A survey of WeChat application in Chinese public libraries

1. Introduction

In recent years, mobile social media such as WeChat have gained increasing popularity. WeChat (Weixin or "微信" in Chinese), launched in 2011 by Tecent, offers multiple services to individuals and organizations, including communication services via text and voice, and social networking services (Wikipedia 2013). WeChat has rapidly become an integral part of people's daily life (Skuse 2014), and the number of monthly active WeChat users has reached 762 million by the end of the first quarter of 2016 (Tecent 2016). One of the WeChat products is WeChat official account, which connects individuals with organizations (WeChat 2015). Organizations, such as libraries, universities and enterprises, could freely apply for WeChat accounts to offer services (WeChat 2015). According to a report issued by iResearch (2015), 79.2% of WeChat users subscribe to WeChat official accounts. Although the increasing pervasiveness of WeChat official accounts in the people's lives is well established, there is much research yet to be done on how this new technology is employed by organizations to improve their services. Researchers show that WeChat official account has been utilized as a marketing tool by academic libraries to promote their services (Xu et al. 2015). However, how WeChat official accounts are applied in public libraries is still unclear. In addition, though WeChat has the potential to promote library services with limited expenses, libraries still hesitate to adopt the new technology due to reasons such as limited time and training, as well as uncertainty about the outcomes (Boateng and Liu 2014). Considering the increasingly important role of WeChat in service innovation, it is necessary to examine the application of WeChat in public libraries.

In the literature, extant research has mainly focused on Web 2.0 applications in university libraries. Linh (2008) conducted a survey on 32 Australasian university libraries, and the results reveal that at least two-thirds of the libraries adopted one or more Web 2.0 tools for specific purposes. Han and Liu (2010) investigated the status and pattern of Web 2.0 tools in 38 top Chinese university libraries; and the results show that more than two-thirds of the university libraries used one or more types of Web 2.0 technologies. Si et al.'s study (2011) on top 30 Chinese university libraries found that two-thirds of libraries adopted one or more Web 2.0 technologies, and one-tenth of libraries employed more than four Web 2.0 technologies. Boateng and Liu (2014) showed the usage and trends of various Web 2.0 technologies in the top 100 US academic libraries. The study of Kebede (2014) noted that about half of the 82 top university libraries in Africa employed one or more Web 2.0 applications. In addition, a few studies have examined the use of Web 2.0 technologies in public libraries. Wojcik (2015) found that the number of Polish urban public libraries adopting social media to promote their services was increased between 2011 and 2013. Grgic and Macnjak (2015) conducted a survey on Croatian public libraries to examine the frequency and types of their presence on Facebook. Recently, researchers have paid more attention on the application of mobile social media in university libraries. For example, Xu et al.'s survey (2015) on 39 top university libraries in China revealed that about one third of the libraries adopted WeChat to improve services, and most libraries only used the basic functions.

In general, prior studies show that libraries have successfully employed Web 2.0 technoligies. However, research on mobile social media in libraries is still limited (Xu et al. 2015). Also, as users of university libraries and public libraries are different, it may be different for public libraries to use WeChat in boosting their serives. Considering the insufficient research on this topic, this study attempts to reveal the current characteristics and status of WeChat application in Chinese public libraries.

Specifically, this study aims to address the following questions:

(1) To what extent is WeChat prevalent in public libraries?

(2) For what purposes is WeChat being used by public libraries?

To answer the research questions, this study collected data from 46 sub-provincial and provincial public libraries in China, and conducted a statistical survey and content analysis. To doing so, this study offers several contributions. First, it is among the few studies to explore the application of mobile social media in public libraries. The results will add our knowledge on how public libraries utilize the new technologies. Second, the findings of this study are expected to provide insights into how libraries could further enhance their services through WeChat and thus improve their presence in social media. Third, the results will also help libraries to learn how to conduct the WeChat services and what level they can achieve.

The reminder of this paper is organized as follows. Research methology is introduced in section 2. Section 3 describes the results, following with a discussion in section 4. Section 5 presents the implications and research limitations.

2. Research methodology

There are 3,117 public libraries at different levels in China until the end of 2014 (LSC and NLC, 2016). However, it is difficult to analyze each public library completely. As sub-provincial and provincial public libraries represent the most developed groups of public libraries in China; and the majority of public libraries at other levels may face difficulty in adopting WeChat, such as insufficient awareness of the outcomes, inadequate technical supports and restrictions on human resources (Aharony 2012, Baro et al. 2013, Xu et al. 2015), thus this study considers public libraries at the levels of sub-provincial and provincial as the research samples. In total, there are 46 sub-provincial and provincial Chinese public libraries, of which 31 are provincial and 15 are sub-provincial (Taiwan, Hongkong and Macao are excluded) (LSC and NLC 2016).

Regarding the descriptors, this study develops a checklist according to the study of Xu et al. (2015) and our explorative study (Gan and Zheng 2016). The following descriptors are included: general information (established time, types of accounts, WeChat name, WeChat ID, logo, introduction information and welcome message), history information (number, types and contents), service mode and reference services.

To help examine the current characteristics and status of WeChat official accounts organized by public libraries in China, the following steps were carried out:

Step 1: Searched the 46 libraries' homepages manually for WeChat icons, QR codes and opening announcements. In doing so, 26 libraries were found.

Step 2: Searched for the libraries' presence on the WeChat App, using names of the other 20 libraries as keywords. And 15 libraries were also found.

Step 3: Consulted with librarians through reference services via e-mail and telephone, so as to check out whether the left 5 libraries had applied for WeChat official accounts.

The searching process reveals that 41 (89.1%) libraries had applied for WeChat official accounts, of which 26 are provincial public libraries and 15 are sub - provincial ones (statistical date: April 5th, 2015). In addition, the results show that 2 public libraries had applied for two accounts. A further analysis reveals that only one account of the two is operating and offering services. Furthermore, one account is under construction and two accounts do not offer services. Thus, this study conducted surveys on the 38 (82.6%) public libraries which are offering services for users.

The researchers subscribed to all the 38 libraries' WeChat official accounts, documented the

related information and interacted with the accounts during the period of April 5th, 2015 through April 14th, 2015. The data was entered into an Excel spreadsheet and compiled for further analysis. Furthermore, statistical analysis and content analysis were adopted for data analysis.

3. Results

3.1 General information

3.1.1 Created time

Table 1 depicts the created time for each account of the 38 public libraries. The earliest time for setting up an account was March 20th, 2013, created by Shenzhen Library. 7 (18.4%) libraries created their accounts in 2013, and the number increased rapidly into 27 (71.1%) in 2014, indicating the increasingly important role of WeChat in fostering libraries services.

Table 1 Created time of WeChat official accounts for sample public libraries

Public libraries*	Created time	Public libraries*	Created time
SZLIB	March 20th, 2013	TLIB	April 18th, 2014
HBLIB	April 19th, 2013	FJLIB	April 23th, 2014
XJLIB	May 7th, 2013	CQLIB	April 23th, 2014
HBPLIB	May 25th, 2013	JSLIB	May 20th, 2014
CCLIB	July 13th, 2013	WHLIB	May 22nd, 2014
CLIB	November 25th, 2013	LNLIB	June 9th, 2014
SHLIB	December 20th, 2013	HENANLIB	June 10th, 2014
HZLIB	January 23th, 2014	GZLIB	July 20th, 2014
QDLIB	January 24th, 2014	XMLIB	August 6th, 2014
SAXLIB	January 26th, 2014	HELIB	August 7th, 2014
HLJLIB	February 12th, 2014	CDLIB	September 9th, 2014
HNLIB	February 15th, 2014	JLPLIB	September 17th, 2014
JNLIB	March 3rd, 2014	DLLIB	September 19th, 2014
SXLIB	March 31st, 2014	GSLIB	October 15th, 2014
SDLIB	March 13th, 2014	NBLIB	October 27th, 2014
ZSLIB	March 18th, 2014	ZJLIB	February 13th, 2015
HILIB	March 28th, 2014	JXLIB	Unknown*
XALIB	March 28th, 2014	GZPLIB	Unknown*
JLLIB	April 17th, 2014	YNLIB	Unknown*

*Unknown: Researchers cannot acquire the created time of their accounts.

*Abbreviations: SZLIB, Shenzhen Library; HBLIB, Harbin Library; XJLIB, Xinjiang Library; HBPLIB, Hubei Provincial Library; CCLIB, Changchun Library; CLIB, Capital Library of China; SHLIB, Shanghai Library; HZLIB, Hangzhou Public Library; QDLIB, Qingdao Library; SAXLIB, Shaanxi Provincial Library; HLJLIB, Heilongjiang Provincial Library; HNLIB, Hunan Library; JNLIB, Jinan Library; SXLIB, Shanxi Library; SDLIB, Shandong Library; ZSLIB, Sun Yat-sen Library of Guangdong Province; HILIB, Hainan Library; XALIB, Xi'an Public Library; JLLIB, Jinling Library; TLIB, Tibet Library; FJLIB, Fujian Provincial Library; CQLIB, Chongqing Library; JSLIB, Nanjing Library; WHLIB, Wuhan Library; LNLIB, Liaoning Provincial Library; HENANLIB, Henan Provincial Library; GZLIB, Guangzhou Library; XMLIB, Xiamen Library; HELIB, Hebei Library; CDLIB, Chengdu Library; JLPLIB, Jilin Provincial Library; DLLIB, Dalian

Library, GSLIB, Gansu Provincial Library; NBLIB, Ningbo Library; ZJLIB, Zhejiang Provincial Library; JXLIB, Jiangxi Provincial Library; GZLIB, Guizhou Provincial Library; YNLIB, The Library of Yunnan Province

3.1.2 Verified accounts and types of accounts

Verified accounts are authenticated by Tecent, which require at least 500 followers and an authentication fee of 300 RMB each year (Tecent 2011). Also, verified accounts could ensure authenticity and security of the information (Tecent 2012), thus making the host library more authoritativeness. The results show that 33 (86.8%) libraries had applied for certifications (as listed in Table 2).

In addition, there are two types of accounts: subscription and service accounts. One of the biggest differences between subscription and service accounts lies in the number of message an account could send out; that is, a subscription account can send out one message each day, while a service account can only send out four messages each month (WeChat 2015). Therefore, whether applying for a subscription account or a service one depends on library's needs and its development strategy. The results reveal that 22 (57.9%) libraries had applied for subscription accounts, while 16 libraries (42.1%) had service accounts (as shown in Table 2).

Table 2 Verified accounts and types of accounts for sample public libraries

	Verified accounts	Non-verified accounts	In total (Percentage)
Subscription accounts	21	1	22 (57.9%)
Service accounts	12	4	16 (42.1%)
In total (Percentage)	33 (86.8%)	5 (13.2%)	38 (100%)

3.1.3 WeChat IDs, WeChat names and account logos

Regarding the forms of WeChat IDs, 3 (21.1%) libraries did not have IDs, and 30 (78.9%) libraries provide their IDs. Table 3 presents the forms of WeChat IDs for sample public libraries. 34.2% of the libraries use the combination of "full city names in Chinese" or "their abbreviations" and "library", such as shanghailibrary and hnlibrary; followed by the combination of "full city names in Chinese" or "their abbreviations" and "lib" (13.2%).

Table 3 The forms of WeChat IDs for sample public libraries

Forms of WeChat IDs	Number of public libraries (Percentage)	Examples
Full city names in Chinese or their abbreviations + library	13 (34.2%)	shanghailibrary, hnlibrary, xj_library
Full city names in Chinese or their abbreviations + lib	5 (13.2%)	QingdaoLib, hrblib
Full city names in Chinese in abbreviations, lib + numbers	3 (7.9%)	gslib1916, whlib85718020
Full library names in Chinese or their abbreviations + numbers	3 (7.9%)	hntsg1904, hljstsg2014
Full library names in Chinese or their abbreviations	3 (7.9%)	jlstsg, Xiantushuguan
Others	3 (7.9%)	zwntsg, zslib_wx
In total	30 (78.9%)	-

In addition, all the 38 (100%) libraries use their library names as the WeChat names, such as Shanghai Library and Sun Yat-sen Library of Guangdong Province. Furthermore, 28 (73.7%) libraries use library badge as their account logos, 9 (23.7%) employ photos of library architecture, and only 1

(2.6%) adopts other picture.

3.1.5 Introduction information and Welcome messages

Introduction information briefly describes functions of the account. The results show that most of the libraries (52.6%) present their service functions, and 6 libraries (15.8%) show their directions. Other contents include introduction of the library (10.5%), welcome message (10.5%), the combination of directions and functions (7.9%) and others (2.6%).

As shown in Table 4, 37 (97.4%) libraries present welcome messages after users follow their accounts, while 1 librarydoes not. A further analysis of the contents reveals that, the most information provided is meaningless information (51.4%), such as "Welcome to follow the account"; followed by information related to URL, phone number and wifi password of the library (21.6%).

Table 4 Contents of welcome messages for sample public libraries

Contents of welcome messages	Number of public libraries (Percentage)
Meaningless information, such as "Welcome to follow the account"	19 (51.4%)
Information related to URL, phone number and wifi password of the library	8 (21.6%)
Information related to service guideline or lists of service contents	5 (13.5%)
Information related to using custom menus	5 (13.5%)
Information related to using WeChat for consultation	5 (13.5%)
Information related to introduction of the library	2 (5.4%)

3.2 History information

3.2.1 Number of Information

As subscription and service accounts could publish different number of message each time, there will be big differences between numbers of history information for the two types of accounts. Thus, this study separately conducted surveys on subscription and service accounts for sample public libraries. The results show that 4 (10.5%) libraries do not have history information, therefore the following analysis focuses on those 34 (89.5%) libraries which provide history information and the results are shown in Table 5 and Table 6.

Regarding the service accounts (Table 5), the highest number of history information is 49, followed by 43 and 40. And 4 libraries had the relative lowest number (less than 10 times). Also, the three most total number of history information is 219, 199 and 192. In addition, as for the number of information each time, the highest is 5, and the lowest is 1. Moreover, 2 libraries provide information four times each month, achieving to the limited number for service accounts; while 1 library has the frequency of less than once.

Table 5 Number of history information for service accounts for sample public libraries

Public library	Times	Total number	Number of information each time	Frequency (per month)*
HELIB	7	7	1	1
SXLIB	31	97	3.1	1.6
LNLIB	38	176	4.6	3.8
SHLIB	43	192	4.5	4
JSLIB	8	16	2	1.2
ZJLIB	8	36	4.5	1.2
FJLIB	49	219	4.5	4

ZSLIB	29	46	1.6	2.6
CQLIB	40	199	5	3.6
DLLIB	4	4	1	0.4
GZLIB	36	81	2.3	3.8
CDLIB	19	62	3.3	2.8
*: Frequency (per month) = Total number / 5, this study calculated the total number of history information for the latest five months (Date: from November, 2014 to March, 2015)				

As for subscription accounts (as shown in Table 6), the three highest number is 480, 378 and 336; and the least is 7. Also, the highest number of history information is 1,831, followed by 1,249 and 1,041. In addition, the most number of information each time is 4, and the least is 1. Moreover, the highest number for each month is 29, indicating almost once a day; and the lowest is 0.2.

Table 6 Number of history information for subscription accounts for sample public libraries

Public library	Times	Total number	Number of information each time	Frequency (per month)*
CLIB	336	783	2.3	19.6
JLPLIB	57	57	1	7.8
HLJLIB	378	1041	2.8	24.2
HENANLIB	10	10	1	0.6
HBPLIB	195	305	1.6	7.4
HNLIB	287	1249	4.4	29
HILIB	76	157	2	5.6
TLIB	25	41	1.6	2.4
SAXLIB	88	186	2.1	6.4
GSLIB	37	76	2	7
XJLIB	111	247	2.2	2.6
HBLIB	47	167	3.6	9
CCLIB	206	726	3.5	8.6
JNLIB	76	136	1.8	6.6
QDLIB	205	280	1.4	11
JLLIB	208	313	1.5	21
HZLIB	243	633	2.6	19.8
NBLIB	110	131	1.2	19.4
XMLIB	7	8	1.1	0.2
WHLIB	135	229	1.7	12.4
SZLIB	480	1831	3.8	24.4
XALIB	140	550	3.9	21.4
*: Frequency (per month) = Total number / 5, this study calculated the total number of history information for the latest five months (Date: from November, 2014 to March, 2015)				

3.2.2 Different types of information

Based on the findings of Chen et al. (2012) and Xu et al. (2015), there are two kinds of information provided by the WeChat accounts: single-way information dissemination and two-way information interaction. Single-way information dissemination indicates that libraries disseminates information to readers, such as library news and activities; and two-way information interaction

requires information exchange and communication between libraries and users through the accounts, such as reader investigation and entrance for activities (Chen et al. 2012, Xu et al. 2015). In addition, for the forms of information, two types of information exist: information with pure texts and information with texts and pictures.

As presented in Table 7, among the 34 libraries with history information, 14 (41.2%) offer two-way information interaction. However, the rate of two-way information interaction is relatively low, ranging from 0% to 12.5%. Also, 20 (58.8%) libraries do not have interactive information. In addition, most libraries provide information with texts and pictures, of which 10 (29.4%) provide totally 100% information with texts and pictures, and only 2 libraries (5.9%) provide more information with texts.

Table 7 Different types of history information for sample public libraries

Public libraries	Total number of information	Single-way information dissemination	Two-way information interaction	Rate of two-way information interaction	Information with pure texts	Information with texts and pictures	Rate of information with texts and pictures
HELIB	7	7	0	0.0%	1	6	85.7%
SXLIB	97	91	6	6.2%	0	97	100.0%
LNLIB	176	176	0	0.0%	0	176	100.0%
SHLIB	192	168	24	12.5%	2	190	99.0%
JSLIB	16	16	0	0.0%	1	15	93.8%
ZJLIB	36	35	1	2.8%	0	36	100.0%
FJLIB	219	215	4	1.8%	3	216	98.6%
ZSLIB	46	45	1	2.2%	2	44	95.7%
CQLIB	199	191	8	4.0%	0	199	100.0%
DLLIB	4	4	0	0.0%	3	1	25.0%
GZLIB	81	81	0	0.0%	6	75	92.6%
CDLIB	62	62	0	0.0%	0	62	100.0%
CLIB	783	783	0	0.0%	2	781	99.7%
JLPLIB	57	57	0	0.0%	41	16	28.1%
HLJLIB	1041	1041	0	0.0%	0	1041	100.0%
HENANLIB	10	10	0	0.0%	2	8	80.0%
HBPLIB	305	305	0	0.0%	13	292	95.7%
HNLIB	1249	1244	5	0.4%	1	1248	99.9%
HILIB	157	157	0	0.0%	10	147	93.6%
TLIB	41	40	1	2.4%	1	40	97.6%
SAXLIB	186	186	0	0.0%	7	179	96.2%
GSLIB	76	76	0	0.0%	5	71	93.4%
XJLIB	247	247	0	0.0%	0	247	100.0%
HBLIB	167	167	0	0.0%	2	165	98.8%
CCLIB	726	709	17	2.3%	3	723	99.6%
JNLIB	136	136	0	0.0%	2	134	98.5%
QDLIB	280	280	0	0.0%	5	275	98.2%
JLLIB	313	308	5	1.6%	0	313	100.0%

HZLIB	633	614	19	3.0%	4	629	99.4%
NBLIB	131	126	5	3.8%	0	131	100.0%
XMLIB	8	8	0	0.0%	0	8	100.0%
WHLIB	229	229	0	0.0%	7	222	96.9%
SZLIB	1831	1813	18	1.0%	16	1815	99.1%
XALIB	550	546	4	0.7%	2	548	99.6%

3.2.3 Contents of information

An analysis of the contents provided by the 34 libraries with history information shows that, the following information are included: resources recommendation, services recommendation, information about the library, notification of activities, reader investigation, knowledge popularization, current events and hotspots, entertainment, FAQ, introduction to other libraries, holiday blessings and usage guideline. Table 8 describes contents of history information for each account.

All 34 (89.5%) libraries provide information about the library, including notices of opening and closing hours, introduction of the library, library news, media news and announcement; and notification of activities, such as information related to activities, lectures and competitions. In addition, 27 (71.1%) libraries provide resources recommendation service, that is, recommending good resources or services to readers, such as books, articles, digital resources and videos, as well as new media service and self-service library. The relatively less information provided include: information related to current events and hotspots (4, 10.5%), FAQs (5, 13.2%), information to introduce other libraries (5, 13.2%), usage guideline on how to utilize the library resources (5, 13.2%), and reader investigation (5, 13.2%).

Table 8 Contents of history information for sample public libraries

Public libraries	Resources recommendation	Services recommendation	Information about the library	Notification of activities	Reader investigation	Knowledge popularization	Current events and hotspots	Entertainment	FAQ	Introduction to other libraries	Holiday blessings	Usage guideline
ELIB	0	0	1	1	0	0	0	0	0	0	0	0
CLIB	1	1	1	1	0	0	0	0	1	0	0	0
NLIB	1	1	1	1	0	0	0	0	0	0	0	0
SHLIB	1	1	1	1	0	0	0	0	1	0	0	0
JSLIB	0	1	1	1	0	1	0	0	0	0	0	0
ZJLIB	0	1	1	1	0	0	0	0	0	0	0	0
FJLIB	1	1	1	1	0	1	0	0	0	0	0	0
ZSLIB	1	1	1	1	0	0	0	0	0	0	0	0
CQLIB	1	1	1	1	1	1	0	0	1	0	0	1
DLLIB	0	0	1	1	0	0	0	0	0	0	0	0
GZLIB	1	1	1	1	0	0	0	0	0	0	0	0
CDLIB	1	1	1	1	0	0	0	0	0	0	0	0
CLIB	1	1	1	1	0	1	0	0	0	0	0	0
JLPLIB	0	1	1	1	0	0	0	0	0	0	1	0
HLJLIB	1	1	1	1	0	1	1	1	0	0	1	0
HENAN LIB	0	0	1	1	0	0	0	0	0	0	0	0
HBPLIB	1	0	1	1	0	0	0	0	0	0	1	1
HNLIB	1	1	1	1	1	1	0	1	0	1	0	0
HILIB	1	1	1	1	0	0	0	0	0	0	1	0
TLIB	0	0	1	1	1	0	0	0	0	0	0	0
SAXLIB	1	1	1	1	0	0	0	0	0	0	0	0

SLIB	1	1	1	1	0	1	0	0	1	0	0	0	0
LIB	1	1	1	1	0	1	1	0	1	0	0	1	0
BLIB	1	1	1	1	0	1	0	0	1	0	0	0	0
CLIB	1	1	1	1	0	1	1	1	1	0	1	0	1
LIB	1	1	1	1	0	1	1	0	1	0	0	0	0
DLIB	1	1	1	1	1	1	1	1	0	0	0	0	0
JLLIB	1	1	1	1	0	1	0	0	1	0	0	0	0
HZLIB	1	1	1	1	1	1	1	0	1	1	1	0	0
NBLIB	1	1	1	1	0	1	0	0	0	0	0	0	0
XMLIB	0	1	1	1	0	1	0	0	0	0	0	0	0
WHLIB	1	1	1	1	0	1	0	0	0	0	0	1	1
SZLIB	1	1	1	1	1	1	1	1	0	1	1	0	0
XALIB	1	1	1	1	0	1	1	0	1	0	1	0	0
In Total (Percentage)	27 (71.1%)	27 (71.1%)	34 (89.5%)	34 (89.5%)	5 (13.2%)	34 (89.5%)	16 (42.1%)	4 (10.5%)	10 (26.3%)	5 (13.2%)	5 (13.2%)	7 (13.2%)	5 (13.2%)

Note: 1 = The library provides the corresponding information; 0 = The library does not provide the corresponding information.

3.3 Service mode

3.3.1 Custom menus

32 (84.2%) libraries utilize custom menus to offer services. A further analysis of the contents from the custom menus reveals that the following 7 types of information are included: personal information service, resources service, notification of activities, information about the library, help information, interactive communication and other services. And only 1 library (2.6%) offers all the above-mentioned types of services. In addition, the most information provided is personal information service (31, 81.6%), such as checking loans through user ID, renewing loans and announment about returning books in due time; and resources service (31, 81.6%), such as searching catalogue, recommending library resources and mobile reading. The least information is interactive communication service (4, 10.5%), which provide a platform for communication among readers and libraries, such as micro-communities and official microblog. Other information is related to: (1) help information (28, 73.7%), including FAQs, guideline for readers and reference services; (2) notification of activities (27, 71.1%), such as the latest notification of activities, advance notice of lectures and exhibitions; (3) information about the library (21, 55.3%), such as introduction of the library, news and announcement; (4) other services (17, 44.7%), such as apps download, seat reservation and recommendation for books.

3.3.2 Self-inquiry information

This study checked out whether the accounts provide self-inquiry information through entering texts in the dialogue box. The results show that 26 (68.4%) libraries offer the service. The analysis of the feedback information reveals that 7 (18.4%) libraries present information with no specific contents, such as "Thank you" or "We will reply to you as soon as possible". And 3 libraries (7.9%) reply the following information: "Please use keywords for searching information"; however, they do not give suggestions on what the keywords are. In addition, 16 (42.1%) libraries reply with specific information. A further analysis of the 16 libraries with self-inquiry information indicates that there are 6 types of information, including searching catalogue, help information, notification of activities, personal information service, recommendation for resources and reference services. In addition, the most information provided is catalogue search service (10, 26.3%), which enables readers to search books through the official accounts, followed by help information (4, 10.5%), such as FAQs and guideline for readers; and notification of activities (4, 10.5%), including acquiring the latest information about library activities and participating in activities. The least information provided is personal information service (2, 5.3%), such as renewing loans, changing password and checking loans; and recommendation service for resources (2, 5.3%), such as recommending new books.

3.4 Reference services

3.4.1 Real-time reference services

Real-time reference services enable users to directly ask questions through the box in the account. The researcher's interaction with the accounts reveals that 11 (28.9%) libraries replied (Table 9), and the fastest response was within 2 minutes. 4 (10.5%) libraries responded within 10 minutes, while 2 (5.3%) libraries responded beyond 24 hours.

Table 9 Time used for responses from real-time reference services

Public libraries	Time for responses
LNLIB	Within 24 hours
SHLIB	Within 10 minutes
ZJLIB	Within 7 hours

FJLIB	More than 24 hours
DLLIB	Within 10 minutes
CLIB	Within 10 minutes
SAXLIB	Within 4 hours
XJLIB	Within 4 hours
CCLIB	More than 24 hours
QDLIB	Within 10 minutes
HZLIB	Within 2 minutes

3.4.2 **Other reference services**

Other reference services include reference services via menu and reference services through phones or e-mails. The results show that only 3 (7.9%) libraries offer references services via menu, which is located in the custom menus. And 14 (36.8%) libraries present phone numbers or e-mail addresses in their accounts for reference services.

4. Discussion

This study aims to examine how WeChat is applied in the Chinese public libraries at the levels of sub-provincial and provincial. The results show that the majority (82.6%) of the 46 libraries had used WeChat accounts and offered services, indicating the important role of WeChat in promoting library services. And the earliest created time for setting up a WeChat account was March 20th, 2013, later than other organizations who registered an account in a quick time since the emergence of WeChat account in August, 2011. In addition, most (86.8%) of the 38 libraries had verified accounts. And the number of subscription accounts (57.9%) is higher than that of service accounts (42.1%).

Regarding to WeChat names, WeChat IDs, and logos, all the 38 (100%) libraries use their library names as the WeChat names, which is reasonable and could be easily recognized by users, as the library names may enter users' mind immediately when they seek for the library accounts. And there are a variety of forms for WeChat IDs, such as different combinations of "full city/library names" or "their abbreviations" and "numbers". The form of WeChat IDs may be better when using full library names or their abbreviations, as it is easy to remember and understood by users. In addition, most (73.7%) libraries use the library badge as their logos, which is in line with the marketing principle (Potter 2012).

The results also indicate that 52.6% of the libraries provide introduction information, which is shown in the same interface and will be first presented to users after they search the accounts and decide whether to follow it or not. The user interface design is closely related to the first impression to users, thus the libraries should make the WeChat names and IDs to be easily understood and remembered, as well as design a beautiful logo with unique features of libraries; also, the introduction should be briefly and attracting (Potter 2012, Rossiter 2008). Moreover, almost all the libraries (97.4%) present welcome messages after user follow their accounts; however, 51.4% of the libraries provide meaningless information, and only 13.5% provide specific information about service guideline. According to primacy effect in psychology (Anderson 1971), the presentation of welcome messages is the first time for libraries to communicate with users, which plays an important role in affecting how users perceive their accounts. Thus, the welcome messages should be related to how to use the accounts for accessing library services, therefore fulfilling users' needs and enabling users to learn the accounts in general.

As for history information of the 12 service accounts, the total times that published information ranged from 4 to 49, and the total number of information ranged from 4 to 219. Also, the number of

information published each time changed from 1 to 5, and the frequency is from 0.4 to 4. On the other hand, as for history information of the 22 subscription accounts, the total times changed from 7 to 480, and the total number ranged from 8 to 1,831; also, the number of information for each time ranged from 1 to 4.4, while the frequency changed from 0.2 to 29. This indicates that the libraries did not fully use the platforms to offer services, and big differences exist for the extent of each library to utilize WeChat accounts. Regarding the types of history information, 41.2% of the 34 libraries provide two-way information interaction, with the rate ranging from 0% to 12.5%; also, 29.4% provide totally 100% information with texts and pictures. This shows that although the libraries interact with users through the accounts, they still mainly publish static information. Furthermore, the results from the contents analysis reveal that the majority (89.5%) of the libraries provide the following information: information about the library and notification of activities, followed by services recommendation (71.1%) and resources recommendation (71.1%). This indicates that libraries provide a variety of information, including basic services and expanded services.

Furthermore, the results reveal that two service modes exist: custom menus and self-inquiry information. 84.2% of the libraries have custom menus and the information provided mainly focuses on personal information service (81.6%), resources service (81.6%), help information (73.7%) and notification of activities (71.1%). However, only 2.6% of the libraries provide all the above-mentioned 7 types of services. On the other side, 68.4% of the libraries provide the self-inquiry information, of which 42.1% include the following 6 types of information: searching catalogue, help information, notification of activities, personal information service, recommendation for resources and reference service; in addition, 18.4% provide information with no specific contents.

Regarding reference services, only 28.9% of the libraries offer real-time services, of which the fastest response time was within 2 minutes (2.6%), and the latest was beyond 24 hours (5.3%). Also, 36.8% of the libraries offer services via phone numbers or e-mails and 7.9% are menu references services. The results indicate the relatively insufficient in reference services, especially in real-time services.

5. Implications and limitations

This study draws an overall picture of the WeChat application in Chinese public libraries. This is among the few investigations on this topic. Prior studies have mainly focused on Web 2.0 applications in university libraries (e.g., Han and Liu 2010, Linh 2008, Kebede 2014); and less attention has been paid on the public libraries. In addition, there is a lack of research on the application of mobile social media (i.e. WeChat) in libraries, especially the public libraries. The results will deepen our understanding of how libraries use the new technologies to improve their services and thus strengthen their social media presence. Also, the results will expand the application of the new technologies in new areas.

From a managerial perspective, the results provide suggestions to libraries on how to promote and enhance their services using the new technologies, and the results could be used in practice to improve public libraries' presence in social media. For example, the libraries should pay attention to the utilization of WeChat to help improve their services, especially those which had not applied an account. Also, service and subscription accounts have their specific features, so the libraries should choose the appropriate type based on their needs. In addition, it is better to apply for a verified account due to its authoritativeness. Furthermore, the libraries should provide reasonable WeChat names, ID, logos and introduction information to leave a good first impression to users. For example, the libraries could use the library names as the WeChat names, choose the library badge as the logos,

and present information related to functions and features as introduction information. Moreover, the libraries should provide a variety of information to meet users' different requirements: not only basic services, such as information about the library and resources recommendation; but also expanded services, such as entertainment and knowledge popularization. And two-way interactive information will be better to help strengthen the interaction with users, such as reader investigation and online activities. Finally, the libraries should utilize the functions of custom menus and self-inquiry information to push information to users.

Although this study has revealed useful findings on the application of WeChat in Chinese public libraries, there are a few limitations that should be borne in mind. First, it investigated only the 46 public libraries at the levels of provincial and sub-provincial, the results may not represent the entire public libraries in China. Future research could include other levels of public libraries, such as public libraries at sub-prefecture-level cities. Second, the study is completely based on publicly available data regarding the application of WeChat accounts. Thus data in intranets were not analyzed. Future studies could consider acquiring data from the libraries, such as the number of followers. Third, this study only employed statistical survey and content analysis for data collection and analysis. Future research could combine other methods such as case study and interviews to fully investigate how WeChat is perceived and utilized in Chinese public libraries.

Acknowledgments

References

Aharony, N. (2012), "Facebook use in libraries: an exploratory analysis", *Aslib Proceedings,* Vol. 64 No. 4, pp. 358-72.

Anderson, N. (1971), "Integration theory and attitude change", *Psychological Review,* Vol. 78 pp. 171-206.

Baro, E.E., Ebiagbe, E.J. and Godfrey, V.Z. (2013), "Web 2.0 tools usage: a comparative study of librarians in university libraries in Nigeria and South Africa", *Library Hi Tech News,* Vol. 30 No. 5, pp. 10-20.

Boateng, F. and Liu, Y.Q. (2014), "Web 2.0 applications' usage and trends in top US academic libraries", *Library Hi Tech,* Vol. 32 No. 1, pp. 120-38.

Chen, D.Y.-T., Chu, S.K.-W. and Xu, S.-Q. (2012), "How do libraries use social networking sites to interact with users", *Proceedings of the American Society for Information Science and Technology,* Vol. 49 No. 1, pp. 1-10.

Gan, C. and Zheng, J. (2016), "Investigation on WeChat Public Platform of Public Libraries in China", *Journal of Modern Information,* Vol. 36 No. 1, pp. 74-78, 83.

Grgic, I.H. and Macnjak, D. (2015), "Social Networking Phenomenon and its Use in Libraries", *Croatian Journal of Education-Hrvatski Casopis Za Odgoj I Obrazovanje,* Vol. 17 No. 1, pp. 217-41.

Han, Z. and Liu, Y.Q. (2010), "Web 2.0 applications in top Chinese university libraries", *Library Hi Tech,* Vol. 28 No. 1, pp. 41-62.

iResearch. (2015), "Report on media value of WeChat official account", available at: http://wreport.iresearch.cn/uploadfiles/reports/635703238888906250.pdf (accessed 2015-06-19).

Kebede, H.W. (2014), "Adoption of Web 2.0 in academic libraries of top African universities", *The Electronic Library,* Vol. 32 No. 2, pp. 262-77.

Linh, N.C. (2008), "A survey of the application of Web 2.0 in Australasian university libraries", *Library Hi Tech,* Vol. 26 No. 4, pp. 630-53.

LSC (Library Society of China) and China, N.N.L.o. (2016), *Almanac of Libraries in China,* National Library of China Publishing House, Beijing.

Potter, N. (2012), *The Library Marketing Toolkit,* Facet, London.

Rossiter, N. (2008), *Marketing the best deal in town: Your library. Where is your purple owl?,* Chandos Publishing, Oxford.

Si, L., Shi, R. and Chen, B. (2011), "An investigation and analysis of the application of Web 2.0 in Chinese university libraries", *The Electronic Library,* Vol. 29 No. 5, pp. 651-68.

Skuse, A. (2014), "WeChat: The Chinese chat app stealing Weibo's thunder", available at: http://edition.cnn.com/2014/02/27/business/tencent-wechat-unseats-sina-weibo/ (accessed 2014-02-27).

Tecent. (2011), "Related questions about authentication of WeChat official accounts", available at: http://kf.qq.com/faq/120322fu63YV131224ymQRNB.html (accessed 2014-04-24).

Tecent. (2012), "The role of a verified WeChat official account", available at: http://kf.qq.com/faq/120322fu63YV131031NR36Fb.html (accessed 2014-04-18).

Tecent. (2016), "2016 Interim Report", available at: http://tech.qq.com/a/20160518/067853.htm (accessed 2016-05-18).

WeChat. (2015), "WeChat official account", available at: https://mp.weixin.qq.com/ (accessed 2015-02-12.

Wojcik, M. (2015), "The Use of Web 2.0 Services by Urban Public Libraries in Poland: Changes over the Years 2011-2013", *Libri,* Vol. 65 No. 2, pp. 91-103.

Wikipedia. (2013), "WeChat", available at: https://en.wikipedia.org/wiki/WeChat#cite_note-10 (accessed 2013-12-22).

Xu, J., Kang, Q., Song, Z. and Clarke, C.P. (2015), "Applications of Mobile Social Media: WeChat Among Academic Libraries in China", *The Journal of Academic Librarianship,* Vol. 41 No. 1, pp. 21-30.

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