# Mechanisms to increase system quality and B2C e-commerce reuse: An empirical test

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## Abstract

Many studies have investigated factors affecting B2C e-commerce website adoption and success. While system quality is an essential dimension of e-commerce website success, it has not yet been explored in depth. This study proposes a model that investigates the role of user interface design (in terms of Design Aesthetics-DA and Picture Aspects-PA) and soft security protection in terms of Third-Party Seal (TPSs) displaying the logo as three antecedents of system quality and their effect on the intention to reuse e-commerce websites. The research model was tested using a sample of 328 experienced online shoppers using PLS. The results suggest that DA and PA impact intention to reuse e-commerce websites via the mediation of system quality, while TPS was not found to play an important role. The results provide valuable insights for researchers and practitioners aiming to enhance e-commerce B2C success by potential customers.

**Keywords**: B2C e-commerce, Reuse, System quality, User interface design, Third-Party seal.

## Introduction

The increasing popularity of the Internet has attracted both businesses and consumers to reap the benefits offered. The Internet offers possibilities for both consumers and companies to engage in e-commerce. The benefits of e-commerce for consumers and businesses have been well investigated (Rouibah, P. B. Lowry, & Al-Mutairi, 2015; Rouibah, Lowry, & Hwang, 2016).

With the COVID-19 pandemic, e-commerce is becoming indispensable for everybody anywhere and at any time. It has been recognized to play a significant role in our lives and the global economy. Worldwide e-commerce, including B2C and B2B, is estimated at $26.7 trillion by 2021 (UN, 2021), while the volume of e-commerce B2C is expected to reach $5 trillion in 2022 and $6 trillion by 2024 (Intelligence, 2022), and expected to surpass $ 7.45 trillion by 2030 (Newswire, 2022). At the same time, Statista (2022) estimates the volume of e-commerce to reach $ 8.5 trillion by 2022, $10.98 trillion by 2024, and $13.91 trillion by 2026 (Newswire, 2022). In addition, mobile commerce sales are projected to reach $3.56 trillion in 2022—22.3 percent more than the $2.91 trillion it registered in 2021 (Oberlo, 2022), and this phenomenon is increasing.

The COVID-19 crisis accelerated an expansion of e-commerce towards new firms, customers, and types of products. It has provided customers with access to a significant variety of products from the convenience and safety of their homes. It has enabled firms to continue operations despite contact restrictions and other confinement measures. Therefore, understanding B2C e-commerce success is becoming more crucial than ever before (K. Rouibah, P. B. Lowry, & L. Al-Mutairi, 2015). Improving B2C e-commerce success can

support business adaptation efforts to the new structures and models of doing business during a pandemic such as the COVID-19 outbreak (OECD, 2020). This study defines e-commerce success as factors that encourage customers to buy and rebuy from e-commerce websites.

Prior studies have investigated a variety of driving and hindering factors of e-commerce success, including individual, technological factors, environmental factors, and organizational factors, e.g., see literature review studies (Akter & Wamba, 2016; Bell, McCloy, Butler, & Vogt, 2020; Liao, Palvia, & Lin, 2006; Lim, Jin, & Srai, 2018; Mashiur Rahman, 2018).

In the e-commerce field, many researchers have focused on the success factors that encourage users to buy from e-commerce websites (Colla & Lapoule, 2012; Rouibah, 2015; K. Rouibah et al., 2015; Rouibah et al., 2016). These studies were centered around the Delone and McLean information system success model (Jeyaraj, 2020) and have identified system quality (DeLone & McLean, 1992, 2004; Shi & Yuan, 2019; Wang, 2008), and user interface design (Chopdar & Balakrishnan, 2020; D. Cyr, Head, & Larios, 2010; Dianne Cyr, Head, Larios, & Pan, 2009; Sung & Yun, 2010) as essential determinants of website success.

Security attacks are also increasing with the increased use and adoption of B2C and mobile commerce. The global cybercrime damage is estimated to reach $6 trillion per year, $16.4 billion in damage per day, $684.9 million per hour, $11 million per hour, and $190000 per second (Institute, 2021). Cybercrimes include various attacks, including VirWare, TrojWare, Ransomware, spoofing, and phishing websites. To lessen customer fear perceptions towards e-commerce, many prior studies have focused on understanding the role of many factors, including quality attributes (information, system, and services) (K. Rouibah et al., 2015; Wang, 2008), trust (Karahanna, Williams, Polites, Liu, & Seligman, 2013; Rouibah et al., 2016), electronic trust (Gefen & Straub, 2004), cultural factors (e.g., uncertainty avoidance) (Karahanna et al., 2013), security (Rouibah et al., 2016), and Third-party seal (TPS) (Jin, Park, & Kim, 2008; C. Kim, Tao, Shin, & Kim, 2010; Rouibah et al., 2016).

The final success of e-commerce will be dependent on the means and tools implemented by the B2C providers to secure their gateway and get customers to accept, trust, and feel safe when they transact with the B2C provider. First, the provider must have a reliable, highly available infrastructure so that the services are always available. Second, the infrastructure of the e-commerce platform must be secured against accidental or fraudulent misuse. Security management must be installed for the service provider to combat non-technical and technical attacks on the infrastructure and the service itself.

While prior studies focused on different factors, this study will focus on the role of User Interface Design (UID) and TPS as antecedents of system quality on e-commerce success for the following reasons. First, while system quality is an essential determinant of B2C success (DeLone & McLean, 2016; K. Rouibah et al., 2015; Wang, 2008), prior studies have not fully represented it and have overlooked the usability and security aspects of this construct. UID and TPSs did not receive the due attention as antecedents of system quality. Second, despite the growing popularity of TPS among B2C e-commerce websites and advocates that TPS plays a vital role in lessening customer risk perceptions and increasing their trust toward the B2C provider, very few papers have focused on the consequences of TPS in e-commerce (Hu, Wu, Wu, & Zhang, 2010; Kim, Ferrin, & Rao, 2008; Li, Jiang, & Wu, 2014; Lowry et al., 2012; Miyazaki & Krishnamurthy, 2002; Özpolat & Jank, 2015). Third, existing academic literature that used TPS logos provides mixed results about its consequences on e-consumer behavior (Hu et al., 2010; Kim et al., 2008; Li et al., 2014; Lowry et al., 2012; Miyazaki & Krishnamurthy, 2002; Özpolat & Jank, 2015; Rouibah et al., 2016). Fourth, to date, no study has explored the role of TPS on system quality. Fifth, uncertainty avoidance was found to be an essential factor that inhibits e-commerce adoption (Karahanna et al., 2013; Yoon, 2009). Therefore, this research digs deeper and investigates the impact of TPS in a culture when uncertainty avoidance is high.

This study, therefore, aims to answer the following research question: What is the role of TPS, besides user interface design (intern of picture aspects and design aesthetic), on the intention to reuse B2C e-commerce websites via the mediation of system quality?

This study is among a few studies that test the impact of two factors (presence of TPS and user interface design through its constituent-design aesthetic and picture aspects) on continuous intention to reuse B2C e-commerce websites via the mediation of system quality.

The study's structure is as follows: the following section will address the literature review and research model. Next, we present the methodology, survey instrument development, and distribution. Data analysis and results follow. Lastly, we discuss the main research contributions, limitations, and implications for research and practice, and finally, we conclude.

## Literature review and research model

### E-commerce in GCC and Kuwait

The Arabian Gulf Cooperation Council (GCC) countries includes six countries with a population of 54 million and among the highest internet penetration countries (Bureau, 2022; Stats, 2022): Qatar (P[1]=2.508; IP= 104.3 %), United Arab Emirates (P=9.915; IP=103.3 %), Kuwait (P=3.058; IP= 98.3 %) and Bahrain (P= 1.540; IP= 97.7 %), Saudi Arabia (P=35.354; IP=90.1 %) and Oman (P=3.764; IP=76.8 %). Forty-five percent of the population comprises people between 25 and 40 years old who are heavy Internet shoppers, thus making the GCC a good target for e-commerce. This age group in the GCC is well educated and has grown up using technology and mobile devices. As in most other countries, E-commerce in GCC is also in high demand and increasing yearly, especially post the COVID-19 pandemic. It is estimated to reach $52 billion by 2025, according to Kearney Middle East, a management consulting firm (Kearney, 2022). According to Kearney Middle East, the volume of e-commerce in Kuwait is estimated to reach $4 billion by the end of 2022 and $5 billion by 2024. In addition, Middle East Kearney (2022) found people born after 2000 in KSA and UAE have an annual average expenditure that jumped by about 30 percent between 2018 and 2019, reaching $600 and $1,280, respectively.

In addition, usage of e-payment systems is increasing in the GCC, and there is a shift from cash usage to e-payment (Rouibah, 2015), contributing to the ease of B2C transactions. The total volume of e-payment in Kuwait in 2021 over KNET totaled $90 billion, which is a 46% increase compared to 2020. This amount results from 558 million electronic payment transactions-based debit/credits cards, point of sale, integrated points of sale, electronic stamps, and mobile payment (Kuwait, 2022). KNET is a Kuwaiti shared automated banking services company established in 1992 in partnership with all local banks to link the systems of local banks to provide a range of banking services with advanced technologies. In addition, the number of electronic payments operations-based Internet via KNET in 2021 amounted to 159 million transactions, making it worth $ 32 billion. Also, the government electronic payment system "Tasdeed" amounted to $1 billion and increased in 2021 by 45 percent. Tasdeed is an electronic payment system that facilitates government transactions online at the level of individuals, either residents or citizens (Rouibah & Al-Qirim, 2017). Furthermore, the number of electronic government stamps issued reached 13 million representing a valuation of $531 million.

### Behavioral model to study e-commerce adoption

Since its emergence in 1995, the e-commerce phenomenon has been studied from different perspectives and uses various theories and models to explain user acceptance and success of e-commerce. A variety of theories and models were proposed, such as Theory of Reasoned Action, Theory of Planned Behavior,

Technology Adoption Model and its variations (TAM), technology- Organization-environment model, diffusion of innovation theory, unified technology acceptance and use of technology model and its variations (UTAUT), information success model of Delone and McLean, and combined models (Rouibah & Al-Qirim, 2017; Rouibah, Thurasamy, & May, 2009). These theories and models investigated many factors that impact individual use of e-commerce, i.e., purchases from e-commerce websites, from different perspectives (Boateng, Molla, & Heeks, 2009).

**System quality**

System quality measures the desirable characteristics of the e-commerce system (DeLone & McLean, 2003). Prior studies (DeLone & McLean, 1992, 2004; Rouibah et al., 2015) reviewed studies that have proposed different system quality dimensions. However, no study investigated the influence of UID and TPSs on system quality. Other studies investigated the role of system quality on intention to use B2C websites (e.g. (K. Rouibah et al., 2015; Shin, Kim, Park, & Oh, 2018; Wang, 2008)). These studies found system quality is an important antecedent of success of B2C website. Some studies identified dimensions of website usability (Alotaibi, 2013) and developed and tested WebQual for assessing the website quality (Shi & Yuan, 2019). Thus, we this study hypothesize:

H1: The system quality of an e-commerce website will positively influence the intention to reuse B2C websites.

**User Interface Design (UID)**

UID refers to system quality characteristics and is an essential element of designing effective websites. The importance of UID in e-commerce may be derived from the fact that websites have become more competitive with thousands of competing websites competing for consumers' visual attractiveness (Chopdar & Balakrishnan, 2020). According to the visual rhetoric theory (Scott, 1994), the graphic design effect appeals to customers.

Prior studies have investigated the effect of UID (design aesthetic-DA, visual aspect-VA) on the intention to use B2C (D. Cyr et al., 2010; Dianne Cyr et al., 2009; Sung & Yun, 2010). Nöteberg (1999) found that among factors that made customers trust vendor websites was the design of the website. However, UID is well recognized in literature, and prior studies found mixed results of its consequences. A group of studies found that visual design (e.g., colors, font style, graphical information, shape, and size) improves website aesthetics, which in turn results in more positive responses and intention to use (Chopdar & Balakrishnan, 2020; D. Cyr, Head, & Ivanov, 2006; Kim & Stoel, 2004; Sung & Yun, 2010). In comparison, other studies failed to find such an association (Éthier, Hadaya, Talbot, & Cadieux, 2008; Shaouf, Lü, & Li, 2016). Other studies proposed items to measure user interface design that include a combination of visual aspect and picture aspects but was not tested (Kuo & Chen, 2011). However, no prior study has examined the effect of design aesthetic and picture aspects as distinct factors and antecedents of system quality. This study explores UID through design esthetic (background color, font size, and combination of colors) and picture aspects (availability of pictures, sizes and quality of the pictures) and we posit for the first time:

H2: The design aesthetic of an e-commerce website will positively influence the perceived system quality.

H3: Picture aspects of an e-commerce website will positively influence the perceived system quality.

**The Third-Party Seal (TPS)**

Third-Party Seal (TPS) logo is a visual picture attached to a B2C e-commerce website to increase customer trust and perceived security. Prior studies found that customers are less aware of privacy seals and cookies than encryption (Vakeel, Das, Udo, & Bagchi, 2017). Since a "normal consumer" cannot evaluate the technical protection of the B2C website, TPS is a visual logo that is advocated to catch customers' attention to trust the vendor. It also informs consumers of B2C providers' compliance with the rules regarding privacy and security and assures protection of these two factors (Lowry et al., 2012; Rouibah et al., 2016). There are many trusted organizations that provide such logos including: Trustee, Trustwave, VeriSign, BBBOnline, Trust Guard, Thawte, Geotrust, and Norton. A study from Princeton Survey Research Associates (2002), in (Head & Hassanein, 2002), reports that 60% of respondents thought that a website's display A TPS was at least somewhat important, and the importance of seals-of-approval declines somewhat with experience.

Prior studies have investigated the effect of TPS on trust (Kim et al., 2008; Miyazaki & Fernandez, 2000; Rouibah et al., 2016; Vakeel et al., 2017; Yang, Hung, Sung, & Farn, 2006), risk (Kim et al., 2008; Rouibah et al., 2016; Vakeel et al., 2017) initial trust (Hu et al., 2010; Li et al., 2014), privacy (Hui, Teo, & Lee, 2007; Lowry et al., 2012; Miyazaki & Krishnamurthy, 2002)., 2012), size of B2C vendors, and characteristics of product and customers (Özpolat & Jank, 2015). For example, Li et al. (2014) used a lab-controlled experiment with students from a public university in China and found that TPSs increase initial trust for online shoppers. Özpolat and Jank (2015) examined a dataset of thousand online transactions across 493 online retailers. They found TPSs are more effective for small online retailers and new online shoppers and TPSs are more effective for expensive products and only when presented at the later stages of shopping cycle.

While the popularity of TPS logos among B2C websites increased, current literature offers conflicting results about its effect on consumer behavior among those that found a positive impact (Connolly & Bannister, 2007; Li et al., 2014; Rouibah et al., 2016), those that found with mixed results (Hu et al., 2010; Hui et al., 2007; Kim et al., 2008; Özpolat & Jank, 2015) and those who failed (Hui et al., 2007; Lowry et al., 2012; Nöteberg, 1999). In addition, no study has explored the effect of TPSs on system quality despite it being is a visual picture logo.

H4: The presence of a TPS on an e-commerce website will increase perceived system quality.

Based on the previous discussion, we developed the following research model, as shown in Figure 1.
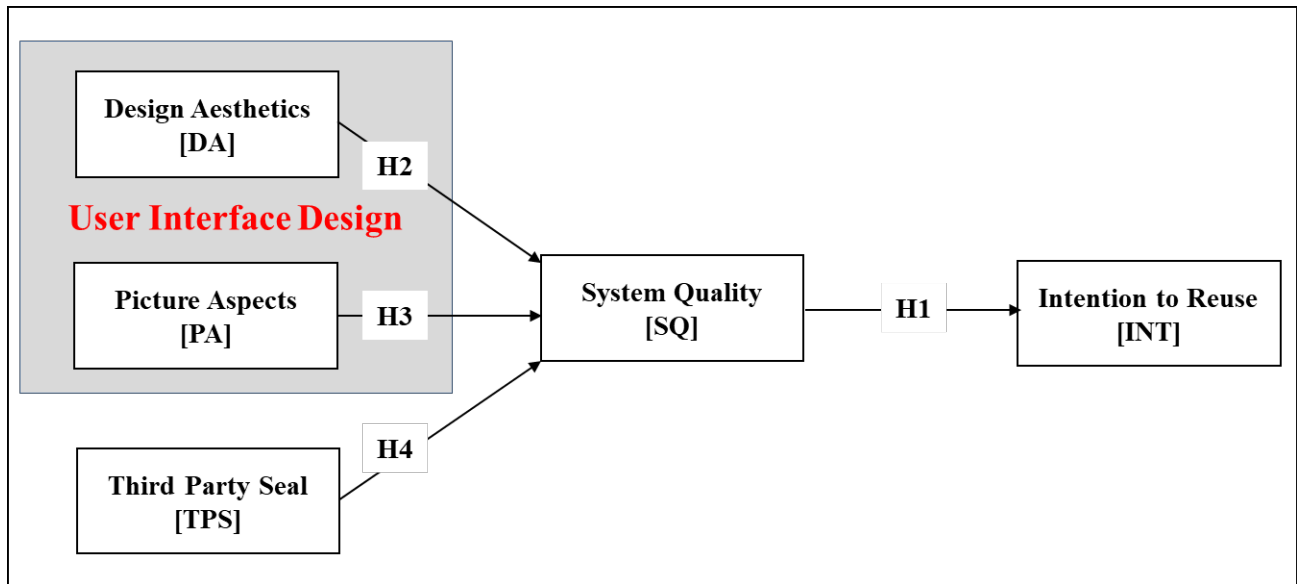
**Figure 1. The proposed research model**

## Methodology

In answering the research questions, this study employed a methodology based on a quantitative method that consisted of a survey questionnaire.

**Subject and procedure and data collection**

The target sample was online shoppers from Kuwait who experienced purchasing products or services over the Internet. The questionnaire was designed to capture the participant's most recent experience with the latest website from which they recently purchased. In this research, we did not assign a specific website for evaluation by the participants. Instead, our goal is to measure the users' experience in purchasing at B2C websites and evaluate our research model accordingly. Therefore, we asked the participants to write the name of the last website they had purchased, and the type of product or service they bought from that website, and we requested that they answer the survey questions accordingly. Through this approach, we tested the research model in the e-commerce context in general and not for a particular e-commerce website.

A survey instrument was then developed to assess and measure the five constructs of the research model (system quality, design aesthetic, picture aspects, TPS, and intention to reuse). Questions included three categories—the first measures demographic data (gender, age, education, status). The second category measures internet and e-commerce activities (type of activities done over the Internet, frequency of online purchasing, type of product purchased online, frequency of buying from the recalled B2C website). The third category measures were raised regarding participants' perceived success factors of the B2C e-commerce websites regarding the research model. Items of the third category were measured on a five-point Likert scale ranging from (1) for strongly disagree to (5) for strongly agree. This survey was then pretested by four experts in the field who reviewed it for understandability and readability. After this stage, surveys were created online using Qualtrics' online survey platform. Arabic and English versions of the questionnaire were distributed using two techniques.

A complete directory of accessible customers in Kuwait was not available to the researchers; we thus used a combination of convenience sampling with snowball-sampling techniques as an alternative method, which is common in consumer studies (Pinsonneault & Kraemer, 1993). We targeted students in an introductory

information system at a leading public business school in Kuwait, who had been introduced to e-commerce, and graduates randomly selected from the same business school. We targeted university students because they can be characterized as "digital natives" (Margaryan, Littlejohn, & Vojt, 2011) and are thus an excellent customer segment for understanding trends in e-commerce activities. Data was collected during December-January 2021-2022. We sent our target respondents an invitation email address letter requesting them to complete the survey. We also asked them to suggest others to whom we could also distribute the survey, which may include their friends, family members, and colleagues. We also separately distributed it to several popular social network groups/forums/ in Kuwait. A total of 537 online surveys were received. To prevent multiple entries, respondent identities were confirmed through email and IP addresses when the questionnaires were received. Of the 537 received responses, 150 were removed for incompleteness and 53 for not passing two "attention trap" questions designed to see whether the participants were carefully reading and answering all the questions. Our final sample consisted of 328 valid responses.

## Construct measurement

Items were reused from past validated scales to ensure content validity: system quality was modeled as a second-order formative composed of ease of use (8 items), reliability (4 items), and security (4 items) (Kuo & Chen, 2011; K. Rouibah et al., 2015), user interface design measured by visual aspect (3 items) and picture aspects (3 items) from Kuo and Chen (2011), and TPS (4 items) from Rouibah et al. (2016) and intention to reuse (3 items) from Rouibah et al. (2015).

# Results

## Demographic Data

Table 1 portrays the demographic data of participants. As shown in Table 1, the target sample in Kuwait was experienced online shoppers who had previously purchased products or services over the Internet. Of the 328 respondents, 71% were female, and 29% were male. About three-quarters of the sample (75%) were less than 30 years old, and 17.0% were 31-40 years old. More than half (64 %) of the respondents have a bachelor's degree, 12.2% have a high school degree or lower, 16.5% hold a master's degree, 4.3% have a Ph.D. degree, and 3 attended two years of college.

**Table 1. Demographic data of the sampled participants**

| Variable | N | % |
|---|---|---|
| **Gender** | | |
| Male | 95 | 29.0 |
| Female | 233 | 71.0 |
| **Age** | | |
| Less than 20 years | 87 | 27 |
| 21–30 years | 156 | 48 |
| 31–40 years | 55 | 17 |
| More than 40 years | 30 | 9 |
| **Education Level** | | |
| High school & lower | 40 | 12.2 |
| Diploma degree (2 years university degree) | 10 | 3.0 |
| Bachelor's degree | 210 | 64.0 |
| Master's degree | 54 | 16.5 |
| Ph.D. Degree | 14 | 4.3 |

### B2C e-commerce activities

Table 2 displays participants' e-commerce activities. Most of the respondents use the Internet to send and receive emails (91.8%), search for information on the Web (91.5%) and use the Internet for chatting (45.1%). Others specified they use the Internet for other activities such as downloading software, finding information for studies, searching for health and medical information, telephone calls on VoIP, listening to music, downloading and watching movies and series, paying bills, reading eBooks, saving data online using cloud services, file sharing, searching for scientific articles on online databases, and for e-learning.

Slightly four out of five (79.3%) use the Internet for blogging and participating in social networks, and 26.5% to play online games. Nearly a third (32%) of the respondents shop online two to four times per year; slightly more than a quarter (25.6%) shop 5 to 10 times per year; 23.2% shop ten or more times per year; and 19.2% shop online at least once per year.

**Table 2. B2C activities of the sampled participants**

| E-Commerce Activity | N | % |
|---|---|---|
| **Internet activities** | | |
| Send & receive emails | 301 | 91.8 |
| Searching for information on the Web | 300 | 91.5 |
| Blogging & participating in social networks | 260 | 79.3 |
| Chatting | 148 | 45.1 |
| Play Online game | 88 | 26.9 |
| Play online games | 87 | 26.5 |
| Other activities | 40 | 12.2 |
| **Frequency online purchasing** | | |
| Once a year | 63 | 19.2 |
| 2 to 4 times a year | 105 | 32 |
| 5 to 10 times a year | 84 | 25.6 |
| More than 10 times a year | 76 | 23.2 |
| **Type of purchased products** | | |
| Clothing | 89 | 27.1 |
| Electronics / computers | 52 | 15.9 |
| Travel (airline tickets / hotel booking) | 45 | 13.7 |
| Accessories / bags / watches | 42 | 12.8 |
| Books / magazines / newspapers | 29 | 8.8 |
| Order restaurants | 21 | 6.4 |
| Software | 8 | 2.4 |
| Music / Videos | 4 | 1.2 |
| Sport equipment | 3 | 0.9 |
| Other | 35 | 10.7 |

In descending order, and according to the most recent product or service that participants purchased from e-commerce websites, the most purchased products fell into the following categories: clothes (27.1%), electronics/computers (15.9%), traveling (airline tickets and hotel booking) (13.7%), accessories, bags and watches (12.8%), books and magazines and newspapers (8.8%), a small percentage use B2C e-commerce websites to order form restaurant (6.4%), software (2.4%), music and videos (1.2%), and sports equipment (0.9%), while 10.7% use B2C websites to purchase other products such as (jewelry,

health products, video games, makeup and beauty products, skin care products, cinema tickets, food and cosmetics, shoes, baby accessories, wedding accessories, birthdays supply, expensive pens, installment payment, fishing rods, crochet books and tools, football tickets, cars, electronic cigarette and Medicine products, and hobby equipment).
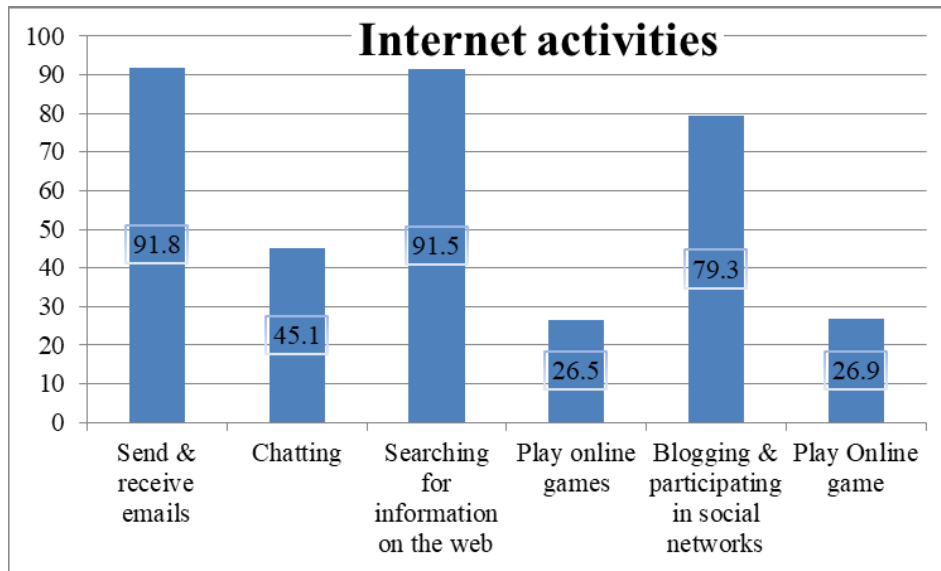


**Figure 2. Internet activities of the sampled participants**

## Factor analysis and reliability

This study used partial least squares (PLS) regression using SmartPLS version 3.2.7 (Ringle, Wende, & Becker, 2015). We used the PLS to perform data validation to establish: (i) the factorial validity of the reflective measures through convergent, and discriminant validity, (ii) that multicollinearity was not a problem for any of the measures, (iii) validity of the formative measure (system quality), (iv) check for common-method bias, and (v) strong reliabilities exist.

We first conducted a factor analysis to check convergent validity, i.e., whether the instrument's items loaded on their due factor. Table 3 shows the items retained, the five-factor loadings, and reveals that all items' loadings were significant, except for three that were deleted (as symbolized by "(d")) for the remaining analysis. The criteria we used to keep these items according to Hair, Hult, Ringle, and Sarstedt (2021) are: (i) Items defining the various factors all had communalities greater than 0.50; (ii) Extracted factors accounted for greater than 50% of the variance in their sets of items; (iii) all factors have Eigen-values greater than 1.0; (iv) all item loadings were greater than 0.60; and (v) all factors are interpretable.

**Table 3. Factor analysis, collinearity Statistics, and Reliabilities for Constructs**

| Latent construct & Items | Loading | Mean | SD | Cronbach α | CR | AVE | VIF |
|---|---|---|---|---|---|---|---|
| **Picture aspect (PA)** | | | | | | | |
| PA1: The website provides authentic and real pictures of products | 0.824 | 4.13 | 0.75 | 0.806 | .842 | 0.642 | 1.723 |
| PA2: Pictures of products are provided in different sizes. | 0.699 | 3.79 | 0.935 | | | | |
| PA3: The website shows high quality and clear pictures | 0.871 | 4.05 | 0.818 | | | | |
| **User Interface Design (UID)** | | | | | | | |
| VA1: Font sizes of the website are effectively used to distinguish between title and content | 0.836 | 3.98 | 0.759 | 0.825 | .873 | .696 | 1.735 |
| VA2: Font color of the website is effectively used to distinguish between information displayed | 0.839 | 3.92 | 0.78 | | | | |
| VA3: The combinations of colors used in the webpages are well selected (e.g., Background). | 0.827 | 4 | 0.745 | | | | |
| **Third-party seal (TPS)** | | | | | | | |
| TPS1: I prefer to buy from websites that carry "third-party seal" | 0.609 | 4.18 | 0.853 | 0.928 | .907 | .714 | 1.356 |
| TPS2: Third-party seals make me feel more comfortable to buy from the website | 0.905 | 4.24 | 0.839 | | | | |
| TPS3: Third-party seals make me feel more secure in terms of privacy. | 0.909 | 4.02 | 0.877 | | | | |
| TPS4: Third-party seals make me feel safer in terms of the transaction. | 0.916 | 4.04 | 0.856 | | | | |
| **Intentions to reuse (IR)** | | | | | | | |
| IR1: Assuming that I have access to the website, I intend to reuse it | 0.891 | 4.37 | 0.712 | 0.921 | .862 | .676 | 2.015 |
| IR2: I will reuse the website in the future | 0.895 | 4.39 | 0.715 | | | | |
| IR3: I will frequently use the website in the future | 0.830 | 4.24 | 0.789 | | | | |

Table 3 shows that perceived picture aspect (means between 3.79 and 4.13), UID (means between 3.92 and 4.00), and TPS (means between 4.02 and 4.24) are essential factors of B2C reuse. The reuse of B2C e-commerce from where they last purchased is also rated high (means between 4.24 and 4.39).

**Assessing construct convergent validity and discriminant validity**

We assessed the convergent validity (measured by Cronbach's α, composite reliability, and average variance extracted) and discriminant validity of the structural model, which were achieved through factor analysis.

The overall reliability coefficient Cronbach's α, shown in Table 3, was comprised between 0.726 and 0.928 and thus satisfied the criteria of Hair et al. 2021. All constructs' composite reliability (CR) varies from 0.803 to 0.907, therefore within the recommendations' range and larger than the 0.70 cut-off (Fornell & Larcker, 1981b). All values of Average Variance Extracted (AVEs), see Table 3, vary from 0.506 to 0.811, which were above the 0.50 proxy (Fornell & Larcker, 1981a; Hair et al., 2021). All three criteria (Cronbach's α, CRs, and AVEs) support convergent validity.

We assessed the discriminant validity using two approaches (Gefen and Straub (2005). The first one inspected the factor loadings to ensure significant overlap did not exist between the constructs. The second approach examines the square roots of the AVEs described in (Fornell & Larcker, 1981b). According to Fornell and Larcker (1981b), constructs have adequate discriminant validity if the square root of the AVE for a construct is higher than the variance shared between the constructs and other constructs in the model. Table 4 shows the shared variance ($r^2$) among variables obtained by squaring the

correlations was less than the values of AVE. Therefore, strong discriminant validity was demonstrated for the five factors using both approaches (see Table 3 for the first and Table 4 second approaches). All the AVE thresholds were exceeded for all latent constructs.

**Table 4. Correlation matrix between latent constructs [[a]CR, [b]AVE in BOLD]**

| Latent construct | 1. | 2. | 3. | 4. | 5. | 6. | 7. | 8. | 9 |
|---|---|---|---|---|---|---|---|---|---|
| 1. SQ ease-of-use (SQE) | .482 [a] | .703 [b] | | | | | | | |
| 2. SQ reliability (SQR) | .404 | .643 | .725 | | | | | | |
| 3. SQ security (SQS) | .412 | .464 | .456 | .801 | | | | | |
| 4. System quality (SQ) 2nd order | .519 | .799 | .885 | .716 | N/A | | | | |
| 5. Picture aspect (PA) | .375 | .401 | .362 | .375 | .455 | .701 | | | |
| 6. Visual aspects (VA) | .470 | .443 | .450 | .417 | .521 | .512 | .824 | | |
| 8. Third-party seals (TPS) | .230 | .209 | .165 | .244 | .235 | .358 | .284 | 825 | |
| 9. Intentions to reuse (IR) | .480 | .384 | .407 | .402 | .491 | .423 | .433 | .383 | .822 |

## Model validation and results

The fit indices of the measurement model show converged and reasonably fit indices ($\chi^2$=4044.51, SRMR=0.052; and NFI=0.784). In sum, factor loading coefficients, squared multiple correlations, composite reliability, AVE, and model fit indices suggest that the measured latent factors explain the variances of corresponding latent constructs, supporting the validity of the measures (Hair et al., 2021).

Regression analysis was conducted to examine the relationships between the five constructs in the research model (see Figure 1). The results of the tested model are shown in Figure 4, and the results of the path analysis are displayed in Table 5.

**Table 5. Results of path analysis**

| Hypotheses (Path) | Path coefficient ($\beta$s) | P-value | t-value | Significant or Not Significant |
|---|---|---|---|---|
| H1: The system quality of an e-commerce website will positively influence the intention to reuse B2C websites. | 0.420 | 0.000 | 10.210 | Yes |
| H2: The design aesthetic of an e-commerce website will positively influence the perceived system quality. | 0.382 | 0.000 | 9.860 | Yes |
| H3: Picture aspects of an e-commerce website will positively influence the perceived system quality. | 0.220 | 0.005 | 5.430 | Yes |
| H4: The presence of a TPS on an e-commerce website will increase perceived system quality. | 0.030 | 0.066 | 1.181 | No |
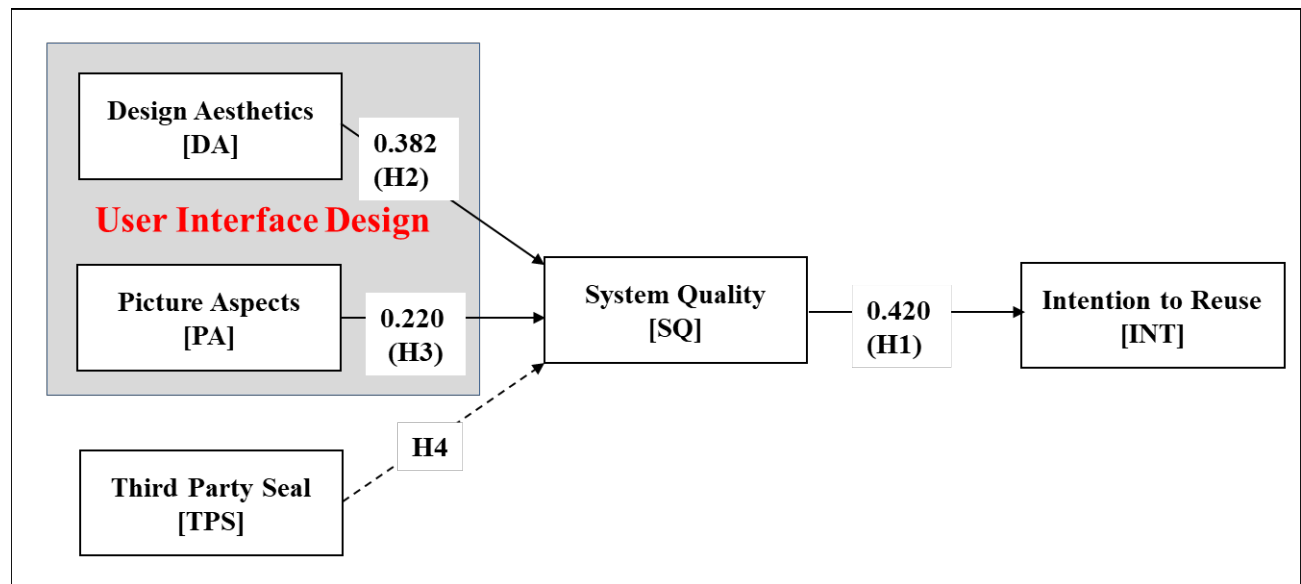
**Figure 4. Results of the tested model.**

Among the four hypotheses, Table 5 shows that only three were valid. User interface design in terms of visual aspect (β= 0.382, t=9.860) and picture aspect (β=0.220, t=5.430) have a direct influence on system quality, while our results failed to find a significant effect of TPS (β=0.030; t=1.181) on system quality. Among these two factors, the visual aspect affects system quality more strongly than the picture aspect. Also, system quality (β=0.030; t=1.181) has a direct effect on the intention to reuse B2C websites. The model explains 35.2% of the total variance of system quality ($R^2$=o.352) and intention to reuse ($R^2$=47%). This result supports H1, H2, and H3, while we find no support for H4.

## Discussion

This study highlights the importance of a website's user interface design and security aspects and their indirect effect on the intention to reuse a B2C website via the mediation of system quality. This study has achieved the following contributions.

Results of this study support results of prior studies that found the direct effect of system quality on intention to reuse B2C websites support previous studies that applied DeLone and McLean (2003) (Brown & Jayakody, 2008; K. Rouibah et al., 2015; Shin et al., 2018; Wang, 2008). Our results also extend those of previous models that focused on antecedents of system quality (Khayun, Ractham, & Firpo, 2012; McGill & Klobas, 2005; Rana, Dwivedi, Williams, & Lal, 2015; Teo, Srivastava, & Jiang, 2008) and for the first time, we added TPS as a new antecedent.

The study highlights the importance of website design aspects in terms of B2C reuse and success. Unlike prior research (Éthier et al., 2008; Van der Heijden, 2003), which found mixed results on the impact of user interface design on system quality, our findings highlight that the most critical factors that affected system quality were design aesthetics and picture aspects, which is in line with previous literature displaying the importance of such elements for customer satisfaction (D. Cyr et al., 2010; Sung & Yun, 2010).

While our model hypothesized a link between TPS and system quality, we did not find a significant impact of TPS on system quality. This result corroborates with results of prior studies that failed to find a significant effect of TPS on intention to use B2C websites (Nöteberg, 1999), TPS on intention to disclose personal information online (Hui et al., 2007), TPS on perceived privacy assurance/ protection (Lowry et al., 2012). Also, our results partially contradict prior studies' findings that mixed results of TPS's role. TPS has a small

effect on initial trust in B2C (Hu et al., 2010), TPS has no effect on consumer trust but has a negative impact on perceived risk (Kim et al., 2008), TPS did not induce participants to disclose their personal information, but TPS has a positive effect on customer trust and assurance perception toward B2C website (Hui et al., 2007). TPS is effective for higher-value shopping carts (expensive products) but only in the latter stages of the shopping cycle (Özpolat & Jank, 2015). Finally, our result entirely contradicts those who found a significant and positive effect of TPS on Trust in Internet shopping (Connolly & Bannister, 2007); TPS on trust and risk (Rouibah et al., 2016), positive effect of displaying trust assurances on initial trust (Li et al., 2014). Three potential explanations for the lack of TPS effect on the intention to reuse could be advocated. The first one is that participants in the study may not have been aware of such TPS seals. A second reason may be that participants did not see the TPS even though it was attached to the B2C websites, possibly meaning the position placement of the TPS on the website is a vital attribute to examine for future research. Third, the lack of TPSs effect may be due to cultural effect, suggesting future studies to include both extra factors that measure the effect of culture besides the knowledge of TPSs.

Lastly, the findings of this study could provide unique insights for both researchers and professionals to better understand the role played by antecedents to system quality and to suggest ways to increase B2C website reuse. From a managerial perspective, this study highlights the importance of investing in user interface design and proper font sizes, font colours, and color combinations for B2C website owners. Furthermore, the picture aspect is also crucial as a system quality signal for providing authentic pictures and products in different sizes and high-quality graphics. Therefore, B2C website owners should also invest in proper high-quality pictures.

## Limitations and future research

Similar to studies in social sciences, our investigation suffers from three limitations. First, participants might have suffered from form-recall bias since we asked them to remember the last B2C website from where they previously purchased and then complete the survey. While this approach was used by previous studies (Wang 2008; Rouibah et al., 2015), we encourage future studies to explore other methodological approaches such as longitudinal studies and classic experimentation. Second, the influence of product type design aesthetic, pictures aspect, and TPS on the system quality dimension of B2C website system success can differ according to product type and price.

Third, this study focused on antecedents of system quality and their effect on the intention to reuse B2C websites but omitted to include other factors of the Delone & McLean success model. Prior studies have established the influence of product type and price on the vendor attributes (i.e., brand name, website quality, information quality, service quality, perceived value, and satisfaction) as well as on the consumer's risk perception and the purchase intention (Girard & Dion, 2010). Thus, we suggest future studies include additional factors (other components of the Delone & McLean model) with the presence of TPS, "knowledge of TPS," and cultural factors (e.g., uncertainty avoidance). Prior studies (Karahanna et al., 2013) have shown that it affects e-commerce adoption, especially in a culture characterized by high uncertainty avoidance, and then test the new model in different cultures with such characteristics (e.g., compare the model between Arab countries and south-eastern European countries).

## Conclusion

This study focused on the antecedent of system quality, an essential factor in DeLone and McLean's IS model in the e-commerce field in Kuwait. Results revealed that only two antecedents (design aesthetic and picture aspects) influence intention to reuse B2C via the mediation of system quality. Among the two-user interface design, design aesthetics appears to be the most significant factor in the intention to reuse online B2C e-commerce websites. This indicates that meeting user requirements in terms of design

aesthetic and picture aspect may be a foundation to build on competitive advantage for online shopping websites.

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