Inf Syst Front (2015) 17:1283–1299
DOI 10.1007/s10796-014-9499-0

E-commerce web site loyalty: A cross cultural comparison

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Published online: 14 May 2014

Abstract This study investigates the factors that affect e-loyalty in e-commerce websites. The e-loyalty model proposed in this study is based on DeLone and McLean's IS Success Model. E-loyalty is explained using three independent factors (information quality, system quality, and service quality), and two mediating factors (trust and customer satisfaction). The proposed model was tested with Thai and Taiwanese samples using Structural Equation Modeling (SEM) data analysis. The study yielded different results when Thai and Taiwanese samples were tested using SEM multi-group moderation data analysis. This study incorporated the concepts of national identity (NATID) and Hofstede's five cultural dimensions to better explain cultural differences between the two countries and how culture can affect the e-commerce environment.

Keywords E-loyalty model · IS success model · Information quality · System quality · Service quality · Trust · Customer satisfaction · B2C E-commerce · Nationality and cultural difference · Structural equation modeling

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1 Introduction

Due to the high level e-commerce penetration over the last decade, e-loyalty has become an important issue in e-commerce research. Previous studies on e-loyalty have investigated the relationships among various constructs, such as trust, customer satisfaction, and service convenience (Lee et al. 2012; Lai et al. 2012). However, few studies have examined all of these relationships in their e-loyalty models (Kassim and Ismail 2009; Brown and Jayakody 2008). To address this gap in the literature, the current present study proposes an integrated e-loyalty model based on the refinement of the original DeLone and McLean IS success model (Petter et al. 2013).

Cultural differences due to national identity have been known to affect consumer perceptions with regard to the successful use of information technology (Leidner and Kayworth 2006). However, previous studies of e-loyalty tend to be based on a single country, without taking the issues of culture differences into consideration. There are thus only a few studies which compare two or more different countries (or cultures) in examining an e-loyalty model in the context of e-commerce websites (Toufaily et al. 2013).

Although they are both in South-East Asia, Thailand and Taiwan have relatively different populations, with different levels of education, income, and standards of living. This study thus uses these two countries to examine the differences in terms of national identity and cultural dimensions, and how these affect e-loyalty. More specifically, this study applies the concepts of national identity (NATID) and Hofstede's five dimensions cultural measures to investigate this issue.

This study intends to answer the following two research questions: 1) What are the antecedents of e-loyalty and what are its relationships with other constructs? 2) How do e-loyalty and its relationships with other constructs differ in Thailand and Taiwan? Based on these questions, the main objective of the study is to develop and empirically test an

integrated model of e-loyalty based on DeLone and McLean's IS success model. The second objective is to compare the model in two contexts, Thailand and Taiwan. The cultural comparison is conducted using multi-group moderation analysis to assess the relationships in our proposed research model.

2 Theoretical background, research model, and hypotheses development

2.1 E-loyalty

Flavian et al. (2006) defined e-loyalty as a consumer's intention to continuing buying from a specific website, with no intention of changing to another. Reichheld and Schefter (2000) stated that e-loyalty is based on quality customer support, on-time delivery, compelling product presentations, convenient and reasonably priced shipping and handling, and clear and trustworthy privacy policies. The facilitating information technologies have also been used greatly to improve the frequency of customer revisit, which tends to correlate positively with online customer loyalty (Oua et al. 2003). In this study, e-loyalty refers to a consumer's perceived loyalty towards an e-commerce website.

2.2 Refining DeLone and McLean's IS success model with trust and E-loyalty

Many studies have attempted to find the most appropriate dependent variable with regard to IS success (Petter et al. 2013). For example, (DeLone and McLean's 2004) tried to adapt their IS success model to assess e-commerce success. In their work, the last dependent variable of e-commerce success was collapsed into one single construct for the sake of parsimony, namely the net benefits, which consist of individual and organization impact. However, DeLone and McLean (2004) also noted that the following issues must be addressed with regard to this construct: "What qualifies as a benefit? for whom? and at what level of analysis?" Similarly, Wang (2008) also argued that the new net benefits measure in DeLone and McLean's revised model is conceptually too broad to define, thus limiting its usefulness.

In order to avoid some of the issues associated with this new net benefits measure in an e-commerce context, some studies applied DeLone and McLean's IS success model and replaced this construct with customer loyalty (Molla and Licker 2001) or intention to reuse (Wang 2008), which are thought to work as good surrogates for net benefits at an organizational level (DeLone and McLean 2004). Wang (2008) argued that another way to measure e-commerce success is the ability to ensure that online consumers keep accessing (e.g. repeatedly using) a particular e-commerce website and making purchases from it, without changing to another retailer, and this is termed e-loyalty. Therefore, following Wang (2008) and Molla and Licker (2001) study, we used e-loyalty as our dependent variable to measure e-commerce success.

The terms "continued intention to use", "intention to reuse or return", and "repeat purchase" all have similar meanings to e-loyalty. However, the term e-loyalty, as used in this study, is a more complete construct than intention to re-use. Early constructs that were used to proxy loyalty, such as repeat purchase, do not fully represent consumer loyalty, since they do not distinguish between true and spurious consumer loyalty (Chang and Chen 2009). Moreover, a comprehensive meta-analysis shows that many previous e-commerce studies are related to e-loyalty (Toufaily et al. 2013), and thus this construct is seen as important by researchers in this field.

In addition, Molla and Licker (2001) included "support and service" (later referred to as service quality) and "trust" as additional factors to consider in a B2C e-commerce environment. McKnight et al. (2002) defined trust as a multi-dimensional construct with two inter-related components—trusting beliefs and trusting intentions— as well as the willingness to depend on the retailer. The inclusion of trust as an additional variable is justifiable given its importance to the e-commerce success model (Molla and Licker 2001; Brown and Jayakody 2008). Indeed, trust is considered one of 15 success factors that have been consistently found to influence IS success (Petter et al. 2013). Based on these earlier studies, Fig. 1 shows the research model used in the current work.

2.3 Information quality and trust

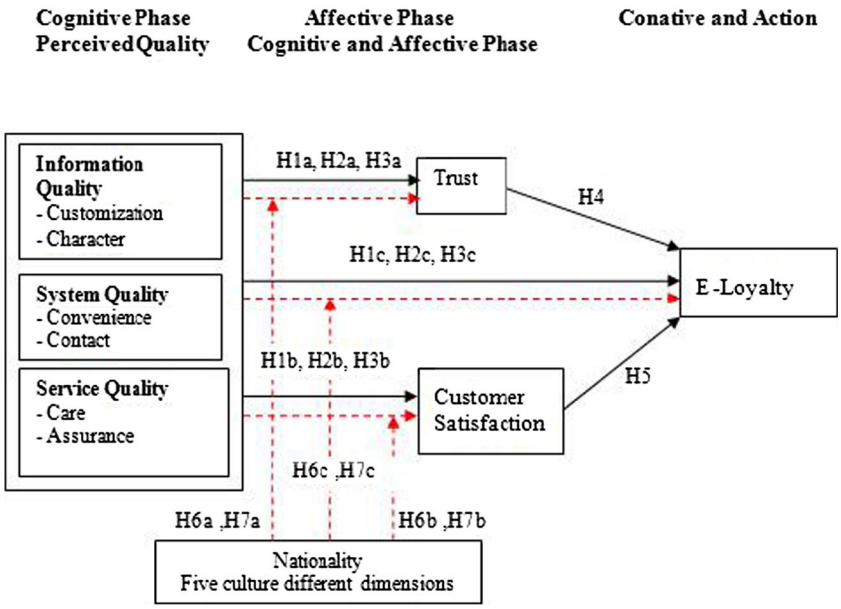
Information quality refers to the generation of relevant and accurate information on e-commerce websites (Petter et al. 2013). It encompasses the measures of accuracy, precision, currency, timeliness, and conciseness, among others (Petter et al. 2013). The importance of trust has been discussed in various e-commerce studies. (McKnight et al. 2002) found that web site quality significantly affects trust, while (Kim et al. 2004) reported that information quality has significant effects on trust for both potential and repeat customers. Based on these previous studies, we argue that better information quality on a website would increase consumer trust toward it, as stated in the following hypothesis:

H1a Information Quality has a positive effect on Trust towards an e-commerce system.

2.4 Information quality and customer satisfaction

(Petter, DeLone and McLean 2008) concluded that there is a strong relationship between relationship between information

Fig. 1 Proposed Model



quality and user satisfaction, and a number of studies have revealed a consistent relationship between information quality and user satisfaction at the individual unit of analysis. Previous research (Riel et al. 2004) also suggested that website design is important with regard to user satisfaction, which is directly related to the user interface. Based on this, the following hypothesis is proposed:

H1b Information Quality has a positive effect on Customer Satisfaction with an e-commerce system.

2.5 Information quality and E-loyalty

DeLone and McLean (2003) argued that information quality influences the intention to continue using a system, and previous studies (Chang and Chen 2008; Kassim and Ismail 2009) showed significant relationships between information quality and e-loyalty. Gao and Koufaris (2006) also concluded that both perceived informativeness and perceived entertainment are significantly and positively related to attitude toward the site, and that this attitude is positively related to a user's intention to return to the site. We thus hypothesize that:

H1c Information Quality has a positive effect on E-loyalty towards an e-commerce system.

2.6 System quality and trust

According to DeLone and McLean (2004), system quality in an e-commerce context is reflected by the usability, availability, reliability, adaptability and fast response time of the system. In addition, a link between system quality and trust has been demonstrated by Gefen et al. (2003). Through investing time and effort in improving the ease of use of websites, e-commerce vendors can demonstrate to consumers their integrity and trustworthiness (Brown and Jayakody 2008). Brown and Jayakody (2008) also found that trust is strongly influenced by system quality. Based on these earlier works, the following hypothesis is proposed:

H2a System Quality has a positive effect on user Trust towards an e-commerce system.

2.7 System quality and customer satisfaction

The system quality of a website greatly affects customer satisfaction toward an e-commerce system, as demonstrated in prior research on IS success (Brown and Jayakody 2008), while Molla and Licker (2001) argued that this effect applies equally to e-commerce systems. Therefore, we hypothesize that:

H2b System Quality has a positive effect on Customer Satisfaction with an e-commerce system.

2.8 System quality and e-loyalty

A good website interface will encourage a customer to continue navigating the website, enhance the customer experience, and eventually increase the likelihood of a purchase being made (Kuan et al. 2005). According to Anderson and Srinivasan (2003), the factors of convenience and purchase

size can both increase the impact of e-satisfaction on e-loyalty when consumer level factors are considered. We thus hypothesize that:

H2c System Quality has a positive effect on E-loyalty towards an e-commerce system.

2.9 Service quality and trust

Service quality is defined as the overall support delivered by the e-commerce service provider (DeLone and McLean 2003), and higher levels of this should be able to increase customer trust (Reichheld and Schefter 2000). Gefen et al. (2003) found that a combined dimension of responsiveness, reliability, and assurance is the most significant factor with regard to increasing customer trust. A prior study also indicated that trust is strongly influenced by service quality (Brown and Jayakody 2008), and thus the following hypothesis is proposed:

H3a Service Quality has a positive effect on user Trust towards an e-commerce system.

2.10 Service quality and customer satisfaction

Devaraj et al. (2002) found empirical support for the assurance dimension of service quality (SERVQUAL) as a key determinant of e-commerce channel satisfaction. Similarly, Molla and Licker (2001) demonstrated that e-commerce satisfaction is affected by the level of support and service quality offered on the website. Prior research concluded that service quality is an antecedent of customer satisfaction (Brown and Jayakody 2008), which other studies noted the importance of e-commerce service convenience, and how it can positively influence customer satisfaction with e-retailers (Lai et al. 2012). Based on these earlier works, we hypothesize that:

H3b Service Quality has a positive effect on user Customer Satisfaction with an e-commerce system.

2.11 Service quality and E-loyalty

Gefen (2002) argued that the service dimensions captured by SERVQUAL are important to online customers. Service quality will influence costumer intentions to use a system, and this may equally apply to the intention to continue using it (Brown and Jayakody 2008). Customer loyalty in brick-and-mortar retailers is built up through good quality service, and this also applies to online vendors (Reichheld and Schefter 2000). We thus hypothesize that:

H3c Service Quality has a positive effect on user E-loyalty towards an e-commerce system.

2.12 Trust and E-loyalty

Trust is regarded as one of the most important prerequisites for success in an e-commerce context. In McKnight et al. (2002) and Gefen et al. (2003), trust is conceptualized as a set of beliefs about an Internet vendor. Developing e-loyalty in a virtual environment requires trust (Miller 2004),. Prior research examined how trust and distrust can affect online loyalty differently (Lee et al. 2012), and the results empirically confirmed that trust has a strong, positive effect on customer loyalty. Kim et al. (2004) also found that creating an atmosphere of trust can increase loyalty. Therefore, we propose the following hypothesis:

H4 Trust has a positive effect on E-loyalty towards an e-commerce system.

2.13 Consumer satisfaction and e-loyalty

According to Zeithaml (2000), satisfaction is a general antecedent of loyalty, while Kim et al. (2009) found that customer satisfaction positively affects customer loyalty. Indeed, the relationship between satisfaction and loyalty seems intuitive, and several researchers have attempted to confirm this (Carlson et al. 2003), since if customers are satisfied, they are more likely to use the same e-commerce system again. Therefore, we hypothesize that:

H5 Customer Satisfaction has a positive effect on E-loyalty towards an e-commerce system.

2.14 Background of Thailand and Taiwan

According the Internet World Statistics (2012), there were 17.53 million Internet users in Taiwan as of mid-year 2012, representing more than 75 % of its total population (approximately around 23 million people in 2012). In 2012, Thailand had 26 million Internet users, representing 39 % of the population (there were around 67 million people living in Thailand by the end of 2012). As the more developed country, it is not surprising that Taiwan has greater Internet penetration compared to Thailand.

However, both countries have been experiencing rapid increases in Internet penetration, especially Thailand, which has recently seen significant improvements in its broadband Internet infrastructure. Both the government and businesses in Thailand have fully supported the development of a profitable

e-commerce environment. In addition, a rise in the use of mobile devices, such as smart phones and tablets, has also triggered a sudden increase in the number of Internet users and e-commerce transactions, and thus a rapid growth in the related revenues.

According to surveys conducted by the government-sponsored Institute for Information Industry, the total value of e-commerce sales transactions through Business to Consumer (B2C) and Consumer to Consumer (C2C) modes in the Taiwan market in 2012 was estimated at NT$660.5 billion (US$22.2 billion), up by 17.4 % from 2011. In addition, the total trade value of B2C and C2C reached NT$382.5 billion, or 57.91 % of the total and NT$278 billion, or 42.09 %, respectively (Hwang 2012). In the meantime, the value of online trading in Thailand reached THB 1 trillion (US$32 billion) in 2011, and was predicted to grow by 20 % in 2012 (approximately US$38 billion). These figures show the greater amount and value of e-commerce sales transactions in Thailand compared to Taiwan, presumably due to the greater number of e-commerce users in the former, as well as its greater population overall.

It can thus be argued that there are a few key differences between Taiwan and Thailand in terms of e-commerce proliferation. However, since Taiwan has a smaller population and it has already a very high degree of Internet penetration, Internet use might already have achieved its saturation point in this market. In contrast, Thailand still has great potential with regard to continuing to increase the number of their Internet users, and thus for the continued growth in the number and value of e-commerce transactions. The comparison of Taiwan and Thailand carried out in this study is appropriate, since both countries have significant numbers of Internet (e-commerce) users, and both have seen enormous numbers of e-commerce transactions in recent years. This study is also a way to compare a more developed country (Taiwan) with less developed one (Thailand) in terms of the related e-commerce environments. In addition, we also consider cultural issues to further investigate the differences between the two countries. This study thus incorporates the concepts of national identity (NATID) and Hofstede's five cultural dimensions to further test and compare both countries based on the proposed research model.

2.15 National identity (NATID) of Taiwan and Thailand

According to an extensive review of the IS literature by Leidner and Kayworth (2006), national culture has significant effects on various aspects of IS, such as their development, adoption, usage, and management. National culture thus has a strong influence on how IS can be successfully integrated into organizations.

Culture can also lead to different preferences with regard to IS, such as website design (Cyr et al. 2005) and the perceived value of websites (Steenkamp and Geyskens 2006), with Gefen and Heart (2006) highlighting the effects of culture on e-commerce. A recent study incorporated the concept of NATID (National Identity Measure) as a moderating factor in the relationships among information, system, service qualities, and attitude towards e-commerce (Chen et al. 2013). Although NATID was originally being used in international marketing contexts, it is now beginning to be used in IS related research (Chen et al. 2013; Steenkamp and Geyskens 2006).

NATID is a framework developed by (Keillor, Hult, Erffmeyer, and Babakus 1996) for measuring the degree of national identity and the differences between the national identities of various nations, especially in an international marketing context. They defined national identity as "the set of meanings owned by a given culture that sets it apart from other cultures". Their study used samples from the United States, Japan, and Sweden, and found distinct characteristics for all three countries which influenced international marketing efforts. The NATID scale was designed in their study "to empirically measure how strongly individuals in a given nation, identify with religious, historical, cultural, and social aspects of their national identity".

Unlike other cultural measures, which mainly focus on cultural similarities and differences, NATID focuses on "the extent to which a strong sense of cultural and national uniqueness exists and the characteristics that form the foundation of this unique sense of identity". NATID is based on four dimensions, namely: national heritage, cultural homogeneity, belief system, and consumer ethnocentrism.

National heritage is accumulated from a country's history. Cultural homogeneity is a combination of a country's cultural attributes, background, identity, and the nationality. It is culture that makes an individual have a sense of being a citizen of a particular country. Belief system is anything related to religion, such as the religious activities, philosophies, and theological beliefs. Finally, consumer ethnocentrism is concerned with loyalty towards local products and prejudice towards foreign ones.

In marketing, similarities or differences in the four dimensions of NAITID may be used as parameters to determine the properties of products that are marketed in different countries, such as whether to standardize or customize them. According to Singh and Matsuo (2004), country specific web and e-commerce sites reflect differences in national cultures. It thus important to identify the various dimensions in NATID, as any differences among them can impact the development and design of country-specific (localized) e-commerce websites. Such websites can be tailored in accordance to local culture characteristics, and one previous study suggested that the use of more comprehensively personalized interfaces, designed to meet the users' cultural backgrounds, can increase satisfaction, revenue, and market share (Reinecke and Bernstein

2013). In an e-commerce context, the current study uses NATID to determine the degree to which Thailand and Taiwan and their populations have a strong sense of enduring cultural traits and national uniqueness, and how these might affect the proposed research model of e-commerce website loyalty.

Based on our data, Thailand had higher scores than Taiwan on all dimensions in the NATID framework, as shown in Table 1. Keillor et al. (1996) highlighted that the concept of national identity is based on the premise that the elements which characterize a nation's identity are also the components which serve to tie sub-cultures together within national boundaries. Based on these ideas, the following hypotheses are proposed:

H6a There is a difference between Thailand and Taiwan with regard to the relationships that information quality, system quality, and service quality have with Trust.

H6b There is a difference between Thailand and Taiwan with regard to the relationships that information quality, system quality, and service quality have with Customer Satisfaction.

H6c There is a difference between Thailand and Taiwan with regard to the relationships that information quality, system quality, and service quality have with E-loyalty.

2.16 Hofstede's five dimensions of cultural differences

The ideas in (Hofstede 1983) have been applied in many mainstream IS cross-cultural studies to conceptualize the construct of national culture (Leidner and Kayworth 2006). Hofstede (1991) proposed five dimensions of culture, namely power distance, uncertainty avoidance, individualism-collectivism, masculinity-femininity, and long term orientation. Power distance is based on the fact that inequalities exist among the individuals in a society, and thus a hierarchical order is needed to distribute power unequally. Uncertainty avoidance is related to attitudes towards uncertainty. Countries with high uncertainty avoidance tend to avoid uncertainty, maintain rigid codes of beliefs and behaviors, and are intolerant of new knowledge or ideas, such as innovations. Individualism is related to the degree of interdependence among the people within a society. The opposite of individualism is collectivism, and in societies that are more collectivist more weight is given to relationships between family members of wider groups. Masculinity/femininity refers to the attributes which make men and women different within a certain culture. Countries with a high degree of masculinity will be driven by competition, achievement, and success, while more feminine societies emphasize caring for others and quality of life. Long term orientation is closely related to having a more future-oriented perspective, rather than a short term view of events. People in countries with a high long term orientation tend to save and invest for the future.

Using (Hofstede's 1994) dimensions of culture, several studies have provided evidence of the impact that culture has on e-commerce. For instance, website design and culture are important to website trust, website satisfaction, and e-loyalty in online business relationships (Cyr et al. 2005). Cyr (2008) also concluded that information design, navigation design, and visual design have different impacts on trust, customer satisfaction and online loyalty, and suggested that such design characteristics should be a central consideration in website design across cultures.

Thailand has higher scores than Taiwan in terms of power distance and individualism, although it has lower scores for masculinity, uncertainty avoidance, and long-term orientation index (see Table 2). Sigala and Sakellaridis (2004) found three cultural dimensions (power distance, masculinity and long-term orientation) affect certain website quality (WEBQUAL) dimensions. This study investigates the influence of five cultural dimensions on the relationships that information quality, system quality, and service quality have with trust, customer satisfaction, and e-loyalty. All five cultural dimensions are included, because there are differences in the related measures for both countries. Based on these ideas, the following hypotheses are proposed:

H7a The relationships that information quality, system quality, and service quality have with Trust will be different based on Hofstede's five cultural dimensions.

H7b The relationships that information quality, system quality, and service quality have with Customer Satisfaction will be different based on Hofstede's five cultural dimensions.

H7c The relationships that information quality, system quality, and service quality have with e-loyalty will be different based on Hofstede's five cultural dimensions.

Table 1 National Heritage, Cultural Homogeneity, Belief System, Consumer Ethnocentrism and NATID Scores of Taiwan and Thailand (Phau and Chan 2003)

Country	National heritage score	Cultural homogeneity score	Belief system score	Consumer ethnocentrism score	NATID score
Taiwan	4.55	4.33	3.80	3.88	16.57
Thailand	5.30	4.98	4.38	4.93	19.59

Table 2 The Indexes of Hofstede's Cultural Dimension (1991)

Country	PDI: Power distance index		IDV: Individualism index		MAS: Masculinity index		UAI: Uncertainty avoidance index		LTO: Long-term orientation index	
	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score
Taiwan	29/30	58	44	17	32/33	45	26	69	3	87
Thailand	21/23	64	39/41	20	44	34	30	64	8	56

3 Methodology

3.1 Measurements

All measurement items were adapted from previous studies. The Information quality was measured using several items adapted from Srinivasana et al. (2002), while items were adapted from Chang and Chen (2009) to measure system quality and customer satisfaction. Service quality was measured using items adapted from Srinivasana et al. (2002) and Ribbink et al. (2004). Trust was measured using items from Brown and Jayakody (2008), and ttems from (Kim et al. 2009) were adapted to measure e-loyalty. Finally, Hofstede's VSM 94 was used to measure the cultural dimensions.

3.2 Sample and data collection

The samples were collected in both Thailand and Taiwan. In Thailand, physical (hard copy) and online surveys were used. The target samples were Thai employees who were working in Bangkok, Thailand. There were 10 companies targeted (ranging from medium to large). A total of 358 samples were collected, but only 227 were valid, with the 117 respondents answering "have no online purchasing experience", 11 respondents who were not employees, and three questionnaires that were excluded for other reasons. Thai MBA students were not considered as appropriate samples, due to the inconvenience of data collection among this group. In Taiwan, the samples were collected from the employees of three large companies. In addition, online surveys were also sent to Taiwanese MBA students via email, and most of these were already working or had some work experience at various Taiwanese companies. A total of 256 samples were collected from Taiwan, although only 214 were usable (three respondents answered "have no online purchasing experience", 37 respondents were not employees, and two were excluded for other reasons) Overall, there were a total of 441 valid questionnaires, 227 from Thailand and 214 from Taiwan. Table 3 shows the demographic characteristics of the respondents.

3.3 Measurement results for cultural index

The cultural index formula, as presented in Hofstede's VSM 94, was used to generate index values for each cultural dimension, as shown in Table 4. For each cultural dimension, all the relationships among the constructs in the proposed model are compared between Thailand and Taiwan.

3.4 CMV with Harman's single factor test

According to MacKenzie et al. (2003), Harman's single-factor test is arguably the most widely known approach for assessing CMV in a single-method research design. After investigating all items with exploratory factor analysis (EFA) using Harmon's one factor post hoc method, the results show that fifteen un-rotated factors explain 64.94 % of the total variances in the results, with the first factor accounting for 26.68 %, indicating that CMV is not the issue in this study.

3.5 CFA with the SEM approach to main constructs and relationships

Confirmatory factor analysis (CFA) was conducted to test the overall validity and reliability of latent variables. Standardized estimate loadings were used to assess the reliability of the latent variables, as measured by variance extracted (VE) and construct reliability (CR). Eight indices were used as indicators to test goodness of fit for CFA. The first one was the chi-square test., while the second was the relative chi-square, as suggested by Kline (1998). The third is the goodness of fit index (GFI), which is used to produce a fit statistic that is sensitive to sample size (Hair et al. 2006). The fourth index is adjusted goodness of fit (AGFI), which adjusts GFI for the degrees of freedom. The fifth index is root mean square residuals (RMR), while the sixth is NFI, which would have a value of 1 for a perfect model. The last two indexes are the comparative fit index (CFI) and root mean square error of approximation (RMSEA), as suggested by (Fan et al. 1999).

Table 3 Demographic characteristics of the samples

	Thai		Taiwan		Combined	
	N	% within country	N	% within country	N	%Total
Gender						
Male	99	43.61 %	104	48.60 %	203	46.00 %
Female	128	56.39 %	110	51.40 %	238	54.00 %
Total	227	100.00 %	214	100.00 %	441	100.00 %
Age						
18–25	24	10.57 %	4	1.87 %	28	6.35 %
26–35	167	73.57 %	114	53.27 %	281	63.72 %
36–45	32	14.10 %	72	33.64 %	104	23.58 %
46–55	4	1.76 %	21	9.81 %	25	5.67 %
>55			3	1.40 %	3	0.68 %
Total	227	100.00 %	214	100.00 %	441	100.00 %
Education						
Undergrad.	1	0.44 %	13	6.07 %	14	3.17 %
Graduated	111	48.90 %	86	40.19 %	197	44.67 %
Master	109	48.02 %	110	51.40 %	219	49.66 %
Doctor	6	2.64 %	5	2.34 %	11	2.49 %
Total	227	100.00 %	214	100.00 %	441	100.00 %
Occupation						
Company						
Employee	227	100.00 %	214	100.00 %	441	100.00 %
Job						
Accounting/Financial	33	14.54 %	15	7.01 %	48	10.88 %
Sales	40	17.62 %	38	17.76 %	78	17.69 %
Marketing	37	16.30 %	32	14.95 %	69	15.65 %
Engineer	62	27.31 %	34	15.89 %	96	21.77 %
Officer/Admin.	10	4.41 %	50	23.36 %	60	13.61 %
Management	38	16.74 %	39	18.22 %	77	17.46 %
Others	7	3.08 %	6	2.80 %	13	2.95 %
Total	227	100.00 %	214	100.00 %	441	100.00 %
Nation						
Thai	227	100.00 %	214	100.00 %	227	51.47 %
Taiwan					214	48.53 %
Total	227	100.00 %	214	100.00 %	441	100.00 %

3.6 CFA and reliability tests of combined Thai and Taiwanese data

The retained items and their factor loadings when using the combined data are shown in Table 5. With regard to the reliability tests, the variance extracted (VE) and construct reliability (CR) of all constructs are higher than 0.5 and 0.7, respectively. The model fit indicators are shown in Table 6, all eight indicators passed the goodness of fit criteria, except for AGFI and RMSEA. Although AGFI (0.887) and RMSEA (0.055) are slightly below the related thresholds, we still consider that our CFA results show an acceptable model fit.

4 Results

4.1 Structural equation model (SEM)

As shown in Table 7 and noted above, almost all the indicators passed the related fit criteria, except for AGFI and RMSEA, and even these were still within an acceptable range.

Table 4 Cultural Different Index Formula by VSM 94 (Hofstede)

Cultural Different Dimension	Index Formula
Power Distance Index (PDI)	PDI=−35 m(Hpd1)+35 m(Hpd2)+25 m(Hpd3) −20 m(Hpd4) −20
Individualism Index (IDV)	IDV=−50 m(Hi1)+30 m(Hi2)+20 m(Hi3) −25 m(Hi4)+130
Masculinity Index (MAS)	MAS=+60 m(Hm1) −20 m(Hm2)+20 m(Hm3) −70 m(Hm4)+100
Uncertainty Avoidance Index (UAI)	UAI=+25 m(Hu1)+20 m(Hu2) −50 m(Hu3) −15 m(Hu4)+120
Long-term Orientation Index (LTO)	LTO=+45 m(Hl1) – 30 m(Hl2) – 35 m(Hl3)+15 m(Hl4)+67

We thus consider that the SEM model has an acceptable fit. The CR values of the relationships among all the constructs are significant, showing that the independent constructs have a significant influence on the dependent constructs. Figure 2 shows the results of the SEM path analysis, which indicate that information quality has a positive and significant effects on trust (ß=0.387, $p<0.001$), customer satisfaction (ß=0.435, $p<0.001$) and e-loyalty (ß=0.212, $p<0.01$). It can thus be concluded that H1a, H1b and H1c are supported.

System quality has positive and significant effects on trust (ß=0.224, $p<0.01$), customer satisfaction (ß=0.360, $p<0.001$) and e-loyalty (ß=0.221, $p<0.01$), and so it can be concluded that H2a, H2b and H2c are also supported. Meanwhile, service quality has positive and significant effects on trust (ß=0.360, $p<0.001$), customer satisfaction (ß=0.211, $p<0.001$) and e-loyalty (ß=0.114, $p<0.01$), supporting H3a, H3b and H3c. Customer satisfaction has a positive and significant effect on e-loyalty (ß=0.264, $p<0.001$), while trust has no effect on e-loyalty (ß1=0.140, $p=0.08$). H4 is thus not supported, while H5 is.

Table 5 CFA of Combined Data: Loadings, VE and CR

Constructs	Items	Standardized Factor Loadings	VE	CR
Information Quality	Cu1	0.574	0.624	0.838
	Cu3	0.531		
	Ch3	0.636		
	Ch4	0.753		
	Ch5	0.624		
System Quality	Co1	0.653	0.683	0.880
	Co2	0.784		
	Ci1	0.618		
	Ci4	0.596		
	Ci5	0.762		
Service Quality	As1	0.856	0.908	0.947
	As2	0.96		
Trust	Ts2	0.783	0.815	0.935
	Ts3	0.811		
	Ts4	0.783		
	Ts5	0.881		
Customer Satisfaction	Cs3	0.846	0.901	0.943
	Cs4	0.956		
E-Loyalty	El1	0.829	0.791	0.937
	El2	0.893		
	El3	0.767		
	El4	0.802		
	El5	0.665		

4.2 Multi-group SEM moderation analysis of nationality

The multi-group SEM moderation analysis procedure was conducted using AMOS software. The combined data was divided into two groups, Thailand and Taiwan, with were then tested and compared with regard to each relationship in our research model. The results are shown in Table 8. The baseline model generated a chi-square (216) of 545.922, while the constrained model (with ability as the moderating variable) had a chi-square (432) of 894.580. In comparing the data from Thailand and Taiwan, the results indicate that there are four significantly different relationships, namely: the relationship between information quality and trust (t-value=−2.491), between information quality to customer satisfaction (t-value=−3.206), between system quality and trust (t-value=2.253), and between system

Table 6 CFA of Combined Data: Model Fit

	Criteria	Indicators
Chi-Square test		
Chi-Square	$p<0.05$	0.000
Chi-Square/d. f	<3.00	2.327
Fit indices		
Goodness of Fit Index (GFI)	>0.90	0.912
Adjusted Goodness of Fit Index (AGFI)	>0.90	0.887
Normed Fit Index (NFI)	>0.90	0.922
Alternative indices		
Comparative Fit Index (CFI)	>0.95	0.954
Root Mean Square Error of Approximation (RMSEA)	<0.05	0.055
Root Mean Square of Standardized Residual (RMR)	<0.05	0.048

Table 7 SEM of Combined Data

Relations			Standardized Coefficients	C.R.
Variables				
Information	Cu1	This website makes purchase recommendations that match my needs.	0.577***	11.284
	Cu3	The advertisements and promotions that this website sends to me are tailored to my situation.	0.529***	10.357
	Ch3	I feel comfortable shopping at this website.	0.627***	12.274
	Ch4	The information on site is well organized.	0.737***	-
	Ch5	The sites layout and colors are appealing.	0.613***	12.011
System	Co1	A first-time buyer can make a purchase from this website without much help.	0.652***	13.349
	Co2	This website is a user-friendly site.	0.782***	16.211
	Ci1	This website has a search tool that enables me to locate products.	0.614***	12.513
	Ci3	The information on site is well organized.	0.596***	12.128
	Ci5	The sites layout and colors are appealing.	0.762***	-
Service	As1	I feel secure about the electronic payment system of this website.	0.858***	-
	As2	This online transaction of the website is trustworthy.	0.957***	22.649
Trust	Ts2	I trust in the benefits of the decisions made by this online retail site, i.e.: I trust the specials offered and recommendations made by the site.	0.777***	20.091
	Ts3	This online retail site keeps its promises and commitments.	0.811***	21.611
	Ts4	This online retail site keeps customers' best interests in mind.	0.779***	20.182
	Ts5	I trust this online retail site.	0.884***	-
Customer Satisfaction	Cs3	My choice to purchase from this website was a wise one.	0.858***	23.351
	Cs4	I think I did the right thing by buying from this website.	0.942***	-
E-Loyalty	El1	If I were to buy the same product again, I would likely buy it from this website.	0.828***	23.096
	El2	I am likely to return to this website for my next purchase.	0.893***	-
	El3	I am likely to make another purchase from this site in the next year.	0.766***	20.111
	El4	I intend to continue using this website rather than discontinue its use.	0.801***	21.727
	El5	I will recommend this website to friends.	0.664***	16.13
Paths				
Information quality –>Trust			0.387***	4.139
Information quality –>Customer Satisfaction			0.435***	4.173
System quality –>Trust			0.224**	2.467
System quality –>Customer Satisfaction			0.360***	2.199
Service quality –>Trust			0.360***	7.745
Service quality –>Customer Satisfaction			0.211***	4.201
Information quality –>E-Loyalty			0.212**	1.975
System quality –>E-Loyalty			0.221**	2.453
Service quality –>E-Loyalty			0.114**	2.123
Customer Satisfaction –>E-Loyalty			0.264***	4.286
Trust –>E-Loyalty			0.140	1.748
Fit Index				
Chi-Square (*p*-value)			0.000	
Degree of Freedom (d.f.)			216	
Chi-Square/d.f.			2.527	
GFI			0.906	
AGFI			0.880	
RMSEA			0.059	

*refers to *P*-value<0.05, ** refers to *P*-value<0.01, *** refers to *P*-value<0.001

quality and customer satisfaction (*t*-value=3.132). There are no significant differences with regard to any of the other relationships. Based on these results, we conclude that H6a, H6b are partially supported, while H6c is not supported.

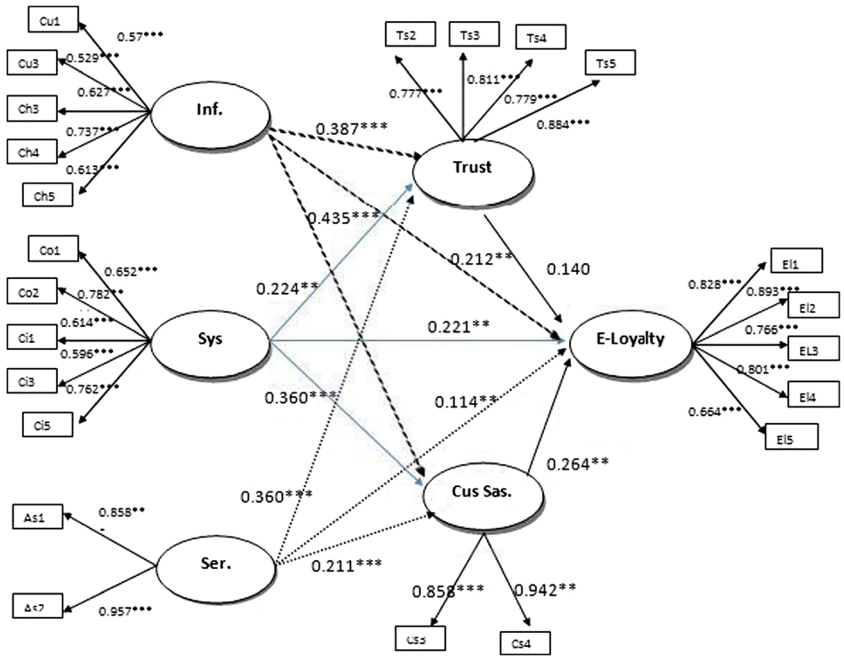


Fig. 2 SEM path analysis for combined data

4.3 Hofstede's five cultural dimensions: Multi-group SEM moderation analysis

Table 9 shows a summary of the results of the multi-group SEM moderation analysis based on Hofstede's five cultural dimensions. In the Power Distance dimension, the relationship between system quality and e-loyalty (*t*-value=2.129) is different in Taiwan and Thailand. In the Individualism dimension, there are some differences between Taiwan and Thailand in several relationships, namely those between information quality and trust (*t*-value=3.624), information quality and customer satisfaction (*t*-value=2.529), system quality and trust (*t*-value=−1.960), service quality and trust (*t*-value=−2.299), and service quality and e-loyalty (*t*-value=−2.445).

In the Masculinity dimension, Taiwan and Thailand are different in several relationships, namely those between information quality and trust (*t*-value=2.276), information quality and customer satisfaction (*t*-value=3.946), system quality and trust (*t*-value=−2.035), system quality and customer satisfaction (*t*-value=−2.861), service quality and trust (*t*-value=−2.683), and service quality and customer satisfaction (*t*-value=−2.556). In the Uncertainty Avoidance dimension,

Table 8 Multi-Group Moderation Analysis of National Identity

Paths	Standard Coefficient Estimates		t-value
	Thai	Taiwan	
Information quality –>Trust	0.525***	(−)2.109*	−2.491
Information quality –>Customer Satisfaction	0.444***	(−)1.273*	−3.206
System quality –>Trust	0.236	2.560*	2.253
System quality –>Customer Satisfaction	0.263*	1.833***	3.132
Service quality –>Trust	0.198**	0.058***	1.569
Service quality –>Customer Satisfaction	0.192*	0.228*	0.159
Information quality –>E-Loyalty	0.157*	7.502	0.033
System quality –>E-Loyalty	0.205	−8.571	−0.033
Service quality –>E-Loyalty	0.127	−1.647	−0.034
Customer Satisfaction –>E-Loyalty	0.325**	0.237	−0.611
Trust –>E-Loyalty	0.106*	3.611	0.034
Chi-square (degree of freedom)			
Unconstrained model	545.922(216)		
Constrained model	894.580(432)		

*refers to *p*-value<0.05, ** refers to *p*-value<0.01, *** refers to *p*-value<0.001

Table 9 Summary of Multi-Group Moderation Analysis based on Hofstede's Five Cultural Dimensions

Paths	*t*-value of Hofstede's Five Cultural Dimensions - Comparison between Thailand and Taiwan				
	Power distance	Individualism	Masculinity	Uncertainty Avoidance	Long Term Orientation
Information quality –>Trust	1.393	3.624***	2.276*	0.497	−1.774
Information quality –>Customer Satisfaction	0.44	2.529*	3.946***	1.173	−1.961*
System quality –>Trust	−1.237	−1.960*	−2.035*	−1.631	1.677
System quality –>Customer Satisfaction	0.133	−1.783	−2.861**	−1.567	1.798
Service quality –>Trust	−0.924	−2.299*	−2.683**	2.186*	0.986
Service quality –>Customer Satisfaction	−0.08	0.08	−2.556**	−1.106	0.704
Information quality –>E-Loyalty	−1.269	−1.487	−0.95	−0.144	−0.728
System quality –>E-Loyalty	2.129*	1.711	1.389	1.027	0.696
Service quality –>E-Loyalty	1.495	−2.445*	−0.239	0.169	0.311

*refers to p-value<0.05, ** refers to p-value<0.01, *** refers to p-value<0.001

the relationship between service quality and trust (t-value= 2.186) is different between Taiwanese and Thai. Meanwhile, in long term orientation dimension, the relationship of information quality to customer satisfaction (t-value= −1.961) is different for Taiwan and Thailand.

Based on these results, we conclude that H7a, H7b, and H7c are partially supported. In addition, the differences in the relationships among the various constructs mostly occurred in the Individualism and Masculinity dimensions.

5 Discussions and implications

This study extends the literature on DeLone and McLean's IS success model, and also confirms and extends Wang (2008) regarding the validation of this model in an e-commerce context. The use of e-loyalty as surrogate measure of net benefits can be considered a better dependent variable with regard to measuring general e-commerce success. Our results demonstrate that e-loyalty can be significantly predicted by information quality, system quality, service quality, and customer satisfaction. This result is consistent with Wang (2008), which found that user satisfaction could positively affect intention to reuse (similar to e-loyalty). Table 10 and table 11 show the results of hypotheses testing, with most being supported, except the one examining the relationship between trust and e-loyalty. The results of the multi-group moderation analysis of national identity and Hofstede's five cultural dimensions for Thailand and Taiwan show some differences, as explained in more detail below.

Based on SEM using the combined data, all the independent variables (e.g. information quality, system quality, and service quality) have significant positive relationships with trust, customer satisfaction, and e-loyalty. We also found that customer satisfaction has a significant, positive effect on e-loyalty. Nevertheless, it is surprising that the relationship

Table 10 Hypotheses Result Summary

Hypotheses		Result
H1a	Information Quality has a positive effect on Trust towards an e-commerce system.	Supported
H1b	Information Quality has a positive effect on Customer Satisfaction with an e-commerce system.	Supported
H1c	Information Quality has a positive effect on E-loyalty towards an e-commerce system.	Supported
H2a	System Quality has a positive effect on user Trust towards an e-commerce system	Supported
H2b	System Quality has a positive effect on Customer Satisfaction with an e-commerce system.	Supported
H2c	System Quality has a positive effect on E-loyalty towards an e-commerce system.	Supported
H3a	Service Quality has a positive effect on user Trust towards an e-commerce system.	Supported
H3b	Service Quality has a positive effect on user Customer Satisfaction with an e-commerce system.	Supported
H3c	Service Quality has a positive effect on user E-loyalty towards an e-commerce system.	Supported
H4	Trust has a positive effect on E-loyalty towards an e-commerce system.	Not Supported
H5	Customer Satisfaction has a positive effect on E-loyalty towards an e-commerce system.	Supported

Table 11 Hypotheses Result Summary of the Differences between Thailand and Taiwan

Hypotheses of The Cultural Differences		Results
H6a	There is a difference between Thailand and Taiwan with regard to the relationships that information quality, system quality, and service quality have with Trust.	Partially supported
H6b	There is a difference between Thailand and Taiwan with regard to the relationships that information quality, system quality, and service quality have with Customer Satisfaction.	Partially supported
H6c	There is a difference between Thailand and Taiwan with regard to the relationships that information quality, system quality, and service quality have with E-loyalty.	Not supported
H7a	The relationships that information quality, system quality, and service quality have with Trust will be different based on Hofstede's five cultural dimensions.	Partially supported
H7b	The relationships that information quality, system quality, and service quality have with Customer Satisfaction will be different based on Hofstede's five cultural dimensions.	Partially supported
H7c	The relationships that information quality, system quality, and service quality have with e-loyalty will be different based on Hofstede's five cultural dimensions.	Partially supported

between trust and e-loyalty is not positive and significant, and, based on the SEM results; trust might thus not be a very strong predictor for e-loyalty in an e-commerce context.

However, based on the multi-group moderation analysis of national identity (Table 8), for the Thai sample the relationship between trust and e-loyalty is positive and significant (0.106*). In contrast, no such relationship between trust and e-loyalty (3.611) is found in the Taiwanese data. Our results thus demonstrate that trust and its relationship with e-loyalty in an e-commerce context may be perceived differently across the two cultures. Likewise, although the differences are not significant, it can be seen from Table 8 that the Thai and Taiwanese respondents have some differences in several of the construct relationships. For example, for the Thai sample the relationship between customer satisfaction and e-loyalty is positively significant (0.325***), as is that between information quality and e-loyalty (0.157*). On the other hand, these relationships are not significant for the Taiwanese sample (0.237 and 7.502 respectively). This suggests that customer satisfaction and the information quality of an e-commerce website are more important for Thai consumers than for Taiwanese ones.

Table 8 also shows that there are significant differences in some path relationships (t-value>1.96) between the Thai and Taiwanese respondents. For the Thai sample, the path coefficients of information quality to trust (0.525***), information quality to customer satisfaction (0.444*), and system quality to customer satisfaction (0.263*) are positively significant. In contrast, for the Taiwanese sample only the path coefficients of system quality to trust (2.560*) and system quality to customer satisfaction (1.833***) are positively significant. It thus appears that both the information quality and system quality of an e-commerce website are more important for Thai consumers rather than Taiwanese ones. However, Taiwanese consumers are generally more concerned with the system quality of such websites.

It is surprising that the relationships between information quality and trust (−2.109*), and between information quality and customer satisfaction (−1.273), are negatively significant for the Taiwanese respondents. In other words, for this group the higher the level of information quality, the lower the levels of trust and satisfaction will be. This can be explained by the characteristics of Taiwanese e-commerce website design, which may affect the users' perceptions of information quality on such websites. For instance, a previous study compared Taiwanese and Australian government website characteristics (Hsieh et al. 2013), and found that the former use much more multimedia elements, such as images, moving images (e.g. flash animations or stream video), and cute illustrations, than the Australian ones. In terms of layout, most Taiwanese e-commerce websites use a three column design (Hsieh et al. 2013). Another study compared Taiwanese and USA e-commerce websites, and found that the biggest differences were the use of more images and very bright colors (Tsai 2009).

Figures 3 and 4 show e-commerce websites from Taiwan and Thailand. In general, Taiwanese e-commerce websites are more cluttered, condensed, and complex than Thai ones, and also make use of many vivid colors. In addition, Taiwanese e-commerce websites tend to contain much more information than Thai ones. The great amount of information on Taiwanese websites, along with the multimedia content, and complex layout, may negatively affect users' perceptions of the e-commerce sites. These characteristics may also negatively influence Taiwanese attitudes toward e-commerce websites, thereby reducing the levels of trust and satisfaction in them.

Sigala and Sakellaridis (2004) found that three of Hofstede's cultural dimensions (power distance, masculinity, and long-term orientation) affected user expectations with regard to certain website quality dimensions. Another study showed that uncertainty avoidance and long-term orientation have moderating effects on the relationship between trust and intention to use (Yoon 2009). Yoon (2009) also found that masculinity moderated the relationship between perceived usefulness and intention to use, as well as that between perceived ease of use and intention to use. Our results are thus in

Fig. 3 Example of e-commerce websites in Taiwan http://tw.buy.yahoo.com/ (left side), http://shopping.pchome.com.tw/index/ (right side)

line with these previous studies' findings, in which it was suggested that Hofstede's five cultural dimensions could affect consumer perceptions in an e-commerce context (Sigala and Sakellaridis 2004; Yoon 2009).

The results of this study as it can be seen in Table 9 show that there is a significant difference between Taiwan and Thailand in the relationship between system quality and e-loyalty in power distance dimension, while the relationship between information quality and customer satisfaction is also significantly different in long-term orientation dimension. Meanwhile, the relationship between service quality and trust is also different in uncertainty avoidance dimension. The most interesting finding of this study is that most of the differences in the construct relationships are within the cultural dimensions of individualism and masculinity. Our findings can thus complement those of previous studies, and help to better understand the impact of Hofstede's five cultural dimensions in an e-commerce website context.

Our model can be adapted to investigate other factors related to e-loyalty and e-commerce websites. For online companies our results can be used to help improve e-commerce website design in terms of information quality, system quality, and service quality, in order to have more positive effects on consumer e-loyalty. In this age of increasing globalization, e-commerce businesses should be especially aware of cultural differences when developing their websites. E-loyalty is very important with regard to retaining consumers, and it is especially difficult to develop due to the low switching costs online, with shoppers able to visit other e-commerce websites with a simple click of the mouse (Chang

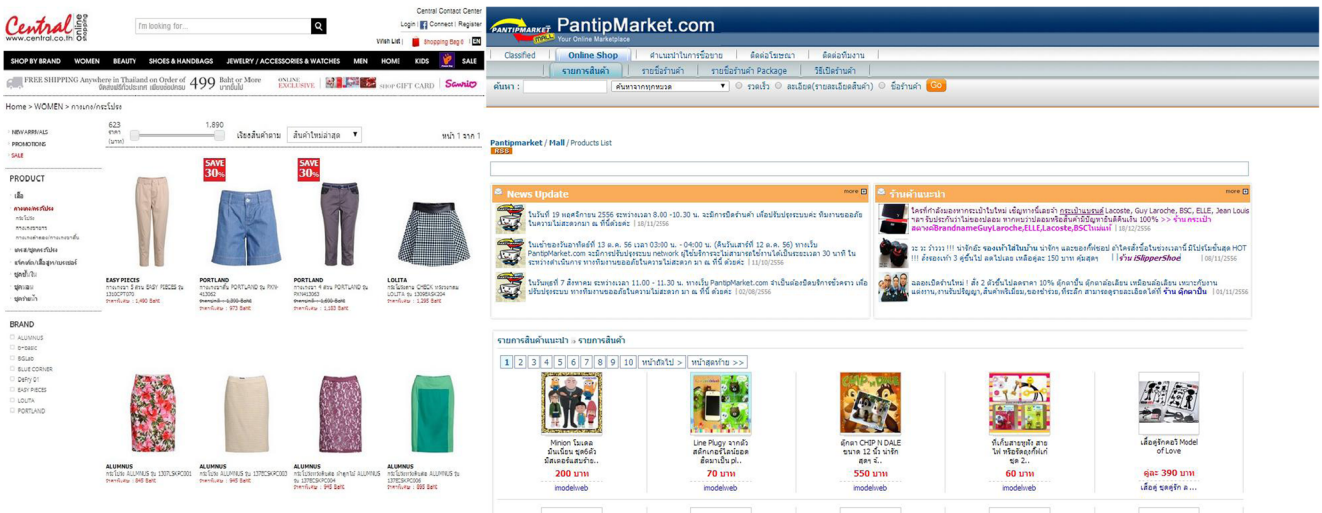


Fig. 4 Example of e-commerce websites in Thailand http://www.central.co.th/ (left side), http://www.pantipmarket.com/mall/center/index.php?node=products (right side)

and Chen 2009; Kamis et al. 2010). A better understanding of cultural backgrounds is also critical with regard to more appropriate User Interface Design (UID), as well as the creation of cultural friendly e-commerce websites. As for e-commerce users, this study can serve as reference that can enable them to visit more localized e-commerce websites, by considering the local culture and improving the overall quality of the website, thereby enhancing e-loyalty.

Understanding cultural differences is very important when conducting e-commerce business, particularly in Thailand and Taiwan. We can infer from the results of this work that there are significant differences in how consumers in each country view system quality and information quality. This study thus provides an opportunity for both academics and practitioners to consider the importance of various cultural elements when developing e-commerce websites.

6 Limitations and future research directions

The first limitation of this study is related to the samples. The target population in our study is e-commerce users in both countries. We believe the best target population is the working adults, due to their ability to conduct e-commerce transactions, as they are more likely have credit cards and good knowledge of how to use the Internet.

At first, our target respondents were mainly Thai employees who work in three large companies in Thailand, and Taiwanese employees who work in three big companies in Taiwan. However, due to time limitations and the need to collect more questionnaires, we had to extend our sampling in Thailand from three to ten companies. In Taiwan, according to a report from the Market Intelligence & Consulting Institute (MIC) of the Institute for Information Industry in 2008, 52.8 % of Taiwanese online shoppers are university or graduate school students (Kuo and Wu 2012). For this reason we extended our sample by surveying Taiwanese MBA students. However, we argue that due to the many similarities in our samples' characteristics, the differences between them should not have affected our empirical results. Our respondents are all working adults or people who already have some work experience. The Taiwanese MBA students in our sample generally have similar characteristics to those of the Taiwanese employees, with some work experience being a major requirement for such students to be accepted into an MBA program.

Our samples thus consist of Taiwanese employees from three companies in Taiwan, Taiwanese MBA students, and Thai employees from the ten companies in Thailand. In terms of company size, the three companies in Taiwan are all large ones companies. Meanwhile, the ten companies in Thailand are more diverse in terms of size, ranging from medium to big. We included Taiwanese MBA students to make Taiwan samples more diverse and thus more comparable to the Thai samples. All the Taiwanese MBA students had some work experience, and the companies they worked for varied in size. The samples from both countries can thus be considered comparable, since both consisted of adults who work or have worked in companies of various sizes.

The second limitation is about the measurement items. As the survey was conducted online by sending a link via email, it was difficult to control the environment in which the survey was completed. The set of Hofstede's five cultural dimensions used in this questionnaire is the older "VSM 94" version. As noted in Hofstede (1994), "VSM 94" is considered to be adequate in capturing these five cultural dimensions, and has been widely in the literature. Newer versions of VSM have now been developed, such as VSM 08 or VSM 13, and these contain new dimensions, with seven rather than five in VSM 13. Since these instruments are relatively new, they are used less often in the literature. However, future research may utilize newer versions of VSM in order to apply perhaps more accurate and up-to-date interpretations of the various cultural dimensions.

Furthermore, the measurement items used for it each construct were rather, limited since only some of these were used for estimating the final model, and these may not be sufficient to represent the characteristics of each construct. Follow-up research could thus extend our research model to further investigate customers' online purchasing experiences, and thus gain more valuable insights into the issues raised in this study. In addition, by referring to (Kamis et al.'s 2010) study on attribute based UID, future studies can utilize the results of the current work as cultural references in designing better e-commerce websites.

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