E-GOVERNMENT IN HUBEI, CHINA: AN EVALUATION OF COUNTY PORTAL USABILITY, ACCESSIBILITY, ELECTION, AND MOBILE READINESS

Zhenyu Huang, Central Michigan University
huang1z@cmich.edu

Luokai Hu, Hubei University of Education
huluokai@hue.edu.cn

ABSTRACT

Many studies have investigated e-government issues in the US at the state and local levels. However, similar research about Chinese e-government websites is relatively few. To fill this void, this study investigated the e-government practices by the counties in Hubei province, China. Hubei province is selected due to its size, economic status, and geographic location, which makes it a good representative of other provinces in China. Besides usability, this study investigates Hubei county e-government portals on their accessibility, election content, and mobile readiness, to give a comprehensive evaluation of the local e-government practices in China. The findings suggest that though most Hubei county e-government websites followed many usability rules well, they deliver very little voting and election content on their websites. Many of them do poorly in compliance with accessibility standards. The mobile readiness, on the contrary, is quite high and matches the current mobile trend in China.

INTRODUCTION

The differences in geographic locations, political climates, governance structures, and technological developments make the deployment and diffusion of e-government vary dramatically from country to country and region to region. Therefore, the research of e-government and e-politics of different countries and regions tends to have its uniqueness, academic values, and practical significances. Because of this uniqueness and diversity of e-government implementation, e-government and its growth has attracted researchers' interests from all over the world. For instance, scholars conducted a comprehensive investigation of U.S. local e-government portals (Huang, 2007; King & Youngblood, 2016), proposed approaches to the assessment of e-government efforts from European perspective (Mates, Lechner, Rieger, & Pekná, 2013), surveyed citizens' attitude toward e-government in Australia and New Zealand (Freeman, 2013; Gauld, Goldfinch, & Horsburgh, 2010), presented the growth pattern of Africa e-government and issues addressed by research on Africa e-government (Dombeu & Rannyai, 2014), used U.N.'s e-government readiness score to analyze how e-government implementation varied among Latin American and Caribbean countries (Warf, 2014), investigated the factors that drove innovations in Chinese public sector (Zhang, Zhao, Zhang, Meng, & Tan, 2017) and the influence of Chinese

cultural elements on the user experience with e-government sites (Lei, Liu, Wu, Jin, & Wang, 2017), and explored how personal data was protected in the e-government environment across countries such as the US, China, and Germany (Wu, 2014). These studies reflect the fact that the difference and uniqueness of political status, governance structure, culture, and technological readiness decides that the e-government experiences and theories drawn on one country or region cannot be directly applied to another.

Usability refers to a quality attribute that assesses how easy user interfaces are to use. It also refers to methods for improving ease-of-use during the design process (Nielsen, 2012). Usability has received broad coverage, which is defined and measured by five quality components (Nielsen, 2012). They are: *learnability*–how easy it is for users to accomplish basic tasks the first time they encounter the design; *efficiency*–how quickly users can perform tasks; *memorability*–how easily can users re-establish proficiency after a period of not using the design; *errors*–how many and how often user make errors and how severe those errors and; and *satisfaction*–how pleasant is it for users to use the design. Since Jakob Nielsen published his famous book *Designing Web Usability* in 2000, many scholars joined him by publishing research papers and books to emphasize the importance of usability to web design. They confirmed the importance of usability to the success of a website and extended Nielsen's measurement of usability by including clarity, simplicity, predictability, consistency, as well as ease of use these constructs into the domain of usability.

Though usability advocates stress the importance of usability on web and software design, some researchers have started a series of research to investigate usability practice by industries and governments (Cappel & Huang, 2007; Huang & Cappel, 2012; Youngblood & Mackiewicz, 2012). Cappel and Huang (2007) studied the usability of INC 500 companies' websites systematically. They designed eleven usability measurement standards, which are categorized into three areas: avoidance of usability mistake, the following of usability principles, and the promotion of usability. They found that INC 500 companies had a lot of room to improve their website usability. After that, Sandvig and Bajwa (2011) studied users' perceptions of search enhancement in web search; Green and Pearson (2011) integrated usability into the electronic commerce acceptance model; and Zollet (2014) investigated the Interactivity of Corporate Websites. Following the explorative study of INC 500 company website usability, Huang and Cappel (2012) extended their usability model and measurement instrument to compare the usability practices of Fortune 500 vs. INC 500 companies. They found that usability has a high correlation with a company's resources and technological support. The more resources and technological expertise a company has, the higher usability its website tends to possess.

In recent years, the usability of e-government websites has gained researchers' attention (Huang & Benyoucef, 2014; Youngblood & Mackiewicz, 2012). During the diffusion of e-government, usability has a critical role to play in increasing citizens' acceptance and participation (King & Youngblood, 2016; Youngblood & Mackiewicz, 2012). Alabama state e-government leaped into the top 10 in 2008 after being ranked bottom three for three consecutive years. However, the rise in the state's e-government website quality ranking did not help much to the diffusion of municipal government websites in Alabama. Citizens' participation and use of e-government websites were not on par with the high ranking of Alabama's e-government. In their research, Youngblood and Mackiewicz (2012) found it was the poor government website usability that eroded citizens' involvement and participation in e-government, which significantly impaired the web credibility

of municipalities trying to engage citizens, to create or strengthen sustainable practices, and to attract companies that can bring new jobs and improve the local economy. Another study also reveals that the credibility of an e-government website is highly correlated with its usability. The higher the usability, the more credibility a government website has to citizens, and vice versa (Huang & Benyoucef, 2014).

People also started paying attention to the usability and accessibility issues of government websites. Shi (2006), for instance, conducted a longitudinal comparison study of the accessibility of Australian and Chinese e-government websites. Shi (2006) found that provincial e-government websites in China had serious accessibility issues in 2004. The accessibility issues worsened in 2005. He concluded that Chinese governments did not spend much effort in improving the usability of their websites. In comparison, Australian government websites had much better accessibility. Shi (2006) alerted Chinese governments to pay attention to the accessibility issues and give more consideration in the design to the needs of people with disability. Hong, Katerattanakul, and Joo (2008) also investigated the accessibility issues of e-government by comparing Korean and U.S. e-government websites. They found accessibility problems and errors in both Korean and U.S. e-government websites in the period of 2004 to 2007. Similarly, Isa, Suhami, Safie, and Semsudin (2011) and Al-Khalifa (2012) found accessibility issues in Malaysian and Saudi e-government websites. Though Shi (2006) started exploring usability issues in Chinese government website design, overall research efforts in this area seem to be lacking. There are many unknowns in the usability and accessibility practices by Chinese government websites that deserve to be investigated and analyzed.

This research tries to give a comprehensive evaluation of Chinese local e-governments and has two major implications. First, it will contribute an important case of local e-government websites of the world most populous country to the e-government literature. It will shed light on the literature by providing empirical data and analysis results. Second, it will bring insights to practitioners such as Web architect and developers on how to incorporate usability and accessibility principles into government website design and evaluate the usability of their own websites.

RESEARCH QUESTIONS

According to the e-government literature, the development of e-government has significant values to the politics, economy, culture, and governance to any country, especially the largest developing country as China. China is the most populous country in the world. According to Chinese Bureau of Statistics, China has a population of nearly 1.4 billion. China also has one of the highest officer-citizen ratios in the world, which incurs extraordinary administrative expenses (Rothstein, 2015). It has been proven by research that e-government is effective in reducing administrative costs, improving service efficiency, increasing government transparency, and even improving democracy (Watson & Mundy, 2001). Watson and Mundy (2001) found that e-government web function could dramatically reduce the cost of property tax processing to 22 cents from five dollars in the U.S. With four times the population in China than in the US, e-government could save more for Chinese governments. However, as aforementioned, government websites in China face the

challenges of low usability and accessibility (Shi, 2006). With unfriendly interfaces, poor accessibility, inadequate/missing functions, and weak search capabilities, it is hard for Chinese government websites to attract mass citizens to use the websites and justify the governments' investments on e-government websites. Citizens still follow the traditional channels to conduct administrative tasks, leaving expensive e-government sites unused. Therefore, it is interesting and imperative for researchers to systematically analyze the usability of government websites in China. The research question is accordingly raised as follows.

RQ1. How well do e-government websites in China meet usability guidelines?

Disabled people exist in both developed and developing countries. An estimated 650 million people worldwide live with some form of disability (World Health Organization, 2011). Disability is defined as one or more abnormalities in anatomical structure or the loss of an organ or function (either physical or psychological) affecting a person's ability to carry out a normal activity and to participate fully in study, work, and community and social life. In the US alone, about 50 million adults suffer from various forms of disability, including hearing loss, visual impairment, cognitive impairment, and limited mobility (Zheng et al., 2011). In China, about 85 million people have a disability or another condition that affects their daily lives and social activities (Peng, Song, Sullivan, Qiu, & Wang, 2010). Furthermore, disability can lead to limited access to education, health care, and rehabilitation services, to the detriment of the disabled people, their families and local communities, health-care systems and social security systems. Therefore, specific strategies, policy initiatives and sustainable programs are needed to improve the health status of the disabled population (Zheng et al., 2011). One of such policies in the US is Section 508 standard. Chinese governments and businesses did not typically pay attention to provide facility and convenience to disabled people. The research question in this regard is raised.

RQ2. How well do e-government websites in China meet accessibility guidelines?

The content of e-government, especially political content such as voting information is an important part and function of e-government websites. According to Watson and Mundy (2001), e-democracy is the highest level of e-government practice. Implementing e-democracy demands a careful and comprehensive plan for citizens to master it (Watson & Mundy, 2001). E-democracy also requires governments to have a high level of transparency and close and direct interactions with its citizens. E-democracy includes online voter registration and voting functionalities on e-government websites. However, according to Huang (2007), even the U.S. local e-government diffusions only reach the information and communication stages at most, but poorly at transaction and democracy stages.

China is a non-democratic socialist country, though it has achieved enormous economic growth in the past three decades. Its political system is run by the Chinese Communist Party, therefore, Party membership affects political beliefs and behaviors in contemporary China. However, Party members are not more likely than other citizens to support and trust the state institutions, neither do they produce more support for the local state (Dickson, 2014). While China Party Congress put the grass-roots self-government into the basic categories of democratic politics with Chinese characteristics, due to the voting information and process ambiguity, improper campaign conduct, such as bribery, interest groups, administrative intervention, violence election and so on, have

plagued the normal village committee elections and higher level local elections (Li & Zhang, 2010). This insufficient support of Party members to the local state and improper campaign conduct poses a serious impediment to the construction of China's democracy. E-government technology is believed to play an important role in fostering the redistribution of power and encouraging government-citizen interactions (Seifert & Chung, 2009) and promoting e-democracy (Lappas, Triantafillidou, Kleftodimos, & Yannas, 2015; Padget, 2005). Chinese governments want to use e-government technology to leapfrog its political democracy and governance, without paying the high costs, such as political turmoil and governance instability, associated with the democratization process. One important solution is to publicize voting and election information on the e-government portals to increase the election transparency. In recent years, using indices to assess the performance of election administration has become a prominent method (Clark, 2015). By using indices, a series of criteria can be used to assess the functionality and usability of election websites. For example, King and Youngblood (2016) established 22 election information content criteria to measure Alabama election websites. It would be interesting to see how e-democracy is carried out through Chinese e-government practice. The following research question is asked.

RQ3. What type of voting and election information is provided on Chinese e-government websites?

In 2009, mobile Internet users have reached 233 million in China ("China - Mobile internet users," 2010). In 2013, the number of mobile Internet users with smartphones totaled 330 million ("China - China's smartphone mobile," 2013). By 2015, China's mobile users already exceeded 1.3 billion, over 90% of China's population, of whom 29.6 percent are 4G users (He, 2016). With such a big population of mobile users, online transactions have been largely moved to mobile platforms. WeChat Pay and AliPay digital wallet services have sped this process (Larson, 2015). The mobile pressure on e-commerce has also been infused into the e-government zone. Mobile-government, aka m-government, is becoming an important trend of e-government technology (Al-Hubaishi, Ahmad, & Hussain, 2017; Faisal & Talib, 2016; Hung, Chang, & Kuo, 2013). West (2011) already found 17 U.S. states had websites designed for smaller screens in 2008. In general, however, few studies have investigated m-government deployment at the local level (King & Youngblood, 2016). It will be interesting to see how m-government has been implemented in China with such an enormous mobile user population. The following research question is established.

RQ4. How is the mobile readiness of Chinese local e-government websites?

RESEARCH METHODOLOGY

In this research, we investigate the e-government practices by counties in Hubei province. Hubei province is selected for a couple of reasons. First, Hubei province is in a unique geographic location. It is located at the center of China and is the hub of air, water, and land (road and rail) transportation. Its economic size is ranked in the middle of 35 provinces and special municipalities in China. The quality ranking of Hubei e-Government is ranked 15 among 35 provinces and special municipalities in China (Guomai, 2012). Hence, the e-Government status of Hubei province is typical and representative of other provinces.

Both county-level cities and county government websites will be considered. Some administrative units, though called city in China, are no more or less than a county with regard to the administrative functions. County governments face a more scattered and less dense population (example in Figure 1) than larger cities. County citizens have lower education levels and per capita incomes. Technological infrastructure is also less developed than in cities. Therefore, citizens' requirements for government websites tend to be lower.

We first finalized the list of counties in Hubei province from the City Population website (https://www.citypopulation.de/) and verified the list with the Chinese provincial government website. There are 64 counties and county-level cities found in Hubei province. The list of these counties and their demographic information is provided in Appendix 1. A county-level city has the name of a city but is administered as a county. Its administrative functions and geographic size are similar to a county. Therefore, in this research, we include these county-level municipalities in our analysis. Next, we conducted a search via Baidu.com, the top search engine in China, using the county name and "government" as the keywords, and examined the first page of results. We have found all government portals of 64 counties and county-level cities in Hubei province. However, one county website - Shenlongjia - was infected with virus. Thus, this county is removed from our research and our total sample size is 63. We then analyzed these county e-government portals for their usability, accessibility, election content, and mobile readiness following the research framework tested by King and Youngblood (2016). The content analysis methodology was carried out as guided by Neuendorf (2002). The instruments of measuring county e-government usability, election content, and accessibility are adapted from previous empirical research (Huang, 2007; King & Youngblood, 2016; Youngblood & Mackiewicz, 2012) and are presented in Appendix 2, Appendix 3, and Appendix 4 respectively. Data collection occurred over a 40-day period between February 15 and March 30, 2017, with two primary coders. The coders met for one training session and coded 10 county e-government portals from the adjacent Hunan province (around 16% of the Hubei sample size) to check for the intercoder reliability. The intercoder reliability is acceptable with a Krippendorf's alpha greater than 0.8 (Neuendorf, 2002). The final intercoder reliability reached 0.995.

FIGURE 1. GONG'AN COUNTY GOVERNMENT WEBSITE HOMEPAGE

The common method to measure usability is to use usability standards, checking for the presence or absence of site features. In this research, a usability instrument was established in the previous studies (Cappel & Huang, 2007; Huang, 2007; Huang & Cappel, 2012; King & Youngblood, 2016). These usability measurements are categorized into six areas including overall design standards, hypertext, navigational standard, readability, language option, and findability (see Appendix 2). These measurement standards also considered guidelines from the federal government's usability.gov website. As suggested by King and Youngblood (2016), the usability heuristics are applied to the election information page for each site.

Using the content recommended by Pew Center on the States (2008) and King and Youngblood (2016), plus additional content criteria pertinent to China's situation, a 22 election information measuring instrument is established. Each county and county-level city was given one point for the presence of each criterion, with a maximum election information score of 22. Counties without online election information will have a score of zero. As aforementioned, China is a communist country. Public and direct election is not a common political phenomenon or widely implemented practice. Most leaders, if not all, are elected by communist party members instead of eligible voting citizens. However, it is still possible to see local governments display election results on their websites to inform their citizens. Certain election information items may not be visible in Hubei county websites, such as voter registration. To keep its integrity and make it easy to compare with research results of other studies, such as King and Youngblood (2016), we keep the similar election information instrument as that of Pew Center on the States (2008) and King and Youngblood (2016).

When Chinese citizens turn to their smartphones to access the Internet and conduct transactions, as RQ4 asked, how mobile ready are Chinese local e-government portals? To measure that, small screen devices should be used to test e-government mobile readiness. A mobile ready e-government site will display websites in a different style: smaller fonts and concise web design that enables smartphone usage.

RESULTS

All of 64 Hubei counties have e-government portals. One county, Shenlongjia's e-government portal was infected by virus and was forbidden to visit. Therefore, 63 valid county websites were analyzed and evaluated on their usability, accessibility, election content, as well as mobile readiness.

The mean land area of Hubei counties is 2,429.22 square kilometers, with an average rural population of 650K. The average GDP of Hubei counties is 12.92 billion RMB (US $1.88 billion) and average GDP per capita is 19,500 RMB (US $2,834). The GDP and Per Capita GDP gap from county to county is large. The social and economic data of Hubei counties are provided in Table 1. According to Huang (2007), socioeconomic factors such as population change, household income etc. significantly impacted on local e-Government diffusion. Similarly, GDP and per capita GDP has influence on e-government website design and functionalities.

TABLE 1. DEMOGRAPHIC DATA OF HUBEI COUNTIES

	N	Minimum	Maximum	Mean	Std. Deviation
LandAreaSqKm	64	604.00	5763.00	2429.22	1078.96
RuralPop10K	64	7.60	156.20	65.13	31.59
GDP (Billion RMB)	64	1.68	44.42	12.92	9.45
PerCapGDP (RMB)	61	3,949.95	69,321.51	19,504.69	12,246.21

Hubei counties do not do well in six of sixteen usability standards. These six usability standards are (a) a small random floating window on homepage is NOT used (41.3% failing rate), (b) all text links are blue (some shades of blue) (76.2%), (c) all text links are a different color than the main text (42.9%), (d) all text links color changes after a link is clicked (98.4%), (e) all text links are underlined (55.6%), and (f) page has a non-Chinese version or a translation option (95.2%). Hubei as an inland province; most counties have relatively few foreign immigrants. That could be the reason that these counties do not provide a non-Chinese version or translation option on their e-government website. However, with China's economy linked to the world increasingly closely and with more Chinese companies doing business with foreigners, it is important for local governments to add language choices to their websites to serve foreign companies and travelers better. Other than these six usability measures, Hubei counties are doing fine in following the other 10 usability rules.

As China is evolving on its democracy, the election content provided on Hubei counties' websites is limited. The highest election information score (EIS) is 7, out of possible 22. Many counties achieved zero EIS. The void of election content is rooted in the China's political system and administrative policies. When direct election is not an adopted practice at the county level, it cannot be expected to see counties publish much election content on their portals. However, it would be beneficial for local governments to release more information on candidates, election results, and election process to increase their administrative transparency.

China did not typically enforce laws to protect people with disabilities. Most public buildings did not have a ramp for handicapped people until recent years. It is also relatively new for websites in China to adopt section 508 standards to increase its accessibility. In this research, it is interesting to see that 8% of counties do not violate any section 508 standards, and only one county violates all section 508 standards. Other counties violate 2 to 4 accessibility standards. The lack of accessibility compliance is most significant with redundant links for server-side image maps (63.5%) and frames shall be titled with text that facilitates frame identification and navigation (63.5%). When it comes to mobile readiness, over 90% counties provide a mobile device friendly version of the government website. It proves that Hubei counties are well prepared for mobile technology and market.

Usability

Out of four overall design standards, county e-government portals in Hubei province are doing well in three standards, but failed significantly in the measure O2 that a small random floating

window on homepage is NOT used (Table 2). Over 40% of county portals, i.e. 26 counties out of 63, used at least one small random floating window/image on their government homepage that keeps floating across the screen in random directions. These governments try to use the floating window/image, most clickable, to propagandize a new government slogan, promote a service, or solicit user feedback. An example of floating window/image can be viewed in Figure 2. However, according to Nielsen (2000) and Nielsen and Loranger (2006), a floating window/image on a webpage is a bad usability practice. It is annoying and distracting, and seldom clicked by the users. Therefore, though governments try to get more attention from e-government portal users, the bad practice of usability in fact annoys its users and may not get the click rate as they expected. It seems that county e-government portals in Hubei province has a hard time to meet the conventions for hyperlinked text in main text suggested by Nielsen (2000) and Nielsen and Loranger (2006). Chinese e-government websites like to use red and gold colors for their website themes. Red and gold are two favorable colors in the Chinese culture. Obviously, the cultural factor is weighed in significantly in government website design which supersedes the usability rules, whilst shades of blue are recommended for hyperlinks. Of the 63 county e-government portals, 76.2% failed to provide hyperlinks in blue or shades of blue; 42.9% failed in using a different color for text links than the main text; as high as 98.4% do not change text link colors when they are clicked; and 55.6% failed to underline their text links.

FIGURE 2. AN EXAMPLE OF RANDOM FLOATING WINDOW/IMAGE USED BY COUNTY PORTALS

In terms of navigation standards, Hubei county e-government portals followed three of four usability rules well, except the standard N2, i.e., a county logo or other header graphic serving as a home link on internal pages. As high as 79.4% of websites failed in taking advantage of using county logo or similar header images as a home link to guide users from internal pages back to the portal home page. Beyond these violations, county portals were doing relatively fine in following other navigation rules, such as providing a home text link on internal pages, main navigation on the top or left side of the page, and having 10 or less visible items per navigational grouping, with a failed rate of 3.2%, 1.6%, and 4.8% respectively.

Readability rules are relatively easy to follow and meet the general custom. Most e-government websites meet readability rules with a low failing rate of 1.6% in R1 and R2. With that said, most Hubei county e-government portals have text left aligned and underlined the text if it is a hyperlink.

Out of 63 valid county e-government portals, only one provided an English version, 95.2% of county e-government portals in Hubei province failed to provide a non-Chinese version or translation options. Though it seems to be a high violation to this usability rule, it may not be a significant issue to these county e-government websites, as their main service targets are Chinese citizens. However, when the economy keeps growing and the market is more open to foreigners, the county governments in Hubei province should realize the importance of providing other-language options on their e-government portals.

Most county e-government are findable from Baidu. Baidu.com is the most popular search engine in China and has the highest portion of the search market. It is important for county e-government websites to be searchable and listed as the first page results from Baidu when the county name and "government" are used as the search keywords. Only 2 county e-government portals (3.2% failing) are beyond the first page search results from Baidu. However, we did notice that many confusing search results exist when the county name and "government" are used as the keywords to search Baidu. These searched sites also claim themselves as "XXX county e-government portal" on their home pages and provide a lot of government related information as well. When checked carefully, however, these websites are not official e-government portals but a website built by a company or a government-affiliated organization. It is very confusing and misleading to the citizens who try to find the official e-government portal and use its services. The bogus e-government portals appeared on the Baidu search results for 18 counties. These county governments should scrutinize these bogus e-government portals and make sure they do not use "government portal" text on their websites. Otherwise, it would be easy for these websites to conduct fraudulent services to their users or at least mislead users who need official government services. The usability results of Hubei counties are summarized in Table 2.

TABLE 2. HUBEI COUNTY E-GOVERNMENT PORTAL USABILITY (N=63)

		Websites failing (%)
Overall Design standards		
O1	A splash page is Not used	6.3%
O2	A small random floating window on homepage is NOT used	41.3%
O3	Audio and video do NOT auto play when page loads	3.2%
O4	Horizontal scrolling is NOT required with the browser window set to 1024 pixels across.	0%
Conventions for hyperlinked text in main text		
C1	All text links are blue (some shades of blue)	76.2%
C2	All text links are a different color than the main text	42.9%
C3	All text links color changes after a link is clicked	98.4%
C4	All text links are underlined	55.6%
Navigation Standards		
N1	A "home" or "return" text link appears on internal pages	3.2%
N2	A county logo or other header graphic serves as a "home" link on internal pages	79.4%
N3	Main navigation is on the top and/or left-side of the page	1.6%
N4	There are 10 or fewer visible items per navigational grouping	4.8%
Readability		
R1	Main body text is left aligned	1.6%
R2	Any text that is underlined is a link	1.6%
Language option		
L1	Page has a non-Chinese version or a translation option	95.2%
Findability		
F1	County website is in the first page of results from Baidu	3.2%

Election Content

To measure e-democracy in China, county voting and election information is used as a measuring tool. Though China has made tremendous success in its economic growth and business-oriented transformations, it is still a communist country and its government still claims that it will stick to its communist characteristics down the road. Its administrative style is regarded as authoritarian by scholars (Zhang, 2017). China holds direct elections for deputies to serve in the Local People's Congress (LPC) at the county and township levels, and it seems possible that the LPC will become more representative and therefore make local government more responsive. However, according to Zhang (2017), the LPC is more like an inclusive institution, sometimes degenerating into patron clientelism, rather than a representative institution. Moreover, direct elections are tightly controlled and sometimes deteriorate into personalized patronages, because private entrepreneurs purchase votes to win personal privileges, rather than to promote institutional reform (Zhang, 2017). Besides LPC, other major government officers at county level or above are elected via the

communist party system, instead of through direct elections. However, China governments like to advocate publicly that they have a democratic system with unique socialist characteristics. Under this circumstance, it is expected that county e-government websites display election related information to general public.

From Table 3, however, we can see that up to 12 election related information content of 22 are not provided by any counties in Hubei province. These items are contact information (form), contact information (phone), contact information (online chat), email information sign up, text information sign up, online downloadable voter registration form, voter registration status/search, sample ballot, vote by mail (absentee) ballot application, update voter registration address link/form, voter registration locations, and voter ID information and requirements. It is interesting to see that almost half the counties in Hubei (46.0%, 29 out of 63) listed the names of election officials on the websites. However, the general contact information (phone, form, etc.) about election or candidates was not provided to general public on the government websites. It seems that county governments do not want to get citizens involved in the election process nor want their opinions on the election or candidates.

As high as 65.1% counties (41 out of 63) offered media/press information section on their government websites. It somehow matches the findings of Huang (2007) in that most local e-government websites stay at the "information" stage. The main purpose of local e-government portals is to inform the citizens about rules and administration policies. Therefore, though the election process was not transparent to the general public, up to 44.4% counties chose to display election results on government websites. About 20% reported election results of 2015 and over 10% election results of 2010.

Up to nine counties did not provide any election related information on their government websites (see Figure 3). Huangmei County had the highest election information scores (EIS) of 7, out of possible 22. Three counties, Xingshan, Jiangling, and Chongyang had an EIS of 6. Following that, eight counties had an EIS score of 5. Other counties had a score of 4 or below. Obviously, the governments at the national and provincial levels opted out of having any policies or commands on the local county governments' websites about elections, so it is up to the county to decide what election information it wants to report. Based on the current election practice, most counties in Hubei had no desire to release more election information than the status quo. Comparing to what reported by King and Youngblood (2016) on Alabama counties, Chinese e-government websites have more to catch up on reporting election related information.

Accessibility

When scrutinizing Hubei counties' government websites' compliance with section 508 standards, we could find most counties violate web accessibility rules here and there. Over 90% counties violate at least one of the five web accessibility standards, with one county violated all standards, and only five counties (8%) violated none (see Table 4). A further look at the violation details of the accessibility standards reveals that many counties failed to provide redundant links for server-side image maps (63.5%) or their frames were not titled with text to facilitate frame identification

and navigation (see Table 5). Twenty-seven counties (42.9%) had forms that are not accessible. Following that, 28.6% counties had scripts not identified by accessible text and 12.7% counties did not have text equivalent for non-text.

TABLE 3. ELECTION INFORMATION DISTRIBUTION BY HUBEI COUNTIES

|	Number of counties	% of all counties
Election website	7	11.1%
Specific link on main county site for election website	2	3.2%
Name of election official(s)	29	46.0%
Contact Information (email address listed)	1	1.6%
Contact information (form)	0	0.0%
Contact information (phone)	0	0.0%
Contact Information (online chat)	0	0.0%
Email information sign up	0	0.0%
Text information sign up	0	0.0%
Media/press information section	41	65.1%
Physical Address	9	14.3%
Online downloadable voter registration form	0	0.0%
Voter registration Status/Search	0	0.0%
Voting location address search	1	1.6%
Sample ballot	0	0.0%
Vote by mail (absentee) ballot application	0	0.0%
Update voter registration address link/form	0	0.0%
Voter registration locations	0	0.0%
Voter ID information and requirements	0	0.0%
Election results (any)	28	44.4%
Election results for 2015	13	20.6%
Election results for 2010	8	12.7%
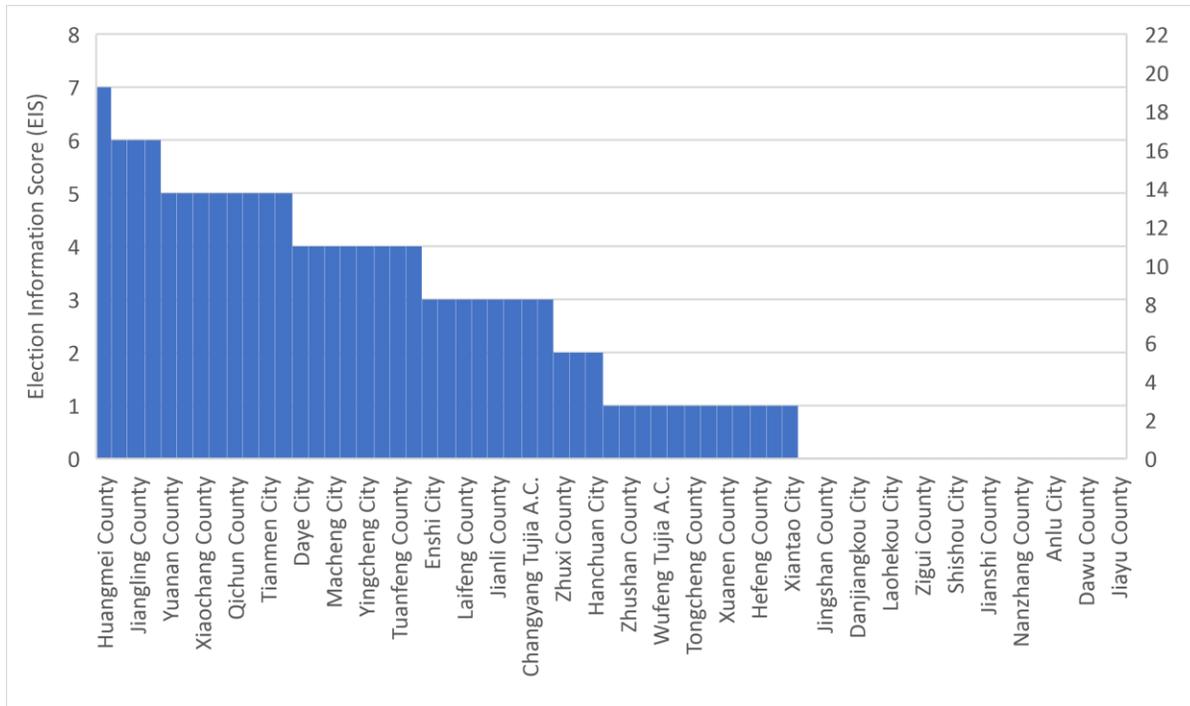
FIGURE 3. ELECTION INFORMATION SCORE (EIS) DISTRIBUTION

Due to illness, impairment, or aging factors, many people are regarded as disabled in front of the Internet browsers. However, it is not right to exclude them from the service provided by governments via their digital services. China has a large disabled population. For many of them, an accessible online government website can bring government services to their homes. This will increase their satisfaction with the government, ease the services, and reduce the costs for governments as well. Under this circumstance, it is necessary for local governments make sure their websites meet accessibility standards to facilitate access to the government information and services that people with disabilities need.

TABLE 4. SECTION 508 ACCESSIBILITY VIOLATION DISTRIBUTION BY HUBEI COUNTIES

# of accessibility violations	Counties with violations	% of all counties
0 Violation	5	7.9%
1 Violation	14	22.2%
2 Violations	19	30.2%
3 Violations	20	31.7%
4 Violations	4	6.3%
5 Violations	1	1.6%

TABLE 5. SECTION 508 ACCESSIBILITY STANDARDS VIOLATION

Section 508 standards	Counties with violations	% of all counties
Text equivalent for non-text	8	12.7%
Redundant links for server-side image maps	40	63.5%
Frames shall be titled with text that facilitates frame identification and navigation.	40	63.5%
Scripts should be identified by accessible text	18	28.6%
Forms should be accessible	27	42.9%

Mobile Readiness

When King and Youngblood (2016) found that less than a quarter of Alabama county websites were prepared for mobile, it is interesting for this research to find that as high as 92.1% of Hubei counties, i.e., 58 out of 63 counties, were mobile-ready. Mobile readiness means that the webpage design changes to suit a smaller screen when a mobile device is detected in use. The server provides webpages with larger fonts, less crowded design, and more concise menu options to facilitate easy mobile navigation and operation. Normally, web designers use a different set of Cascading Style Sheet (CSS) for mobile devices. It is automatically loaded when the server detects a mobile device rather than a desktop/laptop computer is in use. In terms of technology, it is not a difficult matter. It is more about the management and attention the government pays to the mobile readiness issue. With a huge number of mobile users in China, about 700 million (Deagon, 2016), companies are paying closer attention to their services via mobile channels. Obviously, governments at local levels, such as Hubei counties, are catching onto this trend and making their e-government portals mobile friendly.

DISCUSSION AND CONCLUSIONS

The benefits of e-government are tremendous, including reducing government spending and increasing interest earning, improving delivery of government services, and promoting e-democracy (Huang, 2007). E-government can significantly reduce government transaction costs. For example, savings of e-democracy could be as much as $110 billion and €144 billion a year; $3 trillion in exchanges happen between citizens and U.S. governments each year (Watson & Mundy, 2001). Other research reports that e-government can transform bureaucracy, can allow public sectors to focus on user satisfaction and control and flexibility in service delivery (Ho, 2002), and can support businesses (Gengatharen & Standing, 2005). However, it takes a lot of resources and strategic vision to establish a good e-government website that will be adopted by citizens for information, communication, transactions, and democracy purposes. As King and Youngblood (2016) commented, when we move forward with increasing numbers of government transactions and information sharing being facilitated via digital means, it is critical to consider who may be excluded and under what conditions the exclusion happens. It is necessary to

investigate what administrative resources and capacity or service and information delivery priorities lead to different decisions by local governments to establish a web presence. To design a government website with high user satisfaction, local governments should consider usability, accessibility, as well as mobile readiness. While these three issues are more technology-related, the voting and election content is not. Election is an administrative process guided by a country's laws and policies. If the current law at China's county level does not support direct election, local governments can still choose to publish the election information about candidates, their contact information, and election results etc. to increase government transparency and interest citizens in politics. This research provides a comprehensive evaluation of local e-governments in Hubei province in terms of usability, accessibility, election content, as well as mobile readiness. The data and insights from this research will be useful for scholars and practitioners who are interested in e-government management in China.

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APPENDIX 1. COUNTIES IN HUBEI PROVINCE

CountyCN	CountyEN	CNPortal	LandAreaSqKm	RuralPop10K	GDP	PerCapGDP
阳新县	Yangxin County	http://www.hbyxx.gov.cn/	2783	102.0	128.70	12618
大冶市	Daye City	http://www.hbdaye.gov.cn/	1566	94.6	331.84	35078
郧西县	Yunxi County	http://www.yunxi.gov.cn/	3509	50.7	40.43	7974
竹山县	Zhushan County	http://www.zhushan.gov.cn/	3586	47.3	49.66	10499
竹溪县	Zhuxi County	http://www.zhuxi.gov.cn/	3311	37.4	42.72	11422
房县	Fang County	http://www.cnfx.gov.cn/	5110	48.7	43.77	8988
丹江口市	Danjiangkou City	http://www.danjiangkou.gov.cn/	3121	46.0	108.38	23561
远安县	Yuanan County	http://www.yuanan.gov.cn/	1752	19.4	101.13	52129
兴山县	Xingshan County	http://www.xingshan.gov.cn/	2327	17.6	56.26	31966
秭归县	Zigui County	http://www.hbzg.gov.cn/	2427	38.2	66.69	17458
长阳土家族自治县	Changyang Tujia A.C.	http://www.changyang.gov.cn/	3430	40.7	75.30	18501
五峰土家族自治县	Wufeng Tujia A.C.	http://www.hbwf.gov.cn/	2072	20.5	36.62	17863
宜都市	Yidu City	http://ldj.yidu.gov.cn/	1357	39.5	273.82	69322
当阳市	Dangyang City	http://www.hbdy.gov.cn/	2159	48.6	240.63	49512
枝江市	Zhijiang City	http://xxgk.zhijiang.gov.cn/	1310	49.6	232.72	46919
南漳县	Nanzhang County	http://www.hbnz.gov.cn/	3859	58.8	124.70	21207
谷城县	Gucheng County	http://www.hbgucheng.gov.cn/	2553	58.9	163.49	27757
保康县	Baokang County	http://www.bk.gov.cn/	3222	27.8	56.02	20151
老河口市	Laohekou City	http://www.lhk.gov.cn/default.asp	1032	53.3	165.57	31064
枣阳市	Zaoyang City	http://www.zyzf.gov.cn/	3277	112.1	301.81	26923
宜城市	Yicheng City	http://www.ych.gov.cn/	2115	57.3	165.10	28813
京山县	Jingshan County	http://www.jingshan.gov.cn/	3520	65.7	206.23	31390
沙洋县	Shayang County	http://www.shayang.gov.cn/index.html	2044	62.2	153.12	24617
钟祥市	Zhongxiang City	http://www.zhongxiang.gov.cn	4488	106.9	255.54	23905
孝昌县	Xiaochang County	http://www.xiaochang.gov.cn/	1217	67.6	73.08	10811
大悟县	Dawu County	http://www.hbdawu.gov.cn/	1985	64.2	79.65	12407

云梦县	Yunmeng County	http://www.yunmengnet.com/	604	58.0	130.23	22453
应城市	Yingcheng City	http://www.yingchengnet.com/	1103	67.8	151.57	12618
安陆市	Anlu City	http://www.anlu.gov.cn/alweb/government-firstPage.whbs	1355	63.4	108.03	17039
汉川市	Hanchuan City	http://www.hanchuan.gov.cn/index.html	1659	112.8	247.57	21948
江陵县	Jiangling County	http://www.jiangling.gov.cn/	2257	105.9	41.83	3950
公安县	Gongan County	http://www.gongan.gov.cn/	3460	156.2	134.62	8618
监利县	Jianli County	http://www.114huoche.com/zhengfu/JingZhou-JianLiXian	1048	40.9	156.64	12618
石首市	Shishou City	http://www.shishou.gov.cn/shishou/	1427	64.6	95.87	14841
洪湖市	Honghu City	http://www.honghu.gov.cn/	2519	94.1	122.89	13060
松滋市	Songzi City	http://www.hbsz.gov.cn/	2177	77.0	126.78	16465
团风县	Tuanfeng County	http://www.tfzf.gov.cn/	833	37.8	49.50	13095
红安县	Hongan County	http://www.hazf.gov.cn/	1796	66.4	82.26	12389
罗田县	Luotian County	http://www.luotian.gov.cn/	2129	61.4	72.93	11878
英山县	Yingshan County	http://www.chinays.gov.cn/	1449	40.1	52.07	12985
浠水县	Xishui County	http://www.xishui.gov.cn/	1949	103.0	124.68	12105
蕲春县	Qichun County	http://www.qichun.gov.cn/	2398	100.3	129.15	12876
黄梅县	Huangmei County	http://www.hmzx.gov.cn/	1701	98.9	108.50	10971
麻城市	Macheng City	http://www.macheng.gov.cn/	3747	116.3	156.67	13471
武穴市	Wuxue City	http://www.wuxue.gov.cn/	1246	78.8	159.52	20244
嘉鱼县	Jiayu County	http://www.jiayu.gov.cn/	1017	37.2	131.16	35258
通城县	Tongcheng County	http://www.zgtc.gov.cn/zw/	1172	50.0	73.80	14760
崇阳县	Chongyang County	http://www.chongyang.gov.cn/	1968	47.7	67.44	14138
通山县	Tongshan County	http://www.tongshan.gov.cn/	2680	46.8	56.20	12618
赤壁市	Chibi City	http://www.chibi.gov.cn/	1723	52.2	188.21	36056
随县	Sui County	http://www.zgsuixian.gov.cn/index.html	5763	97.9	120.94	12618
广水市	Guangshui City	http://www.zggs.gov.cn/	2641	94.7	166.76	17609
恩施市	Enshi City	http://www.enshi.gov.cn/zwz/index.html	3972	80.5	105.34	13086

利川市	Lichuan City	http://www.lichuan.gov.cn/	4607	90.6	64.77	7149
建始县	Jianshi County	http://www.hbjs.gov.cn/	2666	51.4	47.87	9313
巴东县	Badong County	http://wlwz.hbbd.gov.cn/	3354	49.0	57.52	11739
宣恩县	Xuanen County	http://www.xuanen.gov.cn/	2737	35.9	34.64	9649
咸丰县	Xianfeng County	http://www.xianfeng.gov.cn/	2550	38.5	41.98	10904
来凤县	Laifeng County	http://www.laifeng.gov.cn/	1342	32.7	35.24	10777
鹤峰县	Hefeng County	http://www.hf.gov.cn/	2872	22.3	30.43	13646
天门市	Tianmen City	http://www.tianmen.gov.cn/zwgk/ldzc/	2622	141.9	321.2	23989.0
仙桃市	Xiantao City	http://www.xiantao.gov.cn/zwgk/zcfg/	2538	117.5	444.2	
潜江市	Qianjiang City	http://www.hbqj.gov.cn/	2004	94.6	441.8	
神农架林区	Shennongjia District	http://www.snj.gov.cn/	3253	7.6	16.8	

APPENDIX 2. USABILITY INSTRUMENT

		Websites failing (%)
Overall Design standards		
O1	A splash page is Not used	
O2	A small random floating window on homepage is NOT used	
O3	Audio and video do NOT auto play when page loads	
O4	Horizontal scrolling is NOT required with the browser window set to 1024 pixels across.	
Conventions for hyperlinked text in main text		
C1	All text links are blue (some shades of blue)	
C2	All text links are a different color than the main text	
C3	All text links color changes after a link is clicked	
C4	All text links are underlined	
Navigation Standards		
N1	A "home" or "return" text link appears on internal pages	
N2	A county logo or other header graphic serves as a "home" link on internal pages	
N3	Main navigation is on the top and/or left-side of the page	
N4	There are 10 or fewer visible items per navigational grouping	
Readability		
R1	Main body text is left aligned	
R2	Any text that is underlined is a link	
Language option		
L1	Page has a non-Chinese version or a translation option	
Findability		
F1	County website is in the first page of results from Baidu	

APPENDIX 3. VOTING & ELECTION INSTRUMENT

	Measure
E1	Election website
E2	Specific link on main county site for election website
E3	Name of election official(s)
E4	Contact Information (email address listed)
E5	Contact information (form)
E6	Contact information (phone)
E7	Email information sign up
E8	Text information sign up
E9	Media/press information section
E10	Physical Address
E11	Online downloadable voter registration form
E12	Voter registration Status/Search
E13	Voting location address search
E14	Provisional ballot status search
E15	Sample ballot
E16	Vote by mail (absentee) ballot application
E17	Update voter registration address link/form
E18	Voter registration locations
E19	Voter ID information and requirements
E20	Election results (any)
E21	Election results for 2015
E22	Election results for 2010

APPENDIX 4. ACCESSIBILITY INSTRUMENT

A	Text equivalent for non-text
E	Redundant links for server-side image maps
I	Frames shall be titled with text that facilitates frame identification and navigation.
L	Scripts should be identified by accessible text
N	Forms should be accessible
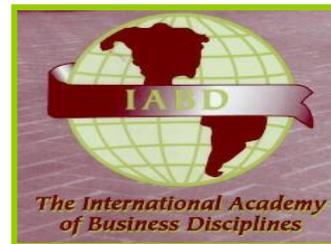
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