Information Needs of Chinese Mobile Internet Users
A User Study

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Abstract—**This paper investigates the information needs of Chinese mobile Internet users in their fast-paced environment. The mobile Internet users grown up in such an environment would have different interests, ways of using, and information needs. In order to obtain a better understanding on Chinese mobile Internet user behavior, a web survey was conducted in Xi'an, China, followed by the previous ethnographical study. With the pervasiveness of smart-phones, people from different age groups joined the mobile Internet market, and the results of this study illustrated the various user behaviors on the mobile Internet across different age groups of people. The study revealed that in the mobile Internet era, Chinese users are more concerned with information relating to the scope of safety and love/belonging needs, advancing towards the next level in Maslow's Hierarchy of Needs.**

Keywords-Internet; mobile Internet; interests; user behavior; web survey; mobile applications.

I. INTRODUCTION

Mobile applications have emerged as one of the most popular sector of the mobile industry chain. As shown by the newest statistics published by EnfoDesk databases, in the third quarter of 2011, the number of mobile Internet users in China has reached 396 million users, increasing at a rate of 4.4% [1].

The following graph shows the number of new iOS and Android device activations in China at the beginning of year 2012, an astounding growth which has surpassed that of the United States to become number one around the globe.
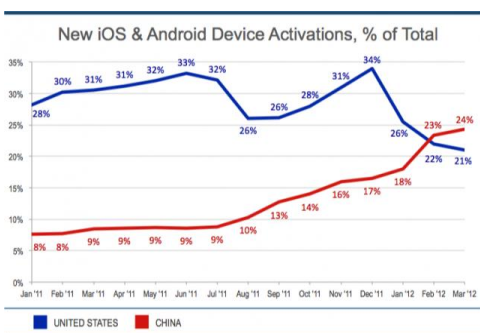

Figure 1. iOS and Android Device Activations
in China and USA [2].

Based on Flurry's data in Figure 1, from Q1 2011 to Q1 2012, China led in the mobile app session growth as well,

increasing 1,126% year-over-year. In such a fast-paced environment, users have various needs for the mobile applications. In order to better design mobile applications, we need to understand the information needs of mobile users. Thus, we designed a questionnaire and conducted a web survey in Xi'an, China.

The next section of this paper will discuss the methodology prescribed in questionnaire design and survey procedure. The third section will discuss findings and results of the web survey. The final section will analyze and summarize our findings.

II. METHODOLOGY

The research plan consists of ethnographic interviewing and web surveys. Ethnographic interviews were first conducted in Xi'an [3]. Afterwards, a web survey on customer concerned issues was administered as the second step of the research. This paper focuses on the second step.

According to the best practice suggested by Kuniavsky [4], the study plan was drafted to collect data to validate research hypothesis. According to the previous ethnographical study, Chinese Internet users focus more on two levels of Maslow's Hierarchy of Needs [3], safety and love/belonging, when surfing the Internet. We hypothesize that this same user behavior and focus on safety and love/belonging needs is demonstrated when these users utilize the mobile Internet. Out of these two levels, we wish to further investigate which subcategories are more important to the users. What specific information within these categories do they care about the most? Based on the previous study, we know that people have interests on trust, safety, education, job, psychology, communication, and health, etc., so this paper will study more on these interests.

A. Questionnaire Design

We designed the questionnaire based on the ethnographic results: Internet user behavior correlated to the user age group and other user demographic information. Since we assume that the users' information needs while using the mobile Internet are similar to their using the Internet, therefore we designed questionnaire focusing on the three basic needs in Maslow's Hierarchy of Needs: physiological, safety, and love/belonging.

The questionnaire includes both a first level factor and a second level factor. Each second level factor in turn encompasses multiple different related questions, and each question was designed for a 5-Lirket Scale answers from

most agree to most not-agree. There are also some multiple choices or open ended questions that allowed survey participants to provide more inputs.

The first level factors are seven broad categories, such as Trust; Communication; Safety; Education; Jobs and Career; Psychology; and Health. The first level factors are further specified and divided by second level factors. For example, under the first level factor "Trust", there are several second level factors such as "Consumer Recommendation", "Shopping and Merchandise", "Trust in Society", "Location-Based Information Acquirement", "Traffic", etc. The following describes a few examples of the details of the questionnaire.

Example1:
First level factor - Trust
    Second level factor - Consumer Recommendation
    Related Questions:
        1) When I purchase expensive electronic products, I usually research online beforehand.
        1. Most Not Agree, 2. Not Agree, 3. Neutral; 4. Agree, 5. Most Agree
        2) What information do you look for? Choose from the following options or add your input.
        __quality of product, __manufacturer reputation, __ market price, __consumer reviews, __after-sales service, or other_____?
        .

    Second level factor – Shopping and Merchandise
    Related Questions
        1) I only go shopping at a fixed number of stores.
        1. Most Not Agree, 2. Not Agree, 3. Neutral, 4. Agree, 5. Most Agree

        2) I wish to receive information about sales at local stores.
        1. Most Not Agree, 2. Not Agree, 3. Neutral, 4. Agree, 5. Most Agree

        3) I wish to receive electronic coupons and vouchers instead of paper ones.
        1. Most Not Agree, 2. Not Agree, 3. Neutral, 4. Agree, 5. Most Agree

        4) I wish to save time by checking for information regarding products I buy often on my smart-phone.
        1. Most Not Agree, 2. Not Agree, 3. Neutral, 4. Agree, 5. Most Agree

B. Questionnaire Validity

The web survey was conducted using a formally designed questionnaire and surveyed a total of 200 mobile Internet users in China. In accordance to a completely randomized design in order to yield the most accurate results, the questionnaire was sent to a polling agency, where it was reviewed and proofread. Afterwards, the questionnaire was sent to a variety of different websites over the Internet in order to sample a more diverse and random population. When prefixed percentage ratios were satisfied, the poll was closed and data analysis was conducted on the results.

C. Predictive Validity

Prediction validity refers to the effectiveness of the outcome of a survey to predict the results of future surveys or experiments. As a form of criterion validity, the validity of the results is established when compared against known criteria. The main purpose of this survey is to target the most common problems current users face when using the mobile Internet. We also hope to investigate some of the most common issues these users are concerned about as well.

When information needs based on geographical location are taken into account, careful analysis of the survey results reflects the information needs of current users in different situations and holds predictive value on a long-term basis.

D. Construct Validity

Construct validity refers to whether the questionnaire is comprehensive and takes into consideration all facets and elements of the questions. It also refers to the extent to which what was to be measured was actually measured, and whether the results of the survey can account for the survey's accuracy and validity. The formal questions in this survey are derived from the previous ethnographical study and the analysis of the users' most commonly faced problems.

E. Content Validity

Content validity refers to the effectiveness of translating factors surveyed into specific and relevant questions, and the level by which these questions through content can accurately and comprehensively reflect a surveyed factor. It additionally refers to the verification of whether the survey method measures what is expected, as well as whether such a measure accounts for all aspects of a social construct.

These questions in the survey have been improvised and refined by comparing the content validity between a preliminary survey and that of a formal survey. Only conducting questions that involve measuring the satisfactory level of users when they encounter problems cannot completely reveal the information needs that users are interested in or are concerned about.

Hence, when designing this questionnaire, we not only took into account issues that users may confront, but also

verified the specific types of information these users want to see. This particular verification process is administered by allowing surveyed users to select types of information they are interested in from a list of options and following up with analysis of the most popular choices indicated by the subjects.

III.   FINDINGS AND RESULTS

A.   *Demographical Information*

    1) Age group

    Out of the total 200 web survey participants, the chart below illustrates the age group distribution for people who were born after the 1960's, 70's, 80's and 90's:
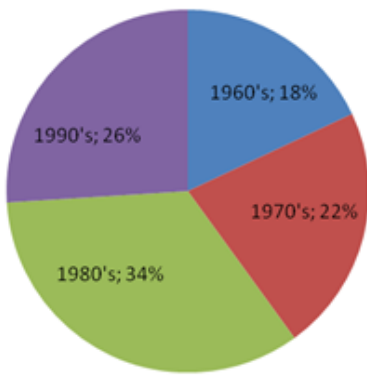
Figure 2. Age Group Distribution.

    2) Sex

    Out of the total web survey participants, 40.2% are female and 59.8% are male.

    3) Marital status

    Out of the total web survey participants, 15% were married with kids, 15% were married without kids; 30% were single and in a relationship; 40% were single and not in a relationship. The following chart shows this breakdown. The participants' marital status could influence their regularly-sought information. For example, if they are married with kids, their information seeking is more related to the family than if they were not married with kids, especially on issues such as childcare and children's education.
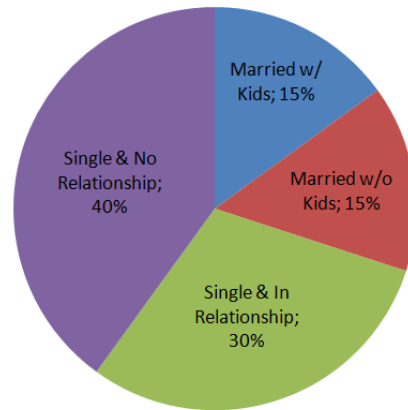
Figure 3. Marital Status Distribution.

    4) Education background

    Out of the total web survey participants, the education level breakdown is presented by the following chart:
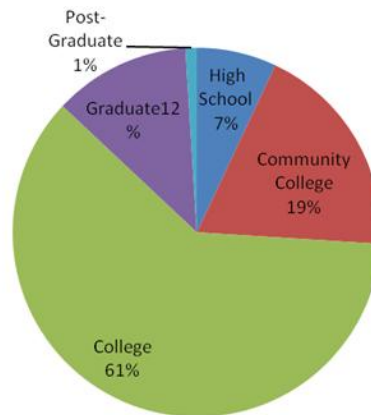
Figure 4. Education Level Distribution.

B.   *Information Needs Related to the Gender*

    By observing Figure 5, we find that a significant amount of women are more concerned with the job search category, compared to that of men because job security in China for women is lower than men due to the culture reason. Women are particularly interested in finding a job nearby. In another relevant category, career plan, it can also be concluded that women demonstrate more interest, although there is less of a statistical difference.

    Another observation is the significant difference in interest between men and women on the education of children. On this topic, there is a greater difference than that of any other category. Men tend to like the information pushed to their mobile devices regarding how to educate their children, while women like to chat with their social

groups in order to get the information for children and education related topics.

Some of the common topics that both men and women are equally concerned about are those regarding food and nutrition safety, health and lifestyle, local events, and career planning.
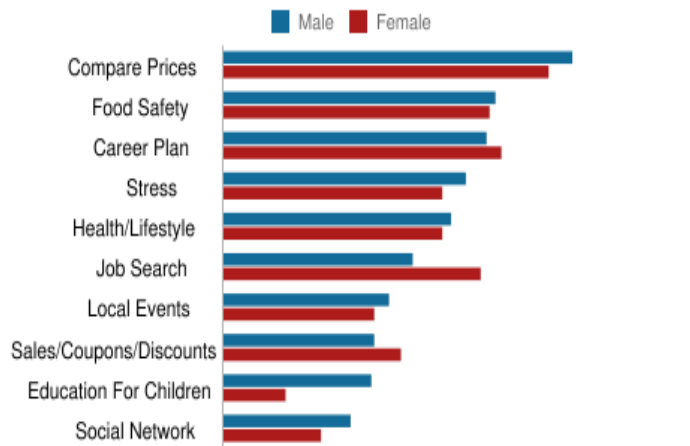

Figure 5. Interest in Different Information Categories Across Genders.

C. Information Needs Related to the Age Groups

The information needs broken down by age groups can be seen in the Table 1. The average Likert scale score for each type of questions were calculated according to the age groups.

TABLE I.   INFORMATION NEEDS RELATED TO AGE GROUPS

Information Needs	Age Groups (born after …)			
	60s	*70s*	*80s*	*90s*
Compare Prices	4	4.45	4.59	4.56
Food Safety	4.4	4.64	4.27	4.22
Career Plan	3.6	4.36	4.3	4.78
Stress	4.4	4.36	4.13	4.44
Health/Life Style	3.8	4.27	4.13	4.56
Job Search	3.4	4	4.19	4.11
Local Events	4	3.82	3.95	3.89
Sales/ Discounts	3.4	3.55	4	4.22
Education for Children	4	4.55	3.65	4.11
Social Network	4.2	3.82	3.73	4.11

The above data can be illustrated in Figure 6. From this figure, it reveals that mobile Internet users born after the 60s are notably less concerned about sales/discounts, career planning and job search, compared to all other age groups, which indicated that this group has more financial freedom than other groups.

On the other hand, people born after the 90s are the most attentive to their career. In addition, this age group also display great attention to information related to the sales/coupons/discounts and health/lifestyle category, as compared to the three other age groups. A consistent trend shown by Figure 6 is that the younger age groups tend to be more concerned with physiological needs than safety needs, and pay more attention towards information that relate to livelihood (finding jobs and saving money).

For the people born after 70s, their main concerns focus on the food safety and education for children. Their needs are more related to safety and love/belonging as they have established social status. They like to check nearby restaurant reviews through their mobile devices before dining, and quickly learn from their mobile devices on others' or experts' opinions on how to educate their children.

A topic that evokes interest across all four age groups is that of news about local events and information regarding the local environment. They like to check local information through mobile devices on their way to commute in the public transportation, or in their spare time, because they think only local (specific to one city) information is most relevant to their daily lives.
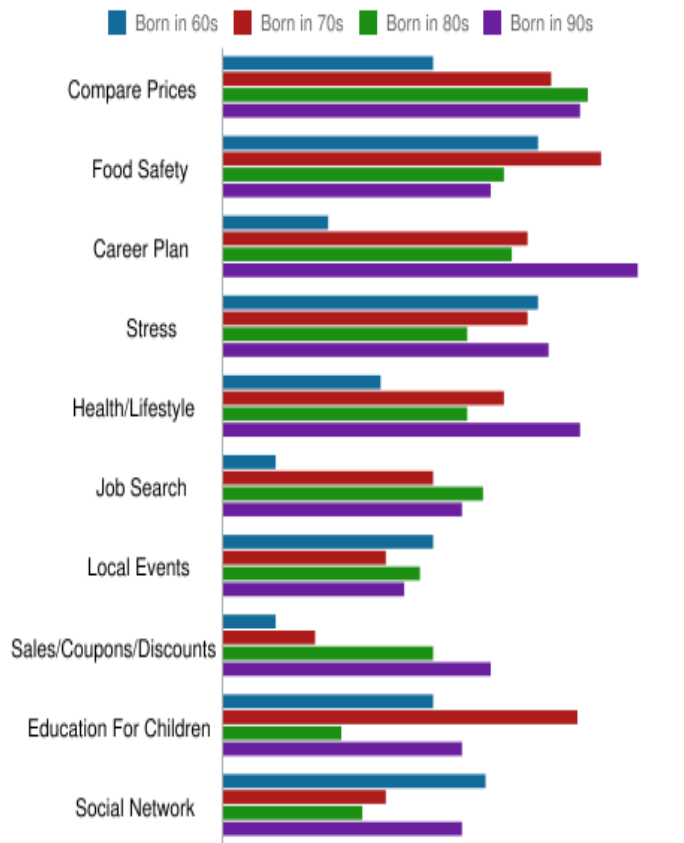

Figure 6. Interest in Different Information Categories Across Different Age Groups.

D. Local Information Needs-Checked with Mobile Devices Frequently

Figure 7 shows the top categories of information that surveyed mobile Internet users indicated what they wanted to know regarding their local community. As the chart illustrates, information related to saving money, such as discounts and sales, is clearly a high priority.

Users also like to utilize their mobile devices for quick access to daily local news and events happening in the neighborhood. They believe that the things happening around them are more meaningful to their lives.

Finally, many users also express equal interest in issues regarding livelihood, such as job openings and the price of gas and electricity. News regarding education also appears to be of considerate interest.
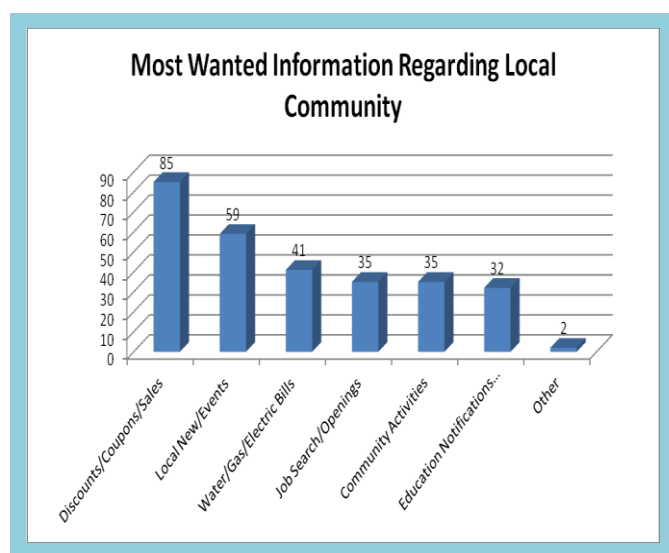

Figure 7. Local Information Needs.

IV. CONCLUSION

It can be concluded that mobile Internet users in China demonstrate information needs that are mostly on physiological, safety needs and love/belonging, and leaning towards the needs of safety and love/belongs. The mobile Internet users' information needs are the same as those on the Internet, and thus, also follow the egg theory by Yang [3]. By looking overall at Figures 5 and 6, the top categories of information that all mobile Internet users are concerned about as a whole are related to price comparison, food and nutrition safety, and career planning. Figure 7 also reinforces this observation. Categories that fall under physiological needs are that of price comparison. The mobile Internet introduced a quick access to people for online shopping and browsing. Categories that fall under safety needs are that of career planning, job search and self improvement, food safety, and health and lifestyle, which

the users are more concerned with. Categories that full under the love/belonging are that of communication with friends and family, and child education, which have drastic use in the mobile Internet era.

Within the two categories of needs that mobile Internet users most focused on, safety and love/belong, which specific information do they care about the most? Analysis of Figures 5 and 6 reveals that the two most popular topics surveyed mobile Internet users were interested in are food safety, and career planning which all fall under the safety level of needs. The communal interest on information regarding the safety of food may be a result of the numerous reports of food poisoning or false products. Users may wish to go online through their mobile devices and check references or other customers' reviews of nearby restaurants' reputation and history before choosing those restaurants.

Here we elaborate more on how people's need relate to the level of love/belonging. The users communicate with their friends and family through cell phone calls, instant messaging, text, or wechat, which already has more than 200 million users, either to talk, share popular news/topics, or send personal pictures. Since a mobile phone's basic function is to communicate, the drastic increase in sales for mobile phones in China is due to a greater demand for faster, more accessible communication by the people. Many of these new mobile phone users are from the large amount of immigration of workers into the city from the countryside. In addition, college graduates often find jobs in bigger, well-developed cities than their home towns. This distance from their families contributes to these users' dependence on mobile phones to quickly connect with their families. The mobility within the cities also cause people to rely more on mobile phones than landlines because it is harder to keep a permanent landline number. Some people even have two or three phone numbers to reduce the cost of communication.

Finally, the demographic difference may cause different user behavior for the mobile Internet use. For example, as a result of the developing global economy, many job opportunities and career options have surfaced; therefore, many people are eager to acquire career information and counseling. This trend is especially prevalent in the female subset of surveyed subjects. This may be because women tend to want to find a job close to home in order to avoid traffic and to easily take care of their families. From a different perspective, the rankings given by people born in the 1960s show they are less concerned compared to the younger age groups regarding career planning and job search. As an overall trend, some of the older age groups tend to focus more attention towards information that fall under the safety category.

Human needs are a powerful resource of explanation of human behavior and social interactions [5, 6]. In the mobile Internet era, human needs have overall moved towards a higher level in the Maslow Hierarchy of Need [3]. People

are more concerned with things relating to the scope of safety and love/belonging. Between these two categories, different age groups of mobile Internet users have different methods of using the mobile Internet, as well as distinctive focused interests and objectives. There are several possible reasons that may contribute the variance, such as society development, influence of popular applications in the market during different times, education levels, amount of time spent on the Internet and mobile Internet, and many others.

The study of user behavior on the mobile Internet also reveals the extent by which mobile Internet is fusing into users' life. The closer mobile Internet is to its users' daily life, the more popular mobile applications will be. The next study will focus more on how users interact with the different types of mobile devices (phone/pad) on iOS, Andorid, and Win Mobile.

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