



# An Assessment of Digital Divide in the PRC

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## ABSTRACT

As the most populous country in the world, the PRC has seen a drastic increase in Internet users in recent years with the latest count of 22.5 million at the end of June 2001. However, it is known that some groups in the PRC are not enjoying the benefits of Internet use, creating the so-called "digital divide" phenomenon. This means that for a number of reasons, these groups in the society cannot or will not be able to access the Internet to reap many potential benefits it can offer. This paper provides findings of a preliminary analysis on digital divide in the PRC using past Internet surveys together with economic and demographic data of the PRC. Obvious hurdles to Internet use, such as illiteracy, cost of Internet access, lacking of infrastructure will be examined with near-term technology advancements considered so to assess the magnitude of the digital divide at the present time and in the future. Suggestions to alleviate digital divide are then discussed.

## INTRODUCTION

### Digital Divide Phenomenon

The Internet has been claimed as the "Information Superhighway" or "Cyberspace" that will provide universal access to information and educational opportunities for the world and possibly eradicate the gross disparities within our society (Dunham, 1999; Howland, 1998). Yet, recently there has been a serious concern in the U.S. that while majority of the white middle and upper class individuals is accessing the Internet the poor and non-white are not taken the advantage of this technology. The report, *Falling Through the Net: A Survey of the 'Have Nots' in Rural and Urban American* (1995), by the U.S. Department of Commerce first documented the so-called "digital-divide" phenomenon. This report provided evidences to support the great technological disparity in the U.S. society using the U.S. Census Bureau's 1994 data on telephone subscribership, and ownership and usage of PCs and modems. The findings of the two subsequent reports by the U.S. Department of Commerce: *Falling Through The Net II: New Data on the Digital Divide* (1998) and *Falling Through the Net: Defining the Digital Divide* (1999) showed that with the expanded information access, the "digital divide" between certain groups of Americans had increased between 1994 and 1998. Factors affecting PC-ownership and on-line access include geographic area, income, race, age, education, and household type. Profiles of the "The Least Connected" are rural poor, rural and central city minorities, young households, female-headed households.

Some have argued that the first three Department of Commerce reports on "digital divide" phenomenon may have been false alarm for the Internet is spreading so fast that soon or later people of all groups will be wired (Frezza, 1999; Steward, 1999). In fact, the recent report, *Falling Through The Net: Toward Digital Inclusions* (2000), shows that progress is being made on accessing the Internet by members of the low-income, rural and minority households. However, the fact remains that those who are currently behind in Internet access are not able to enjoy many benefits of being wired and to participate fully in a society's economic, political and social life (Howland, 1998; Office of the Press Secretary, 1999).

### Internet Use in the PRC

In recent years, the People's Republic of China (PRC) has seen a drastic increase in the number of Internet users. Although the absolute number of Internet users is still quite small compared to the vast population of China, the speed of increase has been very impressive indeed. According to the *Statistical Reports on Internet Development in China* (1997, 1998, 1999a, 1999b, 2000a, 2000b, 2001) released by the China Internet Network Information Center (CNNIC), the number of Internet users in the PRC was estimated to be 620,000 in October 1997. By July 2001, the number of Internet users in China

has reached 22.5 million (Figure 1). (CNNIC is a nonprofit organization of Internet administration and service that performs the duties of National Network Information Center.) Every six-month, CNNIC publishes a survey report on Internet development in China. The survey report contains the total number of Internet users, geographic user distribution, traffic pattern, and domain name distribution among others. Online survey and spot checking are used to solicit responses from Internet users.

Geographically speaking, most of the PRC Internet users are located in major cities and provinces along the pacific coast. Inland provinces and rural areas take up only a small percentage of the user population. Most of the users are young and more affluent than average in the population. Thus, there are evidences of digital divide in the PRC. (Since Hong Kong, a Special Administrative Region of PRC, is quite dissimilar in Internet use compared to the mainland, it is not included in this study.)

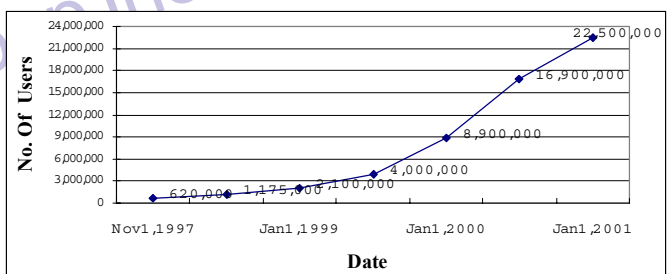
## DIGITAL DIVIDE IN THE PRC

Based on CNNIC surveys, factors such as education, geographic area, income and age play important roles in digital divide similar to conditions in the U.S. On the other hand, race is not taken into consideration due to the fact that 98% of the Chinese population is Han. Data on Internet users with respect to these factors are analyzed and results presented below.

### Education

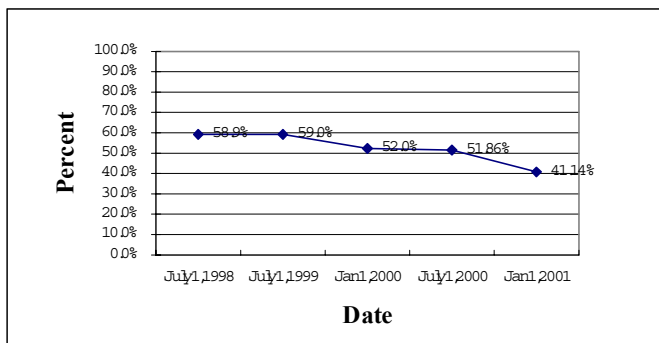
Internet adoption in general starts with highly educated groups in the population, and younger students and white-collar workers. As time goes by, Internet use would spread to less-educated sectors of the society. The adoption of the Internet in the PRC follows more or less the same trend. In July 1998 CNNIC survey, 93.1% of the users are

Figure 1: Number of Internet users in the PRC (excluding Hong Kong)



students with at least a technical secondary school or two-year college education. In January 2001 survey, this percentage is even higher at 97.5%. If only college or graduate-school education users are included, the percentage declined from a high of 58.9% in July 1998 to 35.8% in January 2001 showing a broad base of users in terms of educational background (Figure 2). However, users with below technical secondary education still account for a very small percentage of the total user population. This indicates that educated (in relative terms) Internet users account for the majority of the Internet population in the PRC currently, while in the U.S. Internet use has spread to the majority of the population, digital divide notwithstanding. However, with the language difference, it does not seem possible for Internet use to spread to less-educated and older population groups in the foreseeable future in the PRC. With a very high percentage of illiterates and primary education only in the PRC population, digital divide is quite apparent.

Figure 2: Internet users with undergraduate and higher education



Using data from *PRC Statistics Yearbook* (1997, 1998) on the percentages of population with College and Higher education and the percentages of Internet users in the population in each province and region, and the CNNIC survey results, a correlation analysis was performed between the two for years 1997 and 1998. The results show a very close correlation between the two:  $r = .989$ ,  $p = 0.000$  for 1997 and  $r = 0.951$ ,  $p = 0.000$  for 1998. In other words, the percent of Internet users in the population is highly correlated to the percent of college-or-higher-educated in the population.

#### Geographic Area

In the PRC, inland regions fall behind coastal regions in Internet use, similar to the case in the U.S. The eight coastal provinces with cities within them together account for three-quarter (3/4) of the Internet user population according to the CNNIC surveys (ranging from 77.3% in November 1997 to 74% in July 1, 2001). The values of this percentage have been relatively stable over the interim years (except an abnormality for January 2001 at 64.01%). This is out of proportion in view of the coastal regions' population of 410.25 million, approximately one-third of the total PRC population of 1,232.82 million as of 1998. This means that approximately 31 out of 1,000 people in the coastal regions are Internet users, yet for inland regions, less than 4 out of 1,000 people are Internet users.

The higher percentage of illiterates and primary school population in inland regions plus the lack of infrastructure bring about the digital divide. For example, among the twenty inland regions, only six have illiteracy rates below 10%, others are all in double-digit range. If the percentages of primary educated population are added to illiteracy percentages, many of those provinces would result in close to or over 50% totals for the new category.

#### Income

Household or personal income is an important factor affecting Internet access according to U.S. Department of Commerce reports

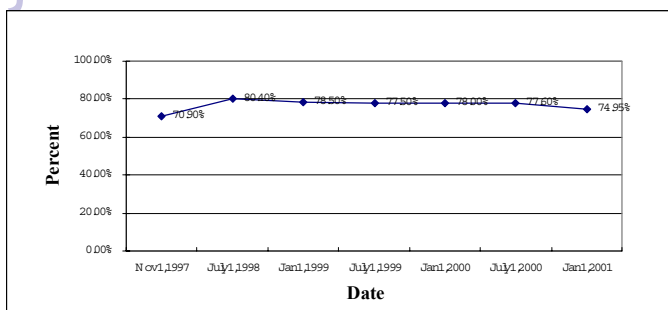
(1995, 1998, 1999). This is simply because low-income households or persons cannot afford to acquire the necessary hardware such as PC, modem, or set-top boxes, and pay for the cost of subscribing to Internet services. With a much lower level of income and higher cost of online access, income should be a more critical factor to the PRC in influencing Internet access. With a per capita disposable income for urban city residents of 5,160 yuans (US\$620) in 1997, a PC costs around 6,000 yuans would be prohibitively high for low-income families. Telephone installation ranges from 600 yuans to 1000 yuans in most places. For those who can afford to purchase a PC and acquire a telephone line, they have to pay a big share of their income for Internet access, for which the government (The Ministry of Information Industry) has been setting the prices. After the 20% rate reduction in March 1999, the Internet access fee for individual users is still 4 yuans per hour for the first 60 hours in a month, and 8 yuans for every additional hour. On top of this, one has to pay for a fee for using the telephone line. In some cities, Internet users have paid about one-third of their monthly salaries to gain Internet access at home (China Daily, 25 November 1999). If the costs does not declining drastically, Internet use will remain unaffordable to a large portion of the Chinese population.

A correlation analysis was carried out between the Per Capita Disposable Income (urban) and Percent of Internet Users in the Population using data from *PRC Statistics Yearbook* (1997, 1998) and CNNIC survey results with Beijing excluded. (Beijing has a much higher than average percentage of Internet users than other regions because it is the national capital.) The correlation analysis reveals a rather close relationship between the two variables:  $r = 0.641$  with  $p = 0.000$  for 1997 and  $r = 0.758$  with  $p = 0.000$  for 1998.

#### Age

In western countries, especially in the U.S., age as a damping factor for Internet use is gradually disappearing as the Internet penetration approaches 50% of the population. In the PRC, majority of Internet users is still relatively young. Based on CNNIC surveys, Internet users below 30 years of age account for three-quarters of the user population (Figure 3). Over the last few years, it appears that there has been little change in age composition of Internet users. In other words, increase in Internet usage has not spread out to other age groups so far.

Figure 3: Percent of Internet users below 30 years



It is most probable that in the future, the under 18 age group will see a substantial increase as more elementary and secondary schools are equipping themselves with PC labs will Internet access. At the same time, parents are buying PCs for their only child to use. However, there will be difficulties for the older population to use the Internet because of their lower level of education and computer proficiency.

## DISCUSSION ON FACTORS AFFECTING DIGITAL DIVIDE

#### Current Digital Divide

The above sections describe the digital divide in the PRC in terms of education, geographic area, income, and age, the important factors

affecting Internet use in the PRC. It appears that among these factors, education and income are, in particular, the primary factors contributing to the digital divide. To summarize the above discussion, one may arrive at the following general statements:

- Those with less than senior high or equivalent education have much less chance of becoming Internet users, accounting for approximately 3% of Internet users currently. With most of the PRC population in this category, it may be the most important contributing factor to digital divide.
- Those live in the rural regions, especially in inland provinces, have much less chance of accessing the Internet. In July 2000, 31 out of 1,000 people in the coastal regions are Internet users; for inland regions, less than 4 out of 1,000 people are Internet users.
- Those with income of less than RMB500 per month have much less chance of subscribing to Internet services; they account for 8% of the user population. Since the percentage of Internet users paying for their access will account for most of the increase in user base in the future, affordability for Internet access is a major factor to digital divide.
- Those whose age are 50 or above have much less chance of being Internet user. Most of the current users are less than 30 years of age. Above 50 years of age group accounts for less than 2% of the user population.

Since both survey and demographic data available are in simple summary form, a more comprehensive analysis by authors is not possible at this stage. However, even with the available data and analysis results, one may safely conclude that the disadvantage group in digital divide in the PRC are the older population located in the inland rural area. These are also the low-income people who cannot afford Internet access even if the information infrastructure is in place.

#### Perceived Usefulness and Perceived Ease of Use

It is quite apparent that the education level, geographical area, income, and age are important factors affecting Internet access and use. This casual relationship may be described using the Technology Acceptance Model (TAM) (Davis, 1989; Davis, Bagozzi, and Warshaw, 1989; Igbaria, Guimaraes, and Davis, 1995; Seddon, 1997) which has been widely used to study the adoption of information technologies, including personal computers, in information systems research. In TAM, it is assumed that the intention to use a technology is affected by the attitude of the user, the feelings of favorableness or unfavorableness toward the technology. User's attitude, in turn, is determined by two beliefs, the perceived usefulness and perceived ease of use. It appears that it is possible to use TAM to examine the factors affecting digital divide.

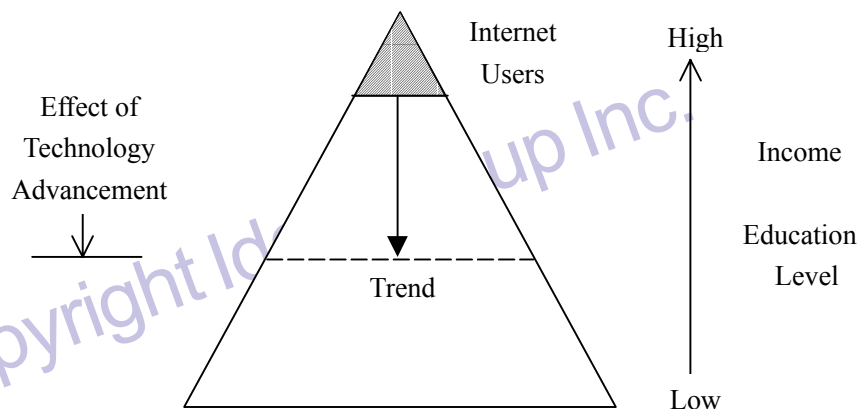
While geographical area may be neutral with respect to the two beliefs because it affects the availability of Internet access to people and not their attitude, the other three factors can be seen affecting the two beliefs. For example, it is obvious that perceived ease of use is largely affected by education level and age. Those with higher education levels tend to hold white-collar jobs and would be more knowledgeable about the use of technology if not personal computers. Younger people also have easier time adopting to new technology. On the other hand, it is reasonable to claim that educational level and income would also affect the perceived usefulness of Internet access. The tangible and intangible benefits resulting from Internet access, such as information gathering and decision making aids, and e-commerce, are mostly enjoyed by better educated and higher income segment of the population.

#### Impact of Technology Change

At the present time, the most common method of Internet access is through a personal computer and the modem hookup. This necessitates access to a telephone and certain degree of computer literacy. Currently the number of fixed line telephone subscribers in the PRC is around 130,500,000 (Hong Kong Dai Kung Pao, September 26, 2000). This pretty much is the upper limit for Internet access at the present time. In the foreseeable future, the use of set-top boxes will become increasingly popular, removing computer literacy as the necessary condition for Internet use, thus, diminishing the impact of education level and, to some degree, the influence of income. The rapid increasing use of mobile phones in the PRC (at 65,000,000 in September of 2000, Hong Kong Dai Kung Pao, September 26, 2000) also paves the way for the mobile commerce (or M-commerce). Wireless Internet access will reduce the influence of education level and income; it will also be a more user-friendly technology to the older population. Wireless technology certainly will, to some degree, help to remove the geographical barrier. The coming of the broadband age will allow a broader range of applications, such as iTV which will be more appealing to users, and thus increasing the Internet's perceived usefulness.

The population of the PRC may be view as a pyramid with the base being the group which has lower education level and lower income. As one goes up the pyramid, the base becomes smaller (Figure 4). At the current time, only 1.4% of the population at the top of the pyramid is enjoying Internet access. As the technology of access through wireless mobile phones and set-top boxes, the line separating those "haves" and those "have-nots" will move downward, thus gradually closing the gap between the two groups.

Figure 4: Internet access



### Reducing the Gap between Digital Divide

The recent drive by the PRC government to introduce competition into the telecommunications market will have great impacts on PRC's Internet service market. In 1999, the PRC government decided to break up China Telecom, the nation's monopoly supplier in telecommunications, into three separate companies: the China's Telecom Group (for fixed line services), the China Mobile Telecom Group, and the China Satellite Telecom Group. This break up, together with the establishment of China Unicom (a new carrier supported by various government ministries) in 1994, will undoubtedly bring about intense competition to the telecommunication markets in the PRC. Furthermore, PRC's entry to WTO in 2001 will also have direct and significant impacts on the Internet service market in China. With the cost of Internet access in the PRC on the decline and the steadily increasing household incomes, the base of Internet users will expand.

The PRC can certainly learn from the initiatives proposed by President Clinton to combat digital divide in the U.S. These initiatives include the government-funded Community Technology Centers, Preparing Tomorrow's Teachers to Use Technology Program, assistive technology for people with disabilities. The U.S. Commerce Department also launched the Home Internet Access and Technology Opportunity Program. These initiatives have to be examined to see whether they can be modified to suit the economic, cultural, and political environments in the PRC. Other alternatives should also be examined to reduce the gap of the digital divide. To do so, the government and the society have to be aware of the seriousness of digital divide at the first place.

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