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# WEB-BASED DATA COLLECTION IN CHINA

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## ABSTRACT

In the last few years, web-based surveys have received increased attention given their potential to cut the costs and time associated with paper-based surveys. In this exploratory study, we consider the feasibility of using the web as a data collection medium in China, which has a current Internet population of 103 million. Following a review of the literature regarding the design, implementation and application of web surveys, and the current state of data collection in developing countries in general and China in particular, we describe how we developed a web-based survey instrument focusing on the ethical values of IT professionals. We emailed 5,000 IT professionals in China, inviting them to participate in the survey. 37% of those contacted visited the website and 5.8% submitted the survey. The survey data, both qualitative and quantitative, is analysed and discussed with a view to drawing up instructive guidance for researchers interested to use the web as a data collection tool in China, as well as developing countries more generally. The web-based survey has great potential in these contexts, if sensitively designed and implemented. We consider the implications of this research and identify areas where future research is necessary.

**Keywords:** Web Surveys, China, IT Professionals,

## INTRODUCTION

Empirical research in China has traditionally applied a variety of research methods. Key amongst these have been surveys of various sectors of the population. Some of these surveys have relied on secondary data, e.g. from government sources, but the paper-based questionnaire has also been frequently deployed. The toolbox of survey techniques has recently been extended with the development of web-based surveys – surveys that reside on Internet web sites and are completed online. In this exploratory study, we report on an ongoing project that involves the collection of survey data in China with a web-based survey instrument and provide initial answers to the question “Is it feasible to use the web to collect survey data in China?”.

In order to engage in research that would be valuable from both content and methodological perspectives, we decided to investigate the ethical reasoning of IT professionals in China. Through this investigation, we aimed both to develop our knowledge about web-based surveys in China, and specifically with respect to a professional target population, many of whom can be expected to have access to the Internet, and to develop our knowledge about the ethical reasoning of an important set of participants in the national economy. Much concern has been raised about ethical values in general around the world in the wake of various corporate scandals. There are parallel concerns in China in academia (Ding, 2002) as well as in the business sector (Steidlmeier, 1999; Su, 2001; Huang and Snell, 2003). This concern extends to the IT sector, given the extent to which our society depends on effective and efficient IT. Nevertheless, the sensitivity of this topic clearly creates challenges for any kind of data collection procedure. However, we believed that a sensitively designed web-based survey would provide potential respondents with a high level of confidentiality when they submitted their responses, a confidentiality that would be hard to replicate with face-to-face or paper-based survey techniques. The main thrust of this article is a methodological one, given our research question. However, we do make reference to ethical issues on occasion as they relate to the instrument that we used to collect data.

Following this introduction, we concisely review a number of literatures germane to this study, viz.: web-based surveys, data collection in developing countries in general, as well as in China in particular; and the Chinese experience with web-based surveys. We then explain the precise methodological approach used in this study, with a detailed description of the way we operationalised the research

instrument on the web, and the procedures associated with ensuring the rigor of the research design. The survey results follow, with a particular emphasis on the methodological issues which are then discussed before we conclude with key findings and directions for future research. We do not report on or discuss the ethical reasoning employed by IT professionals in China, since this is not the focus of this article.

## **LITERATURE REVIEW**

In order to review the literature on web-based surveys in a systematic fashion, we followed the following protocol. Firstly, we reviewed the literature on web-based surveys in general (i.e. without any restriction to China or other developing countries), in order to identify current practices as well as the broadly recognised advantages and disadvantages of this adaptation of the paper-based survey method (2.1). Secondly, we looked at current data collection methods in developing countries: we considered paper-, email- and web-based surveys (2.2). These two areas of literature were not restricted to the Information Systems or Information Management domains. We explain our search protocol in greater detail below. Finally, we focused our literature search on the specific case of data collection in China (2.3), and the use of web-surveys in that context (2.4). At this stage of the search process, while we searched the English language databases, we also looked at Chinese language databases, which cover publications in Chinese that are published inside China. Finally, we summarise the relevant literature findings in a short section (2.5).

### **Web-Based Surveys**

In the early years of the web (i.e. the mid-1990s), most websites were relatively static entities that only provided a one-way information dissemination channel. However, as Thompson et al. (2003) observe, it was quickly realised that websites had a great potential to receive and process information, which would significantly enhance their value. This view is supported by Dillman (2000, p.400) who observes that web-surveys are poised to be the next significant development in the survey methodological tradition (after random sampling in the 1940s and telephone interviews in the 1970s) as “no other method of collecting data offers so much potential for so little cost”. Given this potential, web programming techniques were developed to enable such online data entry (see Dennis and Gambhir (2000) for a general overview of the technology). While there is a considerable comparative

literature on the relative efficacy of paper vs. fax vs. email surveys (Cobanoglu et al., 2001), until recently there has been a dearth of published academic research assessing the reactions of respondents (or potential respondents) to web-surveys (Thompson et al., 2003; Tingling et al., 2003).

Web-based surveys offer significant advantages over traditional paper-based surveys, not least in terms of cost and time: once an instrument has been developed, it can be located on a database-linked website and completed by respondents with essentially no additional resource implications beyond the cost of hosting the survey on the website and the subsequent analysis of data (Lazar and Preece, 1999). Furthermore, as data is entered in digital form, neither is there a need to transcribe data from paper forms, nor should there be a need for data cleaning (Lazar and Preece, 1999). Web-based surveys can include a variety of interaction opportunities, ranging from check boxes and rank order mechanisms to text boxes and drop-down lists. Respondents can access web-based surveys by clicking on a link in an email message and submitting their response immediately – there is no postal delay. Notwithstanding these opportunities to create a more varied interaction experience, some scholars caution that web pages should be simple, consistent and easy to use, since fancy or complex pages can cause a significant reduction in response rates (Dillman and Bowker, 2001). It is thus best not to assume that potential respondents have access to more than the most primitive and unsophisticated browsing and downloading environment (Bowker and Dillman, 2000).

Where response rates are concerned, the expectation that web-based surveys should generate higher rates has not been consistently substantiated, with some reports indicating higher rates than other forms of surveys and others lower or equal (Thompson et al., 2003; Dillman, 2002). Indeed, it is hard to measure response rates on the web unless you know in advance the precise size of the population you are sampling. When a link to a web-based survey is placed on one or more websites (Ngini et al., 2002), it is impossible to be sure how many people saw the link. Some studies use a mix of web- and paper-based surveys, but don't always distinguish the sources of data in the results (Mbarika et al., 2004). One way to be sure of the population size sampled is to contact each potential respondent by email. However, concerns may still exist about the way in which the individual potential respondents are identified. Pimchangthong et al. (2003) indicate a 64% response rate, but they

carefully selected and then personally invited people to participate – this was not a random sample of the population.

The availability of web-based surveys has propelled new growth for market research as well as commercial, government and academic research (Birnbaum, 2000; Buchanan and Smith, 1999). However, the potential efficiency of conducting web-based surveys causes some authors to raise concerns about the scientific underpinnings of quality research. Large numbers of responses do not exclude the possibility of sampling or coverage errors (Dillman and Bowker, 2001; Dillman, 2002; Granello and Wheaton, 2004). Furthermore, there are a number of weaknesses associated with web-based surveys (Cobanoglu et al., 2003; Couper, 2000; Thompson et al., 2003), including: issues of respondent access to the Internet; the difficulty of providing effective online financial incentives (such as vouchers, lotteries or charitable donations) (Deutskens et al., 2004); computer/Internet literacy; the possibility that individual respondents may make multiple submissions (Tingling et al., 2003); the extent to which (potential) respondents are prepared to trust the web as a medium for the submission of personal information; the extent to which respondents perceive that their anonymity can be guaranteed and their privacy protected; and the risk that emails inviting participation in the survey are never actually read, either because potential survey participants didn't see the invitation, or treated it as junk email (Saxon et al., 2003), or even because it was incorrectly screened out by spam detection/removal systems. Recent research shows that up to 20% of email may be false-positively identified as spam and autodeleted by email servers without the recipient being aware of the fact (Morrissey, 2003). Chinese Internet users, for instance, report that they receive, on average, 7.9 spam email messages per week, compared to 4.4 non-spam messages received (CNNIC, 2005).

### **Data Collection in Developing Countries**

Research into Information Systems in Developing Countries represents a fairly new trend, with most mainstream IS journals publishing only a handful of papers over the last two decades. The emergence of journals, such as the *Journal of Global Information Management*, and more recently the *Electronic Journal of Information Systems in Developing Countries*, has increased the number of papers published substantially. In order to gain an understanding of the methods (both web-based and paper-based) used to collect data in developing countries in general, we searched the

ProQuest and Emerald Insight online databases, as well as scholar.google.com, using keywords such as: web-based, online, data collection, developing countries/country. We also searched scholar.google.com for “web-based survey + [Developing Country Name]<sup>i</sup> for a selection of 50 ‘sample’ developing countries around the world, in order to identify studies about specific countries that did not use the term ‘developing country’ as a keyword. We also specifically targeted three journals for this search: the Journal of Global Information Management, the Journal of Global Information Technology Management and the Electronic Journal of Information Systems in Developing Countries. Through this process, we identified 20 items of potential relevance to this study.

From this search, we noted that while there is an increasing tendency to use case studies (Khalfan and Gough, 2002 [Kuwait], Mosse and Nielsen, 2004 [Mozambique]), many articles rely on survey data. However, the vast majority of these involve paper-based surveys (Grandon and Pearson, 2003 [Chile], Brown and Licker, 2003 [South Africa], Lertwongsatien and Wongpinunwatana, 2003 [Thailand]), with only a handful using email surveys (Ahmed, 2002 [Bahrain, Saudi Arabia, Kuwait, Oman, UAE, Qatar], Wresch, 2003 [Nicaragua, Pakistan, Senegal, Ghana, Kenya, Nepal, Tanzania, Sudan, Mozambique]), or web-based surveys (Gandsas et al., 2001 [Global], Ngini et al., 2002 [Global], Pimchangthong et al., 2003 [Thailand]). A variation to the online data collection method was explored by Al-Saggaf (2004) [Saudi Arabia] who conducted interviews through a web-based virtual community.

### **Data Collection Issues in China**

Research essays on and scholarly critiques of data collection in China generally concur that it is inappropriate to engage in the mere transfer of Western research practice to China without any form of adaptation to the local context, which is perceived to be a unique phenomenon (Manion, 1994; Roy et al., 2001). Not all scholars agree about the uniqueness of the research context in China, but nevertheless there is agreement that the contextually and culturally sensitive application of research methods is essential if those methods are to have any explanatory power (Shenkar and Von Glinow, 1994). With specific reference to the collection of data, Roy et al. (2001) document a number of concerns including the ability of researchers to gain the official permissions needed for data sampling, the use and value of



secondary data, the tendency of local research contacts to engage in self-censorship, the design and implementation of survey instruments and the analysis and interpretation of data. A further concern relates to the designation of some possibly innocuous information as 'secret' or 'classified'. This kind of situation was exemplified by the case of a Hong Kong-based economics researcher who, as a result of his data gathering activities, was accused by the PRC of spying for Taiwan (Cheung, 2002).

### **The Potential for Web-Based Surveys in China: Practical and Demographic Issues**

There is growing attention to the usage of the web as a medium to collect survey data in China. In order to obtain an overview of how the web-based survey has been researched among Chinese scholars, in addition to the literature search described above, we conducted a search in the Chinese-language China Journal Fulltext Database. To our surprise, we found more than twenty journal articles that are specifically related to the examination of web-based surveys. The topics of these articles cover a wide array of issues ranging from detailed presentations of the software that can be used to implement web-based surveys, discussions of technical issues in designing, monitoring, and controlling the survey process (Mi, 2001; Yu et al., 2000) and careful delineations of different ways of using the Internet to collect survey data (Ke, 2001a, 2001b), to analyses of the advantages and constraints of using the web as a medium to administer surveys (Kang, 2001; Tang, 2002; Wang and Zhang, 2001), questions related to instrument design and the conduct of statistical analyses (Zhang, 2003), and issues related to the establishment of policies and rules associated with the regulation of web-based surveys in China (Lin and Yin, 2001; Su, 2000).

We consider that at least three factors contribute to the rising enthusiasm for web-based surveys in China. First, the population of Internet users has grown rapidly during the past few years. According to the China Internet Network Information Centre (CNNIC), a non-profit organization associated with the Ministry of Information Industry that conducts semi-annual surveys on the development of the Internet in China, the number of Chinese Internet users (not including those in Taiwan, Hong Kong and Macau) has grown from 62,000 in 1997 to 103,000,000 in July 2005 (CNNIC, 2005), approximately 7.9% of the total population of 1.3 billion.

More detailed statistical data about China's Internet population is presented in Tables 1-6 below. For comparison with other countries, see Appendix 1. The rapid expansion in the number of Internet users has important implications for web-based survey research, since there is the indication that the online population is becoming more representative of the *urban* population as a whole, as well as specific sub-populations such as college and high school students, people educated to high school level, and certain occupations such as government officers, engineers, management personnel and teachers.

Second, commercial market research and consulting firms are becoming more involved in conducting web-based surveys. In October 1999, Beijing Horizon Research and Sohu created the first independent company specializing in web-based surveys (Gao, 2002). Subsequently, many other research and consulting firms have developed web-based survey systems.

Third, research institutions are increasingly interested in exploring the possibility of utilizing the web to undertake surveys in China. Traditionally, the survey has been the most popular technique utilized in social science research in China (Deng and Feng, 2000; Li, 2000). As the population of Internet users increases, the web-based survey can be considered as a viable alternative to traditional survey media such as paper-based questionnaires and telephone interviews. Several conferences on web-based research methods have been organised, which is an indication of the growing interest in this new medium. In 2000, the Chinese Academy of Social Sciences held a conference titled "Methodological and Application Issues Associated with Using the Internet to Conduct Survey Research", while the Chinese Information Association held a conference titled "Research Methods and Practice of IT Marketing" (Ke, 2001a, 2001b).

The most frequently discussed issues among Chinese scholars concern the potential advantages of using the web to collect survey data as compared to traditional methods, the reliability and objectivity of this method, and the constraints involved in terms of the technical infrastructure and target populations. While most scholars notice the advantages in efficiency and low cost on the part of the researcher, they also note some factors that constrain the development of web-based surveys in China. First, the technical infrastructure is still relatively underdeveloped outside the larger cities. Second, the cost of using the Internet is still nontrivial (while 31.2% of Internet users spend less than 50 RMB/month on Internet access, a further 62.7% spend

between 50 and 200RMB/month (CNNIC, 2005). Income levels vary considerably, with 28% of Internet users earning less than 500RMB/month and 46.4% earning between 500 and 2000 RMB/month (CNNIC, 2005). Internet access costs are thus likely to represent a significant fraction of net incomes. As a result, Internet users cluster around a particular population of which young and educated urban professionals and college students constitute the majority. Issues of reaching out to potential respondents, providing online incentives, and preventing multiple submissions have also gained attention. Less attention has been paid to the investigation of individuals' privacy concerns and the trust relationship between the respondents and the web medium. Zhang et al. (2001), in a comparison of the willingness of Chinese and US online consumers to participate in web-based surveys, observed that Chinese consumers tend to be more willing than their US counterparts to provide personal information. However, within the Chinese population, female respondents were less willing than their male counterparts to provide information. Moreover, while working professionals were more likely to provide information online simply out of goodwill, students needed to be lured with incentives.

Despite the constraints facing web-based survey research in China, it has become an important alternative to traditional survey methods. The most salient advantages it has over traditional survey methods may be the anonymity it provides to respondents and the confidentiality it inspires, as well as the control that it enables researchers to exert during the survey administration process. Some scholars point out that the web-based survey is particularly suited to research into sensitive issues such as social problems and private behaviour (Sun and Cai, 2000; Xiang, 2001, 2002). They argue that because surveys on the Internet provide better guarantees for the protection of individual identities, people are more likely to express their true opinions on sensitive issues. Related to this, the responses should be more reliable since researchers have more control over the collection of data. For paper-based surveys, there is always the risk that the return of the questionnaire to the researchers may be disrupted, whether by postal delays or questionnaire loss by respondents. Using the web to collect data enables the researcher to obtain the data directly from respondents, thus eliminating potential threats to the reliability of the responses, though it must be admitted that the technology itself is unlikely to be fool-proof, given the potential for server crashes.

### **Literature Review Summary**

While surveys are undeniably a popular research methodology, the vast majority of surveys conducted today are traditional, in the sense that they are paper based. In recent years, there has been a trend first to develop email-based surveys, and more recently to use web-based surveys. The potential that web-based surveys offer the researcher is considerable, in terms of cost, time and accuracy of data. However, there are concerns about the ability of potential respondents to access websites, and indeed about the complexity of those websites from a browser perspective. While some respondents users may prefer a more fancy and graphically attractive web-based survey, that uses a variety of interaction methods such as drop down boxes, radio buttons, rank order responses, etc., other respondents may not have browsers or indeed connections capable of processing these web-pages effectively. Incentives (vouchers, cash, etc.) are sometimes provided to survey respondents to motivate their participation, but this is much less easy to operationalise in the online world, raising concerns about how to motivate people to participate in web-based surveys, particularly once the novelty effect has worn off. In the developing country context, web-based surveys are fairly rare at the time of writing and there is no clear evidence of their universal applicability. This is not entirely surprising since until recently, very few people in developing countries have had sufficiently reliable Internet access to make web-surveys a sensible proposition. However, this situation is changing slowly, particularly in professional groups of employees such as Doctors, Managers, Students, Teachers, Engineers, etc. This is certainly the case in China, where some 7.9% of the total population (103 million people) now have Internet access, including well over one million in the IT industry. The web-based survey is the subject of considerable interest in China, with national conferences being devoted to it, as well as start-up companies being formed in response to an anticipated demand for online surveying. China is not without significant hurdles to the use of the Internet for research purposes, including notably the cost of access, and questions about the representativeness of any sample.

## **INSTRUMENT DEVELOPMENT AND RESEARCH OPERATIONALISATION**

In order to assess the feasibility of conducting web-based surveys in China, in this study we implemented a web-based survey of the ethical values of IT professionals in China. Concerns have been raised about the extent to which potential survey

respondents can access Internet based resources (Saxon et al., 2003). In China, this is certainly a valid concern, yet as we are interested in the ethical values of IT professionals, including engineers and managers, it does not seem unreasonable to expect that they, of all people, should have access to the Internet.

The survey instrument was initially developed in English. It includes twenty substantive items (each is a different kind of ethical dilemma designed to be relevant to the IT profession), as well as eight demographic items and four open-ended text items designed to collect data about respondents' attitudes towards web-based surveys in general. Each of the twenty substantive items consists of the first half of a sentence and is associated with seven possible actions, each of which can complete the sentence. For example, item 18 and its associated actions reads as follows: "I believe that as an IT Professional, I should ... (1) do whatever I like irrespective of other people; (2) cut corners in order to get a job done in a way that maximises my personal benefit; (3) do my best, but not worry if my work is imperfect; (4) fulfil the minimum requirements of a job; (5) promote good practice and high standards in my work; (6) help to develop new standards for professional work; (7) constructively challenge the fundamental values that the IT profession holds as important".

The original English version of the instrument was first translated into traditional Chinese<sup>1</sup> (by two translators located in Hong Kong and Taiwan respectively) and then back-translated into English by a third translator in Hong Kong who was not otherwise associated with the project. All the translators engaged on this project were native Chinese, who regularly use both English and Chinese at work. The back-translation was compared with the original English version. Inconsistencies between the versions were discussed at length by the researchers and translators and the traditional Chinese version was modified in order to address ambiguities, such as the differences in the traditional Chinese used in Taiwan and Hong Kong.

When agreement on the traditional Chinese version was achieved, it was translated into simplified Chinese by a fourth translator, a native of the PRC, who was familiar with both traditional and simplified Chinese, as well as English. This translator preferred to create the simplified Chinese version from the traditional Chinese version, while also referring back to the original English version so as to ensure consistency of meaning. The wording of the simplified Chinese version differs

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<sup>1</sup> Traditional Chinese is used as the written language in Hong Kong and Taiwan, whereas Simplified Chinese is used in China.

from the traditional Chinese version in a few minor respects, e.g. where the characters used in Hong Kong and Taiwan to represent certain English words are different from those used in the PRC. For example, the word computer is written with two characters (電腦) in traditional Chinese but with three characters (计算机) in simplified Chinese.

The three language versions of the instrument were then implemented on a website located at the Department of Information Systems, City University of Hong Kong. Each version was preceded by a sample question which illustrated how to complete the survey. Potential respondents who accessed the website were invited to read a short introduction to the project (in each of the three language versions) and then to select a language version to complete. Buttons were used to enact this choice, with the language clearly specified on the button. When the survey was submitted by a respondent, the data was captured in a database for subsequent analysis. As recommended by Duffy (2002), counters were used to track (a) the number of introductory page hits, (b) the number of survey page hits, and (c) the number of surveys submitted. In addition, the date and time of each submission were recorded in the database.

In order to identify an appropriate population of IT professionals who would have access to the Internet and thus the survey instrument, we employed the services of the China Centre for Information Industry Development (CCID). We paid CCID RMB0.20 (approx. US\$0.025) per email to contact 5,000 randomly selected IT professionals from the 1.2 million in their membership database. A comparison between the CNNIC (2005) statistics on general Internet user characteristics and the CCID (2004) members is made in Tables 1-6 below. This comparison clearly indicates that CCID members are better paid (Table 1) and educated (Table 2) than the population at large, though this is hardly surprising as they are predominantly professionals. For the same reason, there are fewer students in the CCID sample than the CNNIC survey (Table 3). The industries where CCID members work are broadly comparable with those represented in the broader population (Table 4). CCID indicate that approximately 90% of their members work directly in the IT field, with the remainder having a personal interest in the area. CCID members are typically older than the typical Internet user, with 51.7% of CNNIC survey respondents under 25 compared to 27.9% in the CCID database (Table 5). Finally, the CCID membership is much more male dominated than the overall Internet user population in China, but it

should be remembered that IT jobs in China have traditionally been a male preserve (Table 6). This contact email was sent directly from CCID (not from the researchers) and was written in Simplified Chinese. The text of the email explained the nature of our study, the identity of the researchers, and indicated the URL where the survey instrument is located. Both the email and the web page indicated our willingness to provide feedback to any respondents who requested it.

**Table 1: Personal Income of Internet Users (%)**

	CNNIC (2005)	CCID (2004)
< 2000	80.6	40.4
2000-2999	10.7	27.7
3000-4999	5.8	15.4
5000>	2.9	16.5

**Table 2: Educational Profile of Internet Users (%)**

	CNNIC (2005)	CCID (2004)
College or below	39.3	27.1
Undergraduate	27.6	58.7
Masters Degree	2.7	12.1
Doctoral Degree or above	0.4	2.1

**Table 3: Job Title/Position of Internet Users (%)**

	CNNIC (2005)		CCID (2004)
Gov't Officer	7.4	Senior Manager	4.8
Enterprise Manager	9.3	Dept Manager	10.3
Engineer	12.6	Project Manager	6.9
Teacher	7.0	Professional/Technician	32.8
Business/Service Worker	9.4	General Staff	16.2
Student	32.4	Student	18.0

**Table 4: Industry where Internet Users Work (%)**

	CNNIC (2005)	CCID (2004)
Education & Scientific Research	13.9	14.8
Government Bodies & Public administration	11.9	11.0
Finance & Insurance	4.5	4.6
Manufacturing	14.6	12.9
IT / Computer / Internet / Telecoms	16.4	21.9
Consulting	1.2	1.7
Energy & Resources	4.9	5.6
Commerce & Trade	6.7	3.0
Others	25.9	23.5

**Table 5: Age of Internet Users (%)**

	CNNIC (2005)	CCID (2004)
<18	16.4	2.2
18-24	35.3	25.7
25-30	17.7	27.5
31-35	11.4	18.7
36-40	7.6	10.7
41-50	7.6	8.4
51-60	2.9	3.9
>60	1.1	2.8

**Table 6: Gender of Internet Users (%)**

	CNNIC (2005)	CCID (2004)
Male	60.4	81.8
Female	39.6	18.2

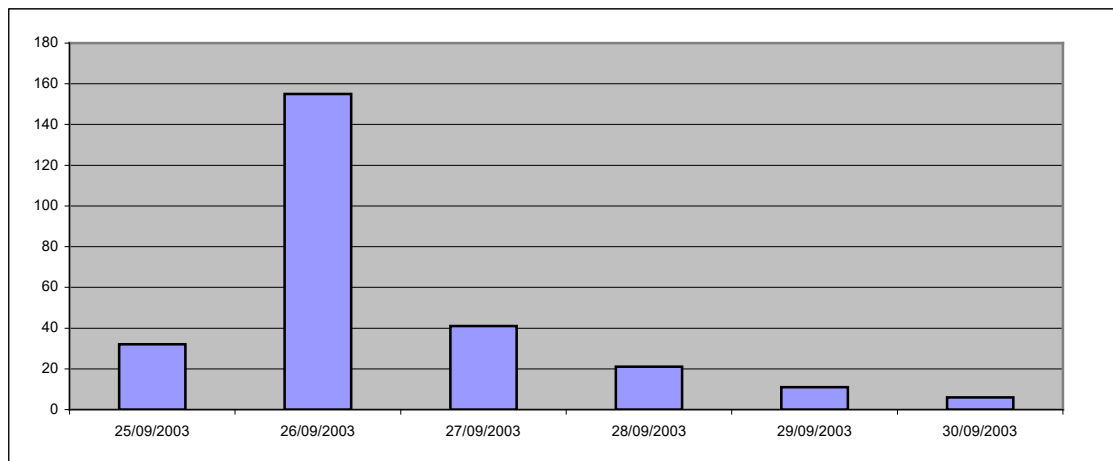
## RESULTS

### Demographic Data

Of the 5,000 individuals to whom we emailed an invitation to participate, 1,717 visited the web page where the instrument was located within 10 days and a further 152 did so during the following 12 days, a rate of 37.4%. Of these 1,869 visitors, 1,617 (87%) proceeded to one of the language versions of the instrument, 1,611 (99%) of these choosing a Simplified Chinese version. However, of these 1,617, only 337 (20.8%) actually submitted the survey. Of these 337 submissions, 15 were entirely empty of data (i.e. the submit button was clicked without any data being entered), 5 were duplicate submissions and a further 27 were incomplete. This leaves 290 valid responses, an overall response rate of 5.8%. Figure 1 indicates how many submissions were received over the course of the six days following the distribution of the email invitation on September 25<sup>th</sup>, 2003. Of the 290 responses, 155 (53%) were submitted on September 26<sup>th</sup>. In the first two weeks of October, five or fewer responses were submitted per day.



**Figure 1: Response Rates During the First Six Days**



Demographically, the data indicates that the majority of respondents are young males (Table 7), with less than 10 years of working experience (Table 8) and at least a Bachelor’s Degree (Table 9), the majority of whom work in Computing and IT Services (45%) or Communications and Media (17%) (Table 10). These statistics are consistent with the profile of CCID’s members (CCID, 2004). A total of 37 people who submitted the survey (12.8%) requested feedback from the researchers by providing their email addresses. Where the job titles of the respondents are concerned, a huge variety is evident. Some 88 job titles are identified by respondents from the more technical programmers and network managers through sales and marketing personnel, clerical staff and presidents of organisations. Indeed, 97 (33%) of our respondents identify themselves as being of managerial level or above (including IT and technical managers), while 42 (14%) are Engineers and a further 59 (20%) occupy other positions that are often associated with the IT profession, e.g. analysts, programmers, network and security specialists. Table 11 indicates the number of responses for the most commonly submitted job types.

**Table 7: Age and Gender of Respondents (N)**

Below 30 years	197	Male	230
30-50 years	82	Female	60
Over 50 years	11		

**Table 8: Years of Working Experience of Respondents (N)**

0 – 10 years	249
11 – 20 years	32
21 + years	9

**Table 9: Education Level of Respondents (N)**

Secondary School / High School	29
Diploma	3

Bachelor's Degree	197
Master's Degree	46
PhD	9
Other	6

**Table 10. Industry Sector where Respondents Work**

Communications and Media	50	Health Care	4
Computing and IT Services	130	Logistics	2
Consumer Sector	6	Manufacturing	23
Education	15	Telecommunications	14
Engineering	15	Travel / Transportation	5
Financial Services / Insurance	7	Utilities (Electricity, Gas, Water)	2
Government	9	Other	8

**Table 11: Most Frequently Indicated Job Titles of Respondents**

CEO/President	7	CIO/CTO/Vice-President	18	Managers and Directors	72
Engineers	42	Technician & Programmer	11	Other IT related staff	59

**Qualitative Data**

In addition to the demographic characteristics of the respondents presented above, we also asked the respondents for their thoughts on the viability of using the web to collect data. The specific questions we asked were:

- What motivated you to participate in this web-based survey?
- How do you feel about participating in this web-based survey?
- Would you encourage your friends or colleagues to participate in a web-based survey in the future? Why or why not?
- How could we make this survey more attractive to potential respondents such as yourself?

Answers to these questions varied considerably and defy easy categorisation. Virtually all of the answers were submitted in simplified Chinese. We have translated or paraphrased the answers here, but selected Chinese responses are given in the accompanying footnotes.

Where motivation is concerned, the most frequently identified reasons include “interest”, “curiosity”, “a desire to know the result” and “a sense of professional IT responsibility to participate”. Other responses include “seeking to learn more about my own work values”, “the opportunity to offer an opinion” and also “I feel like it” or “I want to help”. The vast majority of responses here are positive, some touchingly so, for example “I have an affection and trust for CCIDnet” and “I care for, love and pay attention to the development of this industry. I am even more concerned about the psychological condition of people”.

Where the feelings of respondents about participating in this survey are concerned, a similar variety of responses is evident, though here there is a greater contrast of positive and negative comments. Thus, some respondents feel that there are too many questions, others too few, others that the number is just right. Some commented that the design is nice and clear, others suggest that the design is poor with questions that are strange or obscure. A few respondents noted that the survey includes questions that are not only realistic but that also challenge one’s understanding and practice of work-related values. Others consider the survey to be either troublesome or a complete waste of time.

The third qualitative question asks whether respondents would encourage their friends or colleagues to participate in a web-based survey in the future. This question serves as an independent measure of the respondents’ attitude towards web-based surveys in general. Of the 207 people who answered this question, 122 (59%) of responses are positive, indicating that they would encourage their friends/colleagues to participate, 49 (24%) are negative and 36 (17%) are undecided. Although there is a self-selection bias at play in answering this question – those who voluntarily participated in this survey are more likely to support survey research as respondents - we are still pleased to see that over half of the respondents may encourage their friends or colleagues to participate in a web-based survey in the future.

For those who responded positively to this question, many used the words “meaningful”, “valuable”, or “inspiring” in their answers. Specifically, we note some factors that may be of importance to our understanding of the IT professionals. First, the need for mutual understanding and communication is salient in the answers. One respondent emphasized the importance of communication: “Nowadays, communications between person and person, corporation and corporation, industry and industry, and country and country are far more important than productivity

improvement". An enthusiasm towards participation is also very explicit in some responses. Through participating in surveys, it is hoped that proper standards can be established for the IT industry, better solutions for social problems can be identified, and social progress may be attained. In sum, we note a personal attachment to the IT profession and a sense of belonging to the IT community.

For those who responded negatively to this question, we found that in most cases, this refusal was not targeted at the questionnaire itself, but was rather an expression of an emphasis on individual free will: for instance, "I would do whatever I like, I don't want to influence others". There was also the indication that it took too much time to complete the questionnaire. Those who are indifferent or unsure about whether they would encourage others to participate in surveys mentioned that it depends on whether the survey is relevant to their profession or whether the topic is interesting.

Respondents also provide useful suggestions to our last question. We coded the answers and classified them based on content, style, format, and action. More than 50 respondents suggested that interesting, meaningful topics can attract people to participate in the survey. They said that they welcome questionnaires that have rich, deep, and meaningful content which can make them think deeply. They also emphasized that the content should more closely reflect the real life. A few respondents raised questions about the style of the questionnaire, pointing out that the questions should be simpler, more direct and concrete. A similar number of respondents suggested revisions to the format of the questionnaire and the design of the webpage. A beautiful, visually impressive, and easy-to-operate webpage may attract more people to respond. As expected, a number of respondents suggested that some kind of incentive (whether monetary or 'in kind') may help improve the response rate. Among these actions, offering gifts, cooperating with the media to increase publicity, and providing the results to respondents were regarded as crucial.

## **DISCUSSION**

This objective of this research project involved assessing the feasibility of using the web to collect data in China. We were heartened to see that over 37% of the 5,000 people to whom invitational emails were sent were sufficiently motivated at least to click on the link in the email message and visit the web page where the survey instrument was introduced. We are unable to assess how many of the 5000 initial

email addresses were invalid as the invitation email was sent by CCID, who did not report on emailed that bounced back as undeliverable. Nevertheless, CCID informed us that if an account could not receive an email on three consecutive occasions, it would be removed from their database. Of these 1,869 people, the vast majority (87%) appear to have been further motivated to click on a button taking them to the survey instrument itself. However, a much smaller number, only 337, actually submitted the survey and when empty, duplicate or incomplete responses are eliminated, only 290 usable responses remain – an overall response rate of 5.8% of the original 5,000 invited participants. Similar drop-out rates were experienced by Tingling et al. (2003), with more than 60% of those who started a web-based survey failing to complete it. The data cleaning that proved necessary as we analysed the dataset was not entirely unexpected, despite the suggestion that it might be unnecessary with digitally entered data (Lazar and Preece, 1999). Nevertheless, it proved relatively easy to accomplish since the data can be sorted in a spreadsheet on any field and so missing or duplicate responses were quickly identified.

The demographic data indicates a predominantly young, male and well educated population, most of whom work in the IT industry. This appears to confirm the validity of our selection of CCID as a suitable intermediary for contacting our target population - people who either work in the IT industry or can otherwise be considered to be IT professionals. Clearly, such people do have ready access to the Internet and therefore are able to access survey instruments such as the one discussed in this paper.

The qualitative comments received from over 75% of respondents on their perceptions towards the survey are of great interest because they provide a good indication as to how we could make surveys such as this one more attractive in the future. Where motivational issues are concerned, many respondents indicated either a personal or a professional interest in the survey and in the questions that it asked them. Several indicated that they found it meaningful to participate as it helped them to reflect on their own work practices. It also appears that respect either for IT researchers or for CCID played a significant motivational role: in this sense, we are borrowing respect from CCID and attempting to use it so as to persuade potential respondents to participate in the survey. In the main, this seems to have been a successful strategy, if only because 37% of those invited actually visited the survey's introductory web page. Nevertheless, it is necessary to distinguish between a survey

of a relatively homogeneous population, such as IT professionals, and a general survey of consumers, for instance, who may be far more heterogeneous in character. We suggest that identifying a motivational focus that can be used to leverage participation in a survey may be critical to achieving a high response rate.

The discrepancy between the number of introductory page visitors, the number of survey page visitors and the number of survey submitters is perplexing. There is a very strong correlation between the first two of these: 1,689 people visited the main instrument page and 1,617 of them visited a survey instrument. This suggests that these 1,617 were sufficiently motivated by both the email invitation and the short introductory text on the introductory page at least to attempt to reach a survey. However, just over 20% of these motivated individuals actually submitted the survey. Several possible reasons can be identified, all of which can be tested in future research. Firstly, as many respondents noted, the survey may well be too long, with 20 substantive items and 12 additional demographic or textual items. Associated with the issue of physical length is the issue of file size: the Simplified Chinese version of the instrument is approximately 300kb. This is a large file to download, especially for respondents with limited bandwidth. It may well be that many potential respondents either were unable to download the entire survey or gave up waiting for it to download.

Apart from the amount of time needed either to download or to complete the survey, potential respondents may have experienced difficulties understanding the questions. The instrument was developed in English and was then translated into Chinese (both Traditional and Simplified). We took considerable care with the translation process, ensuring that native speakers/writers of Traditional Chinese were engaged on the Traditional Chinese version and similarly that a native speaker/writer of Simplified Chinese was engaged in producing the Simplified Chinese version. All translators were instructed to assess their translations for readability bearing in mind the audience for whom the instrument was being developed. A Traditional Chinese version was developed both so as to offer choice to respondents in the PRC and because we are separately collecting data in Hong Kong and Taiwan with the same instrument. The translators also compared their Chinese versions with the English version and engaged in extensive discussions with the author of the English version of the instrument. Pilot testing of the Traditional Chinese and English versions of the instrument was undertaken before the survey reported in this study was conducted.

This pilot test did not reveal any significant problems of comprehension. Indeed, in the spirit of the work of Michael Bond and his associates (Chinese Culture Connection, 1987), the separate development of an instrument by Chinese scholars based on Chinese values and concepts, would constitute an effective line of inquiry. This is supported by the words of one respondent who commented: “Different people from different places have different values. Your survey uses a view point from Hong Kong to look at the IT professionals. It relates more to the moral standard, but the mainland IT professionals are not necessarily the same. They have other concerns”.

We asked respondents if they would encourage their friends/colleagues to participate in online surveys in the future. A little over half of all responses were in the affirmative, but many of the negative responses involved a dislike for causing trouble or disturbance to others. This is an interesting finding that deserves further attention, perhaps in the context of research into individual personal privacy. Many of the positive responses were very enthusiastic, respondents apparently gleaming substantial enjoyment from their participation. Finally, we asked how the survey could be made more attractive. Some of the responses here focused on the physical appearance of the survey, with suggestions that it be made more attractive or easy to read, while others focused on issues more closely associated with incentives: one respondent for instance suggested that we offer a free notebook computer! It appears that the issue of topic complexity is also important, though responses here are bipolar, with some preferring a simpler style of question, others preferring more complex questions that need deep thinking.

## **FUTURE RESEARCH, LIMITATIONS AND CONCLUSIONS**

In this study, we have explored how a web-based survey instrument can be used to collect data in China. A high initial response rate (37%) was achieved, though only 5.8% of respondents followed through to submit the survey. We suggest that reasons associated with survey length, question complexity and comprehensibility, and file size may be associated with this low submission rate, fruitful domains for future research. Nevertheless, in this study we have demonstrated that cooperation with a professional society in a developing country such as China can be a viable method of identifying potential respondents and so gathering data. We expect that a similar approach could be used to contact professionals in other developing countries, on the assumption that professional societies exist and are willing to participate in this kind

of research. It also appears that professionals in China are willing at least to contemplate completing a survey online, especially if they feel that the survey questions are relevant to their life and work, meaningful, interesting and thought provoking, though there are also suggestions that the questions need to be simple and easy to understand. This willingness is significant in the light of earlier studies suggesting that people in China are risk averse and distrustful of non-kin members (Cheung and Chow, 1999; Fuller and Peterson, 1992; Hofstede, 1980).

There are several avenues for future research that have been opened up by this study. Firstly, we suggest that it may be valuable to compare survey length and complexity. This can be done by assessing responses to survey instruments of varying lengths and degrees of complexity. Findings from such research would be valuable to survey research designers, though our own inclination is to provide respondents with a choice, given the fact that some will prefer to provide an immediate reaction to a simple question and others will prefer to think more carefully about their response to a more complex question. Where the 'invitation to participate' process is concerned, we suggest that while the efficacy of paying a professional organisation to contact its members directly through email can be tested further, other methods for inviting participation in web-based surveys should be considered, such as the use of banner or pop-up advertisements on web pages (Ngini et al., 2002), bearing in mind the implications that such methods have for accurately calculating the response rate.

The population surveyed in this study was intentionally restricted to IT professionals in China. This limits the generalisability of any of the findings to other populations in other countries, though from a motivational perspective, we anticipate that similar response rates could be achieved from other professional groups in China assuming that they have a similar level of Internet access, and indeed from professional groups in other developing countries, if the same assumption holds true. For instance, Gandsas et al. (2001), received responses to their web-survey from general surgeons located in a number of developing countries including Brazil, Egypt, India, Saudi Arabia, Thailand and Venezuela. Given that the number of people in China who have Internet access is increasing rapidly, so the population of potential respondents for future web-based survey research is also growing.

In summary, and by way of instructive guidance, we suggest that researchers interested in applying the web-based survey method in developing countries, including China, should consider the following issues:



- Identify a motivational focus which can both encourage participants to trust the intentions of the researchers and leverage consequent participation in the survey
  - This can be more easily achieved on the web if the motivational focus can be in some way related to the specific nature of the target population, the manner in which participation is invited or the incentives that can be offered. Information on the researchers can be offered, e.g. a link to their websites and their email address(es).
- Ensure that the amount of time needed to download the instrument (over a low bandwidth line), complete and submit it is reasonable
- Provide the survey in as many language versions as needed
  - Pay careful attention to issues of translation and comprehension.
- Provide instructions on how to complete the survey
  - A worked example is useful, particularly on the web where survey respondents may not be familiar with the medium.
- Offer incentives that are appropriate to the population – and ensure that you deliver!
  - Incentives may involve gifts, prizes, vouchers, lotteries, donations to charities, links to resources that respondents might find useful, the offer of feedback on the survey results.
- Count how many people participate in the different stages of the data collection process. Include a time/date stamp on each submission. This is easy to automate on the web and provides information that can be used to address questions of non- (or late) response bias.
- Ensure that data is submitted to a database controlled by the researchers
- Expect that some data cleaning will be necessary due to invalid submissions

Overall, we recommend the web-based survey research method to researchers interested to explore new avenues of data collection in China, as well as in other developing countries. We believe that this research method has the potential to revolutionise the way we undertake surveys in China: target populations can be identified and contacted with ease; participants can choose a language version dynamically; data can be collected quickly; data cleaning is necessary, but simple to undertake; feedback can easily be provided to participants.

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## APPENDIX 1 – COMPARATIVE GLOBAL INTERNET PENETRATION STATISTICS <sup>2</sup>

World	14.6%	USA	68.5%	France	42.3%	India	3.6%
Asia	8.9%	Canada	63.8%	Finland	69.7%	Indonesia	7%
Europe	36.8%	Mexico	14.3%	Germany	57%	Malaysia	37.9%

<sup>2</sup> Source: <http://www.internetworldstats.com>

EU	48.1%	Chile	25.8%	Italy	48.8%	Laos	0.3%
Australia	67.2%	Brazil	12.3%	Greece	33.9%	Japan	60.9%
New Zealand	56.8%	UK	59.8%	Albania	1%	Philippines	9.3%

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<sup>i</sup> The countries include: South Africa, Namibia, Zambia, Zimbabwe, Uganda, Ethiopia, Eritrea, Togo, Benin, Nigeria, Ghana, The Gambia, Cameroon, Tanzania, Kenya, Egypt, Algeria, Morocco, Libya, Mauritania, Argentina, Brazil, Chile, Paraguay, Venezuela, Colombia, Panama, Nicaragua, Ecuador, Peru, India, China, Nepal, Malaysia, The Philippines, Thailand, Indonesia, Bangladesh, Pakistan, ...