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La gestión en un mundo globalizado: ¿universalismo o particularismo?

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Résumé de l'article

Dans cette article nous étudions les propriétés psychométriques d'une version chinoise d'un instrument de mesure de qualité perçue des sites Web (PWQ). Nos résultats ont vérifié la structure à quatre facteurs et que l'échelle montre une bonne cohérence interne. Les résultats permettent aussi de vérifier la validité convergente et discriminante du modèle de mesure de premier ordre et qu'un seul facteur d'ordre supérieur explique la variance entre les quatre facteurs d'ordre inférieur. Compte tenu que l'instrument possède des propriétés psychométriques robustes, on peut affirmer que la version chinoise de l'échelle PWQ est un instrument utile pour évaluer la qualité des sites Web dans un contexte chinois.

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ABSTRACT

In this study we investigate the psychometric properties of a Chinese version of a perceived website quality (PWQ) measurement instrument. The results of our study confirmed the four-factor structure of the scale scores and that the scale has good internal consistency. CFA results support the convergent and discriminant validity of the scales scores for the first factor measurement model. Our findings also showed that a single higher-order factor accounts for the variance among the four lower-order factors. In view of its sound psychometric properties, the Chinese version of the PWQ scale is a useful instrument to evaluate website quality in a Chinese context.

Keywords: Perceived quality, website quality, China, confirmatory factor analysis, validity study

Résumé

Dans cette article nous étudions les propriétés psychométriques d'une version chinoise d'un instrument de mesure de qualité perçue des sites Web (PWQ). Nos résultats ont vérifié la structure à quatre facteurs et que l'échelle montre une bonne cohérence interne. Les résultats permettent aussi de vérifier la validité convergente et discriminante du modèle de mesure de premier ordre et qu'un seul facteur d'ordre supérieur explique la variance entre les quatre facteurs d'ordre inférieur. Compte tenu que l'instrument possède des propriétés psychométriques robustes, on peut affirmer que la version chinoise de l'échelle PWQ est un instrument utile pour évaluer la qualité des sites Web dans un contexte chinois.

Mots-Clés : Qualité perçue, qualité des sites Web, Chine, analyse factorielle confirmatoire, étude de validité

Resumen

En este trabajo evaluamos las propiedades psicométricas de la versión china de un instrumento de medición de la calidad percibida de sitios web (PWQ). Los resultados confirmaron la estructura de cuatro factores y muestra una buena consistencia interna. Además, los resultados confirman la validez convergente y discriminante de las puntuaciones de la escala del modelo de medida de primer orden y que un único factor de orden superior explica la varianza entre los cuatro factores de orden inferior. En vista de la robustez y consistencia de los resultados obtenidos, la versión china de la escala PWQ puede ser útil para investigar la calidad de los sitios web en un contexto chino.

Palabras Clave: Calidad percibida, calidad de sitios web, China, análisis factorial confirmatorio, estudio de validación

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The Internet in general and websites in particular have become an important marketing tool for companies of any size and located anywhere in the world. In emerging markets, such as China, a growing number of firms, global and local, offer online interactivity to an increasing number of consumers and public in general. China is the largest market for B2C e-commerce. Almost half of internet users in Asia are in China and their growth has been an extraordinary 2,754.5% over the past 14 years (Internet World Statistics, 2014). Not surprisingly companies offer consumers multiple ways to interact with them through their websites.

As a marketing tool, a website improves communication, helps building relationships, facilitates the physical exchange of products/services and improve sales activities (Kiang *et al*., 2000). The pervasiveness of online content means that consumers make use of websites, for different purposes, several times during a regular day. In this fast-paced arena of web marketing competition achieving repeat visitors is key for companies. What brings online users back to a website is a sense of loyalty that emanates from the user's experience with a website of good quality (Li and Suomi, 2009; de Oliveira, 2007). Since the quality of a website increases the chances of repeat visitors, is important that an organization be able to assess the quality of their website portal as perceived by their customers/users. Researchers have made important efforts to conceptualize and measure website quality (Loiacono el al 2007; Aladwani and Palvia 2002; Parasuraman *et al*., 2005; Yoo and Donthu, 2001). These studies have uncovered key dimensions through which users perceive the quality of a website (e.g. design, content, usability, reliability, interactivity, security, appearance and entertainment).

However, these developments have been done in North America and in Europe. There is need to develop new tools or adapt or validate the existent ones to suit the needs of companies willing to assess their online presence in emerging markets such as China. Unlike North America and the European Union, China is an emerging market with an internet infrastructure that conditions the online behaviour of Chinese internauts. An extension of a website quality measurement instrument to a market with such characteristics has significant implications for the generalizability of the measurement model. Also, well documented differences between China (collectivism) and the United States and the European Union (individualism) may lead to differences in how consumers perceive the quality of a website. Careful analysis is needed to assess these potential discrepancies. It is also important to note that while website visitors may evaluate the sites using the same framework, the aspects they prioritize could be noticeably different.

The involvement of consumers in their website experience motivates us to reflect on the interrelated constructs of service experience, satisfaction and quality in the context of website usage. Service experience is holistic in nature (Helkkula, 2011) comprised of process and outcome components that have functional and emotional dimensions (Sandström *et al*., 2008; Wong, 2013, Olsson *et al*., 2012). Some researchers coincide with this view and define service experience as the "cognitive and affective response to any direct or indirect contact with the company or its resources" (Olsson *et al*., 2012). Consumers visiting a website will make a cognitive assessment of their browsing experience based on several website attributes. As Johnston and Kong (2011) pointed out, the evaluation of how well their expectations and needs have been met results in an assessment of the quality of the website. However, the website experience will also produce emotional outcomes. These are the feelings of customers generated as they use a website. These affective outcomes are associated to the construct of satisfaction. As indicated before, the website experience includes both cognitive and affective aspects but also contextual factors that must be considered. Although the experience of an internaut browsing a website plays an important role in customer loyalty, the quality of the website is still a key component worth evaluating. Researchers in the area of global online consumer behaviour have acknowledged the vital role Website quality plays in light of cultural differences (Flavián *et al*., 2006; Nantel and Glaser 2008; Deng and Poole 2012). Accordingly, the perception of quality of a website quality has been found to be vital in determining online buyer behavior (Cyr *et al*. 2010; Deng and Poole 2012; Cebi 2013; Ahmad *et al*. 2017). Consequently, we have decided to focus on website quality as the object of this research. The purpose of this paper is to explore and validate the factor structure of a website quality measure in a Chinese context.

The paper is structured as follows: after the introduction, a brief review of the website quality literature is presented. In the second section, the research method is explained. The results are included in the third section. Finally, we conclude by discussing the theoretical and managerial implications of the study as well as indicating the limitations of our study and areas for future inquiry.

Website Quality

Website quality is a key concept in online interaction because the quality of a website will affect customers' intentions to use a site as well as increase purchase intentions (Chang and Chen, 2008; Hsu *et al.*, 2012). A website serves as a marketing tool for companies to interact with its customers in many ways (e.g. to communicate, to build relationships, to sell) and repeat visits to a website depend on a sense of loyalty that comes from a website of excellent quality (Li and Suomi, 2009; de Oliveira, 2007). Consequently, over the past 15 years a significant body of research has developed around website quality and its dimensionality (Loiacono el al., 2007; Aladwani and Palvia 2002; Parasuraman *et al.*, 2005; Yoo and Donthu, 2001). Research on the construct of website quality has evolved through several stages or categories. According to Éthier *et al.* (2006) researchers first focused on website functionalities. Then studies were influenced by the Technology Acceptance Model (TAM) with information, systems and service quality as important constitutive elements of website quality. The TAM postulates that the acceptability of an information system is determined by perceived ease of use and perceived usefulness. A third wave of studies focused mainly on e-service quality. Finally, researchers turned their attention to study website quality from the perspective of the user, focusing on how customers perceive website quality. Our study focuses on a website assessment tool that belongs to the latter group of studies.

Researchers consider website quality to be a multidimensional construct and have identified key dimensions through which users perceive website quality (e.g. design, content, usability, reliability, interactivity, security, appearance, entertainment). For example, Zeithaml *et al.* (2000, 2002) reviewed and synthesized the literature about service quality delivery through websites and developed a framework for understanding and improving electronic service quality (e-SQ). They identified 11 dimensions consumers use to evaluate e-SQ. These authors also developed and tested a multiple-item scale (E-S-QUAL) for measuring the service quality delivered by websites (Parasuraman *et al.*, 2005). This instrument contains 22 items grouped in four dimensions: efficiency, fulfilment, system availability, and privacy. Efforts have also been made to study the quality of online shopping sites. Yoo and Donthu (2001) developed SITEQUAL, a 9-item four-dimension scale (ease of use, aesthetic design, processing speed and security) that can be used to evaluate the quality of an online shopping site and examine how the four website quality dimensions affect consumers' online behaviour. Loiacono *et al.* (2007) developed WebQual, an instrument of 12 dimensions to measure website quality. The development of WebQual was based on the responses of undergraduate business students to a selected group of Web sites. Bressolles (2006) developed NetQu@l, a 13-item instrument to measure electronic service quality. He followed a thorough research protocol involving more than 1,000 online questionnaires surveying customers of several commercial sites. His findings indicate electronic service quality includes five dimensions: ease of use, design, reliability, security and information. In another study, a general model of e-Tail quality was developed by Wolfinbarger and Gilly (2003). Their study suggests that judgements concerning the quality of a retail online site can be captured using the 14 items included in the dimensions of fulfilment/reliability, website design, privacy/security and customer service.

Drawing from research in three different areas (information systems, marketing, e-commerce and human-computer interaction), Barnes and Vigden (2001, 2002) developed WEBQUAL 4.0 as a method for assessing website quality based on the impressions of website users. The authors affirm that the WebQual instrument" consists of three dimensions: usability, information quality and service interaction quality. Along these lines, Aladwani and Palvia (2002) developed an instrument intended to capture key characteristics of website quality from the user's perspective. Their review of the literature provided them with 102 items representing website quality. After a rigorous refinement process, they obtained a stable four-dimension factor structure with 25 items and sound psychometric properties.

More recently, Hsu *et al.* (2012) used a three-dimension (information quality, system quality and service quality) scale to measure website quality. They examined the mediating effect of two constructs – perceived playfulness and perceived flow – on the relationships between website quality, customer satisfaction and purchase intentions. Their study supports the multidimensionality of the website quality construct based on aspects such as the information provided, the technical ease of use and the interactivity of the web portal. Tsang *et al.* (2010) developed a scale to measure e-service quality for online travel agencies. Their scale has six dimensions: functionality, information content and

quality, fulfilment and responsiveness, safety and security, appearance and presentation, customer relationship. Another researcher, Rocha (2012), didn't empirically assess website quality but based on a large literature review proposed that website quality consisted of content quality, service quality, and technical quality. In the area of tourism websites, Herrero and San Martin (2012) tested a model to understand users' adoption of websites. They identified three key dimensions of website quality: information, interactivity and navigability. For Hasanov and Khalid (2015) the dimensions of website quality are security, enjoyment, information quality, ease of use, and service quality. Jeon and Jeong (2017) considered four dimensions affecting customers' perceptions of website quality: usefulness of information, ease of use, accessibility and website security/privacy. Two other scales were developed to measure the service quality of websites. Ding *et al*. (2011) developed a four-dimension scale named e-SELFQUAL while Janita and Miranda (2013) developed e-merQUAL to be used in the context of B2B websites. Finally, Wang *et al*., (2015) also highlighted the complex multidimensional aspect website quality and proposed a three-dimensional measurement instrument comprising usability, functionality and security and privacy.

The measurement scales developed over the past two decades are reliable, valid and thus useful to interested academics and practitioners (see a list on table 1). As we see, several dimensions have been proposed in these studies. Although some overlap exists on dimensions such as appearance, security, information and ease of use, there there is still no consensus on the number of dimensions that constitute website quality. Nevertheless, our literature review suggests that "website quality is a multidimensional construct although the content of what constitutes website quality varies across studies" (Zeithaml *et al*., 2002). Some researchers emphasize the interface design and hardware performance of the website while others focus on the service provided through the interaction with a website. For the purpose of our study we focus on Aladwani and Palvia's (2002) measurement instrument and tested its applicability in a culturally different context: China. We chose this measurement instrument because: (i) it considers the users' or customers' perspectives on website content not the full online experience (ii) has the virtue of incorporating several aspects of the other reviewed scales, (iii) has been thoroughly developed, refined and has sound psychometric properties (iv) is relatively more parsimonious than the others and easy to use. In addition, this instrument has been used with several country samples such as Portugal (Carlos and Rodrigues, 2012), New Zealand (Djajadikerta and Trireksani, 2006), Canada (Bliemel and Hassanein, 2007) and Taiwan (Chang and Chen, 2008). This instrument "can be utilized to evaluate Web quality at an aggregate level" (Aladwani and Palvia, 2002) and at a dimensional level can help marketers to allocate resources efficiently. Thus, the primary purpose of the present study is to examine the psychometric properties of a Chinese version of Aladwani and Palvia's (2002) measure of website quality.

TABLE 1
Summary of reviewed scales measuring website quality

Scale	Dimensions	Author(s)
SITEQUAL	Ease of use, aesthetic design, processing speed and security	Yoo and Donthu (2001)
eTailQ	Fulfilment/reliability, website design, privacy/security and customer service	Wolfinbarger and Gilly(2003)
WebQual 4.0	Usability, information quality, service interaction quality	Barnes and Vidgen (2002)
NETQUAL	Information, ease of use, site design, security/privacy and reliability	Bressolles and Nantel (2006)
E-S-Qual	Efficiency, fulfilment, system availability, privacy	Parasuraman *et al*. (2005)
Website quality	Specific content, content quality, appearance and technical adequacy	Aladwani and Palvia (2004)
WebQual	Information al fit-to-task, interactivity, trust, response time, ease of understanding, intuitive operations, visual appeal, innovativeness, flow—emotional appeal, consistent image, on-line completeness, better than alternative channels	Loiacono *et al*. (2007)
e-service quality	Functionality, information content and quality, fulfilment and responsiveness, safety and security, appearance and presentation, customer relationship	Tsang, Lai and Law (2010)
Website quality	Security, enjoyment, information quality, ease of use, and service quality	Hasanov and Khalid (2015)
Website quality	Usefulness of information, ease of use, accessibility and website security/privacy	Jeon and Jeong (2017)
Website quality	Usability, functionality and security and privacy	Wang *et al*. (2015)
e-SELFQUAL	Perceived control, service convenience, customer service and service fulfilment	Ding *et al*. (2011)
Website quality	Content quality, service quality and technical quality	Rocha (2012)
e-merQual	Reliability and privacy, utility of the information, value-added services and efficiency	Janita and Miranda (2013)
Website quality	Information quality, system quality and service quality	Hsu *et al*. (2012)

Method

Participants

Data were collected from a convenience sample of university students at a Chinese university in southern China. A convenience sample was deemed appropriate to evaluate the applicability of the website quality scale in a Chinese context. Students attending regular classes were invited to access the online survey and instructed to evaluate a website they had most recently browsed. A total of 524 participants responded to the on-line questionnaire. After discarding 113 responses because of large sections of incomplete data, a final sample of 411 questionnaires was retained for analysis. The online survey was made available for a period of a month to minimize possible bias due to day of the week data collection. The final sample included 153 male and 229 female students (29 respondents didn't answer the gender question) and their average age was 21.25 years old. The students in the sample considered themselves as frequent internet users. More than 70% of the student sample spends more than 11 hours a week on the Internet. The majority of respondents, 80% uses a computer (PC or Mac) to access the internet.

Measure

The website quality measurement scale used in this study was developed by Aladwani and Palvia (2002). According to the authors, users perceive website quality through four dimensions: technical adequacy, specific content, content quality and appearance. Technical adequacy refers to the website's functional capabilities to navigate with ease, swiftness on loading pages, availability and valid hyperlinks. Specific content refers to the information substance offered on a website in terms of usefulness, quality, completeness and accuracy of the information content. Content quality refers the attention to detail, understandability of content and appropriate use of language to communicate information through the website. This information could be about the firm, its products or about customer related matters. Appearance deals with website design, including aesthetics, web page layout, visual design and colors (Aladwani and Palvia, 2002)

The original Aladwani and Palvia's measurement instrument was translated into Chinese using the back-translation technique recommended for cross-cultural research (Brislin, 1970). The questionnaire was translated from English into Chinese and vice versa by bilingual colleagues of the authors to ensure reliability and equivalence. Two bilingual graduate Chinese students reviewed the translation. There were no significant problems in either the translation or the back translation. Chinese researchers subsequently verified the quality of the translation before performing a pre-test of the Chinese version of the questionnaire. Finally, the online-version of the questionnaire was developed, and pilot tested with undergraduate Chinese students. The 25 items of the website instrument were measured on a seven-point Likert scale ranging from strongly disagree – 1 to strongly agree – 7.

Procedure

Two statistical programs were used to analyse the data. We used SPSS 18.0 to calculate the main descriptive statistics, correlations among items, internal consistency and to make an initial assessment of the factor structure. We used EQS 6.2 to perform a confirmatory factor analysis (CFA) to determine the factor structure that best fits the data.

We used EFA and CFA to test for the unidimensionality of each construct. Problematic items were identified for further analysis and elimination if deemed necessary.

Internal consistency was assessed using the Cronbach's alpha (a > 0.7 indicates satisfactory reliability) and a measure of composite reliability known as the Raykov's index ("Rho coefficient") to provide a more accurate estimate of reliability (Raykov, 1997; Fornell and Larcker, 1981). CFA was used to evaluate the adequacy of the measurement model by means of assessing convergent and discriminant validity. Evidence of convergent validity was taken to be present if the average variance extracted (AVE) between a construct and its measures was at least 0.50 (Fornell and Larcker, 1981). Convergent validity is also established when measurement items (factor loadings) load significantly on their corresponding latent construct. Evidence of discriminant validity was determined if the squared correlation between two constructs was lower than their respective AVE's. We also assessed discriminant validity by means of a chi-square difference test between two- versus one-factor models for each pair of constructs in the study. Evidence of discriminant validity is found if the two-factor model fits better the data than the one-factor model.

Overall model fit was checked by examining a relative Satorra-Bentler chi-square index (divided by the degrees of freedom). The ratio is represented as SB χ^2/df. Kline (1998) recommends a ratio lower than 3 as a good fit while Marsh and Hocevar (1985) suggest that a ratio as high as 5 indicates a reasonable fit. Nevertheless, the SRMR, CFI and NNFI were used as indices of individual model fit, with SRMR values lower than 0.08 and CFI and NNFI values greater than 0.90 indicating reasonable model fit. Additionally, the $\chi 2$ difference test ($\Delta\chi 2$) was used to statistically compare nested models.

Data Analysis and Results

Exploratory Factor Analysis

A principal components analysis of the website quality scale scores, using varimax rotation, provided initial support for the a priori assumption that it assessed four dimensions of website quality. Results of the Bartlett's Test of Sphericity and the KMO ($\chi^2 = 6499.47$, $df = 300$, $p < 0.001$; KMO = .92) showed that the respondent data are suitable for factor analysis. The variables having factor loadings less than 0.5 were filtered out and not used for further analysis (Hair *et al.*, 2006). The EFA extracted five factors with four of them accounting for 59.85% of the explained variance (with evenly distributed –16% to 13%– proportions). In general, the pattern of loadings reflected Aladwani and Palvia's four-factor measurement model with all but four items loading as expected. For example, items #1 and #7 had weak loadings (lower than 0.5) for a scale that has already been used in previous studies (e.g. Al-Qeisi *et al.*, 2014). Two other items (#6 and #8) cross loaded both on an independent fifth factor. We re-ran the EFA specifying the 4 factors to be retained. Appendix A shows the items used in the scale. Items #1 and #2 had still loading values less than 0.5 and were not considered for further analysis. The two cross-loaded items (#6 and #8) loaded now on their designated factor. The performance of these two items on subsequent analyses was closely scrutinized. Each of the other twenty-one items loaded most strongly on a factor intended to assess the same orientation.

Test of Unidimensionality

The unidimensionality assessment results indicate, in general, a good fit of the data for the majority of the measurement sub-scales. The ratio SB χ 2/df was acceptable for all but two measured dimensions of website quality: specific content and appearance. However, the other fit indices for these two sub-scales are all within the accepted values and their items' standard coefficients are all highly significant at the $p < 0.001$ level. Consequently, while acknowledging that the ratio SB χ 2/df for these two sub-scales point to potential issues, we affirm that the scale items for each sub-scale assess a single underlying factor or construct.

TABLE 2
Results of the tests of unidimensionality

Constructs	Items	S-B$\chi^2/d.f.$	SRMR	NNFI	CFI
Technical adequacy	5	2.13	.025	.97	.99
Specific content	6	7.92	.054	.90	.94
Content quality	5	1.96	.024	.99	.99
Appearance	5	5.74	.037	.94	.97

Note: S-Bχ^2 = Satorra-Bentler Scaled Chi-Square; CFI = Comparative Fit Index; NNFI = NonNormed fit index; SRMR = Standardized Root Mean Square of Residuals.

Measurement Model, Internal Consistency, Convergent And Discriminant Validity

A confirmatory factor analysis with total disaggregation using EQS 6.2 was performed to test the 21-item, four-factor model of website quality. The overall fit was satisfactory (S-B$\chi^2/d.f.$ = 2.89; SRMR=0.052; NNFI=0.90; CFI=0.91). We also confirmed that all the standardized factor loadings were higher than 0.7 and significant at the $p < 0.001$ level. Each sub-scale showed an excellent level of internal consistency, with the alpha and Rho coefficients both being uniformly above the level of 0.60 (Bagozzi and Yi, 1988). See Table 3.

Convergent validity was assessed by examining factor loadings, composite reliability and the average variance extracted (AVE) for each sub-scale. The standardized factor loadings were moderately large ($b > 0.6$) or very large ($b > 0.9$) and all the items loaded significantly ($p < 0.001$) on their intended dimension. Furthermore, the AVE estimates ranged between .50 and .61, satisfying the minimum requirement of 0.50 (Fornell and Larcker, 1981). The AVE for technical adequacy (0.502) was marginally above the cut-off value. These results support the convergent validity of the constructs in the study.

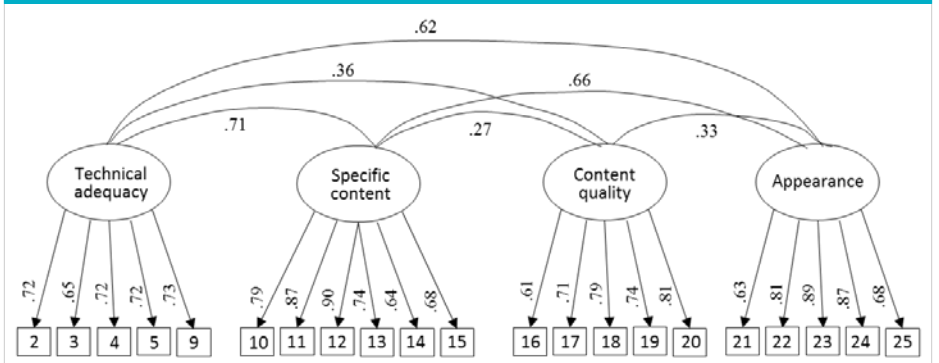
TABLE 3

CFA standardized factor loadings, t-values, Cronbach's a and composite reliability

Construct/ Indicators	Standardized loading	S.E.	Est./S.E.	R^2	Cronbach's a	CR-Rho
Technical adequacy						
2-tecadq2	0.719	0.037	19.599	0.52	0.85	0.85
3-tecadq3	0.646	0.038	16.908	0.42		
4-tecadq4	0.723	0.038	19.146	0.52		
5-tecadq5	0.717	0.033	21.819	0.51		
9-tecadq9	0.734	0.031	23.962	0.54		
Specific content						
10-spcont1	0.791	0.036	21.95	0.63	0.89	0.89
11-spcont2	0.873	0.018	48.967	0.76		
12-spcont3	0.899	0.016	57.745	0.81		
13-spcont4	0.741	0.029	25.408	0.55		
14-spcont5	0.639	0.038	16.893	0.41		
15-spcont6	0.679	0.032	21.303	0.46		
Content quality						
16-contqual1	0.613	0.043	14.195	0.38	0.80	0.80
17-contqual2	0.711	0.049	14.574	0.51		
18-contqual3	0.789	0.039	20.312	0.63		
19-contqual4	0.741	0.046	16.209	0.55		
20-contqual5	0.809	0.042	19.468	0.65		
Appearance						
21-appear1	0.631	0.042	15.141	0.40	0.87	0.88
22-appear2	0.809	0.025	31.94	0.66		
23-appear3	0.893	0.021	43.399	0.80		
24-appear4	0.873	0.031	28.504	0.76		
25-appear5	0.678	0.039	17.196	0.46		

FIGURE 1

PWQ four-factor measurement model, standardized solution



Note: All paths are significant ($p < .001$). Values associated with each path are standardized CFA loadings.

Discriminant validity was established in two ways. First, we calculated the squared correlation (shared variance) between all possible pair of constructs to determine if they were lower than their corresponding average variance extracted estimates. All the AVE's but one exceeded the squared correlations between any two constructs in the model, thereby providing support for the discriminant validity of three of the four constructs. Secondly, we performed a series of pair-wise comparisons of CFA models using a chi-square difference test (Dabholkar and Bagozzi, 2002). For each pair of constructs two models were developed. In one model, all items for a pair of constructs were forced to load on a single factor. In the second model, items were allowed to load on their corresponding factor. We then performed a chi-square difference test to determine if the two-factor model provides a better fit than the one-factor model. For each pair-wise comparison, the chi-square difference values (usually larger than the threshold of 10.828 with 1 *d.f.* for $p < 0.001$) were statistically significant indicating that discriminant validity is achieved in all cases.

Since the squared correlation (shared variance) between two dimensions – technical adequacy and specific content – was not lower than the AVE of technical adequacy (0.504 vs. 0.502), we ran two supplementary tests of discriminant validity. In the first of these additional tests we used a chi-square difference test to compare two models: constrained (correlation between the two constructs fixed as one) and unconstrained (constructs allowed to correlate freely). The significant difference between the constrained and unconstrained models ($D\chi^2 = 27.50$, *d.f.* = 1) indicates that the two constructs are not perfectly correlated. In a second additional test we examined if the confidence interval for the estimated correlation between technical adequacy and specific content contained unity. The 95% confidence interval for the correlation between these two constructs [0.665 – 0.755] didn't contain unity. Overall, these results suggest that the two constructs are distinct, and that discriminant validity is achieved.

TABLE 4
Convergent and discriminant validity

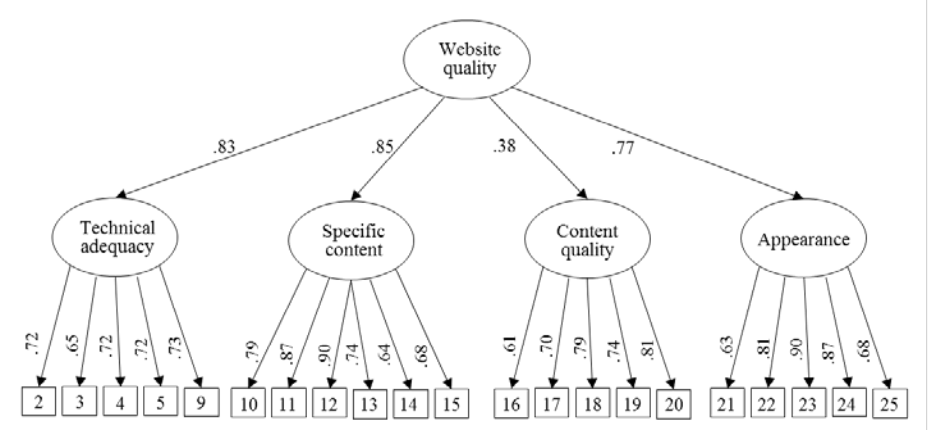
Construct	Technical adequacy	Specific content	Content quality	Appearance
Technical adequacy	(0.50)	294.14	619.76	408.26
Specific content	[0.50]	(0.60)	855.87	599.96
Content quality	[0.13]	[0.07]	(0.54)	814.56
Appearance	[0.38]	[0.43]	[0.11]	(0.61)

Diagonal elements (in parenthesis) represent the average variance extracted (AVE). Off-diagonal elements [in brackets], lower triangle entries are the shared variance (squared correlation) between constructs. For discriminant validity, the diagonal elements should be larger than any other corresponding row or column entry. Off-diagonal elements, upper triangle are the chi-square difference value.

The results of the CFA show evidence that website quality is a multidimensional construct comprised of four dimensions. These four constructs are distinct from one another (discriminant validity is achieved) but significantly correlated suggesting that their variance can be accounted for by one common underlying higher-order construct. Consequently, we specified a second-order factor model with technical adequacy, specific content, content quality and appearance as four primary dimensions of the second-order construct of website quality. The results showed that the structure pattern of the second-order model was adequate based on the fit indices (S-Bχ^2/*d.f.* = 2.86; SRMR = 0.056; NNFI = 0.90; CFI = 0.91). The standardized parameter estimates were all significant and loading on their predefined dimensions. Furthermore, the first-order factors had significant factor loadings on the latent second-order construct of website quality. All in all, these results indicate that the second-order factor structure for website quality was well supported.

Finally, since Chen *et al*. (2005) suggest that " ... in comparison to first-order models with correlated factors, second-order factor models can provide a more parsimonious and interpretable model", we compared the first-order and the second-order factor website quality models to determine which of them provides a better fit to the data. Marsh and Hocevar (1985) have suggested that to assess the fit of a higher order model relative to a first order model a *target coefficient*, needs to be calculated. This coefficient can be obtained by dividing the value of the χ^2 of the first-order model by the χ^2 of the second-order model. If the target coefficient is close to 1, the first-order factors could be integrated into a higher-order construct (Marsh and Hocevar, 1985). In the present case, this ratio is 0.99, indicating that the higher order website quality latent variable accounts for a very large portion of the covariation among the first-order factors. These results provide support for the second-order factor structure. This suggests that users evaluate website quality not only through their perceptions about the four dimensions but they also considered overall website quality as a higher-order factor that captures a meaning common to all the dimensions. Users perceive website quality as a whole rather than parcelling it in sub-dimensions. The order of importance of the primary website quality dimensions based on the CFA standardized coefficient values are specific content (0.85), technical adequacy (0.83), appearance (0.77) and content quality (0.38) (Figure 2).

FIGURE 2
PWQ four-factor higher order model, standardized solution



Note: All paths are significant ($p < .001$). Values associated with each path are standardized CFA loadings.

Discussion

The purpose of the present study was to investigate the reliability and validity of a measure of website quality with a sample of Chinese university students. The results supported that a Chinese translation of the proposed website quality measure has a similar and sound factor structure as compared with that of Aladwani and Palvia's (2002) original study. The four-factor structure clearly emerged from the CFA we performed on the data, confirming that the PWQ scale is multidimensional with four sub-dimensions. Consequently, our study provides support for the stability of the PWQ measurement scale and suggests that its original four-factor structure can be replicated in a Chinese context. Our results also showed that a single higher-order factor accounts for the variance among the lower-order factors (technical adequacy, information content, content quality and appearance).

Common sense indicates that there will be differences between Chinese students users of websites and those elsewhere. Language, technology, values and culture in general may be crucial elements affecting a user's evaluation of a website. Our findings in this study do not support that presumption. A measure of website quality translated into Chinese and used with a Chinese sample has sound psychometric properties.

Our results are similar to those of other researchers who also found a similar factor structure with samples of different nationalities: New Zealand (Djajadikerta and Trireksani, 2006), United Kingdom (Al-Qeisi *et al*, 2014), Canada (Bliemel and Hassanein, 2007) and Kuwait (Aladwani, 2006). We turned to Hofstede's research to help explain our results. We understand Hofstede's framework of national culture does have its shortcomings and weaknesses. However, compared to other models on national cultures, it is a relatively representative and homogeneous cultural model. It is a hands-on framework, simple to use providing a clear explanation of cultural differences. Hofstede (1984, 2001) framework is vastly cited and extensively used in various fields including web or internet related research (e.g. Hermeking, 2005; Loiacono and Lin, 2005; Ko *et al.*, 2004; Tigre Moura *et al.*, 2016)). Therefore, we chose to use it in our research as the reference. The similar factor structures we found can be explained by the fact that these countries, in which others have performed their studies, score similarly in two of Hofstede's dimensions that are relevant to website quality evaluation: uncertainty avoidance and masculinity. In low uncertainty avoidance cultures/societies adherence to laws and rules may be flexible to suit the actual situation and pragmatism. Consumers in these societies should be adaptable and entrepreneurial. Websites change constantly to adapt to trends, to include new products, and to update availability of stock and prices. Users in these societies seem to be comfortable with this situation. Hence their appreciation of website quality is not affected by their similar point of view regarding ambiguous/uncertain situations and a similar measurement instrument will capture the essence of website quality. In terms of Hofstede's masculinity dimension, these country cultures are more similar than different (NZ-58, UK-66, CAN-52, KUW-40). They are on the masculine side of the spectrum. They are success oriented and driven. Navigating seamlessly through websites is for them key to successes and it offers a basis to be competitive when hiring and promotion decisions take place in the workplace. They see the use of a website as contributing to achieve success and aligns clearly with their performance ambition characteristic of masculine cultures/societies.

The lack of differences might also be due to our respondents sharing important characteristics with those of other studies. For example, they are all frequent users of the Internet, frequently navigating the web to find information about a product or a service. As students, our sample share with others the characteristic of being educated at the university level. They frequently use the web for academic purposes. As young consumers, they are more used to make online purchases or to interact with friends. These characteristics, make them comparable to other similar groups in other countries. This suggests the existence of a global consumer segment with homogeneous attributes and that exhibit similar website surfing behaviour. Hence, it is possible to use a standard website quality assessment tool in China.

Although the overall findings of the present study showed that Aladwani and Palvia's (2002) website quality measurement instrument is suitable for assessing perceived website quality in a Chinese sample, some differences were observed in the content of the first dimension. For example, we found that items #1 and #7 loaded weakly on the first factor (technical adequacy) suggesting that these items are not useful to describe this dimension on the Chinese sample. Item #1 refers to the website being secured to carry out transactions. This weak loading

may be a result of the type of website being accessed and evaluated. The large majority of the reported websites were accessed for information searching, entertainment or social purposes and not to make purchases online. See Appendix B. Future studies with Chinese samples should consider instructing respondents to evaluate online retailers also. In such a way, these items would be more relevant. Item # 7 refers to the speed of loading a webpage and also loaded weakly on the first dimension, which is very different from Aladwani's and Palvia's previous findings in Western society sample. The different results with this item are likely due to the Chinese unique cultural conception of time in contrast with the western cultural time orientation. This item may be more relevant to westerners who take time organization as extremely important focusing more on punctuality, promptness and efficiency rather than the relativeness and flexibility of time as seen by individuals in Chinese culture.

As mentioned above, the EFA showed items #6 and #8 loading on the dimension of technical adequacy with weak loading values, and with low squared correlation values in the CFA. These items refer to the website's interactive features and its customization potential. In fact, it refers to the possibility of a user to relate individually to the website through personalizing the interface and/or customizing it to their requirements. Customization of a website can be considered as a reflection of low power distance because in such cultures there is also respect for individual and because it gives certain power to the user situating him/her in a position of power. Consequently, these items may be more relevant to individuals in cultures that are individualistic and with low power distance. On the contrary, collectivist and high-power distance individuals (such as Chinese users) tend to favour websites that show more formal designs in which choices and access to information are limited (Eristi, 2009; Marcus and Gould, 2000). In such a context, an item that refers to flexibility in the interaction rather than to a strict and rigid interface may not relate well with Chinese respondents.

In summary, our results demonstrate that a measure of website quality translated into Chinese and used with a Chinese sample has sound psychometric properties. However, China may not be a homogeneous culture as we think. Anecdotally, we have observed pronounced differences in the behavioural characteristics of Northern and Southern Chinese. Researchers have identified societal patterns of farming rice versus wheat are a source of major psychological differences within China. This tradition of farming continues to affect Chinese individuals today. Therefore, two distinct cultural psychologies coexist in China (Talhelm *et al.*, 2014). Northerners are more straight forward, often more brusque and less gregarious than Chinese in the south. Southerners, on the contrary, are more reserved, more cautious, less direct, and more interdependent. These psycho-cultural differences suggest caution when using a standard measurement instrument across China. One could argue that the participants' in our study only represent the experiences of students in a southern Chinese city. It would be risky for researchers to extend the overall findings of this study and generalise them to the experiences of internet users in China.

Managerial Implications

The pervasiveness of the internet in our lives is undeniable and the development of electronic commerce is permanent flux. Companies of all corners of the world are using websites as a tool that allows to formulate more efficient business strategies and operations. Consequently, the web has become intensively competitive and affected by the globalization phenomena. Therefore, it is important for managers to understand how people in different countries evaluate the quality of their websites.

Practitioners in China can use our findings to identify the dimensions of website quality that contribute the most to the improvement of their online presence. Website managers' priorities should vary depending on where their customers are located. In China, website managers must recognise the importance of providing in their website information that is useful, complete and accurate. At the same time, the technical adequacy of the website's functional capabilities must be present. These are the two most important dimensions of website quality Chinese website managers could use to achieve competitive advantage. These findings suggest that managers should recognise the importance of hiring and maintaining staff that develops websites with these capabilities. These staff should be also motivated to maintain and update the website frequently and be responsive to any issue arising from its interaction with users.

The results of this study may also prompt managers to emphasize the respective important dimensions in their communication strategies. For example, Chinese managers could highlight the relevance and accuracy of the information provided on their websites. In general, this study results could guide the investment of the firm's financial resources to areas of development related to specific content and technical adequacy.

In terms of digital marketing strategy, this study showed that a western measure of website quality can be used in the Chinese environment. Therefore, a global digital marketing strategy characterized by a standardized marketing effort may result appropriate. However, as we highlighted in the previous section, caution must be exercised when adopting a common marketing strategy across China. Practitioners should be aware of the psycho-cultural differences between Northern or Southern China. Chinese individuals may show different web usage patterns depending if they are from the north or the south.

A website offers firms the possibility of developing, operating and offering services and products across the globe. Online presence extends the market coverage and offer firms the opportunity to increase their market share, reducing operation costs, and developing customer relationships. It poses serious challenges as website users may have different demands, expectations, and needs. However, the results of this study show that when firms use it cautiously, a standard measure of website quality is a good and appropriate starting point to assess website quality in China.

Limitations and Conclusions

As with all research of this type, the conclusions drawn by the present study are subject to certain limitations.

First, although the sample size was somehow large it was not randomly drawn and includes only students. It is possible these young internauts would be more comfortable in assessing the quality of a website than less proficient or experienced users. Also, one could argue that the participants' in our study only represent the experiences of students in a southern Chinese city and it would be risky for researchers to extend the overall findings of this study and generalize them to the experiences of internet users in China. Thus, generalization of the findings to other all Chinese internet user groups should be conducted with caution. A diverse sample should be used in future studies to allow for the generalizability of the results. Second, although the current findings provided evidence for the factorial validity and sound psychometric properties of the PWQ scale, any attempt to use a standard measurement instrument across China should be made with caution. China has huge population with large regional differences in consumer characteristics and preferences. Differences expand to economic and even cultural differences within China. Consequently, generalization of our results should be made with caution. Third, students visited and evaluated different types of websites and for utilitarian or hedonic purpose. The fact we didn't control for the type of website respondents evaluated may have had an impact on the results we obtained (e.g. weak loadings and cross loadings). Future studies should consider instructing respondents to visit and evaluate the quality of a selected website or one type of website. In addition, researchers should control for web customization and web animation of commercial websites in order to make reasonable comparisons. Finally, future studies should distinguish between visiting websites for utilitarian or for hedonic purposes in their design and evaluate the impact of the purpose of the visit on the evaluation of website quality.

In summary, consistent with previous findings, the Chinese version of the Aladwani and Palvia's (2002) PWQ measurement scale exhibited a stable four-factor structure, acceptable internal consistency and evidence of construct validity. The results provided evidence that Aladwani and Palvia's (2002) PWQ is a valuable instrument for assessing website quality in China. When the instrument is paired with an overall measure of website quality, firms can identify the most important dimension for Chinese customers in order to better allocate resources. The scale can be confidently used in website quality related research in a Chinese context. However, the PWQ measurement instrument should be used with caution as this study has validated the instrument in China with only one convenience sample.

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APPENDIX A

Final list of items included in the Chinese version of the PWQ measurement instrument

Technical Adequacy	
2-tecadq2	This website looks easy to navigate through
3-tecadq3	This website has adequate search facilities
4-tecadq4	This website is always up and available
5-tecadq5	This website has valid links (hyperlinks)
9-tecadq9	This website is easy to access (i.e. has a reflective and widely registered name)
Specific Content	
10-spcont1	The content of this website is useful
11-spcont2	The content of this website is complete
12-spcont3	The content of this website is clear
13-spcont4	The content of this website is current
14-spcont5	The content of this website is concise
15-spcont6	The content of this website is accurate
Content Quality	
16-contqual1	In this website, one can find contact information (e.g. e-mail addresses, phone numbers, etc.)
17-contqual2	In this website, one can find firm's general information (e.g. goals, owners)
18-contqual3	In this website, one can find details about products and/or services
19-contqual4	In this website, one can find information related to customers' policies (e.g. privacy and dispute details)
20-contqual5	In this website, one can find information related to customer service.
Appearance	
21-appear1	The website looks attractive.
22-appear2	The website looks organized.
23-appear3	The website uses fonts properly.
24-appear4	The website uses colors properly.
25-appear5	The website uses multimedia features properly

APPENDIX B

Types of websites visited by respondents

Type of website	Count
Information search	144
Others	36
University resources	18
Online purchases	67
Video	37
Gaming	12
Music	27
Social network	70
Total	411