THE QUALITY ASSESSMENT AND CONTENT ANALYSIS OF CORPORATE WEBSITES IN CHINA: AN EMPIRICAL STUDY

YOU MIN XI
Management School, Xi’an Jiaotong University
Xi’an 710049, China
ymxxi@mail.xjtu.edu.cn

YOU LONG ZHUANG
Department of Computer and Mathematical Sciences,
Columbia College, Columbia, MO 65216, USA
yzhuang@ccis.edu

W. HUANG
Department of MIS, College of Business
Ohio University, Ohio 45701, USA
huangw@ohio.edu

CONGGUO SHE and ZHIPENG ZHANG
Management School, Xi’an Jiaotong University
Xi’an, China, 710049

This study evaluates 74 Chinese corporate websites by examining their contents and functions to understand the business objectives. It found that business objectives of these websites mainly focused on publicity, and very little on online sales. Firms in banking and construction industries develop the highest quality websites, while firms in public services and retailing are the laggards. Chinese websites are easy to use with consistent information. The article also compared the findings in China in this study with those in the United States, Australia, and Singapore in similar studies. It found that industry characteristics were similar among nations while more complicated website functions were more popular among the firms of developed countries. The findings will contribute to the research of e-business by confirming the existence of innovators and laggards of Web technology adoption in model given in E. M. Roger, Diffusion of Innovations (The Free Press, New York, 1962), and help managers understand current status of Chinese websites.

Keywords: Website assessment; e-business in China; corporate websites.

1. Introduction
With the globalization of economy and the increasingly widespread adopting of e-business, a growing number of companies worldwide have established websites to publicize their firms, better serve their customers, assist information exchanges with their customers and suppliers, and increase sales with online channels.1-4
Transactions by Business-to-Business alone reached $2.4 trillion in the United States in 2003. Business-to-Consumer e-commerce will grow fivefold by 2010. A recent survey conducted by China Internet Network Information Center (CNNIC) showed that there were nearly 700,000 websites with more than 94 million Internet users in China.

Although China is a developing country, its high average economic growth rate in the past 25 years is rarely seen in world history. E-business is still new in China. But both the number of Chinese websites and the number of Internet users are enormous. It is interesting to study the current status of Chinese corporate websites. The purpose of this research is to examine Chinese corporate websites and identify innovators and laggards by the industry. The study will also provide a comparison between corporate websites of China and those of developed countries.

A corporate website is defined, in this study, as a set of closely related Web pages owned by a company with a unique second-level domain name. It may or may not connect to the intranet and extranet of the company. These websites enhance information flow, facilitate organization re-design, add new distribution channels, enable developing new information-based products, and assist companies in gaining competitive advantage. Corporate websites are also important for consumers by providing product and service information and enabling them to place orders online. A survey of Internet users indicated that 77% of them believed that online services enabled them to work more effectively. However, many companies have not yet gained full benefits from their websites. Hoffman and Novak noted that the major cause of this problem was that managers lacked the knowledge of developing high-quality corporate websites to support their business objectives.

This study will contribute to the theory of technology innovation diffusion by providing empirical evidence from Chinese corporate websites. It will also contribute to e-business industry with an assessment framework to evaluate corporate websites. It will provide a reference for managers who are interested in Web applications in China. First, we present an analysis framework describing the effects of business objectives on website contents and functions, and proposing 10 criteria to assess them. Then, we apply the framework to empirically investigate websites of 74 listed Chinese corporations. Finally, we compare our findings with similar studies in the United States, Singapore, and Australia and conclude with discussion and implications for researchers and managers.

2. Research Framework

A research framework that describes how business objectives of websites affect the contents and functions, and proposes 10 criteria to assess quality of website contents and functions is shown in Fig. 1 and elaborated in this section.

2.1. Business objectives of corporate websites

Business can gain many benefits through its corporate websites. Business objectives of websites vary by firms and industries. Cheung and Huang categorized them
into four groups: general publicity, customer service, online information exchange, and online sales. The four objectives are also the purposes of most Chinese corporate website. Therefore, this research adopts their categorization and shows the four groups of objectives in the up middle of Fig. 1.

General publicity is perhaps the most popular business objective of corporate websites. Such popularity is due to the low cost and timely publishing of online contents. Companies can enhance their reputation and attractiveness as potential employers by promoting corporate logos, images, products, and services on the websites.

Customer service is another important business objective of corporate websites. Web technologies allow customers to contact firms by simply filling out an online form, chatting with live service representatives, and browsing frequently asked questions (FAQ). Corporate websites are also well known for providing product configuration and maintenance specification information.

Online information exchange is the third business objective of corporate websites. Compared to traditional information exchange, online information exchange is faster, more accurate, more convenient, and cost less. Many companies use websites for better communication with their suppliers and customers.16,17 They may also use websites for recruiting and communicating with their stakeholders.

Online sales is the fourth business objective. Online stores allow customers to find the products, add to the shopping cart, type in payment and shipping information, and wait for the products to arrive. Companies benefit from online shopping by increasing sales, better market segmentation, and lower the cost.
The four business objectives discussed above exhibit different levels of extent that the Web technology is used. General publicity in most cases is achieved through static webpages and is the least sophisticated objective. Customer service typically involves the use of server-side programs and other software. Online information exchange may even require the seamless connection with customers and suppliers that may use different platforms. Finally, online sales will involve many other issues, such as privacy and security, and thus is the most complicated objective in terms of Web technology.

Companies may change their websites business objectives over time. For example, a firm may begin with a very simple website with little investment targeting solely on general publicity, and then build more sophisticated websites as it gains more experience as well as stronger demand from its customers and suppliers. The theory of technology innovation diffusion proposes that organizations, according to the time they incorporate new technology, fall into five categories, namely, innovators, early adopters, early majority, late majority, and laggards.

Innovators are firms that are willing to take risks and be the first adopters of the new technology. Early adopters, although accept new technology early, but often imitate innovators. Early majority are typically risk averse. They do not invest in new technology until late growth stage. Late majority and laggards are firms that will not use the technology until it is mature. Understanding the differences in the five categories presents a way to successfully assist companies at various stages of adoption to improve their websites.

Companies consider potential benefits, technological compatibility, organizational compatibility, complexity, and top management support when they decide when and to what extent to invest in website developments. Thus, we propose the first research question:

Question 1: Which industries are the innovators and laggards of Web applications in China?

2.2. Contents and functions of corporate websites

Websites achieve their business objectives through contents and functions. Contents refer to all the digital subject matter presented on a website, including text, image, audio, and video. They present information about a company’s products and services. To achieve the business objective of general publicity, websites often publish information such as corporate background, organizational structure, products/services catalog, news, financial information, messages from CEO, price, and related links. To achieve the business objective of customer service, websites typically provide contacts and product configuration information.

Functions refer to how websites can be used, or the effectiveness of websites to provide users with information they need. Major website functions include recruitment, search engines, chat rooms, bulletin board service (BBS), FAQ, online orders, online payment, customer feedback, and other online applications.
Many websites provide online recruitment to allow applicants to fill out application forms and submit them online. This is likely to support the business objectives of general publicity and online information exchanges. Search engines assist visitors find relevant information on the websites easily and quickly.\textsuperscript{3,18} As such, they may enhance business objectives of customer service and online information exchange. Chat rooms, BBS, and FAQ represent the interactive function of websites.\textsuperscript{28} They support online information exchange. Finally, online order, online payment, customer feedback, and other applications (e.g., online mortgage calculator) contribute directly to online sales.

Website contents and functions are determined by corporate resources and capabilities,\textsuperscript{29} as well as by a country’s information technology infrastructure, marketplace, and culture.\textsuperscript{30} It is interesting to know whether website contents and functions are different across countries. Thus, we propose the second research question:

Question 2: What similarities and differences existed between Chinese corporate websites and those of developed countries in terms of business objectives, content, function, and industrial characteristics?

2.3. \textit{The assessment criteria of corporate websites}

Researchers have studied user satisfaction,\textsuperscript{31} user behavioral intention on the Web,\textsuperscript{32} Web usability,\textsuperscript{33} and service quality\textsuperscript{34–36} at corporate websites. However, a general assessment framework that can be used to evaluate websites based on their contents, functions, and user satisfaction was lacking. This study first draws criteria from Cheung and Huang’s evaluation system that based on website contents and functions.\textsuperscript{3} It then draws user satisfaction criteria from Loiacono \textit{et al.’s} model.\textsuperscript{37} As such, the current study examines corporate websites in three aspects, contents, functions, and user satisfactions as shown at the bottom of Fig. 1.

Website content refers to the materials presented on a website. It includes text, graphics, audio, and video that are used to present information about a firm’s products and services. It is the content that attracts people to visit a particular website.\textsuperscript{38} Quality of contents can be assessed by the \textit{frequency of content update} and \textit{consistency of information} on websites.

\textit{Frequency of content update} is vital for corporate websites.\textsuperscript{39} It is a good practice for firms to update their websites’ content frequently. The renewed information is likely to attract visitors’ utmost attention. For example, manufacturers should periodically update information of products and prices, while tourism companies should publish seasonal services on time.

\textit{Consistency of information} is also fundamental for corporate websites.\textsuperscript{40} Information on a website should be error-free, complete, and meet the visitors’ demand. Materials provided by different units within a firm should not conflict with each
other. Even information archived for search may not be changed over time. Otherwise, the websites can cause confusions to visitors. The consistency of information will also assist visitors in locating relevant information.

Website function refers to how a website can be used. A website should be able to deliver the functionality that users expect. To measure the effectiveness of carrying out websites business objectives, the assessment criteria should include response speed, interactivity, security, sale process, tools to aid user decisions, and customization.

Response speed is the time between a visitor click on a link and the page shown on the screen. The time span for which visitors are willing to wait for downloading or opening a webpage is limited. A survey indicated that the average time-length for waiting is less than 8 s.

Interactivity is one major advantage of websites over traditional media. It can be implemented in many ways, such as FAQ, BBS, chat room, search engines, and customer feedback. Interactivity depends on both technology and management. Technically, an interactive website provides diverse, convenient, quick, and powerful interactive tools. Managerially, an interactive website requires back-end efficiency. Prompt dealing with feedback from visitors is still the responsibility of managers.

Security measures the extents to which visitors feel reassured when visiting a website and enjoying the services. Visitors often fear that webpages contain virus, personal registration information is leaked out, or online payment is insecure. As a result, websites’ security is one of the top priority issues in assessing corporate websites.

Sale process is the capability of direct sale of products and services to the customers. Sale process can be classified into four phases. At the pre-purchase stage, websites provide consumers with the capability of searching for products, comparing products and acquiring price quotations. At the purchase stage, websites assist consumers’ online payment, including terms of payment and payment authorization. Products delivery stage happens after consumers completing orders online; websites email consumers shipping notification and order tracking numbers. Finally, at post-purchase stage, websites send advertisements, follow up emails, and promotional offers to the consumers.

Tools to aid user decisions are online applications that customers can use to assist their purchasing. Websites are capable of enhancing user decision-making during online shopping by providing decision-making tools. A price comparison tool, for example, can be very important for price-sensitive customers to make a purchasing decision.

Customization implies the degree to which visitors can personalize contents based on their profiles. With customization, websites can present customized information on products/services and greet users on introduction page. Personalized webpages have a potential to lock up customers and increase the likelihood of repeated visits.
User satisfaction refers to visitors’ satisfaction with their experiences on a website. The assessment criteria examine how easy a visitor can find the information and how comfortable when browsing the website. User satisfaction is assessed by \textit{ease of use} and \textit{complexity}.

\textit{Ease of use} demonstrates how quickly visitors familiarize themselves with the website structure and its basic contents.\textsuperscript{22,46} Reasonable layout, clear structure, polished words, positive visual effects from matching colors, coherent page style, and legible navigating system all facilitate visitors to use and comprehend a website positively and enjoyably. Users may have different skill levels and familiarity with a website. Websites should use features that are comfortable to the majority of visitors.

\textit{Complexity} is related to the number of webpages, sizes of the pages, the number of pictures, and multimedia used in a website. Complexity is critical for the success of a website.\textsuperscript{47} Webpages with appropriate level of complexity are more capable of capturing users’ attention and thus increasing their satisfaction. Pages with little complexity will not catch visitors’ attention. However, pages that are too complicated may distract users’ attention and disturb them. An appropriate level of complexity should be featured by, when the response speed is not affected, no more than three columns, a couple of pictures, links, and sufficient navigating information.

In summary, business builds corporate website to achieve business objectives. These objectives are accomplished through website contents and functions. Dimensions of contents and functions are based on literature review and authors’ observation of Chinese corporate websites. Similarly, the assessment criteria are drawn from research and verified with users of Chinese corporate websites. Elements and relationships of business objectives, site contents, site functions, and assessment criteria are depicted in Fig. 1.

\section{Methodology}

Seventy-four Chinese corporate websites were randomly selected from more than 600 firms listed in Shanghai Stock Exchange. We began by assigning a random number to all the listed firms and then sorted these firms by the random number. To determine how many firms to pick for this study, we consider two issues. First, we want to have at least three firms in each industry. Second, we want to control the size of the sample so that raters can evaluate these websites in a reasonable amount of time with good quality. The sample companies covered nine industries. The industry categorization was adopted from a locally well-known Chinese website “stockstar” (www.stockstar.com). For ease of comparison, website hosting firms, such as Internet service providers, were excluded from this study. Table 1 shows the nine industries and the number of websites assessed within each industry.

Twenty college students were recruited and trained to use the assessment framework. Then, they were asked to apply the framework to evaluate the websites. Of
Table 1. Number of websites assessed in each industry.

<table>
<thead>
<tr>
<th>Industry</th>
<th>Number of Websites Assessed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Retail</td>
<td>10</td>
</tr>
<tr>
<td>Information technology</td>
<td>11</td>
</tr>
<tr>
<td>Manufacture</td>
<td>21</td>
</tr>
<tr>
<td>Public service</td>
<td>5</td>
</tr>
<tr>
<td>Tour</td>
<td>6</td>
</tr>
<tr>
<td>Storage and transportation</td>
<td>6</td>
</tr>
<tr>
<td>Bank</td>
<td>3</td>
</tr>
<tr>
<td>Agriculture</td>
<td>5</td>
</tr>
<tr>
<td>Construction</td>
<td>7</td>
</tr>
<tr>
<td>Total</td>
<td>74</td>
</tr>
</tbody>
</table>

Table 2. Demographics of the subjects.

<table>
<thead>
<tr>
<th>Character</th>
<th>Number of People</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>16 (2)</td>
</tr>
<tr>
<td>Female</td>
<td>4</td>
</tr>
<tr>
<td>Age</td>
<td></td>
</tr>
<tr>
<td>18–30</td>
<td>20 (2)</td>
</tr>
<tr>
<td>Educational Level</td>
<td></td>
</tr>
<tr>
<td>Bachelor</td>
<td>2</td>
</tr>
<tr>
<td>Master</td>
<td>18 (2)</td>
</tr>
<tr>
<td>Major</td>
<td></td>
</tr>
<tr>
<td>Computer science</td>
<td>4</td>
</tr>
<tr>
<td>Business administration</td>
<td>16 (2)</td>
</tr>
<tr>
<td>Average time of being online</td>
<td></td>
</tr>
<tr>
<td>20–40 h</td>
<td>8 (1)</td>
</tr>
<tr>
<td>Over 40 h</td>
<td>12 (1)</td>
</tr>
<tr>
<td>Experience of online shopping</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>3</td>
</tr>
<tr>
<td>No</td>
<td>17 (2)</td>
</tr>
<tr>
<td>Studying or working</td>
<td></td>
</tr>
<tr>
<td>Studying</td>
<td>18 (2)</td>
</tr>
<tr>
<td>working</td>
<td>2</td>
</tr>
<tr>
<td>Experience of being online</td>
<td></td>
</tr>
<tr>
<td>Less than 1 year</td>
<td>2</td>
</tr>
<tr>
<td>1–2 years</td>
<td>6 (2)</td>
</tr>
<tr>
<td>Over 2 years</td>
<td>12</td>
</tr>
</tbody>
</table>

Note: Number in parentheses indicates the unusable assessment work.

the 20 returned evaluations, 18 assessment reports were complete and usable. The demographics of the 20 assessors are listed in Table 2. Evaluators were asked to visit each of the 74 websites and evaluate it based on the 10 criteria discussed in the previous section. A 9-point Likert scale was used with 9 means very good and 1 means very poor. The data collected thus reflects the subjective judgment of the evaluators instead of exact measurement. For example, the response speed measured the perception of the evaluators regarding the loading speed of a website compared to that of other websites. Complexity measured the perception of the evaluators regarding the optimal level of complexity rather than the straight degree of complexity. Figure 2 shows the scale.
4. Data Analysis

The data analysis includes two steps. The first step is to calculate average assessment scores on each criterion for each industry. The second step is to statistically test the differences of each assessment criterion across industries.

The following formula is used to calculate average assessment score on each criterion for each industry.

\[
\text{Average assessment score} = \frac{\sum_{i=1}^{n} \left( k_{1i} \times 9 + k_{2i} \times 7 + k_{3i} \times 5 + k_{4i} \times 3 + k_{5i} \times 1 \right)}{18n}
\]

In formula (1), \(k_{1i}, k_{2i}, k_{3i}, k_{4i}, \text{ and } k_{5i}\) denote the number of assessors who scored the website with points 9, 7, 5, 3, and 1, respectively, for company \(i\) in the industry. \(n\) is the number of companies assessed in an industry.

Table 3 shows the assessment scores for each industry on each assessment criterion. The last column is the average score of each industry. The second to the last row is the average assessment score of each criterion for all industries. The last row shows the standard deviations.

In terms of the frequency of content update, websites in banking industry received the highest score. These sites were updated quite often. The information on interest rates, exchange rates, and other financial products are updated in a timely manner. On the other hand, content of websites in public service industry was not frequently updated, say, about once every month.

Similar to the frequency of content update, the consistency of information in banking industry’s websites was scored the highest, while that of the public service industry’s websites scored the lowest. Most banking websites contained consistent information on corporate news, organizational structure, shareholder news, and products and services. This criterion for all industries was scored the second highest among all assessment criteria.

When response speed was considered, websites in public service industry was the fastest. These websites are simple and quick to download. The average downloading time for the websites was about 8s. The websites in retail industry had the lowest response speed. Retailers typically offered a large variety of products. They tended to add too much information regarding products on one webpage using multimedia technology.

The banking industry provided the best interactivity. For example, the website of Shanghai Pudong Development Bank provided interactive functions such as search engines, online information submission, and online recruitment. Contrary to the websites of banks, websites in public service industry offered almost no such features.
Table 3. Average assessment score by industry.

<table>
<thead>
<tr>
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<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Retail</td>
<td>5.49</td>
<td>6.26</td>
<td>6.02</td>
<td>5.39</td>
<td>5.57</td>
<td>4.54</td>
<td>4.76</td>
<td>5.24</td>
<td>6.11</td>
<td>5.25</td>
<td>5.59</td>
</tr>
<tr>
<td>Information technology</td>
<td>6.33</td>
<td>6.84</td>
<td>6.3</td>
<td>5.46</td>
<td>5.69</td>
<td>4.87</td>
<td>4.8</td>
<td>5.42</td>
<td>6.34</td>
<td>5.82</td>
<td></td>
</tr>
<tr>
<td>Manufacture</td>
<td>5.91</td>
<td>6.37</td>
<td>6.14</td>
<td>5.37</td>
<td>5.51</td>
<td>4.89</td>
<td>5.1</td>
<td>5.37</td>
<td>6.31</td>
<td>6.19</td>
<td>5.72</td>
</tr>
<tr>
<td>Public service</td>
<td>5.27</td>
<td>5.78</td>
<td>6.93</td>
<td>4.47</td>
<td>5.11</td>
<td>3.67</td>
<td>4.4</td>
<td>5.11</td>
<td>6.07</td>
<td>5.98</td>
<td>5.28</td>
</tr>
<tr>
<td>Tourism</td>
<td>5.91</td>
<td>5.91</td>
<td>6.41</td>
<td>5.22</td>
<td>5.56</td>
<td>4.24</td>
<td>4.45</td>
<td>4.65</td>
<td>6.98</td>
<td>7.04</td>
<td>5.64</td>
</tr>
<tr>
<td>Storage and transport</td>
<td>6.17</td>
<td>6.37</td>
<td>6.06</td>
<td>5.43</td>
<td>5.46</td>
<td>4.94</td>
<td>5.11</td>
<td>5.39</td>
<td>6.43</td>
<td>6.15</td>
<td>5.75</td>
</tr>
<tr>
<td>Bank</td>
<td>7</td>
<td>7.59</td>
<td>6.52</td>
<td>6.08</td>
<td>6.78</td>
<td>5.89</td>
<td>5.78</td>
<td>6.07</td>
<td>6.89</td>
<td>6.7</td>
<td>6.53</td>
</tr>
<tr>
<td>Agriculture</td>
<td>5.8</td>
<td>6.53</td>
<td>6.6</td>
<td>5.18</td>
<td>5.44</td>
<td>4.78</td>
<td>4.82</td>
<td>5.24</td>
<td>6.67</td>
<td>6.53</td>
<td>5.76</td>
</tr>
<tr>
<td>Construction</td>
<td>5.98</td>
<td>6.4</td>
<td>6.49</td>
<td>5.65</td>
<td>5.46</td>
<td>5.92</td>
<td>5.52</td>
<td>6.72</td>
<td>6.32</td>
<td>5.85</td>
<td></td>
</tr>
<tr>
<td>Average</td>
<td>5.94</td>
<td>6.41</td>
<td>6.30</td>
<td>5.36</td>
<td>5.56</td>
<td>4.75</td>
<td>4.90</td>
<td>5.32</td>
<td>6.46</td>
<td>6.29</td>
<td></td>
</tr>
<tr>
<td>Standard Derivation</td>
<td>0.95</td>
<td>0.91</td>
<td>0.65</td>
<td>0.91</td>
<td>0.63</td>
<td>0.96</td>
<td>0.84</td>
<td>0.74</td>
<td>0.70</td>
<td>0.80</td>
<td></td>
</tr>
</tbody>
</table>
The websites of banking industry scored the highest in terms of security, while those of the public industry did the lowest. Banks used secure connection on almost all pages. Public service websites provided no secure connection at all.

The average assessment score on the sale process for all industries was the lowest. Most websites did not provide transaction functions. Online banking and websites of construction industry were exceptions. Many banks allowed customers to manage their account and transfer funds online. Many websites of construction industry allowed construction firms to submit bids online.

Websites of banking industry provided best tools to aid users decision making. These tools included online investment decision system and online calculators for exchange rates and interest rates. Websites of public service industry had the least of such support. Virtually no tools existed.

Customization of banking industry’s websites was rated the best. Much information on these websites could be customized at customer’s request. Websites of tourism industry were scored the lowest.

Ease of use was scored the highest among all assessment criteria. Most of the Chinese websites had a consistent style, a clear layer structure, and were easy to navigate. The websites of the tourism industry were rated the best while those of public services were the lowest.

Websites of the tourism industry again scored the best in complexity, while those of public service industry scored the lowest. Many tourism websites provided a balance of text, image, audio, and video files.

The second step of the data analysis is to use SPSS to test the significance of the differences of assessment criteria among industries. The results are shown in Table 4. Only two criteria (security, $F = 2.057, p = 0.053$; and sale process, $F = 1.951, p = 0.067$) are significantly different across all industries at 0.1 level. Due to the exploratory nature of this study, the significant level of 0.1 is appropriate.

<table>
<thead>
<tr>
<th>Criteria</th>
<th>$F$</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency of content update</td>
<td>1.431</td>
<td>0.201</td>
</tr>
<tr>
<td>Consistency of information</td>
<td>1.641</td>
<td>0.131</td>
</tr>
<tr>
<td>Response speed</td>
<td>1.419</td>
<td>0.206</td>
</tr>
<tr>
<td>Interactivity</td>
<td>0.983</td>
<td>0.457</td>
</tr>
<tr>
<td>Security</td>
<td>2.057</td>
<td>0.053*</td>
</tr>
<tr>
<td>Sale process</td>
<td>1.951</td>
<td>0.067*</td>
</tr>
<tr>
<td>Tools to aid user decisions</td>
<td>1.131</td>
<td>0.355</td>
</tr>
<tr>
<td>Customization</td>
<td>1.220</td>
<td>0.301</td>
</tr>
<tr>
<td>Ease of use</td>
<td>1.096</td>
<td>0.378</td>
</tr>
<tr>
<td>Complexity</td>
<td>1.058</td>
<td>0.403</td>
</tr>
</tbody>
</table>

*Significant at $p < 0.10$
5. Comparison of Websites Among China, the United States, Singapore, and Australia

The findings of current study were compared to the findings of three other similar studies in Australia, Singapore, and the United States. The study included a few firms from the Netherlands, but no major differences were found between the two countries. Table 5 shows the comparison of the websites from the four countries.

The purpose of the study in the United States was to learn how different groups of companies were using the Web and how their websites are structured. The study focused on two aspects of websites: content and design. Website content was measured by its information, transaction, entertainment, advanced site, and perception of content. The design dimension included navigation structure, search function, protected content, quality of the structure, image, and presentation style. It compared source of the website (Yahoo versus Dutch Yellow Pages) and found only minor differences. It also compared the websites by industry and found six of the eight aspects of content and four of the six aspects of design were significantly different. Finally, the size of the website was found to correlate with almost all content and design aspects.

The purpose of the study in Singapore was to understand the purposes of World Wide Web in organization and industry, to examine the contents of commercial website and to compare them by the industry. The paper also studied the effects of industry characteristics on the purposes and contents of World Wide Web usage in organizations. The business purposes of websites were the same as business objectives of the current study. The 14 categories of contents in their study were represented by 19 categories of contents and functions in the current study. The study provided a thorough examination of 11 industries in terms of business purposes and website contents. Major findings were presented in Table 5 in this paper.

The purpose of the study in Australia was to identify commonly used website features and functions and to compare them across industries. It included nine categories of website features and functions. They are similar to the 10 assessment criteria of the current study. Their study provided a comprehensive assessment of 23 industries by evaluating the nine website features. Major findings are presented in Table 5 of this paper.

The second column of Table 5 compares the business objectives of websites, their contents and functions. The third column compares the characteristics of the industries among the four countries.

6. Discussion and Implications

This study examines 74 Chinese corporate websites based on 10 assessment criteria developed by the authors. It found that Chinese banking industry is the innovator of Web technology, construction industry is the early adopters, and public service and retail industries are the laggards. It also found that functions of Chinese corporate website are less advanced compared to those of developed countries.
Banks in China had long been owned and operated by the government. Competitions were limited among banks. However, this has changed in recent years. Foreign invested and private owned banks are mushrooming. As a result, competition is severe and banks introduce new services and use new technology to attract and maintain their customers. The Internet provides such opportunities to provide customers with new services at low cost. Banks are among the first to embrace the Internet and develop the most advanced websites in China.

The construction industry experienced rapid changes in the past two decades, due to the huge but fluctuated demand. The severe competition in the industry also

<table>
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<tr>
<th>Country</th>
<th>Business Objectives, Contents and Functions</th>
<th>Industrial Characteristics</th>
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| China   | • The objectives are publicity and customer support. Online information exchange and online sale are at the initial phase.  
• The sites are easy to use and have consistent styles.  
• Products’ prices are rarely released on websites. | • Banking, construction, and information industries have the highest assessed scores.  
• Websites in bank industry are the most secure and provide the best customization.  
• The websites in public industry have the quickest response time. |
| United States (Ref. 18) | • The objectives are publicity and online sales.  
• A few websites provide search functions.  
• Most websites are easy to use and have consistent style. | • The websites in the computer industry are the best in terms of product information and security.  
• Websites in the manufacturing industry have the best ordering features, but lowest in request for proposals. |
| Singapore (Ref. 3) | • The objectives are publicity, customer services, and online information exchanges. Only a few firms actually sell online.  
• Most websites publish products/service information.  
• Products' prices are rarely released online. | • The bank industry continues to invest in IT, but is slow in website development.  
• IT industry pays the most attention to customer support.  
• The manufacturing industry focuses on online exchange of information. |
| Australia (Ref. 21) | • The objectives are publicity and online sales. The use of multi-media is quite popular.  
• Applications assisting users in making decisions and allowing customizations are popular. | • The bank industry is the best, especially interactivity and tools to aid user decisions.  
• The telecommunication industry is best at customization.  
• The media industry shows the strongest function of acquiring users’ feedback. |
forced these firms to be more cost-effective. They found a good fit between their business goals and Internet technology.

Laggards are firms in the public service and retail industries. Firms in public service industry lack the competition that is seen in the banking and construction industries. Retailers are laggards due to the lack of an effective online payment mechanism such as credit card payment system in China. Credit card is a new thing and far less popular in China than in developed countries. However, this situation may change in the near future and those firms in retail industry may need to find a way to catch up with the usage of Internet technology.

The identification of industries belonging to innovators, early adopters, or laggards by using the assessment framework could help Internet Service Providers (ISPs) and/or IT corporations work out different marketing strategies for different market segments and spend less resources targeting on most suitable segments. For example, ISPs should target on early adopters to market their new Internet products and services, rather than on laggards. In this way, ISPs and IT corporations can serve their customers better and more cost-effectively.

Managers of e-business can use the assessment framework of this study. The framework not only can help corporations in different industries identify the positions of their corporate websites as compared to those of other corporations (functioning as a tool of benchmarking), but also help them identify specific areas of weaknesses in their websites for improvements.

Further, the findings of ease of use and consistent information are the highest ranked quality is interesting. The conciseness of Chinese language might contribute to the quality. Future research may focus on the relationship between language and ease of use. If this is true, foreign firms in China should carefully translate the names of products and services into Chinese.

The findings of only security and sale process are significantly different across industries is also interesting. The significant difference in security suggested that firms of different industries did not treat website security equally. A website design with simple security may satisfy public service companies well, but the same level of security may cause problems in banking websites.

The other factor that was significantly different across industries was sale process. This was because some industries provided business transactions online while others did not. Banks normally provided online banking. Public service firms did not do much to offer online services.

The findings of similarities and differences in using web technology for business in corporations across national boundary are important. One noticeable difference was that firms in China have relatively limited financial and human resources for Web technology. It was reflected in the findings that websites in developed countries, such as Australia and the USA, had more complicated functions such as online sales and personalized services, which generally requires more advanced technology and more skillful IT labor force. Therefore, the findings among the four countries through the analysis of side-by-side comparison suggest that the website design
approach of one-for-all may not be effective in different countries. Multi-Nation Corporations (MNCs) and web-based application systems developers should design different websites to meet different needs in different countries.

Finally, the comparison of websites among four countries in the current study focuses only on business objectives, contents and functions, and industry characteristics. Future research may include culture as an explanatory factor for the differences.

7. Conclusions

This study assessed the quality of 74 Chinese corporate websites and classified Chinese banking industry as innovator of Web technology and firms in public service and retailers are laggards. It also compared the findings with three similar studies of the United States, Singapore, and Austria and recognized the lack of advanced functions in Chinese corporate websites. The findings can help researchers of e-business understand the current status of Chinese Web technology development and managers who are interested in doing business in China. This study also proposed an assessment framework based on business objectives, contents, and functions of a website. The proposed assessment framework was shown to be able to effectively assess corporate websites.

Acknowledgments

We sincerely thank the anonymous reviewers for their insight and useful comments.

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