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EMPOWERING WORKERS AND LABOR NGOS IN CHINA: CREATING A LAW SEARCHING TOOL THROUGH A DESIGN SCIENCE APPROACH

ABSTRACT

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Labor NGOs in China has been utilizing various social media tools, such as WeChat for networking workers and promotion. In the year 2017 WeChat Mini Program was released, allowing developers to create "sub-application" within WeChat. This research evolves from a laws-searching WeChat Mini Program development project, which will adopt a design science approach, follow the design science research methodology (DSRM) process model, and measure the effect of this tool with the concepts from information systems success model and post-adoption behaviors, as well as empowerment and affordance. Usage data and user feedback of this tool were positive, providing it a successful attempt of utilizing new tools for labor NGOs.

Keywords: Design science, DSRM, WeChat Mini Program, labor NGOs, workers

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1 INTRODUCTION

How Information Systems (IS) may help nonprofit organization such as labor nonprofit organization (NGO) is a relatively novel research area in the IS field. In this study, we examine how a laws-searching WeChat Mini Program may influence both the labor NGO as well as the workers which the NGOs serve, from the perspective of design science. In China, the struggle of labor against employers or government related agencies has been on for decades. In 2012, the number of arbitrated labor disputes has reached over 640 thousands, with more than 1.1 million laborers involved (J. Chan & Selden, 2014).

Since the beginning of Chinese economic reform, literally known as "Reform and Opening-up", Chinese workers (especially migrant workers, those who come from rural area to urban area for work, but enjoy less benefit or security treatment than the local citizen do, which is a result of the *hukou*/household administration system) have been suffering from rights deficits, such as forced work overtime and pay delay or default (Wong, 2011).

Recognizing such social injustices, labor activists started establishing and running labor NGOs since 1990s, which evolved from government-banned independent trade unions (C. K. Chan, 2012). Organizing strikes is an illegal activity and may get labor NGOs shutdown by the government. Therefore labor NGOs use other approaches to help workers: providing legal assistance, consultancy, training, education, community service and other services (Bieler & Lee, 2017b; C. K. Chan & Hui, 2017; Gransow & Zhu, 2016; He & Huang, 2015; C. K. Chan, 2012).

Since 2004, labor NGOs have been taking advantages of the digital age: using various online tools, from QQ, Weblog, online forum, Weibo, and now, WeChat (J. Qiu, 2016). WeChat, a social media tool, enjoys high popularity in recent years among Chinese. Since its release in 2011 by Tencent, it experienced tremendous growth with 938 million monthly active users as of the first quarter of 2017 (China Tech Insights, 2017).

In the beginning of 2017, WeChat Mini Program, the "sub-application" within the WeChat ecosystem, was released, enabling individuals and organizations to create mobile applications within WeChat, with a specific framework

highly similar to HTML standard. This product allowed web developer to create mobile applications that can be easily accessed and disseminated in WeChat.

This research evolves from a WeChat Mini Program development project, which involves three labor NGOs in China. Two of them are student associations in Renmin University serving labor workers; the third one is unregistered, located in Shenzhen. The function of this WeChat Mini Program is searching law articles based on keywords. From this section on, I will use the term "this WeChat Mini Program" to refer to it. Its function may seem very basic, however, in China labor workers usually do not have access to high quality information, and are frequently being misled by search results online (Cartier, Castells, & Qiu, 2005; J. L. Qiu, Castells, & Cartier, 2009). A comparative study shows that in India, majority of legal e-resources are lacking search features and mobile-based views are not available (Bhardwaj & Madhusudhan, 2016). In China there is also not easy for underprivileged workers to access mobile-friendly searching tools and to know laws that protect their rights, let alone getting professional legal consultancy and assistance.

The research aims at enabling and improving both labor workers and labor NGO's access to labor-relevant laws, and empowering the workers to defend their rights in the workplace. The research questions of this research are: 1) How to design a law-searching WeChat Mini Program for labor NGOs in a design science approach? 2) To what extent can this WeChat Mini Program fulfill the requirements according to users' perceptions?

To answer these research questions, I adopted the design science research methodology (DSRM) process model. After studying the literature about labor NGOs in China and WeChat, I discovered great potential of creating a law-searching WeChat Mini Program for labor NGOs in China, and then set its objectives. With the help of several labor NGOs and the WeChat Mini Program official documentation, this WeChat Mini Program was designed, developed and released. Based on the objectives of this WeChat Mini Program, evaluation criteria were created by reviewing related literature, focusing on 7 dimensions: perceived affordance, systems quality, service quality, user satisfaction, intention of reuse, intention of recommendation and empowerment. Evaluation was conducted by analyzing the data from daily usage and a user survey. The results showed that users approved our efforts, indicating this project is successfully done and creating such tools are indeed helpful for labor NGOs. Besides, education level was found to have significant influence on some of the user attitudes. This research presents the entire process of creating a laws-searching WeChat Mini Program of labor NGOs, which could be a useful reference for other NGOs' IS development project study.

The reminder of this study is structured as follows: Section 2 introduces the methodology of this research; Section 3 identifies the problem by reviewing literature about labor NGOs in China and WeChat; Section 4 defines the objectives of this solution; Section 5 reviews the theories for evaluation, based on the objectives; Section 6 elaborates the design and development process of this tool; Section 7 introduces the demonstration process and reveals the usage data of

this tool; Section 8 contains the evaluation process and its results; Section 9 discusses the results and their contribution to literature; Section 10 is the conclusion of this thesis.

2 METHODOLOGY

Design science research methodology (DSRM) is chosen because it is the best fit of this project, since developing a new tool (WeChat Mini Program) for emerging labor NGOs is "inventing new solutions for new problems" (Gregor & Hevner, 2013). There are a considerable number of system develop researches adopt the DSRM process to design and develop IS artifacts, such as a hospital-based business intelligence system (Kao et al., 2016) and a performance-oriented e-learning environment (Wang, Vogel, & Ran, 2011).

2.1 DSRM process

Von Alan et al. (2004) defined design science research as "creates and evaluates IT artifacts intended to solve identified organizational problems" (Von Alan, March, Park, & Ram, 2004). Based on this definition, Peffers et al. (2007) broaden it to cover IS artifacts instead of only focusing on IT artifacts, and propose a design science research methodology (DSRM) for the production and presentation of design science research in IS. The DSRM process consists of 6 activities:

1) Problem identification and motivation
   Define the specific research problem and justify the value of a solution.
2) Define the objectives for a solution
   Infer the objectives of a solution from the problem definition and knowledge of what is possible and feasible.
3) Design and development
   Create the artifact.
4) Demonstration
   Demonstrate the use of the artifact to solve one or more instances of the problem.
5) Evaluation
   Observe and measure how well the artifact supports a solution to the problem.

6) Communication
   Communicate the problem and its importance, the artifact, its utility and novelty, the rigor of its design, and its effectiveness to researchers and other relevant audiences.

There are 4 possible research entry points to start the research process: problem-centered (initiated by step 1), objective-centered (initiated by step 2), Design & development-centered (initiated by step 3), and client/context (initiated by step 4). The process can proceed with iterations, e.g. after evaluation in step 5, go back to solution seeking in step 2 (Peffers, Tuunanen, Rothenberger, & Chatterjee, 2007).

The example of design & development-centered approach is a research of SIP-Based Voice- and Video-Over IP Software, the artifact of which was to be deployed across 202 universities (Peffers et al., 2007). Because of the selected standard (SIP), researchers didn't need to compare other telephony and video technology and select one. The objectives of solution in this research are to follow SIP technical standards, meet the requirements of the end users, be compatible with existing directory services and deploy embedded security function.

2.2 Research process

Design science research methodology is appropriate for this research. Since I already selected WeChat Mini Program as the application framework, this research will follow the DSRM process, adopting the design & development-centered approach. Based on the literature review above, I hereby draw the research process for this research, shown in FIGURE 1.
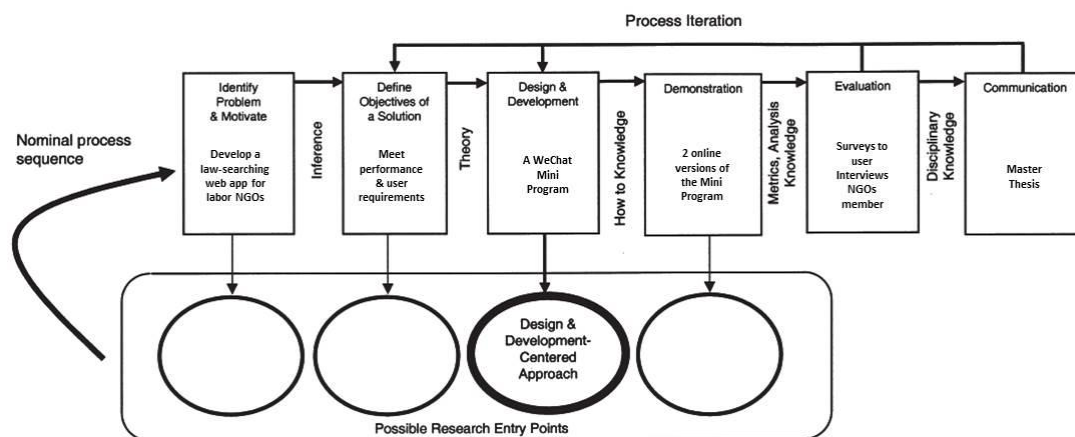
FIGURE 1 Research process (developed from DSRM Process model)

3 PROBLEM IDENTIFICATION: LABOR NGOS AND WECHAT MINI PROGRAMS

In this section, I will introduce the social context: Chinese labor NGO, WeChat and its ecosystem component: Mini Program. Due to the lack of academic literature, web pages and personal experience are used to make supplementary explanation.

3.1 Labor NGOs

After more than 3 decades, under the effect of Reform and Opening-up policy, China has achieved great success in economic development. However those who actually drive this economic boost -- Chinese workers -- are suffering from long hours, low pay, and lack of welfare benefits. According to a research on migrant workers (Wong, 2011), 46.9% did not sign a labor contract, 60.5% worked more than 8 hours a day, 52.5% did not enjoy statutory rest days, 43.0% did not receive overtime pay, and 22.1% experienced pay delay and default in last six months. This phenomenon is described as "super-exploitation". It has not been simply accepted and Chinese workers try to fight back (Bieler & Lee, 2017a).

3.1.1 Origin

Chinese official trade union, the All-China Federation of Trade Unions (ACFTU), the only legal one organization representing workers, had long been neglecting their duties to enforce labor laws and protect workers' rights, which subsequently triggered labor activists' attempts to form an independent trade unions that would not be subordinated to the ACFTU in the early 1990s (C. K. Chan, 2012). According to Chan (2012), the attempts of establishing trade unions eventually failed because of government ban, therefore labor activists try a flexible and realistic way to provide assistance and support: organizing labor NGOs.

Informal labor NGOs play an important role in organizing workers (Bieler & Lee, 2017b). According to Bieler & Lee (2017b), it's not easy for informal labor NGOs to survive in China, because 1982 constitution remove the right to strike and independent trade unions are not permitted. There are three basic strategies for labor NGOs:

1) to collaborate with organizations with a clear legal status (e.g. Communist Youth League, or academic institutions)
2) register as a company (e.g. self-employed person or limited company)
3) not to register at all

This comparative analysis has also founded that informal labor NGOs in cheap labor electronics sector mainly focus on getting workers individual and collective rights, while in high-value added sector the focus turns to organizing recreational activities. In This research will concentrate on the former type of labor NGOs, whose service subjects are mainly less advantaged people, usually migrant workers from rural area (Wong, 2011).

3.1.2 Common activities

TABLE 1 concludes common activities of labor NGOs, which can be categorized into 8 types: legal assistance and consultancy, rights protection, training and education, community services, networking, surveys & investigate, promotion and organizing strike.

A typical example is in Pearl River Delta (where low value-added industry locates) many labor organizations work on providing workers with legal consultancy (C. K. Chan & Hui, 2017).

Besides from legal consultancy, labor NGOs also provide training of collective bargaining (Bieler & Lee, 2017b).

Another research of Migrant Worker NGOs (Gransow & Zhu, 2016) concludes their activities as: "rights protection, legal consultancy, training on collective bargaining, visits to migrant worker accident victims in hospitals, visits to factories to distribute informational materials, training on work safety, workers' culture, community services (such as libraries or after-school activities for migrant children), networking among workers, establishing a database on migrant worker organizations, industrial surveys, activities that target a broader audience (such as signing petitions) and also targeting the media.".

A study on migrant labor rights shows that labor NGOs' service includes: legal assistance, paper service, legal consultation, training, hospital visit, recreational activities (He & Huang, 2015).

Chan (2012) describes 2 approaches of community-based labor NGOs: a) Community intervention methods: establishing Workers' services center, increasing their contact with workers, and conducting social survey and policy advocacy; b) Enterprise intervention approach: conducting outside-factory investigation, in-factory social audit and in-factory training. (C. K. Chan, 2012).

According to Chan, legal consultation is always an important component of a NGOs' work.

Some labor NGOs even managed to organize strike despite the ban. For example the sanitation workers' strike in the University Town Campus of SYSU in Guangzhou, August 2014. A labor NGO played a major role in organizing workers, while receiving significant public support by university students. (Xu & Schmalz, 2017).

TABLE 1 Common Activities of Labor NGOs

Type of activity	Activities	Reference
Legal assistance and consultancy	Counseling	Chan & Hui, 2017
	Lawsuit paper handling	Bieler & Lee, 2017b
		Gransow & Zhu, 2016
		He & Huang, 2015
		Chan, 2012
Rights protection	N/A	Gransow & Zhu, 2016
Training and education	Collective bargaining	Bieler & Lee, 2017b
	Work safety	Gransow & Zhu, 2016
	Adapt to urban life	
		He & Huang, 2015
		Chan, 2012
Community services	Libraries	Gransow & Zhu, 2016
	Child care	
	Hospital visit	He & Huang, 2015
	Organize activities	Chan, 2012
Networking	With workers	Gransow & Zhu, 2016
	With other organizations	
Surveys & investigate	Industrial surveys	Gransow & Zhu, 2016
	Social surveys	
	Investigation	Chan, 2012
	Audit	
Promotion	Distribute informational materials	Gransow & Zhu, 2016
	Signing petitions	
	Targeting the media	Chan, 2012
Organizing strike	N/A	Xu & Schmalz, 2017

3.1.3 Literature gap

"Labor NGOs"has been an emerging research topic in the last decade (C. K. Chan, 2012). However, none of these research is directly related to information system (Search keyword "TS=("labo$r NGO*")" in Web of Science database). Furthermore, only 3 researches of NGOs is related to information system (Search keyword "TS=("NGO*")" in Web of Science database). Their topics are advocating NGOs learning from information (Madon, 1999), examining infor-

mation management (Halpin, Khan, & Reale, 2013) and analysis of online disclosure (del Mar Glvez-Rodrguez, Caba-Perez, & Lpez-Godoy, 2014).

3.2 WeChat and WeChat Mini Program

3.2.1 WeChat

WeChat (*Weixin* in Chinese) is a mobile app launched by Tencent in 2011, now it has reached more than 938 million monthly active user accounts as of the first quarter of 2017 (Tencent, 2017b). According to the 39th Statistical Report on Internet Development in China, among 731 million Internet users, 79.6% users' the most frequently used app is WeChat (China Internet Network Information Center, 2017). WeChat is not only a mobile instant message application, moreover, it has been the most widely used social networking service in China since 2013 (Gao & Zhang, 2013). Some of its important features are:

Moments: allow users to publish text, images or share links of article to their WeChat contacts and to comments and like other's posts. It is comparable to Facebook timeline feature. According to the 39th Statistical Report on Internet Development in China, it has been the most adopted social media in China, with the user adoption rate of 84.3% (China Internet Network Information Center, 2017).

Official Account: Individuals or governmental organizations can acquire such accounts for free (for company, register fee is 300 yuan per year). Users can subscribe to a certain official account to receive its pushed messages (Tencent, 2017c). It is used to disseminate information and for internal communications. Individuals can read messages and communicate with others via these official accounts (Li, Han, Guo, & Sun, 2016).

Mini Program: WeChat Mini Program is a new feature of WeChat. Its framework allows developers quickly develop a new Mini Program. Mini Programs can be easily accessed and disseminated in WeChat. Like WeChat Official Account, it can be deployed by individuals and organization (Tencent, 2017d). It was released in January 2017, and it has reached a penetration rate of around 20% in April (China Tech Insights, 2017). Mini program can be attached to WeChat Official Account, or included in pushed messages of WeChat Official Account.

3.2.2 Technology introduction of WeChat Mini Program

There is no WeChat Mini Program related literature yet, therefore I mainly use webpages as the reference in this sub-section.

1) **User perspective** (GRAZIANI, 2017)

WeChat Mini Programs are "sub-applications" within the WeChat ecosystem. They enable developers to provide advanced features to users such as e-commerce, task management, coupons and etc. via WeChat. User can only access WeChat Mini Program inside WeChat, from Mini Program search, Subscription Account (A type of Official Account) article, chatting messages, or scanning QRcode using camera, but it can't be posted on WeChat Moments yet.

For Chinese users, to get a WeChat Mini Programs is as easy as (perhaps easier, since there is a size limit of Mini Programs, downloading time is shortened) to download application from regular APP stores. Moreover, if users only want to use the basic function from a certain service provider, the Mini Program version will be preferred because it takes less memory space than regular APP.

2) **Developer perspective** (Tencent, 2017a)

The framework of Mini Program has provided its own view layer description languages, WXML and WXSS, as well as a logical layer framework based on JavaScript. Tencent also provides a special development tools for developers. The WXML and WXSS language are similar to HTML and CSS language respectively, which means that web developers can easily learn and develop Mini Programs. It has also provided a data transfer and event system between the view layer and the logical layer which makes it easier for developers to focus on data and logic.

However the components of this framework are different in HTML standard, which causes extra work to migrate a regular web app to Mini Program. For example, for safety reasons, a strict policy was set concerning data security, which means data transmission is only allowed with white-listed domains in HTTPS connection, and the release of Mini Programs requires review from WeChat Mini Programs team of Tencent, and if the Mini Program concerns policy or regulation, a second review from government Internet regulation office needs to be conducted.

3.3 Labor NGOs and WeChat

Study has shown that Chinese NGOs emerged in the digital age, as they naturally use social media as the primary means of engagement (Zhou & Pan, 2016). The purposes of using digital media are: keeping in touch with peer organizations; internal communication with staff; publicizing the organization and its events; fundraising; and keeping target audiences informed of the organization's activities (Sommerfeldt & Xu, 2017).

A study of discursive construction of identity through interaction in WeChat list the typology of communication within a WeChat group chat of a Chinese NGO: besides from community sharing (related or not related to the

projects of NGO), group members will also ask for help (Ruelle & Peverelli, 2017). According to its Appendix 1 - Category 3, some of the questions are legal questions.

Labor NGOs have been trying to utilize social media as a tool to reach workers and post articles. Since 2011, labor NGOs started to adopt Weibo (a Chinese social media, similar to Twitter) as an advocacy approach, later in 2013 when Weibo lost its popularity, WeChat became its substitution (J. Qiu, 2016).

WeChat (as well as QQ, another instance message centered application created by Tencent) plays an important part in the 2013 Yantian dock strike. The dockers were not allowed to gather often, but they found opportunities to be together when they were off work and exchanged ideas by using QQ and WeChat, through which some important conversations could be undertaken to determine the time and actions of the first stoppage (Cao & Meng, 2017).

Notably, a study of Chinese NGOs' usage of social media shows that although NGOs value digital media, evaluation of digital media usage are usually overlooked due to potential cultural resistance, differing expectations, limited account access (registration hinders evaluation), and lack of internal capacity (Sommerfeldt & Xu, 2017).

Although there hasn't been any research studying how WeChat-related products are applied in labor NGOs' activities yet, plenty of labor NGOs are already using WeChat Official Accounts to publish articles for information distribution and promotion purpose. However there is no WeChat Mini Programs-related practice yet, from my personal experience.

3.4 Summary

In conclusion, the widely use of Internet and high penetration rate of WeChat create the opportunity for labor NGOs to take the advantages from this digital age. The context of the research is that in China plenty of labor NGOs are providing legal assistance and consultancy, as well as other services for underprivileged workers. In the meantime, labor NGOs are also utilizing social media to assist their work, from QQ at the beginning, to WeChat nowadays, because of the high popularity of WeChat. In the beginning of 2017, WeChat Mini Program, a "sub-application" of WeChat, was released. Creating a law-searching WeChat Mini Program may have great potential on helping labor NGOs providing legal services, educating workers, networking and promoting themselves.

4   OBJECTIVES OF THE SOLUTION

From the literature review of the research context, we can tell that legal assistance and consultancy is one of the common services that labor NGOs provide to workers. Meanwhile, training, education, networking, and promotion are also among labor NGOs' activities.

The intention of design and develop a WeChat Mini Program that can search for laws is to serve multiple purposes. Here are the objectives.

1) By using this Mini Program to search, workers will know whether or which rights of theirs have been violated. It serves the education purpose. Besides, members of the labor NGOs can use it during legal consultancy, especially when they don't have access to a computer or professional legal database.
2) By sharing this Mini Program to other WeChat contacts or into a group chat so that other WeChat users can use it, workers helps labor NGOs with networking.
3) If other workers further realize the need to contact the labor NGOs, this Mini Program also contributes to the promotion of the labor NGOs.

This WeChat Mini Program should fulfill certain requirements. First, it should be programed as the official document required, using the special framework of WeChat Mini Program, so that it can function normally, showing required text of laws within tolerable time and without any bugs. Second, it should contain clear message when being reposted so that other WeChat user will know what this Mini Program do and run it when needed. Third, it should contain certain contact information about the labor NGOs that can provide further legal assistance and consultancy. Finally, the design of this Mini Program should be as easy to use as possible.

5 THEORETICAL BACKGROUND

This WeChat Mini Program is positioned as:

1) A mobile tool for looking up articles in labor related laws by key-words, which can be used by workers or members of labor NGOs.
2) A social media promotion approach, since Mini Program can be easily attached to WeChat Official Accounts or its pushed messages, and can be forwarded to others WeChat contacts or into group chat, which may leads to further contact with the labor NGOs.

Based on the purpose 1) of this WeChat Mini Program, the quality of it should be measured. Based on the purpose 2) of this WeChat Mini Program, users' intention of reuse and recommendation should be measured. Further-more, I hope this tool can eventually lead users to using law to fight for their rights, or at least knowing that they have this ability to do it. Above all, whether users fully understand all the functions of this tool needs to be measured. Therefore, theories related to these purposes will be discussed. The articles for this review are collected and searched from International e-materials section of JYKDOK-Finna (https://jyu.finna.fi/Primo/Home) with "Full text available" and "Peer reviewed" filter on. Articles are selected by me based on their rele-vance to the topic.

5.1 IS artifact

Although information technology (IT) artifact plays a central role in design sci-ence, Lee et al. (2015) argue that IT artifact is just a part of an IS (Lee, Thomas, & Baskerville, 2015). IS artifact consists of 3 subsystems: (1) a technology artifact, e.g. hardware, software or even books. (2) an information artifact, e.g. a piece of massage. (3) a social artifact, e.g. an utterance in a conversation, a decision made in a committee meeting, a purchase made in a retail transaction or a chari-

table act. IS artifact is formed when these three artifacts are brought together and interact.

Furthermore, IS artifacts can be considered as a system. Base on prior researches on IS artifacts, Prat et al. (2014) conclude that "IS artifacts are systems, and viewing them as such provides a holistic view of their evaluation, organizing the evaluation criteria along the fundamental dimensions of systems." (Prat, Comyn-Wattiau, & Akoka, 2014)

Viewing this WeChat Mini Program as an IS artifact and system makes sense and the theories of IS success factors and evaluation methods can be used upon it.

5.2 DeLone and McLean's IS success model

The measurement of the success of an information system can be conducted from various perspectives. In 1992 DeLone and McLean purposed a more integrated view of the concept of IS success based on prior literature (DeLone & McLean, 1992). Their IS success model consists of 6 variables: system quality, information quality, satisfaction, use, individual impact, and organizational impact. The model suggests that system and information quality contributes to user satisfaction and usage of the system, which further impact on individuals, e.g. time efficiency, productivity, and finally helps the organization achieve better performance. Later in 2002, the model is renewed to adapt to the e-commerce environment (DeLone & McLean, 2002). A new variable, service quality, is added into the model as a result of argument from (Pitt, Watson, & Kavan, 1995), and individual and organizational impacts are combined into a single variable, "net benefits". The authors also suggest that intention of use (the attitude) can be a worthwhile alternative measure to use (the behavior). Respecification and extension are added to DeLone and McLean's IS success model (1992), in which the definitions of the concepts in are also given (Seddon, 1997). Combining these researches, the definitions of useful concepts for this research are listed below:

1) **System Quality**: whether there are bugs or not. In the system, the consistency of the user interface, ease of use, quality of documentation, and sometimes, quality and maintainability of the program code (Seddon, 1997).
2) **Information Quality**: the relevance, timeliness, and accuracy of information generated by an information system (Seddon, 1997).
3) **Service Quality**: In what extent the users' expectation is fulfill, usually measured with SERVQUAL measurement instrument (Pitt et al., 1995). However there's a debate on whether this instrument is actually reliable and valid (DeLone & McLean, 2002).
4) **Intention To Use**: the attitude towards using the information system (DeLone & McLean, 2002).

5) **User Satisfaction**: a subjective evaluation of the various consequences (quality, perceived usefulness, net benefits), evaluated on a pleasant-unpleasant continuum (Seddon, 1997).

5.3   Reuse and Recommendation Intention

A great deal of researches have study the intention of reuse and intention to recommendation, and there are two common perspectives:

1) In the field of IS, reuse and recommendation of an IS artifact are usually considered as post-adoption behaviors. Expectancy Confirmation Theory (or model, referred as ECT or ECM) is commonly used to predict the post-adoption behaviors (Bhattacherjee, 2001; Budiardjo, Pamenan, Hidayanto, & Cofriyanti, 2017; Chea & Luo, 2008; B. Kim, Kang, & Jo, 2014).
2) In the field of marketing, reuse (usually be replaced by repurchase) and recommendation of a service are usually considered as the customer loyalty (Y. Kim, Kireyeva, & Youn, 2014; Lin, 2013; Mittal & Gera, 2012; Jin & Su, 2009).

5.3.1   As post-adoption behaviors

Expectancy confirmation theory explains the process of customers reaching repurchase intentions as: at first customer holds an initial expectation of the product or service, then he/she uses the product or service and forms perceptions about the performance of the product or service. Comparison of the expectation and actual performance are made so that customer can determine the extent to which his/her expectation is confirmed. Finally, the confirmation level affects the intention of repurchase/reuse, where satisfied customer will likely to repurchase while unsatisfied customer won't (Oliver, 1980).

Based on this theory, a post-acceptance model of IS continuance is purposed (Bhattacherjee, 2001), in which intention of IS continuance replace the repurchase/reuse concept in ECT. The test of model shows that perceived usefulness and satisfaction have direct positive effect on IS continuance intention.

Another study about post-adoption behaviors includes not only cognition but also emotion factors, in which post-adoption behaviors refer to continuance intention, recommendation and complaint (Chea & Luo, 2008). The tested model shows that satisfaction and negative affect have statistically significant relationship with post-adoption behaviors: high satisfaction leads to intention of continuance and recommendation; low satisfaction and negative affect leads to complaint.

Constraint-based mechanisms are added in to a post-adoption behaviors study, in which the authors argue that switching costs should be taken into con-

sideration when trying to explain the post-adoption behaviors (B. Kim et al., 2014). In this study post-adoption behaviors refer to continuance intention and recommendation intention. The tested model shows that either user satisfaction or perceived switching costs contributes to the continuance intention and recommendation intention.

The impact of knowledge management system quality on usage continuity and recommendation intention are studied using ECT and DeLone and McLean's IS success model (Budiardjo et al., 2017). In this study, trust, defined as a specific belief in a competency, is also considered as a dependent variable. The tested model shows that in terms of knowledge management systems, continuance intention is affected by perceived usefulness, satisfaction and trust; recommendation intention is affected by satisfaction and notably, continuance intention.

5.3.2   As loyalty

In a study of the thresholds of recommendation and repurchase intentions, these two intentions are claimed to be the two most important dimensions of customer loyalty, based on prior research (Jin & Su, 2009). Furthermore, the authors argue that because recommendation can be done by simply making compliment while repurchase requires spending money, the threshold triggering recommendation will be lower than the one triggering repurchase.

A study of relationship between service quality dimensions and behavioral intentions concludes that in a number of studies concerning service quality and its consequences based on composite models, attitudinal dimension (measured as willingness of recommendation), and behavioral dimension (measured as repurchase intentions) are the two dimension of customer loyalty construct (Mittal & Gera, 2012). The final modified model in their research shows that recommendation intention is affected by satisfaction and service quality, and repurchase intentions is affected by satisfaction and perceived values.

In a study of shopping motivations on the internet, the author selects recommendation intention, repurchase intention and membership system as the constructs of customer loyalty (Lin, 2013).

Customer awareness, defined as tendency that consumers take either favorable or unfavorable actions on the product, is suggested to have positive influence upon purchase intention and recommendation, according to a research on effect of SNS characteristics (Y. Kim et al., 2014).

From the comparison of these two perspectives, we can tell that from both perspective, user satisfaction affects both recommendation intention and continuance (reuse / repurchase) intention, and the quality characteristic (system, information or service) and perceived usefulness (value) may influence the continuance intention. Continuance intention may also contribute to recommendation intention.

5.4 Empowerment

Empowerment is "a construct that links individual strengths and competencies, natural helping systems, and proactive behaviors to matters of social policy and social change" (Zimmerman & Rappaport, 1988). In literature empowerment is usually studied from two perspectives: social-structural perspective and psychological perspective (Tan, Zhang, Heng, & Ge, 2016). The psychological perspective is the expression of empowerment at the level of individual persons (Zimmerman & Rappaport, 1988), which usually study the use of techniques that could motivate individuals to feel in control of their own fate (Tan et al., 2016).

In information systems field, studies have shown that empowerment of users have benefits such as increasing use motivation (Kappelman & Guynes, 1995) and promoting information systems infusion (H. Kim & Gupta, 2014; Maas, Fenema, & Soeters, 2014).

Spreitzer's (1995) psychological empowerment construct with four cognitions are widely used by literature (Hasani & Sheikhesmaeili, 2016; H. Kim & Gupta, 2014; Kuo, Ho, Lin, & Lai, 2010; Maas et al., 2014). The cognitions are:

1) Competence is the individual's belief in his or her abilities to perform activities.
2) Meaning is how the value of a work goal or purpose, align with an individual's own ideals or standards.
3) Self-determination is an individual's opinion about the choice to lead the set of actions.
4) Impact is the individual's belief in his or her influence on the embedded social system.

Since one of the expecting outcomes of using this law-searching WeChat Mini Program is that workers feel they can use this to fight for their rights, therefore empowerment is also a construct to be measured in the evaluation step.

5.5 Perceived Affordance

Although the functions of this WeChat Mini Program are quite simple, whether users fully understand them needs to be confirmed. Affordance, defined by Gibson (1986) as "possibilities of action", is the concept needs to be measured. However affordances exist independently from users (Gaver, 1991). The "perceived affordances" are what actually affects individual behavior, rather than the affordance itself (Mesgari & Faraj, 2012). In my case, in order to make sure users surely understand the usage of this WeChat Mini Program, perceived affordances will be measured. More specifically, the questions will be asking how

well users perceive access affordance, search affordance, sharing affordance and contact with relevant parties affordance.

6   DESIGN AND DEVELOPMENT

The design and development process started in September, 2017. I applied agile methods in the design and development process, in which 2 iteration of development were planned.

With the help from Legal Aid Center of Renmin University of China, 35 laws and legal articles were chosen as the basic document for the search function. They were divided into 5 categories: labor-related (e.g. Labor Law of the People's Republic of China (2009 Amendment)), civil-related (e.g. General Provisions of the Civil Law of the People's Republic of China), marriage-related (e.g. Marriage Law of the People's Republic of China (2001 Amendment)) process-related (e.g. The Civil Procedure Law of the People's Republic of China (2017 Revision)) traffic-related (e.g. Road Traffic Safety Law of the People's Republic of China (2011 Amendment)). All text files were retrieved from www.pkulaw.cn, which is a hi-tech legal information company established by the prestigious Peking University on the basis of its Legal Information Center and maintains a Chinese laws and regulations databases (Chinalawinfo Co., 2018).

Development of the 1st iteration was finished in the early December, 2017. Two week later this WeChat Mini Program passed the review, with certificate document provided by Renmin University of China, without which it would not passed the review because the Chinese network regulation restricts unqualified institutions to post sensitive information (e.g. laws and policies) online. The reviewed version of this WeChat Mini Program was released in mid-December.

Suggestion of this Mini Program was being collected afterwards. In January, 2018, the 2nd iteration started by analyzing the suggestion of improvement given by the member of Legal Aid Center, followed by renewing the requirements, programming, submitting, reviewing and releasing. The second version of this WeChat Mini Program passed review and was released on March 17, 2018.

6.1 Main Functions

6.1.1 Law searching

The searching function is easy and intuitive. First select a category in the main page. Then type in the keywords, separated by space. The relevant articles of the laws in that category will be shown immediately. Users can tap on the articles to view the entire law. FIGURE 2 shows an example where a user wants to know the laws about the payment for working in national holiday, he/she should select labor-related category, type in "holiday" and "payment" in the input box. Related articles will be shown below. By tapping the first blue box of the results, he/she can view the entire Labor Law of the People's Republic of China. Reason to do so is there may be relevant law articles next or previous to it. This function serves objective 1).
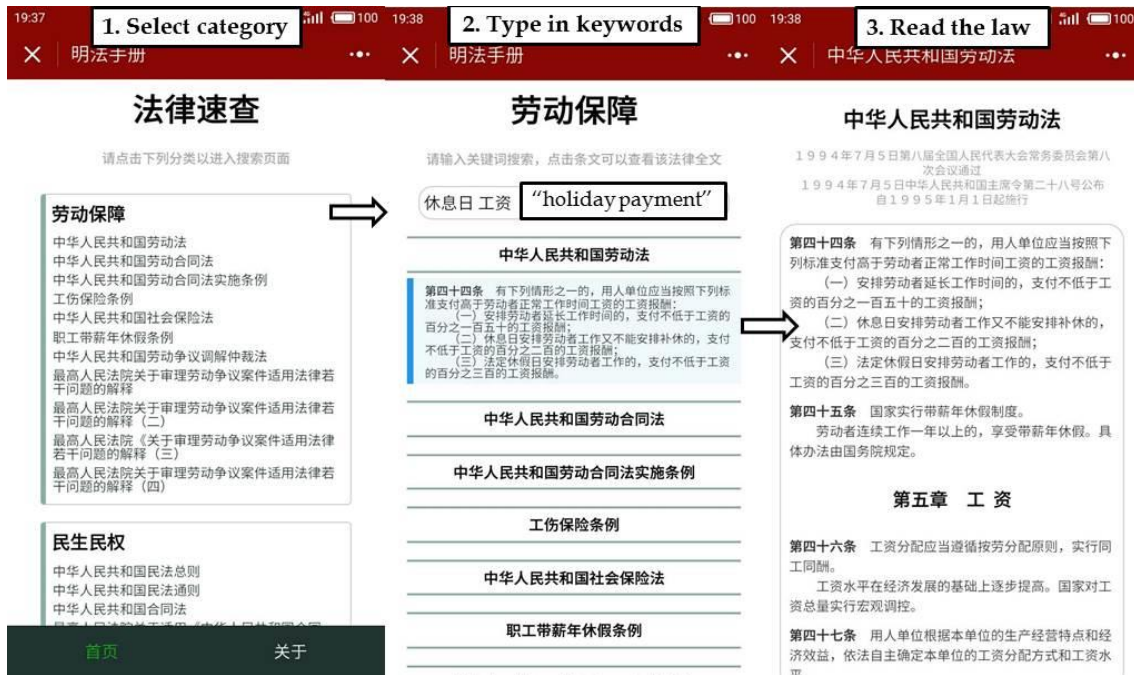
FIGURE 2 Search function example

6.1.2 Sharing via WeChat

There are 3 sharing mode for this WeChat Mini Program: share index page, share search keyword, and share law article. Receiver will see picture of different pages, determined by the shared pages. The examples are shown in FIGURE 3, the order of which corresponds with the examples from FIGURE 2.

Sharing index page leads receiver to index page, where receiver can start a new search.

Sharing search keyword leads receiver to the search page where the search keywords remain the same as what the sharer has typed in. Therefore same results will be shown to the receiver.

Sharing law article leads receiver to the law article page, where the receiver and see the same article that the sender has searched and selected.

The last two share mode can be used in situation when a labor NGO member tries to inform workers about their rights, by sharing the exact law articles related to a specific problem. Meanwhile, when received this Mini Program from the last two share mode, receiver can use the "home" button to return to the index page of this Mini Program and start new searches.

This function serves objective 2).

FIGURE 3 Three sharing mode example

6.1.3 Contact information of NGOs

Due to the limitation of WeChat Mini Program, I can't put links or implement other forms of "one-click contact" function into this Mini Program. However, WeChat Mini Program can be attached to maximum 500 WeChat Official Accounts, and users can view those Official Accounts in the information page of this WeChat Mini Program, which can sever as a contact page. Labor NGOs nowadays usually have their own WeChat Official Accounts. By attaching this WeChat Mini Program, the users of this Mini Program can see their information, and furthermore, contact them thorough this information page. More information can be seen in the "About" tab, where contains instruction of how to get contact information of related labor NGOs, shown in FIGURE 4. This function serves objective 2).
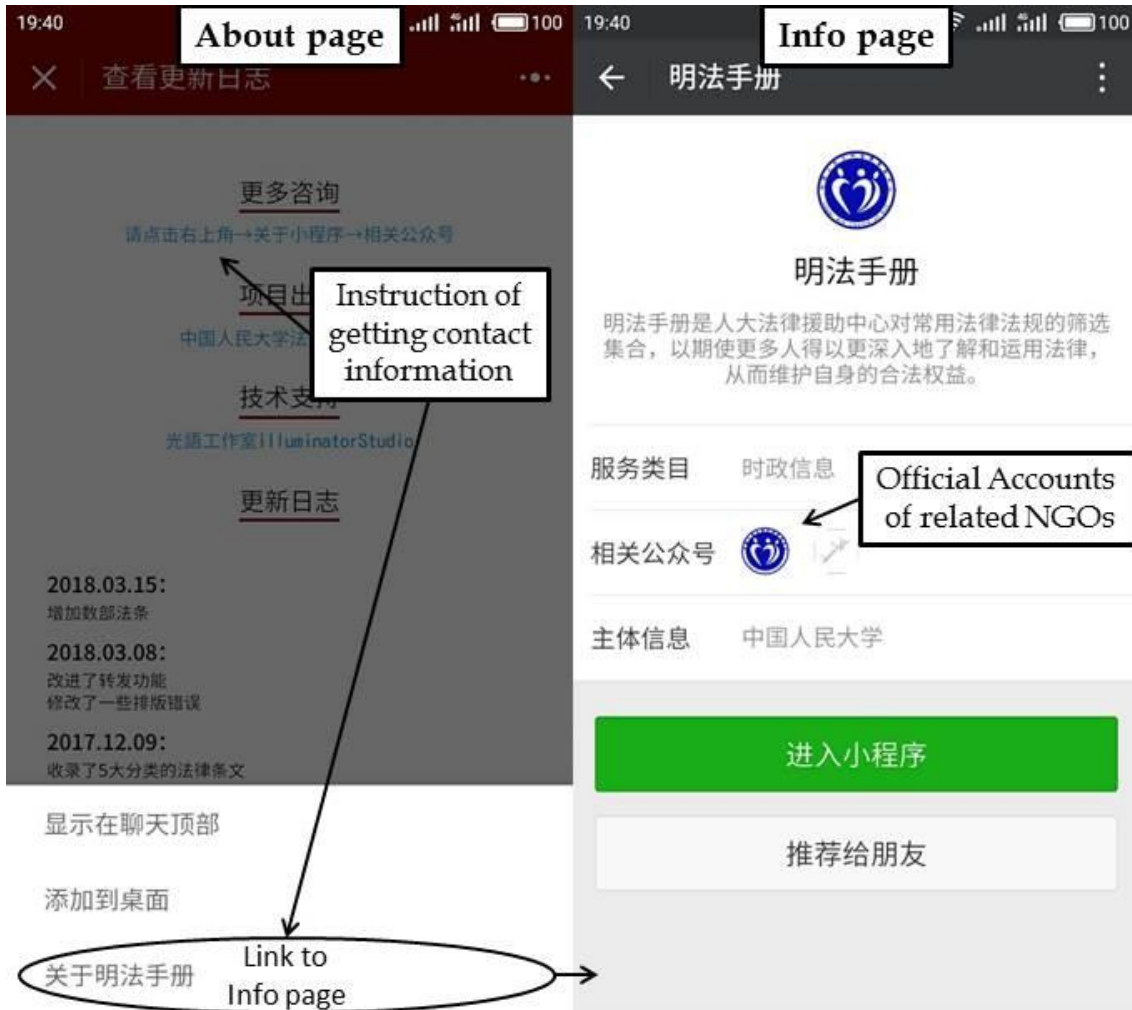
FIGURE 4 Getting contact information of related NGOs

6.2 System Development

6.2.1 Mini Program development

The development process is similar to a web development project, where data are handled in logical layer (JavaScript) and shown in view layer (WXML and WXSS).

The first and most important decision is to embed the laws data into this Mini Program. Reasons are 1) WeChat only allows data transmission in HTTPS connection. Besides, the white-listed domains must acquire ICP licenses from Ministry of Industry and Information Technology. The project team doesn't have such resources. 2) Search function runs faster without data transmission and response time is shortened. The texts of all the laws and legal articles were processed from plain text file to JSON format file, so that logical layer can use

them without extra processing. Additional attributes were added into the JSON file, such as title, info, and label, for better visual display in view layer.

Logical layer listens and handles user actions, then processes data for view layer. An example is shown in FIGURE 5.
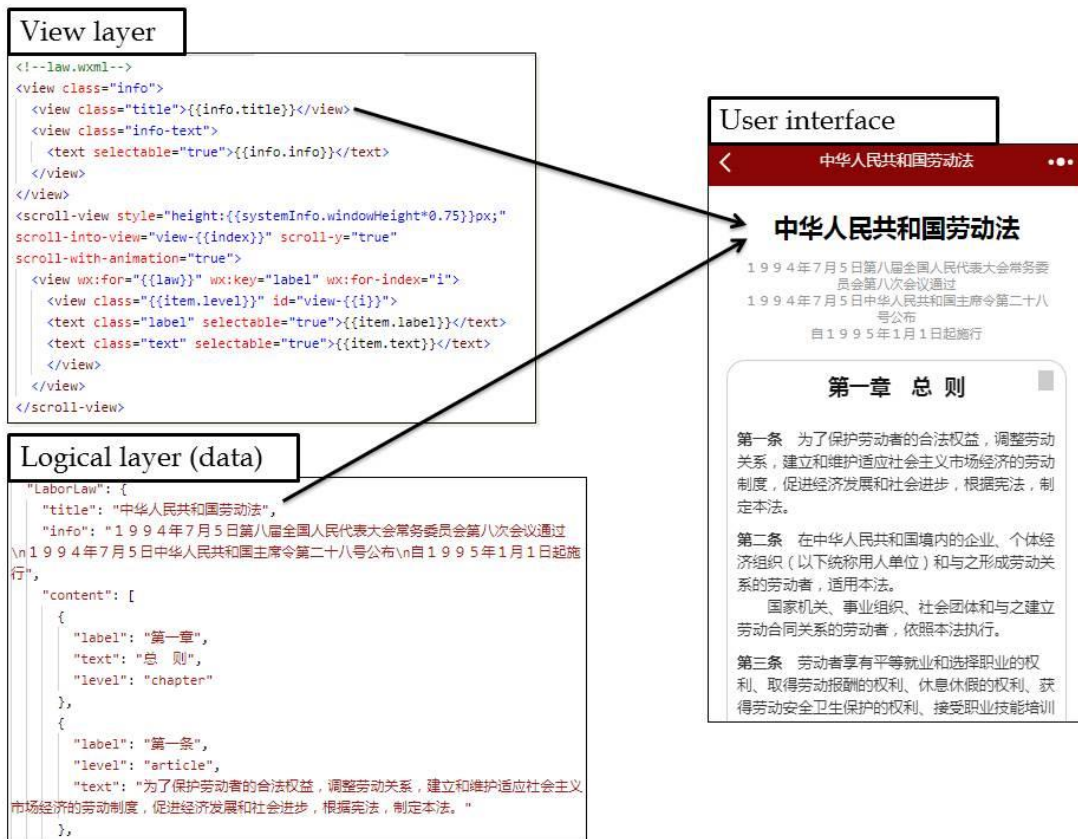
FIGURE 5 View layer and logical layer

6.2.2 File utility, directory and relationship

The source code files are arranged into a certain directory structure that is highly similar to a web application, shown in FIGURE 6. Each page has its own folder under "pages" folder, which should contain 4 required file (WXML WXSS, JS, JSON) with the same file name, otherwise the WeChat Mini Program cannot be compiled normally. This WeChat Mini Program contains 4 pages, thus there are 4 page folders. Besides there are an "util" folder containing some commonly use files and some global setting file ("app.json", "app.js" and "project.config.json").
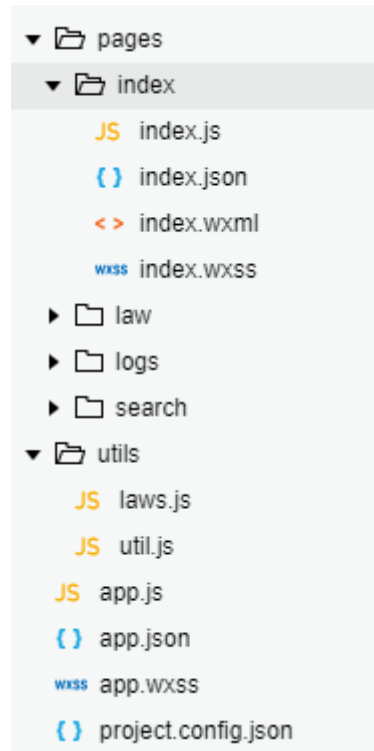
FIGURE 6 File directory structure

A common JSON file records configuration for the WeChat Mini Program, shown in FIGURE 7. This example file "app.json" shows parts of the configuration of this WeChat Mini Program, including the page path lists and some user interface settings.

FIGURE 7 Example of a JSON file

Normally WXML file and the WXSS control the appearance of the view layer. In WXML file there are links to logical layer, e.g data link "{{lawsInfo}}" and function link "goToSearchPage", which will be demonstrated later. They function like HTML and CSS, but with limited features. An example of these file is given in FIGURE 8.

```
index.wxml    ×                                          index.wxss    ×
1    <!--index.wxml-->                                1    /**index.wxss**/
2    <view class="container">                         2    .header {
3      <view class="header">                          3      display: flex;
4        <view class="title">法律速查</view>           4      flex-direction: column;
5        <view class="text">请点击下列分类以进入搜索页面</view>   5      align-items: center;
6      </view>                                         6      margin-bottom: .5em;
7      <view class="laws">                             7    }
8        <view class="cat" wx:for="{{lawsInfo}}" wx:for-index="i"   8
   wx:for-item="info" bindtap="goToSearchPage" data-cat="{{i}}">    9    .header .title {
9          <view class="cat-title">{{info.title}}</view>       10      font-weight: 700;
10         <view class="cat-law" wx:for="{{info.laws}}" wx:for-item="law">   11      font-size: 1.9em;
11           <text>{{law}}</text>                     12      margin-bottom: .5em;
12         </view>                                    13    }
13       </view>                                      14
14     </view>                                        15    .header .text {
15   </view>
```

FIGURE 8 Example of WXML and WXSS file

In the meantime, JavaScript file defines the processes for logical layer, and prepares data for view layer. An example file is shown in FIGURE 9, which defines objects and callback functions for the index page. JavaScript files in "utils" folder provide common functions for other pages to call. "laws.js" contains all the JSON format law data, and provides functions that return data like law title, information and law articles that match search keywords. "util.js" provides a function for extracting the option parameters in a url path. "app.js" in the root directory defines global data and some callback functions.

```
index.js        ×
1    //index.js
2    //获取应用实例
3    var app = getApp()
4    Page({
5      law_JS: require(app.globalData.lawsPath),
6      data: {
7        lawsInfo: null
8      },
9      goToSearchPage: function(e){
10       var cat = e.currentTarget.dataset.cat
11       // console.log(cat)
12       wx.navigateTo({
13         url: '../search/search?cat=' + cat
14       })
15     },
16     onLoad: function () {
17       //console.log('onLoad')
18       this.setData({
19         lawsInfo: this.law_JS.getLawsInfo()
20       })
```

FIGURE 9 Example of a JavaScript file

When a user open index page, the "onload" callback function will automatically run, which retrieves the "lawsInfo" data from "laws.js". Through the data-blinding mechanism of WeChat Mini Program framework, "lawsInfo" data will be sent to view layer (FIGURE 8 WXML line 8 {{lawsInfo}}) and rendered into 5 lists of laws. When user click on one of the list, function link "goToSearchPage" (FIGURE 8 WXML line 8 bindtap="goToSearchPage") will be called, and user will be navigated to search page with an option parameter "cat" in the url (FIGURE 9 line 13).

FIGURE 10 shows the relationship between the pages, files and the 3 main functions mentioned in Section 6.1. The two-way arrows in the figure means that users can navigate forward or backward to the same page with same search parameters.
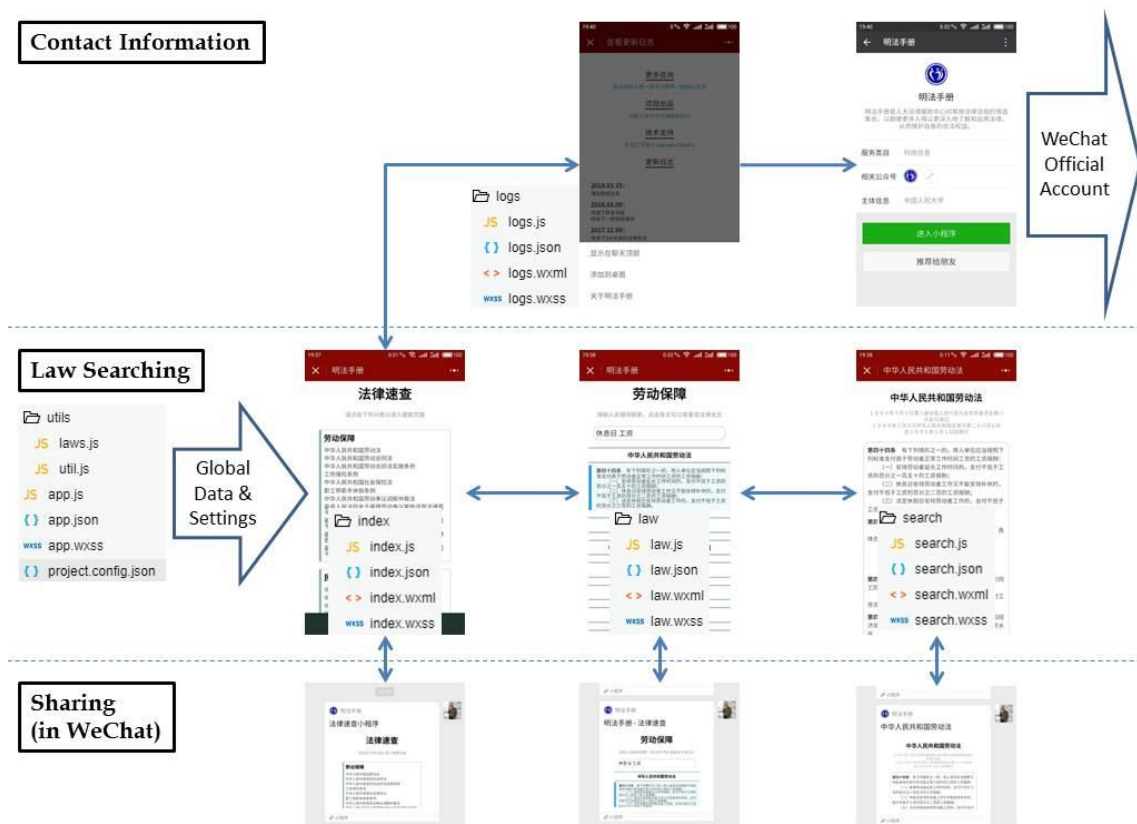
FIGURE 10 Relationship of page and functions

6.2.3 Deployment and Release

Three roles are involved in the deployment and release of WeChat Mini Program: the developer, Tencent, and the users. When finished coding and testing, the developer (in this case, me) uploads the codes to Tencent's server, and applied for the review. Tencent's WeChat Mini Programs team conducts the review on the codes (in this case, Internet regulation office of Beijing conducted a second review on the contents because of government regulation). After pass-

ing the review, developer can upload the codes to Tencent's Mini Program server and thereby release this Mini Program. Users can access it via Mini Program search, Subscription Account article, chatting messages or QRcode. Tencent will record the usage data of this Mini Program automatically, which can be accessed by the developer later. This process is shown in FIGURE 11.
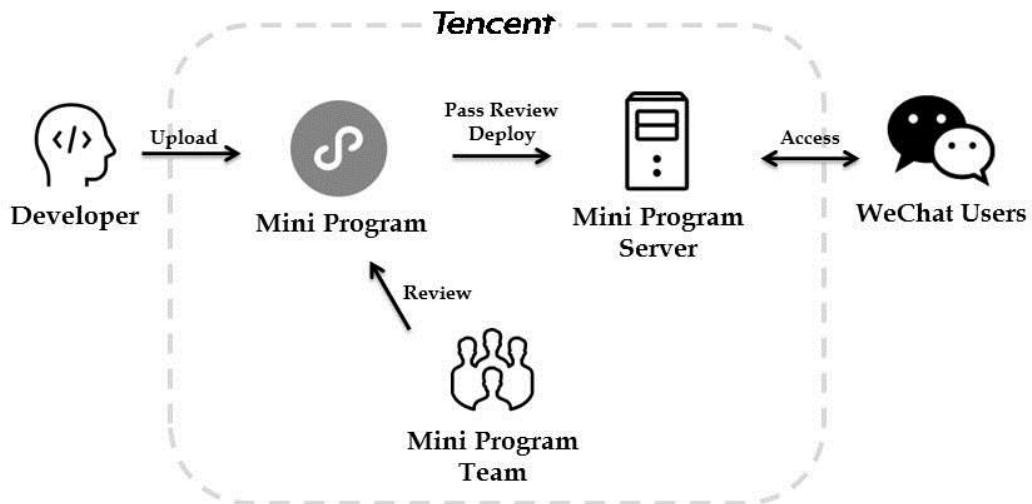
FIGURE 11 Deployment and release process

7 DEMONSTRATION

Legal Aid Center of Renmin University of China (RUC) is a labor NGO that registered under Renmin University of China. Its members are mainly the students from RUC School of Laws, who aims to provide legal assistance & consultancy for the underprivileged citizens in China. Since RUC Legal Aid Center provided the documents for registration of this WeChat Mini Program, Tencent automatically attached this WeChat Mini Program to the WeChat Official Account of RUC Legal Aid Center. The following data were retrieved from Tencent on April 23, 2018, which was one week after the evaluation questionnaire was released.

7.1 Promotion

After the release of this WeChat Mini Program, Legal Aid Center prepared a promotion article introducing its functions and how to access it, and then published the article in its WeChat Official Account, on April 5, 2018. Readers of this article can access this WeChat Mini Program by clicking the links in the article or following the instruction of other access methods. The members of Legal Aid Center and I had been sending this articles to our WeChat contacts and asking them to share it to whoever they thought might need this. By far the promotion article has received 1328 views. The article can be accessed at https://mp.weixin.qq.com/s/ye-nvVZ_BbEDkXi_7hxjrg (in Chinese), inside which there were links to this WeChat Mini Program. Two other labor NGOs helped sharing this articles to workers' chatting group, and their leaders both agreed to attach this WeChat Mini Program to their WeChat Official Account. However until April 24, 2018, they haven't conducted the attachment.

Tencent only collects data of a WeChat Official Account article in a limited time period, which is 1 week after the publishing date of the article. So I can only present the data from April 5, to April 11, 2018, shown in TABLE 2.

TABLE 2 PV and UV of the promotion article

Dates	April 5	April 6	April 7	April 8	April 9	April 10	April 11	Total
Unique visitors	294	793	45	30	25	7	5	**1199**
Page views	330	909	51	33	27	7	7	**1364**
Unique visitors from subscribe page	136	102	25	23	22	3	3	**314**
Page views from subscribe page	150	115	26	26	24	3	3	**347**
Unique visitors from Moments	134	652	14	6	2	2	2	**812**
Page views from Moments	143	739	18	6	2	2	2	**912**
Sharing Users	33	65	0	1	0	0	0	**99**

Since this WeChat Mini Program is attached to the WeChat Official Account of RUC Legal Aid Center, the number of its subscribers had also increased by 576, from March 17 to April 21, 2018, shown in FIGURE 12. However there were no data about the source of subscribe. The sudden rise in April 5, 2018 might be the consequence of the promotion of this WeChat Mini Program.

FIGURE 12 Growth of cumulative subscribers

7.2   Usage data

7.2.1   Cumulative users

The second version of this WeChat Mini Program was released on March 17, 2018 and promoted on April 5, 2018. Another promotion was conducted on April 15, 2018, advocating users to participate the survey for evaluation. By April 23, 2018, this WeChat Mini Program had gained 844 users, who had used this WeChat Mini Program at least 1 time. The trend of user number is shown in FIGURE 13.
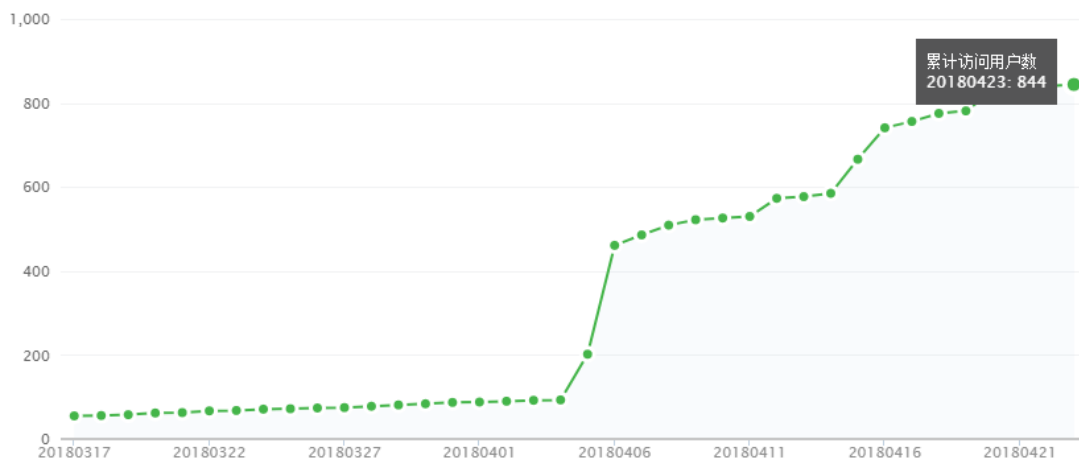
FIGURE 13 Cumulative Users

7.2.2   Daily usage

The number of daily access (open) times peaked on April 6, 2018, the second day of our first promotion, which was 407 times a day. When we promoted the online survey, the number raise rapidly to more than 150 times a day. By now the number had decreased to 10 to 20 times per day.
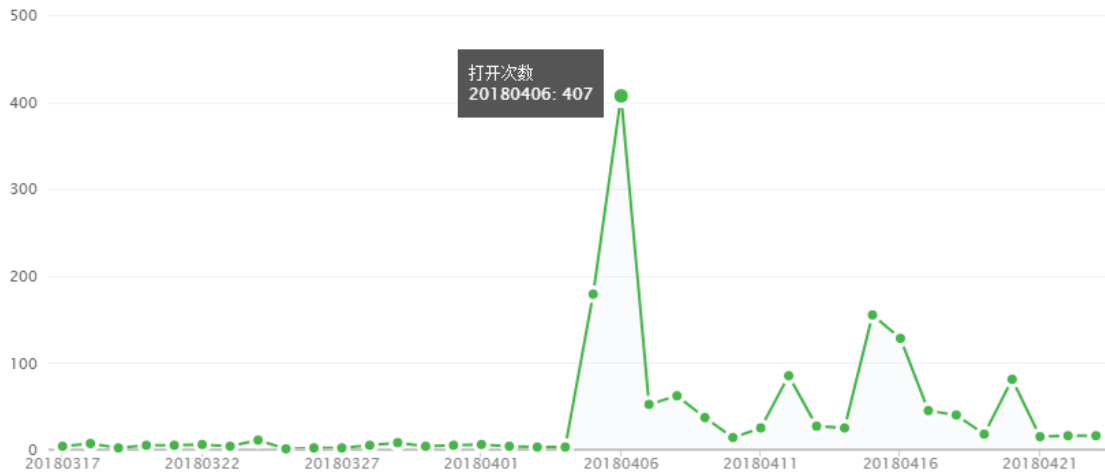
FIGURE 14 Daily access times

7.2.3 Access source

From March 17 to April 23, 2018, this WeChat Mini Program had recorded 1514 times of access. The access sources are shown in TABLE 3.

TABLE 3 Access sources

Source	Access times
WeChat Official Account Article	566
WeChat Official Account Profile Page	252
WeChat Mini Program Taskbar	236
WeChat Chatting	225
Homepage of Operation Systems	69
Wechat Search	66
History List of Used WeChat Mini Program	64
Main Page of WeChat Mini Program	30
Sticky Bar In WeChat Chatting Page	6

7.2.4 Detailed usage data by pages

Tencent provides detailed usage data of WeChat Mini Program, allocated by pages. There are 4 pages in this WeChat Mini Program: index (category) page, search page, law page and logs page (shown in FIGURE 2 and FIGURE 4 respectively). The detailed usage data, from March 17 to April 23, is shown in TABLE 4.

Numbers in "Page View" was the times that a page was shown. The numbers in "Unique Visitor" were the sum of every day's unique visitors, thus the number of total unique visitor was greater than the number of cumulative users. "Average Staying Time" showed the average time (in second) of viewing a page. "Exit Rate" showed the percentage of a page was the last page that a user visited in one open time. "Shared Times" were the times a page had been shared,

and the "Shared Users" showed the numbers of users who had shared a page in this WeChat Mini Program.

TABLE 4 Detailed usage data by pages

Page	Page View	Unique Visitor	Average Staying Time (s)	Exit Rate	Shared Times	Shared Users
Index Page	2561	1011	9.58	25.07%	49	44
Search Page	1149	464	20.37	5.66%	6	4
Law Page	451	184	78.57	22.84%	13	7
Logs	361	246	9.24	21.88%	0	0

8   EVALUATION

Observational evaluation method (Von Alan et al., 2004) was applied in this research. I monitored the use of this WeChat Mini Program and conducted a survey to collect data about users' attitude towards it. Due to the lack of resources, I can't implement a survey in this WeChat Mini Program (data transmission policy is strict in WeChat Mini Program, as mentioned in Section 3.2.2), or recruit a group of survey participants. I created an online survey using an online survey service provider, www.wjx.cn. Since the whole population is hard to be determined, nonprobability sampling was applied. The sampling method was a combination of voluntary sampling and snowball sampling, in other to reach as many users as possible.

8.1   Questionnaire Design

The questionnaire is composed of two parts, user attitudes and personal background (collecting demographic data). The questions in user attitudes part were mostly answered using a five-point Likert scale (strongly disagree, disagree, not sure, agree, strongly agree are represented as 1, 2, 3, 4, 5 respectively), and one optional open-end question. Detailed definitions of the dimensions are described Section 5. The questions and their reference are given in TABLE 5.

TABLE 5 Arranged questions

Constructs	Code	Questions	Adapted from
System quality	SyQ1	This WeChat Mini Program is easy to use	Kao et al., 2016; Budiardjo et al., 2017
	SyQ2	This WeChat Mini Program is stable, rarely down or crashed.	
	SyQ3	This WeChat Mini Program has a good response time and is in the tolerable range.	

Service quality - Expectancy confirmation	SeQ1	My experience with using this WeChat Mini Program was better than what I expected.	Chea & Luo, 2008; Pitt et al., 1995
	SeQ2	The service of this WeChat Mini Program was better than what I expected.	
	SeQ3	Overall, most of my expectations from using this this WeChat Mini Program were confirmed.	
Users satisfaction	US1	This WeChat Mini Program had all expected functions and abilities.	Kao et al., 2016; Budiardjo et al., 2017
	US2	Overall, I am satisfied with this WeChat Mini Program.	
	US3	I am happy with my decision to use this WeChat Mini Program.	
Intention of reuse	UI1	I intend to keep using this WeChat Mini Program rather than stop.	Budiardjo et al., 2017; Chea & Luo, 2008
	UI2	If possible, I will keep using this WeChat Mini Program.	
	UI3	I am planning to keep using this WeChat Mini Program.	
Intention of recommendation	RI1	I intend to share the positive sides of this WeChat Mini Program I am using with others.	Budiardjo et al., 2017; Chea & Luo, 2008; Lin, 2013
	RI2	I plan to recommend this WeChat Mini Program to others.	
	RI3	I intend to get my friends or relatives to use this WeChat Mini Program.	
Empowerment - Competence	EC1	After using this WeChat Mini Program, I think I have the ability to fight for my rights.	H. Kim & Gupta, 2014; Kuo, Ho, Lin, & Lai, 2010
	EC2	After using this WeChat Mini Program, I believe I have the knowledge to help for my rights	
	EC3	I think this WeChat Mini Program improves my capability of defending my rights.	
Perceived affordance	PA1	This WeChat Mini Program enables me to access related law articles.	Supervisor suggested
	PA2	This WeChat Mini Program enables me to search for related law articles.	
	PA3	This WeChat Mini Program enables me to share related law articles to others.	
	PA4	This WeChat Mini Program enables me to contact related non-profit organization.	

| Open-end question | Do you have any suggestion for this WeChat Mini Program? | Supervisor suggested |

Since the study is targeting Chinese labor NGOs, the questionnaire was drafted in English than translated to Chinese. To ensure translation equivalence, three translators were involved (Venkatesh, Thong, & Xu, 2012). I first arranged and edited the English questions from literature. Then a Chinese doctoral student in JYU translated them into Chinese, which was translated back to English by me. My supervisor Dr. Zhang suggested the questions for perceived affordances and the personal background questions. The pilot test was conducted among a group of 10 users and the data from the test were not included in the data analysis. The survey items (both English and Chinese version) are attached in APPENDIX 1.

8.2 Participants and Data Collection Procedure

On April 15, 2018, 1 week after publishing of the promotion article, we published another article on RUC Legal Aid Center's WeChat Official Account, advocating users to participate our survey. We also prepare QR code for the online questionnaire so that WeChat users can easily participate in this survey. Just like the promotion of this WeChat Mini Program, the members of RUC Legal Aid Center and I sent the advocating article and online questionnaire to WeChat users that might be willing to participate, and encouraged them to share the links to others. In case that survey participants had never heard of this WeChat Mini Program, there was a link to the promotion article inside the online questionnaire for them to learn its functions and try it before answering the questions.

However the data collection did not go very well. Two other labor NGOs, that helped promoting this WeChat Mini Program, were involved in distributing the online survey, but the result of getting response was disappointing. Besides, the members of Legal Aid Center are mainly students, who tended to send the online questionnaire to their friends. Therefore we got almost half of the responses from students. Furthermore, we got none participant whose occupation was "agriculture, forestry, animal husbandry, fishery production and support staff" or "soldier". By April 24, 2018, I only got 123 valid responses.

8.2.1 Demographic data of participants

We collected the information about gender, age range, marriage status, occupation, education level and whether possessing a household (*hukou*) of working place. Asking for age range instead of the exact age was for the reason that some participants might be afraid of revealing too much personal information.

The categories of occupation came from the Occupation Categories of PRC (National Occupational Classification Revised Committee, 2015).

48 (39.02%) participants are male and the rest 75 (60.98%) are female. 32 (26.02%) of the participants are married, while the rest 91 (73.98%) are not. The age distribution of participants is shown in TABLE 6, categorized by worker and student. The occupation distribution is show in TABLE 7. 70 (56.91%) participants are workers, while the rest 53 (43.09%) are students. The education level distribution (for workers: highest education level; for student: currently studying) is shown in TABLE 8. Among the workers, 50 (71.43%) of them possess the household (*hukou*) of the city (or town) they work, while the rest 20 (28.57%) don't.

TABLE 6 Age distribution

Age Range	Workers		Students		Total	
	Frequency	Percentage (%)	Frequency	Percentage (%)	Frequency	Percentage (%)
Below 18	1	1.43	2	3.77	3	2.4
18 - 25	27	38.57	45	84.91	72	58.5
26 - 30	15	21.43	6	11.32	21	17.1
31 - 40	11	15.71	0	0.00	11	8.9
41 - 50	7	10.00	0	0.00	7	5.7
51 - 60	8	11.43	0	0.00	8	6.5
Over 60	1	1.43	0	0.00	1	0.8
Total	**70**	**100.00**	**53**	**100.00**	**123**	**100.0**

TABLE 7 Occupation distribution

Occupation	Frequency	Percentage(%)
Heads of enterprises or institutions	6	4.9
Professional skill worker	31	25.2
Service personnel and related personnel	12	9.8
Social production service and life service personnel	4	3.3
Agriculture, forestry, animal husbandry, fishery production and support staff	0	0
Manufacturing and related personnel	3	2.4
Soldier	0	0
Other practitioner	14	11.4
Student	53	43.1
Total	**123**	**100.0**

TABLE 8 Education level distribution

Education level	Workers		Students		Total	
	Frequency	Percentage(%)	Frequency	Percentage(%)	Frequency	Percentage(%)

Primary school or below	1	1.4	1	1.9	2	1.63
Junior high school	1	1.4	1	1.9	2	1.63
Senior high school or vocational school	8	11.4	1	1.9	9	7.32
Bachelor degree	37	52.9	20	37.7	57	46.34
Master degree	21	30.0	24	45.3	45	36.59
Doctor degree or higher	2	2.9	6	11.3	8	6.50
Total	**70**	**100.0**	**53**	**100.0**	**123**	**100**

8.2.2   Reliability test

Reliability test for each of the constructs were conducted in PASW Statistics 18. Cronbach's alpha of each constructs was greater than 0.7 (min value 0.862), which indicates a strong reliability for the survey instrument.

8.3   Results

8.3.1   User attitudes

Data analysis was also conducted in PASW Statistics 18. The descriptive data of the each question is shown in TABLE 9. Scores of every construct are represented by the mean of the measurement questions. The distribution of the scores of every construct is shown in FIGURE 15.

TABLE 9 Results of measurement items

Code	Minimum	Maximum	Mean	Std. Deviation
PA1	1	5	4.33	.763
PA2	1	5	4.28	.795
PA3	1	5	4.20	.839
PA4	1	5	3.75	.920
Perceived affordance	**1.00**	**5.00**	**4.1402**	**.69920**
SyQ1	1	5	4.26	.818
SyQ2	1	5	4.07	.837
SyQ3	1	5	4.24	.800

|				
System quality	**1.00**	**5.00**	**4.1870**	**.75162**
SeQ1	1	5	4.00	.810
SeQ2	1	5	4.01	.844
SeQ3	1	5	4.02	.878
Service quality	**1.00**	**5.00**	**4.0081**	**.78865**
US1	1	5	4.08	.826
US2	1	5	4.18	.725
US3	1	5	4.13	.768
Users satisfaction	**1.00**	**5.00**	**4.1301**	**.72884**
UI1	1	5	3.95	.867
UI2	1	5	4.11	.770
UI3	1	5	4.06	.813
Intention of reuse	**1.00**	**5.00**	**4.0407**	**.76297**
RI1	1	5	4.01	.910
RI2	1	5	4.03	.886
RI3	1	5	3.96	.900
Intention of recommendation	**1.00**	**5.00**	**4.0000**	**.84176**
EC1	1	5	3.72	.919
EC2	1	5	3.96	.891
EC3	1	5	3.93	.822
Empowerment - Competence	**1.00**	**5.00**	**3.8672**	**.82066**
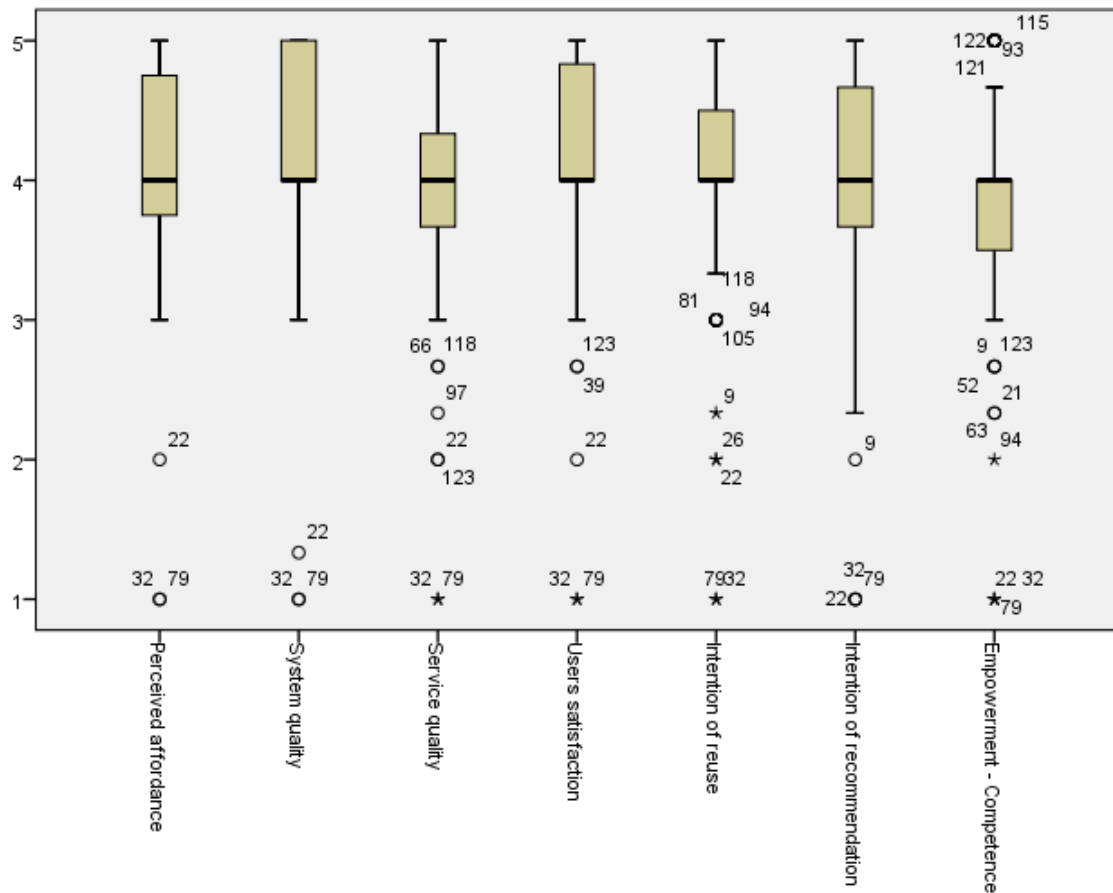
FIGURE 15 Boxplot of the scores

8.3.2 Effects of demographic data

One-way ANOVA test and simple liner regression were used to see whether gender, age range and etc. had effects on user attitudes. The significant level was set on 0.05. TWO OUTLIER SAMPLES WERE REMOVED from the data because their answers to all user attitude questions were 1 (strongly disagree).

The results of one-way ANOVA test showed that gender, age range, marriage status, occupation and household (*hukou*) status had no effects on any user attitude (p > 0.05). Education level had on effects on perceived affordance, system quality and intention of recommendation (p > 0.05), but it had significant effects on service quality (p = 0.040), user satisfaction (p = 0.017), intention of reuse (p = 0.030) and empowerment – competence (p = 0.013).

In terms of service quality, simple liner regression test showed no significant (p > 0.05), indicating although significant differences of user attitudes were found between different education level groups, shown in TABLE 10.

TABLE 10 Multiple comparisons on service quality score - LSD test

Education level (I)	Education level (J)	Mean Difference (I-J)	Std. Error	Sig.
Junior high school	Senior high school or vocational school	1.12963	.52721	**.034**
	Bachelor degree	.62865	.48517	.198
	Master degree	.87037	.48736	.077
	Doctor degree or higher	1.08333	.53317	**.044**
Senior high school or vocational school	Bachelor degree	-.50097	.24190	**.041**
	Master degree	-.25926	.24626	.295
	Doctor degree or higher	-.04630	.32770	.888
Bachelor degree	Master degree	.24172	.13449	.075
	Doctor degree or higher	.45468	.25462	.077
Master degree	Doctor degree or higher	.21296	.25877	.412

However simple liner regression test showed education level had significant influences on user satisfaction, intention of reuse and empowerment – competence, shown in TABLE 11.

TABLE 11 Coefficients between education level and user attitudes

Liner model	Model Summary		Model	Unstandardized Coefficients		Standardized Coefficients	Sig.
	R Square	Adjusted R Square		B	Std. Error	Beta	
Users satisfaction	0.032	0.024	(Constant)	4.791	.312		.000
			Education level	-.139	.070	-.179	.049
Intention of reuse	0.046	0.038	(Constant)	4.875	.334		.000
			Education level	-.178	.075	-.214	.019

| Empowerment - Competence | 0.083 | 0.076 | (Constant) | 5.101 | .366 | | .000 |
| | | | Education level | -.270 | .082 | -.289 | .001 |

8.4 Open-end Question

The open end question was optional for survey participants. Out of 123 valid responses, there are 102 invalid responses for the open-end question (96 blank and 6 "None"). Nevertheless, the suggestions from the rest 21 responses are valuable to us. The suggestions are arranged into 3 categories (there might be more than one suggestion from one response), shown in TABLE 12. Notably there are 8 participants didn't suggest anything, instead they just used the open end question to expressed their appreciation of our work.

TABLE 12 Results of open end question

Suggestion	Frequency
Add more laws into database	5
Improve search funciton	4
Add documents, e.g. legal cases or legal document templates	3
Include practical information, e.g. related official departments	2
Include interaction module for Q&A	2
Kind words of encouragement	8

9   DISCUSSION

This study aims to solve two research questions: 1) How to design a law-searching WeChat Mini Program for labor NGOs in a design science approach, and 2) To what extent can this WeChat Mini Program fulfill the requirements according to users' perceptions. With this WeChat Mini Program released and the evaluation data analyzed, these researches questions can now be answered one by one.

9.1   Creating a WeChat Mini Program

The first research question has been answered by adopting the DSRM process in a design & development centered approach (Peffers et al., 2007). This research provided an example of applying DSRM process in creating IS artifacts for NGOs, which proved that this methodology was still suitable in non-commercial context and in China as well. Similar IS artifact development project of NGOs or WeChat Mini Program development project can use this research as a reference. This research also demonstrated the process of developing a WeChat Mini Program, from technical details to deployment steps, which may help scholars to better understand WeChat Mini Program. Furthermore, the evaluation criteria of this WeChat Mini Program can be reused by other scholars, since system quality, service quality, user satisfaction, reuse intention and recommendation intention are commonly used evaluation index for a WeChat Mini Program.

9.2   Users attitudes

Usage data of this WeChat Mini Program and the results of evaluation both indicate that this WeChat Mini Program has fulfilled its requirements well, considering the overall results (with outliers) are encouraging because all the

means of the measurement data is greater than 3. FIGURE 15 indicates that sample users showed positive attitude towards this WeChat Mini Program. However, we can see a number of outliers, especially some at the bottom. These participants may answer the survey without fully understanding this WeChat Mini Program, or they just sincerely thought this was useless to them. Since the amount of participants is small, I decided to keep those outliers.

The results of perceived affordance show that users understand the access affordance, search affordance, sharing affordance clearly, but not sure about the contact affordance. The reason of it might be the former 3 affordance can be easily seen or tried out, while users have to go through at least 3 pages to get the contact information of related labor NGOs. In general, participants understood the functions of this WeChat Mini Program well, which made the rest of the results more credible.

System quality received the highest score comparing to other constructs, indicating this WeChat Mini Program was successfully developed, and the WeChat Mini Program framework was accepted by the participants.

All 3 questions of service quality received similar scores, indicating the majority of the participants agreed that our WeChat Mini Program had fulfilled or exceeded their expectation. However not all the outliers responded with valid suggestions therefore I can't infer what the rest of the outliers were expecting.

The majority of the participants also agreed that they were satisfied with this WeChat Mini Program.

Although the majority of the participants showed high intention of reusing this WeChat Mini Program, the usage data told a different story. FIGURE 14 shows that daily access times dropped dramatically after the promotions. Based on the feedback from Legal Aid Center, I can infer that despite their high intention of reuse, the users won't reuse it until they actually get legal problems and start seeking for help. Nevertheless, FIGURE 14 shows the daily access times haven't dropped to 0, meaning that this WeChat Mini Program is indeed worth reusing, and the high user reuse intension indicates that they will think of this WeChat Mini Program when they need it.

Participants showed high intention of recommending this WeChat Mini Program to others. However the data of sharing times and sharing users in TABLE 4 seems contradict the actual situation of recommendation. It's because sharing a page in this WeChat Mini Program is merely one of the ways to recommend it, and there are other ways like sharing its info page or the promotion article. TABLE 3 reveals that WeChat Official Account of Legal Aid Center resulted in 818 times of access, while another 225 times come from chatting page. The data from TABLE 2 and TABLE 3 indicate the promotion article or the Official Account profile page has been reposted by users, and link to this WeChat Mini Program has been sent in chatting page or timeline in Moments. Although Tencent don't provide the data of other sharing methods, I can infer that there was more than, as TABLE 4 shows, 68 times of sharing. Moreover, users might recommend this only after they know someone is in need of legal aid. A high

intention of recommendation means they will recommend this WeChat Mini Program, or better, Legal Aid Center to others in the future.

The empowerment – competence construct scores least comparing to other construct, with a mean value less than 4. Besides, participants' opinions varied from each other greatly, as shown in FIGURE 15. In my view this result is predictable. For those who disagree that this WeChat Mini Program empowered them, it might because they need more than some texts in a law to fight for their rights. For those who strongly agreed, they might realize that this law-searching tool also contains contact information of labor NGOs, through which they can get knowledge and capability for defending their rights. This result will impact the next version of this WeChat Mini Program, because a clear instruction of getting contact information is needed, so that users can instantly know where to get help, and be empowered.

In Section 4 I set 3 objectives for this WeChat Mini Program, and try to achieve them by giving it search function, share function and contact function, shown in Section 6. With the data collected, I can judge whether those objectives have been achieved.

Objective 1): Users can easily search for laws with this WeChat Mini Program, as the sample users giving good feedback at the survey. Users' feedback on systems quality, service quality and user satisfaction of this WeChat Mini Program was satisfying. From the feedback on perceived affordance, we know most of the users understand the functions of this WeChat Mini Program well. Therefore the first objective "knowing the laws by searching" was well achieved

Objective 2): Users' feedback on intention of recommendation and the actual sharing data were both positive, meaning the second objective "sharing to help networking" was also achieved.

Objective 3): The score of empowerment – competence construct shows improvement is needed for a clearer demonstration the contact information. However the score of reuse intention is acceptable, so I assume those users will think of this WeChat Mini Program when they need legal assistance, and will eventually get the contact of related labor NGOs. The third objective "contact related NGOs" may be achieved better when the next version of this WeChat Mini Program comes out.

In conclusion, this WeChat Mini Program has achieved all the objectives. It's a successful attempt of creating a social media related tool for labor NGOs in China. Back to the second research question: both usage data and user survey results indicated that this WeChat Mini Program had fulfilled its requirements, although further improvement is needed.

9.2.1 Effects of education level

The results (without 2 outliers) in Section 8.3.2 showed education level had significant effects on service quality, user satisfaction, intention of reuse and empowerment – competence.

In terms of service quality, the score from *Junior high school* group was significantly higher than *Senior high school or vocational school* group and *Doctor degree or higher* group. The score from *Senior high school or vocational school* group was significantly lower than *Bachelor degree* group. The differences and their causes needed to be confirmed and explored. It's hard for me to assume an explanation for this.

From the results of liner regression test we can see the higher educational level was, the lower the score of user satisfaction, intention of reuse and empowerment – competence got. I assume the reason was that users with higher education level processed more knowledge, access to legal assistance and social resources for defending their rights, comparing to the users with lower education level. Therefore this tool would be a greater help to users with lower education level.

9.3   Contribution to literature

This research reviews 2 types of literature: background related (in section 3) and evaluation criteria related (in section 5). Contribution to these 2 types of literature will be discussed separately.

Legal assistance and consultancy, rights protection, training and education, networking and promotion are common activity of labor NGOs in China (Bieler & Lee, 2017b; C. K. Chan & Hui, 2017; Gransow & Zhu, 2016; He & Huang, 2015; C. K. Chan, 2012). However currently labor NGOs only use social media like WeChat for networking and promotion only (Cao & Meng, 2017; J. Qiu, 2016; Sommerfeldt & Xu, 2017; Zhou & Pan, 2016). And there is not yet any literature about the implementation of WeChat Mini Program for NGOs. This research not only fills this gap, but also proves that creating such a law searching tool can well serve labor NGOs with their common activities. As a novel mobile application framework, WeChat Mini Program is easy to learn, which indicates that even with little human resource, labor NGOs can still create one for their own. Moreover, in this research, collaboration with Legal Aid Center of RUC has been a fruitful one, which proves that "collaborate with organizations with a clear legal status" can be a useful strategy of labor NGOs (Bieler & Lee, 2017b). Although Tencent has set a strict policy for data transmission in WeChat Mini Program, this WeChat Mini Program provides a good example showing labor NGOs, who can't afford to meet the requirement, how to bypass it. By embedding the law text in the source code, its search function requires no Internet connection and becomes faster.

Since there are no similar researches that focus on designing IS artifact for NGOs, I have to create the evaluation criteria myself. While using DeLone and McLean's IS success model, I noticed that in their 2002 version (DeLone & McLean, 2002), the definition of service quality they referred to (Pitt et al., 1995) has great similarly with the expectancy confirmation in Expectancy Confirmation Theory (ECT). Since I cannot measure user attitude twice as the SERV-

QUAL measurement requires, I used the questions from ECT literature to create the service quality questions in the questionnaire (section 8.1). My evaluation criteria of a WeChat Mini Program can be adapted by other similar researches. Furthermore, as Sommerfeldt & Xu (2017) mentioned, the lack of internal capability was one of the reason that NGOs overlooked evaluation of digital media usage (Sommerfeldt & Xu, 2017). My research provides an example for doing evaluation and ready-made evaluation criteria for them, which can help them to evaluate their digital media usage.

10 CONCLUSION

This master thesis research explores the feasibility and effectiveness of creating a law-searching WeChat Mini Program for Chinese workers and labor NGOs in a design science approach. By reviewing the literature about labor NGOs in China and technical articles about WeChat Mini Program, I purposed that creating a law-searching WeChat Mini Program was a novel way of implementing information system for labor NGOs to assist legal consultancy and their other activities. This solution needed to achieve 3 objectives, 1) users can learn about workers' rights by searching laws with keywords; 2) users can help networking other workers by sharing this tool; 3) users, who actually need legal assistance, can get contact information of labor NGOs via this tool. Theories about information system artifact, information system success model, reuse and recommendation intention, empowerment and perceived affordance were studied as the basis of evaluation criteria. Design and development process of this WeChat Mini Program was introduced in both function perspective and system development perspective. The demonstration of this WeChat Mini Program was released and promoted to potential WeChat users, with the help from Legal Aid Center of RUC. After 10 days of trial the evaluation started by distributing online survey to users. Although only 123 users participated in the survey, the results of the survey were encouraging. Users gave positive feedback and the actual usage data confirmed it. Despite some limitations, this research presents a successful attempt of creating a law-searching tool for labor NGOs in China.

For technology oriented audiences, the key contribution of this thesis is introducing the WeChat Mini Program framework, showing the pros and cons of this "sub-application", from both user and developer perspectives. This thesis also presents the process of creating a WeChat Mini Program, from coding to releasing.

For management-oriented audiences, this thesis investigated the effectiveness of utilizing WeChat Mini Program, a new information system, to assist labor NGOs. This WeChat Mini Program was evaluated by 7 criteria: system quality, service quality (expectation confirmation), user satisfaction, intention of reuse, intention of recommendation, empowerment (competence) and per-

ceived affordance, and the evaluation results showed the tool achieved its objective. Legal assistance is and will be a common activity of labor NGOs in China, this case can be generalized to those similar labor NGOs that proved legal assistance. Furthermore, adoption of the WeChat Mini Program framework also lowers the difficulties for developers in terms of creating a mobile app. Scholars or managers related to NGOs can consider WeChat Mini Program as a choice when trying to reach out for more people or to improve their services.

10.1 Limitations

Due to limited time and resources, this master thesis research has several limitations that need to be noted.

First, this research process contains only 2 iterations, and the evaluation of first iteration only involved some members of Legal Aid Center. This WeChat Mini Program can be further improved if a third iteration is implemented.

Second, sample size of the evaluation survey was comparatively small, and the distributions of gender, age, occupation and so on were not balanced, which was a disadvantage from snowball sampling. There are only 20 migrant workers, who don't process household (*hukou*) from where they work, in the sample. The conditions of my sample may influence the accuracy of data analysis, which was the foundation of this discussion.

Third, by providing the documents for the code review, Legal Aid Center of RUC automatically claimed the ownership of this WeChat Mini Program, which resulted in other labor NGOs' hesitation on attaching this WeChat Mini Program. Till the end of April, 2018, despite getting verbal confirmation from the other 2 labor NGOs, there is still no other labor NGOs attached this WeChat Mini Program to their WeChat Official Account. Moreover, unregistered labor NGOs are not able to release law and policy related WeChat Mini Program. If they want to build similar application then they will have to either collaborate with other registered NGOs or give up WeChat Mini Program and build other types of application, which might be a setback for the "collaborate with organizations with a clear legal status" strategy (Bieler & Lee, 2017b).

Fourth, this research mainly focused on helping labor NGOs with their "providing legal assistance" activity. Labor NGOs in China have other common activities, and maybe more of them can be assisted by novel technical approaches, in my case, the WeChat Mini Program. The generalizability of this thesis may also be limited since the research was based on only one case and the sample size of survey was small.

Fifth, service quality was measure by questions adapted from ECT related literature rather than commonly used SERVQUAL measurement (Pitt et al., 1995) due to the lack of participants. Its validity needs to be tested.

10.2 Future works

In China, organizing workers to fight for their rights through online tools have been a trend in recent years. The last wide spread news was the Wal-Mart strike (Asia News Monitor, 2016), and there is another strike by tower crane operators going on, which might be a valuable case to study in the future. In this case tower crane operators from all over China called for a strike on social media, and then a dozen of labor NGOs started spreading this information through WeChat and Weibo (Pioneer, 2018). Social media or instant message applications play an important role in these workers movement, so do the labor NGOs. Future researches in information systems field should pay more intention in this combination: information system, labor NGOs and unprivileged workers. Outcomes of this kind of researches will not only help the scholars understand how these parties interact, but also be good materials for labor NGOs to learn from in order to better organize the workers. Providing legal assistance is a common daily activity of labor NGOs, and there are more activities can be assisted with information systems. Although my academic life may end with this master degree thesis, I will continue to improve this WeChat Mini Program with the help of Legal Aid Center of RUC, since there were a dozen of suggestions collected from the open end questions. Other scholars are welcome to study the effects of this WeChat Mini Program in the future.

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APPENDIX 1 SURVEY ITEMS IN CHINESE & ENGLISH

Perceived affordance 功能认知

This WeChat Mini Program enables me to access related law articles.
这个微信小程序让我可以接触到相关的法律条文。

This WeChat Mini Program enables me to search for related law articles.
这个微信小程序让我可以搜索相关的法律条文。

This WeChat Mini Program enables me to share related law articles to others.
这个微信小程序让我可以和人分享相关的法律条文。

This WeChat Mini Program enables me to contact related non-profit organization.
这个微信小程序让我可以联系相关的公益组织。

System quality 系统质量

This WeChat Mini Program is easy to use.
这个微信小程序使用简单。

This WeChat Mini Program is stable, rarely down or crashed.
这个微信小程序运行稳定，很少崩溃。

This WeChat Mini Program has a good response time and is in the tolerable range.
这个微信小程序响应时间良好并且在可忍受的范围内。

Service quality - Expectancy confirmation 服务质量 - 预期确认

My experience with using this WeChat Mini Program was better than what I expected.
我对这个微信小程序的使用体验比我预期的更好。

The service was better than what I expected.
这个微信小程序服务比我预期的更好。

Overall, most of my expectations from using this this WeChat Mini Program were confirmed.

总体来说，我对使用这个微信小程序的大部分期望都实现了。

User satisfaction 用户满意

This WeChat Mini Program had all expected functions and abilities.
这个微信小程序拥有的功能和能力（法条搜索、提供联系方式）符合我的期望。

Overall, I am satisfied with this WeChat Mini Program.
总体来说，我对这个微信小程序感到满意。

I am happy with my decision to use this WeChat Mini Program.
我对使用这个微信小程序的决定感到开心。

Intention of reuse 使用意愿

I intend to keep using this WeChat Mini Program rather than stop.
我打算继续使用这个微信小程序，而不是停止。

If possible, I will keep using this WeChat Mini Program.
如果可能的话，我会继续使用这个微信小程序的。

I am planning to keep using this WeChat Mini Program.
我计划继续使用这个微信小程序。

Intention of recommendation 推荐意愿

I intend to share the positive sides of this WeChat Mini Program I am using with others.
我打算和他人分享关于我正在使用的这个微信小程序的积极方面。

I plan to recommend this WeChat Mini Program to others.
我计划向别人推荐这个微信小程序。

I intend to get my friends or relatives to use this WeChat Mini Program.
我打算让我的朋友或亲戚去用这个微信小程序。

Empowerment – Competence 增权赋能

After using this WeChat Mini Program, I think I have the ability to fight for my rights.
在使用了这个微信小程序之后，我觉得我有能力去维权。

After using this WeChat Mini Program, I believe I have the knowledge to help for my rights

在使用了这个微信小程序之后，我相信我有知识来帮助我维权。

I think this WeChat Mini Program improves my capability of defending my rights.

我认为这个微信小程序提高了我捍卫自身权利的能力。

Open end question 开放问题

Do you have any suggestion for this WeChat Mini Program?

你对这个微信小程序有什么建议吗？

Personal questions 个人信息题

Your gender

○male ○female

您的性别

○男　　○女

Your age

○below 18　　　　○18~25　　　○26~30　　　○31~40　　　○41~50

○51~60　　　　　○over 60

您的年龄段

○18 岁以下　　　○18~25　　　○26~30　　　○31~40　　　○41~50

○51~60　　　　　○60 以上

Are you married?

○yes　　○no

您是否已婚？

○是　　○否

Your occupation:

○heads of enterprises or institutions

○professional skill worker

○service personnel and related personnel

○social production service and life service personnel

○agriculture, forestry, animal husbandry, fishery production and support staff

○manufacturing and related personnel

○soldier

○other practitioner

○student

您的职业是

○机关、群众团体和社会组织、企事业单位负责人

○专业技术人员（如科研人员、工程技术人员、医护、教师、文艺工作等）

○办事人员和有关人员（如公务员）

○社会生产服务和生活服务人员（如快递、家政、水电、维修等）

○农、林、牧、渔业生产及辅助人员

○生产制造及有关人员（如各类工人）

○军人

○不便分类的其他从业人员

○学生

Your education level
(workers: highest level; students: currently studying)

○primary school or below

○junior high school

○senior high school or vocational school

○bachelor degree

○master degree

○doctor degree or higher

您的教育程度

（在职人士为最高学历，学生为在读）

○小学或以下

○初中

○高中或职业学校

○大学本科/专科

○硕士研究生

○博士研究生或以上

Does your household/hukou belong to where you work
○yes　○no

您是否有工作地户口

○是　　○否