**
Product Appeal (PA)	Products offered on the website are appealing.	**0.911**
	Products offered on the website are pleasing.	**0.942**
	Products offered on the website are attractive.	**0.930**
	Products offered on the website are charming.	**0.937**
Trust (TR)	I trust the website (Cyr *et al.*, 2009).	**0.926**
	I trust the information presented on the website (Cyr *et al.*, 2009).	**0.914**
	I trust the transaction process on the website (Cyr *et al.*, 2009).	**0.920**
	I feel that the website is honest (Hassanein and Head, 2006).	**0.906**
	I feel that the website is trustworthy (Hassanein and Head, 2006).	**0.907**
Service Content Quality (SCQ)	Using the website can improve my shopping performance (Hampton-Sosa and Koufaris, 2005).	**0.932**
	Using the website can increase my shopping productivity (Hampton-Sosa and Koufaris, 2005).	**0.968**
	Using the website can increase my shopping effectiveness (Hampton-Sosa and Koufaris, 2005).	**0.939**
Service Delivery Quality (SDQ)	The website is easy to use (Hampton-Sosa and Koufaris, 2005).	**0.956**
	It is easy to become skillful in using the website (Hampton-Sosa and Koufaris, 2005).	**0.963**
	Learning to operate the website is easy (Hampton-Sosa and Koufaris, 2005).	**0.960**
Enjoyment (EN)	The website is interesting (Hampton-Sosa and Koufaris, 2005).	**0.926**
	The website is enjoyable (Hampton-Sosa and Koufaris, 2005).	**0.904**
	The website is fun (Hampton-Sosa and Koufaris, 2005).	**0.934**
	The website is entertaining (Hampton-Sosa and Koufaris, 2005).	**0.778**
Diagnosticity (DI)	The website offers the ability to evaluate products being offered.	**0.933**
	The website offers the ability to evaluate the functionality of the products being offered.	**0.957**
	The website offers the ability to evaluate the appearance of the products being offered.	**0.928**
Justifiability (JU)	I can justify my purchase decision when the purchase is made via the website.	**0.944**
	I feel confident in my purchase decision when the purchase is made via the website.	**0.934**
	I can defend my purchase decision when the purchase is made via the website.	**0.946**

Table 2: Descriptive Statistics for Online Survey Respondents						
Demographic Variable	Category	Percentage (%)	Comparison† (%)	x^2 Test‡	E-commerce site Usage (u)	Purcha
Gender	Female	46.47	37.44	99%	3 years $\leq u <$ 4 years	$f \geq$ on
	Male	53.53	62.56		2 years $\leq u <$ 3 years	$f \geq$ on
Age	19 - 29	14.94	15.16	100%	2 years $\leq u <$ 3 years	$f \geq$ on
	30 - 49	31.54	40.76		2 years $\leq u <$ 3 years	$f \geq$ on
	50 - 64	38.59	33.65		2 years $\leq u <$ 3 years	$f \geq$ on
	Over 65	14.94	9.48		2 years $\leq u <$ 3 years	$f \geq$ on
Income	€0 - €30,000	39.42	32.23	97%	2 years $\leq u <$ 3 years	$f \geq$ on
	€30,000 - €50,000	43.57	23.70		3 years $\leq u <$ 4 years	$f \geq$ on
	€50,000 - €75,000	10.79	18.48		3 years $\leq u <$ 4 years	$f \geq$ on
	Over €75,000	6.22	20.85		2 years $\leq u <$ 3 years	$f \geq$ on
	Unwilling to disclose	0.00	0.05		N/A	
Education	Less than college education	81.90	23.22	30%	2 years $\leq u <$ 3 years	$f \geq$ on
	College education or higher	17.40	75.83		3 years $\leq u <$ 4 years	$f \geq$ on
	Unwilling to disclose	0.70	0.01		1 year $\leq u <$ 2 years	$f \geq$

† Tan *et al.* (2016)

‡ Probability of respondents belonging to the same population pool

Table 3. Internal Consistency and Discriminant Validity

	CR	*α*	*AVE*	*PI*	*WA*	*PA*	*SCQ*	*SDQ*	*EN*	*DI*	*JU*	*TR*
PI	**0.949**	**0.920**	**0.861**	**0.928**								
WA	**0.959**	**0.944**	**0.855**	0.675	**0.963**							
PA	**0.963**	**0.948**	**0.865**	0.557	0.772	**0.930**						
SCQ	**0.963**	**0.942**	**0.896**	0.422	0.494	0.461	**0.947**					
SDQ	**0.972**	**0.957**	**0.921**	0.422	0.560	0.599	0.315	**0.960**				
EN	**0.936**	**0.909**	**0.788**	0.520	0.710	0.667	0.544	0.608	**0.887**			
DI	**0.958**	**0.933**	**0.883**	0.365	0.426	0.462	0.391	0.439	0.477	**0.940**		
JU	**0.959**	**0.936**	**0.886**	0.446	0.457	0.435	0.428	0.492	0.569	0.424	**0.941**	
TR	**0.962**	**0.951**	**0.836**	0.574	0.669	0.641	0.499	0.704	0.193	0.400	0.184	**0.914**

Note 1: CR = Composite Reliability; α = Cronbach's alpha; AVE = Average Variance Extracted

Note 2: Diagonal shows the square root of AVE values.

Note 3: PI = Purchase Intention; WA = Website Appeal; PA = Product Appeal; SCQ = Service Content Quality; SDQ = Service Delivery Quality; EN = Enjoyment; DI = Diagnosticity; JU = Justifiability; TR = Trust.

Table 4. Pseudo-*F* Tests

Comparison	**$R^2_{excluded}$**	**R^2_{full}**	**pseudo-F Statistic**	**df**
Excluding the Effect of Product Appeal on Website Appeal				
Effect of Product Appeal on Website Appeal	0.545	0.669	87.29***	(1, 237)
Excluding the Effect of Product Appeal and Website Appeal (Separately) on Purchase Intention				
Effect of Website Appeal on Purchase Intention	0.304	0.448	60.78***	(5, 237)
Effect of Product Appeal on Purchase Intention	0.445	0.448	1.27 n.s.	(5, 237)