ABSTRACT

There are an estimated 591 million users of the Internet in China, and the number has grown rapidly in recent years. As the environment in which people use the Internet changes over time, and as young people have different formative experiences with the Internet over time, users’ perceptions of the information they access through the Internet as well as their perceptions of the information they access in more traditional ways may shift. This study applies a longitudinal approach to an examination of users’ perceptions of the information quality of both Internet-based and traditional text sources of information. A survey assessing fifteen dimensions of information quality was administered to Chinese college students at the beginning and end of a five-year span of time. Preliminary results find changes in users’ perceptions of the information quality dimensions of accuracy, objectivity, completeness, appropriate amount, ease of understanding, accessibility, and access security for Internet-based information and of the information quality dimensions of objectivity and value added for traditional text sources of information.

KEYWORDS: information quality, user perceptions, Internet, China

INTRODUCTION

As the number of users of the Internet in China has increased to an estimated 591 million (CNNIC, 2013), these users have accessed information in a rapidly changing environment. As technology changes and as cultural norms and practices evolve, users’ perceptions of the information quality they access using the Internet may also shift. Governmental policies and practices may also change over time affecting users’ perceptions of information accessed both through the Internet and through more traditional text sources of information such as books, magazines, journals, and newspapers.

This study examines the phenomenon of changes in user perceptions of information quality over time. This phenomenon is examined in the context of Chinese users of the Internet because
use of the Internet in China has grown rapidly in recent years (CNNIC, 2013) and because the social, cultural, and political environment has changed during this time frame. We take a longitudinal approach by examining user perceptions at the beginning and end of a five-year period using a survey based on a framework of the dimensions of information quality developed by Wang and Strong (1996). The remaining sections of the paper (1) position the study through a review of the literature on use of the Internet in China and the measurement of information quality, (2) discuss the research questions and hypotheses, (3) describe the methodology of the study, and (4) present the preliminary results of a longitudinal survey study.

REVIEW OF RELATED LITERATURE

The literature on the use of the Internet in China over time and the literature on information quality and the Internet inform this study. We also focus on the broader literature on information quality which provides the foundation for the development of the survey used to collect data in this study and on the general literature on longitudinal research into the use of information systems.

Use of the Internet by Users in China

Use of the Internet in China has increased quite rapidly since 1987 when the first email was sent in the country (Lu et al., 2002). Given China’s large population, it is not surprising that there are now more than a half billion people using the Internet in the country (CNNIC, 2013). Because distinct cultural, social, and political factors affect the use of the Internet in China, there is a need to understand this group of user because their attitudes toward the Internet and toward information accessed through the Internet may develop in distinct ways (Kluver and Yang, 2005; Li and Kirkup, 2007; Yang, 2007). Additionally, as successive generations are affected by the norms, policies, and practices surrounding the Internet as they mature in a society their distinct attitudes and perceptions may change over time (Strauss and Howe 1991). The cultural and social landscape in China has shifted quickly in recent decades. That these shifts are recognized by people living in China is seen in the popular use of expressions such as “Born in the 19xxs” and the “Me Generation” which are used to label generations. These labels signal an awareness that shifts in the country are reflected in the attitudes, behaviors, and expectations of young people coming of age at different times in the history of the country. As is the case elsewhere, the largest number of Internet users are these young people who are most strongly affected by changes in the cultural and social environment within the country (Yi et al., 2010). Internet users in China between the ages of 20 and 29 make up approximately thirty percent of all users, while users between the ages of 30 and 39 make up another 26 percent (CNNIC, 2013). Demographic studies indicate that the typical user of the Internet in China is a young, unmarried male who is well-educated and highly compensated (Guo, 2005; Guo, 2007). Chinese end users access information through the Internet for a variety of functions and purposes, and their use patterns have changed in recent years. The mix of use has shifted toward information retrieval and educational activities (Gao et al., 2013; Guo, 2007) as compared to entertainment and social activities in the past (Fang and Yen, 2006; Li and Kirkup, 2007; Zhu and Wang, 2005). The Internet is also used to disseminate information in order to foster civic engagement and economic development. Policies and practices guiding Internet use in this environment restrict access to information related to some topics (Martinsons et al., 2005; Wang, What China, 2013; Xu, 20122002; Yang, 2007; Zittrain and Edelman, 2003). Because information can be published quite quickly using the Internet, state media and the government are compelled at times to respond quickly and transparently in reaction to information published on the Internet (Shao et al., 2012). Because of this, restrictions tend to be
propagated and managed in a way that makes users aware of restricted topics. Younger users in China tend to understand the rationale for these restrictions. When given the opportunity to express dissatisfaction with these restrictions, many users fail to do so with respect to limitations on their ability to access some websites located outside of China (Guo and Wu, 2009). Internet users in China tend to trust websites published by their government, and eighty-five percent of these users are supportive of government management and control of the Internet (Guo, 2007). They also trust information accessed through the Internet more than their counterparts in the United States (Loiacono and Lin, 2003). Younger Chinese users of the Internet also prefer information accessed through the Internet over information published in traditional sources of information (Guo and Wu, 2009). Studies reporting Chinese user perceptions at a single point in time have found that they view richness, timeliness, accuracy, and authority of information as important attributes of information (Dong, 2003), and find Internet-based information to be general, commercial, static, and unreliable (Lu et al., 2002; Fang and Yen, 2007). One study examining user perceptions over time found a decrease in user perceptions of the reliability of Internet-based information over a five year period from 2003 to 2008 (Fallows, 2008).

Measuring the Information Quality of Information Accessed through the Internet

Issues relating to problems with the information quality of information published on the Internet have been discussed since the mid1990s (Clausen, 1996; Keltner, 1998; Saha et al., 2012). The link between information quality problems and poorer decision making, organizational outcomes, social outcomes, and the service quality of governmental organizations have been noted (Fuld, 1998; Gelle and Karhu, 2003; Khovanova-Rubicondo, 2011; Madnick et al., 2009; Saha et al., 2012). In particular in the early days of the Internet it was noted that information can be disseminated through the Internet without the editorial and peer review processes that tended to be used in publication processes prior to the development of the Internet (Cappiello et al., 2010; Kane, 2011; Kargar, 2011; Pack, 1999; Stvilia et al., 2008; Shen et al., 2012; Yaari et al., 2011). It was also noted that information quality problems might occur because of the speed with which information could be published (Notess, 2011), although peer review processes used in websites such as Wikipedia can improve the quality of information published on the Internet (Kane, 2011; Stvilia et al., 2008). More recently issues of information quality have been noted in the context of “content farms” that hire freelance writers to create articles quickly for relatively low compensation with the hope that search engines will direct users to websites that can be used as platforms for delivering advertisements.

Initial studies suggested that end users were relatively insensitive to information quality problems in decision making tasks (Ricketts, 1990). However, this finding was challenged by later studies (Klein et al., 1997) which were followed by studies addressing the question of whether users of Internet-based information are sensitive to differences in the information quality of information published through the Internet and information published using traditional media such as books, journals, magazines, and newspapers. For example, Rieh and Belkin (1998) reported that users of Internet-based information perceive this information to be less authoritative and credible than other types of information systems. Later studies found that users have different perceptions of the information quality of information published on the Internet and information published using more traditional media and that perceptions of the information quality of Internet-based information are influenced by occupation and the country of residence (Klein, 2001; Klein and Callahan, 2007; Klein et al., 2011a; Klein et al., 2011b). Users in several countries have been found to perceive differences in the information quality of Internet-based sources of information and traditional text sources of information differently along a number of different elements of information quality (Klein, 2001; Klein et al., 2011a; Klein et al., 2011b).
This research builds on the existing literature that has sought to identify the key elements or dimensions of information quality. This work has led to the development of several frameworks for understanding and measuring information quality (e.g., Arazy and Kopak, 2011; Davis and Olson, 1985; Fox et al., 1993; Helfert and Foley, 2009; Huh et al., 1990). Both general and task-specific frameworks have been developed (e.g., Alkhattabi et al., 2010; McKemmish et al., 2009; Schaal et al., 2012; Stvilia et al., 2009). For example Stvilia et al. (2009) identified the five information quality constructs of accuracy, completeness, authority, usefulness, and accessibility based on a survey of consumers of online healthcare information. Another specialized information quality framework is focused on information quality problems in the creation of Wikipedia articles. This framework includes the twelve dimensions of accessibility, accuracy, authority, cohesion, completeness, complexity, consistency, informativeness, naturalness, relevance, verifiability, and volatility (Stvilia et al., 2008).

This study uses a robust and commonly applied framework of information quality developed by Wang and Strong (1996). The framework has fifteen dimensions of information quality including believability, accuracy, objectivity, reputation, value-added, relevancy, timeliness, completeness, appropriate amount of data, interpretability, ease of understanding, representational consistency, concise representation, accessibility, and access security (Wang and Strong, 1996). Most of the dimensions have several data attributes that are used to measure the dimensions of information quality. The framework has been applied in many studies addressing issues of information quality (e.g., Baskarada, 2010; Huang et al., 1999; Katerattanakul and Siau, 2008; Klein, 2001; Klein and Callahan, 2007; Klein et al., 2011a; Klein et al., 2011b; Lee et al., 2002; Pipino et al., 2002; Strong et al., 1997; Michnik and Lo, 2007; Pipino et al., 2002). For example, Baskarada (2010) used the framework to categorize and analyze information quality problems in an ethnographic study conducted in a telecommunications company. Multiple issues associated with the use of spreadsheets in the organization were found to affect the believability, accuracy, objectivity, reputation, completeness, amount, interpretability, understandability, consistency, and accessibility of information used in spreadsheets in the organization. The use of this robust framework in the study reported here allows us to continue developing a body of research on users’ perceptions of the information quality.

RESEARCH QUESTIONS AND HYPOTHESES

This study examines the question of whether user perceptions of the information quality of Internet and traditional text sources of information such as books, magazines, journals, and newspapers have shifted over time in China. We report shifts in user perceptions over a five-year period among Chinese undergraduate students studying in Beijing, China. By examining this question over a five-year span of time we are able to examine generational shifts in user perceptions. Changes in user perceptions over time may reflect changes in the social, technological, and political environment that successive generations encounter as they come of age.

Data about user perceptions of information quality were collected for the fifteen dimensions of information quality. We first collected data in 2007 and then repeated the data collection process in 2012. Both the survey and data collection setting were identical in 2007 and 2012. Collecting data at two points in time allows us to examine the stability of user perceptions over time. The first two research questions examine this issue both for Internet-based sources of information and for traditional text sources of information.

**Research Question 1.** Have users’ perceptions of the information quality of Internet-based sources of information changed over time?
**Research Question 2.** Have users’ perceptions of the information quality of traditional text sources of information changed over time?

We are also interested in the question of differences between user perceptions of the information quality of Internet-based sources of information and traditional text sources of information. We first examined this issue using the data collected in 2007, and Klein et al. (2011a) reports the results. We now repeat this analysis using the data collected in 2012, and then examine the question of whether the differences between user perceptions of Internet-based sources of information and traditional text sources of information have been stable over time. In other words, if users reported a difference in the perceived quality of Internet-based and traditional text sources of information for a particular dimension in 2007, is this difference also observed in 2012? The third research question addresses this question.

**Research Question 3.** Have there been shifts in the way users perceive differences in Internet-based and traditional text sources of information for any of the fifteen dimensions of information quality?

The fourth research question examines the nature of any shifts detected in the analysis of the first two research questions. This question examines the magnitude of shifts in user perceptions over time and addresses the question of whether perceptions became more positive or negative during the five-year time period of the study.

**Research Question 4.** What is the magnitude and direction of the change in users’ perceptions of the information quality of traditional text and Internet-based sources of information over time?

We developed a set of fifteen hypotheses for the first research question. An example of these hypotheses for the believability dimension of information quality is given below. Altogether we test a hypothesis with this form for each of the fifteen dimensions of information quality included in the study.

**Hypothesis H1a:** There is no difference in users’ perceptions in 2007 and users’ perceptions in 2012 for the believability of Internet-based sources of information among Chinese users of the Internet.

We also developed a set of fifteen hypotheses for the second research question. An example of these hypotheses for the believability dimension of information quality is given below. Altogether we test a hypothesis with this form for each of the fifteen dimensions of information quality included in the study.

**Hypothesis H2a:** There is no difference in users’ perceptions in 2007 and users’ perceptions in 2012 for the believability of traditional text sources of information among Chinese users of the Internet.

The third research question is answered by first testing fifteen hypotheses (corresponding to the fifteen dimensions of information quality) for differences in user perceptions of the information quality of Internet-based and traditional text courses of information. This is done first for the 2007 dataset (as previously reported in Klein et al., 2011a) and then for the 2012 dataset. We then report differences in the results of these hypothesis tests for the 2007 and 2012 datasets in order to examine whether these differences are stable over the five-year time period examined in the study.
A sample hypothesis used to test for differences in the believability dimension of information quality is shown below. This is tested first using the 2007 dataset and then again using the 2012 dataset.

**Hypothesis H3a:** There is no difference in users’ perceptions of the believability of Internet-based sources and traditional text sources of information among Chinese users of the Internet.

Because the fourth research question is not answered using inferential statistical methods, hypotheses are not stated for this question.

**METHODOLOGY OF THE SURVEY STUDY**

The survey was administered to two groups of college students in a major university in Beijing, China. The survey was first administered in 2007 and then in 2012. In both rounds of survey administration, subjects taking MIS classes were recruited. Rather than following up with the same students surveyed in 2007, we surveyed a new group of students in 2012 with similar backgrounds to those surveyed in 2007. The profile of the respondents is summarized in Table 1. As shown in the table, the demographics and experiences of the respondents in 2007 and 2012 are similar.

| Table 1. Respondent Profile of 2007 and 2012 Surveys |
|---------------------------------|-----------------|-----------------|
|                                | 2007            | 2012            |
| Number of valid responses      | 253             | 200             |
| Average age                    | 21              | 21              |
| Male/Female                    | 185 male        | 112 male        |
|                                | 68 female       | 88 female       |
| Most common level              | Junior          | Junior          |
| Most common major              | Telecommunications | Telecommunications |
| Years of computer experience   | Almost 6        | A little over 8 |
| Years of Internet experience   | 5               | Almost 7        |

Subjects completed a survey of their perceptions of the information quality of Internet-based and traditional text sources of information. The survey is similar to surveys used in prior studies (e.g., Klein, 2001; Klein and Callahan, 2007; Klein et al., 2011a; Klein et al., 2011b) and is based on the work of Wang and Strong (1996). Subjects responded to fifty questions about Internet-based sources of information and fifty questions about traditional text sources (i.e., books, magazines, journals, and newspaper). The fifty questions in each section correspond to the fifty data elements making up the fifteen dimensions of information quality that make up the Wang and Strong (1996) framework. A sample questions for both Internet-based sources and traditional text source is shown below for the accuracy dimension.

Data from Internet sources are accurate. Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

Data from traditional text sources are accurate. Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

**PRELIMINARY RESULTS AND DISCUSSION**

Although prior work has validated the measures of the fifteen dimensions of information quality (e.g., Wang and Strong, 1996), we calculate Cronback’s alpha here for the dimensions of information quality with more than one measure. Table 2 presents Cronbach’s alpha for the
2007 and 2012 datasets for both Internet-based and traditional text sources of information. The objectivity dimension has poor reliability, although it has improved from 2007 to 2012. The other dimensions have acceptable reliability.

| Table 2. Cronbach’s alpha for the Dimensions of Information Quality |
|--------------------------|--------------------------|
| **Dimension of Information Quality** | Internet Sources | Traditional Text Sources | Internet Sources | Traditional Text Sources |
| Accuracy                 | .861         | .872         | .902         | .905         |
| Objectivity              | .539         | .560         | .636         | .676         |
| Completeness             | .771         | .741         | .742         | .741         |
| Reputation               | .754         | .678         | .728         | .717         |
| Value-added               | .762         | .725         | .705         | .705         |
| Relevancy                | .691         | .685         | .796         | .794         |
| Ease of Understanding    | .738         | .758         | .756         | .803         |
| Representational Consistency | .563        | .716         | .753         | .813         |
| Concise Representation   | .805         | .802         | .822         | .881         |
| Accessibility            | .808         | .674         | .853         | .778         |
| Access Security          | .729         | .685         | .776         | .729         |

We next examine the first two research questions. The first research question examines differences in user perceptions of the information quality of Internet-based sources of information over time. Table 3 shows the mean score for 2007 and 2012 of user perceptions of the fifteen dimensions of information quality for Internet-based sources of information. Those dimensions with a statistically significant difference over time are noted. As shown in Table 3, the mean scores are statistically significantly different in 2012 than in 2007 for the dimensions of accuracy, objectivity, completeness, appropriate amount, ease of understanding, accessibility, and access security.

The second research question examines differences in user perceptions of the information quality of traditional text sources over time. Table 4 shows the mean score for 2007 and 2012 of user perceptions of the fifteen dimensions of information quality for traditional text sources of information. Those dimensions with a statistically significant difference over time are noted. As shown in Table 4, the mean scores are statistically significantly different in 2012 than in 2007 for the dimensions of objectivity and value added.

A comparison of Table 3 and Table 4 shows that users’ perceptions of information quality changed for fewer dimensions of information quality for traditional text sources than for Internet-based sources during the five-year span of the study.

| Table 3. 2007 vs. 2012 Perceptions of Internet-Based Sources |
|--------------------------|--------------------------|--------------------------|
| **Dimension of Information Quality** | 2007 | 2012 | Significant Difference (at p<.05) |
| Believability             | 3.57 | 3.67 | no |
| Accuracy                  | 3.46 | 3.72 | yes |
| Objectivity               | 3.41 | 3.69 | yes |
| Completeness              | 4.57 | 4.18 | yes |
Reputation | 3.60 | 3.65 | no |
Value-added | 4.25 | 4.04 | no |
Relevancy | 4.27 | 4.24 | no |
Timeliness | 4.48 | 4.43 | no |
Appropriate Amount | 5.02 | 4.54 | yes |
Interpretability | 4.07 | 4.00 | no |
Ease of Understanding | 4.41 | 4.17 | yes |
Representational Consistency | 3.72 | 3.83 | no |
Concise Representation | 3.81 | 3.85 | no |
Accessibility | 4.64 | 4.28 | yes |
Access Security | 3.40 | 3.77 | yes |

Table 4. 2007 versus 2012 Perceptions of Traditional Text Sources

<table>
<thead>
<tr>
<th>Dimension of Information Quality</th>
<th>2007</th>
<th>2012</th>
<th>Significant Difference (at p&lt;.05)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Believability</td>
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<td>4.24</td>
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</tr>
<tr>
<td>Accuracy</td>
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<td>4.09</td>
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</tr>
<tr>
<td>Objectivity</td>
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<td>yes</td>
</tr>
<tr>
<td>Completeness</td>
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<td>4.25</td>
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</tr>
<tr>
<td>Reputation</td>
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<td>4.40</td>
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<td>Value-added</td>
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</tr>
<tr>
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</tr>
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<td>4.35</td>
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<tr>
<td>Appropriate Amount</td>
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<td>Interpretability</td>
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<tr>
<td>Ease of Understanding</td>
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<tr>
<td>Access Security</td>
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<td>no</td>
</tr>
</tbody>
</table>

**CONCLUSION**

The preliminary results presented here suggest that perceptions of the information quality of Internet-based and traditional text sources of information held by Chinese college students have shifted over time. As we continue our analysis of the data collected for this study we will examine the issues raised by the third and fourth research questions articulated in the paper. We anticipate presenting these findings at the conference along with a discussion of potential explanations of the results.

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