When Most Quickly Developing Technique Meets with Most Quickly Developing Country: Towards Understanding Internet in China

Yun Tang[1*], Lifeng Sun[1], Hai Qin[2], Shiqiang Yang[1], Yuzhuo Zhong[1]
[1] Department of Computer Science and Technology
Tsinghua University
Beijing 100084, P.R.China
[*] tangyun98@mails.tsinghua.edu.cn
[2] State Council Informatization Office, P.R.China

Abstract - *To a large extent, governments and organizations worldwide have recognized that either the broader information communication technologies (ICTs) sector or specifically with respect to Internet, are becoming crucial components of global commerce and human society. However, discussions on the socio-economic impacts of ICTs and Internet have been taken place for several years across nearly all the countries and it is far from clear that what they should be, due in large part to the inherently multi-dimensional and rapid natures. With the consideration that Internet performs one of the most vivid and important roles under "ICTs" umbrella, in this paper we attempt to concentrate on the insightful understanding towards the impacts of Internet in China. We mainly make a quantitative analysis to the social impacts from the perspective of humans on a domestic survey basis. Moreover, several fundamental observations along with its growth and socio-economic development are also extensively investigated, and motivate us to further propose many corresponding suggestions to achieve harmonious development of both the society and Internet itself.*

Keywords: Social Impact, Internet, China Internet, Harmonious Development.

1 Introduction

At the beginning of 1950s, direct dial telephony was in its infancy and international call or cell phone was almost completely a speculation of science fiction. Computers, both huge in size and primitive in capacity, had just come into the eyesight of specific researchers, and cost millions of U.S. dollars at its time [1]. Over 50 years, the inventions and development referred to those have clearly changed our world irrevocably. Mobile phones or voice over IP (VoIP) service, for instance Skype [2], make it possible to establish a direct dialogue between any given pair of users on the planet. Shopping on the net [3] and working at home both come into truth with the turn of this century. Just as the automobile brought entirely new pattern of working and living, information communication technologies (ICTs), such as communication satellites, computers and Internet etc., have further shrunk our world and provided with a capability to communicate, almost any time, anywhere, with anyone. Needless to say, governments and organizations worldwide have recognized that ICTs generally and Internet in particular are becoming crucial components of global commerce and human society.

Whereas nearly everyone advocates either political or socio-economic importance of ICTs and Internet, the discussions on their impacts have formally existed for a couple of years [4][5][6]. Extremely speaking, the universal agreement on such hot topic is nothing but to say it is far from clear that what they should be well and truly, due in large part to the inherently multi-dimensional and rapid natures. Besides, what makes it particularly difficult to answer this question is the unique set of challenges that ICTs pose, i.e. non-territorial characteristics, many-to-many relationship, bottom-up orientation architecture and enabling capability, to name a few. Towards this end, political leaders around the world are struggling to keep pace with the development and innovations in ICTs and to adjust associated regulatory regimes [7].

In view of fact that ICTs have played a key role in social and economic development and will lead continuous growth along with transformations in every sector of human society, we insist that efforts towards understanding what have happened, what is currently experiencing and further what the future shape is, are definitely necessary. As the world's most populous nation, China has made a miracle to keep an unbelievably fast economic growth with annual rate of 8% [8] in last years, and takes more responsibilities of international and regional matters with no doubt. Evidently, China is also experiencing both gains and challenges arising from the global spread of ICTs. Therefore, it is worthwhile to take a glance into the issues and problems upon a national point of view, which is highly important and helpful for the deeper discussions around the world. The introductory summary frames our

research work, which may be summarized as follows.1) *what does the development of ICTs and related industry bring into such a developing country as China? 2) as ICTs grow up in global dimension and cross boundaries, what are the domestic issues and problems appearing with their growth? 3) How should we properly recognize the potentials of ICTs and accordingly adjust public policies to achieve an effective, efficient, flexible and balanced development pattern?*

With the consideration that among various techniques and industries under the "ICTs" umbrella Internet is the most vivid and quickly developing actor, we intentionally exploit it as the first step far towards answering above questions. Target on what had happened when this most quickly developing technique meets with the most quickly developing country, our research work so far makes following contributions: 1) Making quantitative analysis to the social impacts from the perspective of humans on a domestic survey basis; 2) Deriving several fundamental observations coming along with the growth of Internet and socio-economic development in China; 3) Proposing suggestions on the development of Internet in China to achieve harmonious development of both the society and Internet itself.

The balance of this paper is organized as follows. Section II presents an overview of Internet in China, followed by a multi-angle quantitative analysis of social impacts of Internet. Section III concentrates on many fundamental observations along with Internet and society development and then motivates us to propose some suggestions in Section IV. Section V concludes this paper and discusses future work.

2 Internet in china

Starting with a network research project that eventually became the Internet in the late 1960's [9], the circumstances surrounding the Internet are always evolving and thus significantly different from time to time. In the early days, Internet was technical, research-oriented, practical and cooperative. Until about in the middle of 1980's was the Internet essentially a tool for a people in the scientific community. Over time, commercial Internet service providers (ISPs) emerged to offer network service to commercial sector and by 1995 they were fully integrated into an increasingly commercial network connecting all countries. Now Internet itself claims at least 580 million users [10] in all countries of the world. From its very beginning, Internet development and operation have been characterized by bottom-up orientation architecture, decentralized control mechanism and a system of coordination by numerous organizations, each having certain responsibilities for its operation. With the extraordinary rapidth of its growth, Internet has nearly reached every corner on this planet and enlightens a totally different pattern of working, living, and even entertainment. As a matter of fact, it is also becoming prevalent within China in past few years, impressing through deep penetration across from economic growth, social development to domestic culture and lifestyle. In this section, we mainly aim to give a brief overview to Internet evolution in China and then make analysis to its impacts in economy and society, respectively in two subsections.

2.1 Overview: A huge net expanding quickly

As the response to the worldwide bloom of Internet in past years, Internet in China had also experienced a ten-year growth from an infant in swaddle evolving into the critical national infrastructure of economy, e-government and society since China was accepted as one of full-function Internet countries at April, 1994. During these years, China has made great progress in improving information infrastructure and this has been accomplished in part by promoting several network construction projects. According to the 16th statistical survey report on the Internet development in China [11] done by China Internet Network Information Center (CNNIC), the total bandwidth of leased international connections has reached 82,617M and countries directly interconnected to China's Internet include the United States, Russia, France, etc. Besides, by the end of July 2005, there have been more than 100 million Internet users, increased by 51.5% than 3 years ago and 3.9 times that of 5 years ago. Compared to the first survey in 1997, this figure has expanded 140 times and intrinsic to this is an amazing average annual increment of 102%! At the same time, there were 45.6 million computers connecting to the Internet, increased by 9.3 million in one year and nearly 6 times that of 6 years ago. Fig.1 schematically shows the Internet evolution in terms of number of users and computers from 2000 to 2005 in China. It should be stressed that a clear faster increase trend within the lately three years confirms calefactive evidence in information technology industry, especially the Internet economy.

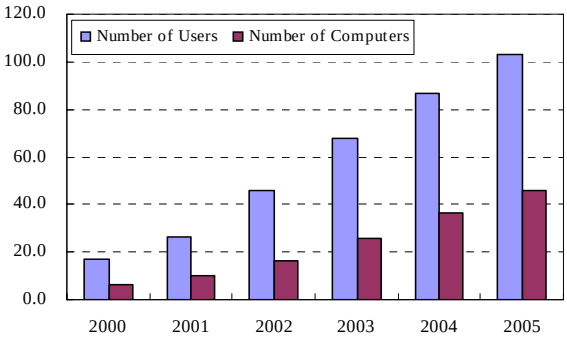

Fig. 1. Internet Evolution in China (Unit: Million)

Particularly, when we notice that broadband connections provide end users with the capability to stay "online-while-

power-on" with more bandwidth resources, as opposed to "connection-on-demand" and 56 or 128kbps rate of dial-up modem access, additional attentions are paid to the striking increase of broadband users. Fig.2 depicts the tremendous proliferation of broadband access mode in China from 2000 to 2005. Observe that in these years its growth always keeps a breathtaking speed and till now it has attracted as many as 53.0 million users, nearly half the size of the Internet users' community. Undoubtedly, the prevalence of broadband leads to certain substantial changes, which could be perceived in following analysis, into the behaviors of users and commercial patterns on the Internet, thus not only enabling a large number of new classes of applications, but more profound, incubating socio-economics transformations.

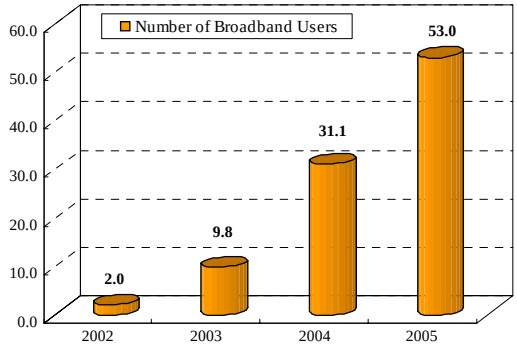

Fig. 2 Broadband Users over Year (Unit: Million)

Given the fact that only a small percentage of Chinese population, say 8%, is currently using the Internet, the potential of its growth is unquestionable. Additionally, with the tidal wave of economy globalization and accelerated modernization progress of China after the accession to the World Trade Organization (WTO), it is commonly believed that Internet in China continues to grow in size, national scope and socio-economic importance for a certainly long period. So we could summarize the growth of Internet in China under the rubric of "a huge net expanding quickly".

2.2 Experiencing "Internetization"

Apparently, beyond the great importance to international and national economy, Internet also plays an important, flexible and complex role in modern society and human activities. From the wireless access on the airport to the public query service right at the gate of lecture hall, we could see Internet everywhere. As China has made significant efforts to modernize its telecommunication infrastructure in past few years, Internet has gained its popularity in this fast-running developing country, especially in most big cities. Naturally, China is also experiencing changes that are introduced by Internet both directly and indirectly, as elsewhere in the world. On one hand, Internet in general is characterized by powerful penetration, broad diffusion and quick self-expansion, resulting in multi-dimensional effects to human lifestyle, behaviors and attitudes in reality. On the other hand, to the extent Internet itself performs the role of hyper-mass media, it really enables this specific area the capability to establish multi-party dialogues among numerous equivalent end nodes, and inherently influence the traditional way of media collection, distribution as well as interaction. Based on the distinct participatory design philosophy, Internet further introduces a new area of interplay between government offices and social individuals. All those factors come into play to motivate us to investigate what has happened between Internet and our society. As the first step, we make a quantitative analysis to a domestic survey [12] to highlight the social impacts from the perspective of humans. As depicted in Fig.3, we tentatively derive this conceptual framework from the survey and then focus on these four panes, comprising media utilization, media trust, intercommunication and political participation. It should be pointed out that 5 big cities and total 2,376 samples, including 1,169 "netizens" [13] and 1,267 "non-netizens" are referred to as the representative data structure. Additionally, several essential statistical properties are also taken into account.

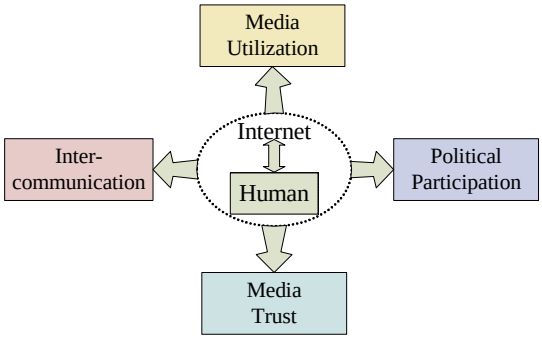

Fig.3 Conceptual Framework of Social Impacts

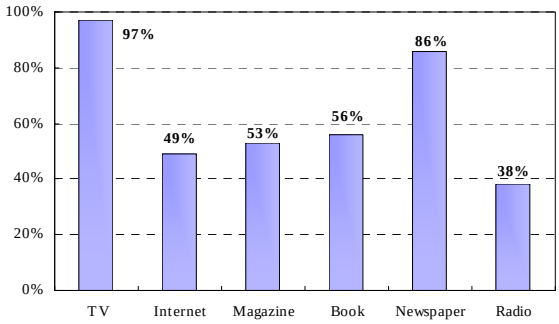

Fig.4 Penetration Ratio of Medias in China

1) **Media Utilization**: As human beings are immersive within the surroundings of media and information, our life substantially relies more and more upon a variety of mass medias (television, newspaper, etc.) and bidirectional

medias (fixed and cellular phones, for instance). However an emerging field, borne out of the Internet and traditional media, so called Internet media induces gigantic changes to the environment for the spread of information and digital media contents. Therefore it is interesting to look through present media utilization pattern in big cities of China. Fig.4 illustrates the penetration ratio of different media formats and it is clear that TV remains the highest while Internet exhibits a comparative value with respect to magazines and books. Note that this ratio of 49% is far more than the previous average ratio, i.e. 8% of Internet users, which demonstrates that the development of Internet in big cities achieves preferential position than other regions. Moreover, in addition to the utilization ratio, another profound factor that basically differentiates each format lies with the utilization time. Fig. 5 shows the average hours per day that users spend on each different media format. The distinct gap between Internet and other media formats mainly attributes to the multi-functional characteristics of Internet. And we believe that a large part of these 2.73 hours falls into the embrace of Internet games-like entertainments, which will be discussed in Section 3. Thirdly, specifically with respect to information acquisition, different media formats are of significantly different importance. With the consideration of distinct frames of reference between "netizens" and "non-netizens", we intentionally compare the ratio of media importance along the dimension of above two groups, as shown in Fig. 6. More than 70% of both communities agree that TV and newspaper are still the most important sources for information, which implies these two media formats did not appear the same descendent trend in China as in the developed countries. Besides, "netizens" and "non-netizens" take different viewpoints to the rest of media formats and the former community shows more interests in books and magazines than the latter.

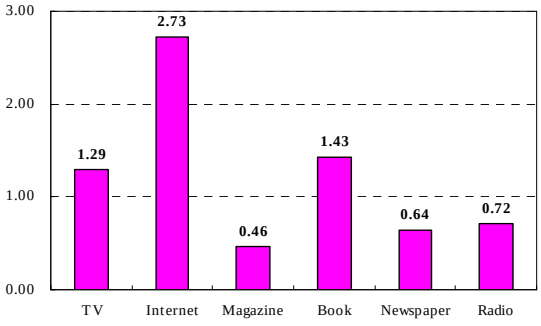

Fig.5 Average Utilization Time of Media Formats (Unit: Hours per Day)

2) **Media Trust**: On second thoughts, another important and interesting issue within the scope of media and Internet is the matter of trust. The intrinsic value of public media mainly depends on whether the masses trust it, which inherently reflects the feedbacks about past reputations. Towards this end, we add domestic and foreign news parameters to previous analysis and then find out that the most trustful media formats range from domestic TV news, domestic newspaper to domestic radio news in turn, as shown in Fig.7. The ratio of trust in Internet news, whether from domestic or foreign websites, remains below 50%. As a public information distribution channel, Internet still needs to take lots of efforts before evolving a matured and credible media format.

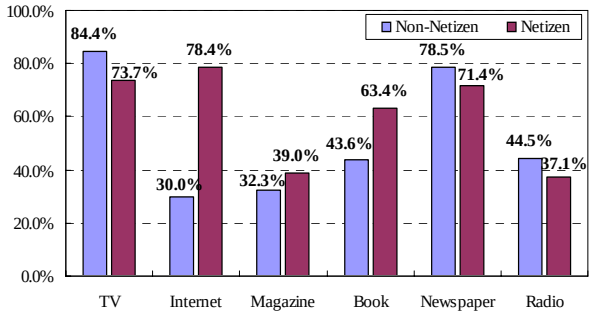

Fig.6 Media Importance for Information Acquisition

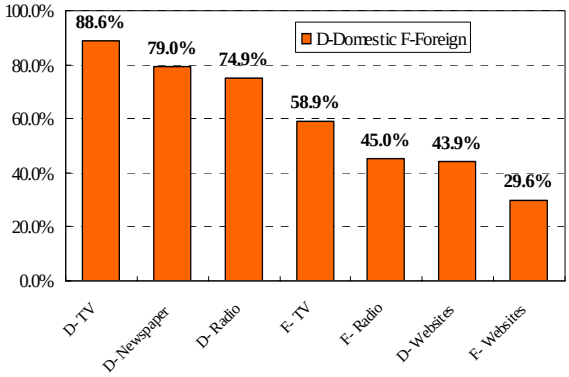

Fig.7 Trust Ratio of News in Different Media Formats

3) **Intercommunication**: Generally speaking, the chief task of Internet is to provide a cheap and convenient platform for information exchange and human intercommunication. Thus it is necessary to examine the issue of networked intercommunication. Here we consider various Internet communication tools and applications as representative examples. Fig.8 gives a brief clue to the utilization ratio of such familiar utilities as blog, MSN messenger, Bulletin Board System (BBS), Internet Relay Chatting (IRC), ICQ/QQ and email. Fig. 9 further illustrates the detailed utilization frequency analysis to email which is in common use around the world, connecting people in different continents without the limitation of time and space. Note that, nearly 1/3 Internet users in China never make use of email while there is more than 1/5 Internet users who often use it and 24% users always deploy email as a routine communication tool.

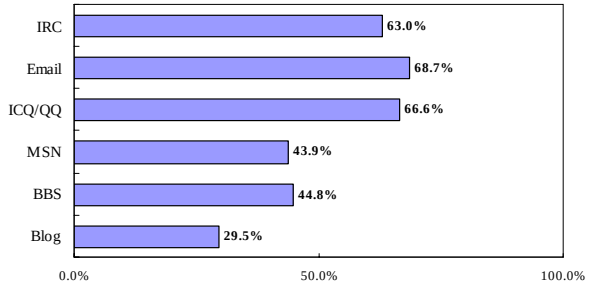

Fig.8 Utilization Ratio of Internet Communication Tools

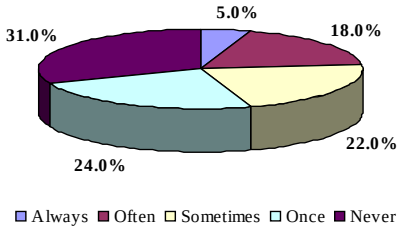

Fig.9 Utilization Frequency of Email

4) **Political Participation**: As said, Internet offers an informative and interactive arena for government and citizens. In reality, it could be observed that more and more "netizens" begin to use the cyberspace, for instance, BBS forums or network communities to make comments on various kinds of news, events and policies. Accordingly in the survey, the attitude towards the effects on Internet in political participation of China includes five "whether", that is, whether the Internet increase the political power of people, whether they could have more opportunities to comment on government affairs, whether more public policy issues could be known, whether Internet facilitate government offices to provide better service as well as whether government get more understandings towards the opinions of the masses. Fig. 10 shows the survey results in detail and we could conclude that most people take the positive viewpoints to the relationship between Internet and political participation. As the juncture of mutual communication, Internet wins unblamable applause across both sides.

As a result, Internet is constantly recognized as an alternative, as well as effective media format and communication tool. Its impacts to traditional media domains, intercommunication and political participation, to some extent, represent quick social development in China. Although these aspects are only very small portions of social impacts of Internet, we still claim that this is the first step towards understanding what Internet brings us with other dimensions.

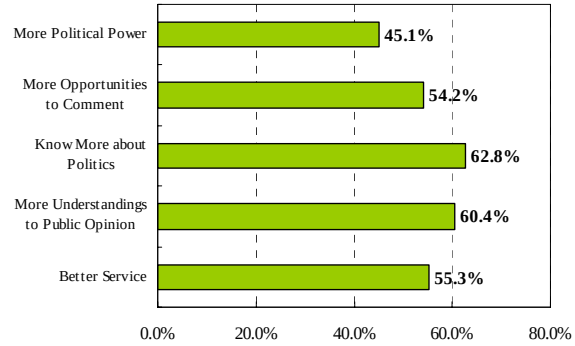

Fig.10 Internet Effecits in Political Participation

In this section, we basically intend to provide a brief description to the Internet development in China. Then a quantitative analysis to the social impacts based on a domestic survey is presented to highlight the status in quo. However, it is believed that many issues and problems arising from the growth of Internet still exist and in next section, we will take a glance to several fundamental observations during the childhood of Internet, in China.

3 Other side of the coin

Clearly, in the arena of Internet, the increasing performers and the increased activities of their roles complicate its role. From the macroscopic perspective, these wonderfully enormous numbers in terms of total users and personal computers account for a fascinating growth of Internet in faith, which in turn takes a great position in the development of China, with more plays in political, economic, social and even cultural stages. However, as each coin has two sides, it is not out of our surprise to find out that this polyhedron also involves a series of issues and problems in China, especially when it is still in the childhood. We will present some fundamental observations along the fields of digital divide, application imbalance and young "netizens" in following analysis.

3.1 Digital divide

Before we go into the details of this worldwide instance, let's first recall that the ratio of Internet users in China is approximately 8% while the penetration ratio in big cities reaches close to 50%. This salient difference has implied unbalanced development of Internet in China. Furthermore, according to [11], North China, East China and South China respectively contributed 31.2%, 27.1% and 23.3% into the total .CN domain names while the sum of domain names registered in Northeast, Southwest and Northwest China was only 12.5%, as schematically shown in Fig.11. This regional diversity fundamentally implicates a match to the disequilibrium of economic development in China and could be defined as the first digital divide. What's more, in the distribution of professions, there is only 2.2% Internet users who engage in agriculture,

forestry, animal husbandry and fishery, even lost 0.1% in comparison with last year. The great contrast between 2.2% and the ratio 70% of agriculture population reminds us the existence of another digital divide. To this extent, we cannot but admit that in China, at present Internet mainly clusters in developed regions and cities.

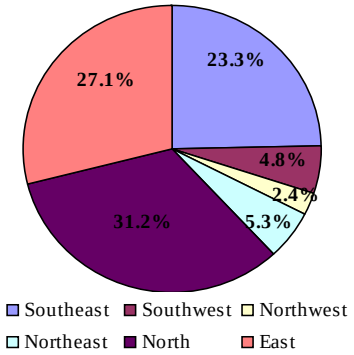

Fig.11 Region Distribution of .CN Domain Name

3.2 Application imbalance

Internet started with electronic communication lines between research institutions and grew as a tool for researchers. However, as shown in [11], only 10.3% and 1.4% users regard studying and academic research as their primary purpose for accessing Internet. In view of fact that at least 60.7% users, including students, teachers, technical persons and enterprises' managing persons, are assumed to have the demand for study via Internet, it could be deduced that Internet does not evolve an effective tool for learning yet. Additionally, users who access Internet for business and economic related activities also remain a low ratio, say 1.0% for financing and 0.1% for selling and buying on the net. Accordingly one of key issues that confront today's Internet in China is how to take full advantages of Internet applications, and further translate kinds of information into the knowledge and in turn the wealth. We believe this is the substantial principle within the knowledge economy and information society.

3.3 Young "Netizens"

In recent years, it is traced in the annual statistical survey reports of CNNIC that the users with entertainment as primary purpose for accessing Internet has reached 39.04 million in China, increased by 30.42 million than two years ago. While the number of Internet users under the age of 35 increases sharply from 37.56 million to 83.74 million, which means a striking increment of 46.18 million. With such 30.42 and 46.18 two tens of millions numbers in mind, we could boldly speculate that most of the increasing Internet users are the youth, and most of those youth users access Internet for the purpose of leisure and entertainment, specifically with respect to network chat and Internet games. It is evidenced that more than 50% young "netizens' in elementary and high schools access Internet for chatting and 44.2% for games [14]. It is reported that the average time spent by Internet game players per week has reached 11.7 hours, and more than half of the users agree that various games have imposed great negative impacts to their study, work and even life. To this end, all of us must be aware of what is behind the large numbers of Internet users and pay much more attention to cultivate Internet toward a favorable environment for learning and business, rather than a solely flourishing market of chatting and network-based games, especially for the young generation.

4 Towards harmonious development

However, it is known to us all that stones could be used to build up either fascinating skyscrapers or illegal architectures around the road. By similar reasoning, Internet itself makes no kind or evil. On the contrary, it is how to recognize its potentials and how to use it properly that makes the most important issue. Needless to say, Internet becomes the critical national infrastructure for the economy, society and e-government. For China, it is recognized broadly that Internet brings not only challenges but opportunities. Discovering how to exploit the Internet for economic, social and political benefit is one such challenge, as well as opportunity. In this section, we simply propose some suggestions to address the problems posed in last section, aiming to achieve harmonious development of society and Internet itself.

First of all, since most of users in China do not recognize the full advantages and characteristics of Internet, it is critical to attach the importance to propagandize how to understand and utilize Internet appropriately. In particular, for the youth, the whole society takes the responsibility to show them the potential of Internet in terms of self-learning and information dissemination. We believe that it would be helpful if some Internet case studies are introduced into teaching materials to guide pupils, high school students and other young people to the right way of Internet utilization. As Internet becomes more prevalent and common in China, it is no time to delay for this issue.

Secondly, the dual digital divides put forward an urgent demand for village and county internetization. In the face of large number of agriculture population, general access to Internet and specific agriculture services are the ultimate choices. More detailedly, we suggest the governments and private sectors to encourage the construction of agriculture information resources system, farming knowledge diffusion system and corresponding applications. Besides, it is impossible to ignore the existence of nearly 110 million agriculture workers who come from various villages and swarm into big cities for a living. Thus the integration of information and services for this specific huge community should be put in place too. In doing so,

the most quickly developing technique basically does a great favor in the modernization process of this most quickly developing country.

At last, we would like to advocate digital content industry as another stanchion for the development of Internet in China, in addition to its own prevalence. To the extent that Internet itself plays the role of both communication tool and media format, the contents on the Internet may be critical to the eventual development of society and economy. On one hand, digital content industry will fulfill the task that takes full capacities of Internet with respect to education, information and resource integration. On the other hand, as one of new emerging industries, it involves the manufacture, development, management and distribution of digital contents and corresponding services, thus syncretizing many existing industries and providing numerous employment opportunities indeed.

Actually there are so many other important issues in the development of Internet in China that we could not cover with each aspect, so we refer to these three suggestions as the most pivotal ones. In short, Internet is a meaningful outcome of technical advancement and human evolution. We believe that with proper understanding and utilization, Internet in China would be of great assistance towards the harmony of socio-economic development.

5 Conclusions

In this paper, we mainly investigate the issues and problems arising from the interplay between the most quickly developing technique, Internet and the most quickly developing country, China. On the basis of a domestic survey, some understandings towards the social impacts of Internet are provided with quantitative analysis. We also exhibit three fundamental problems along with the development of Internet, namely digital divide, application imbalance and youth “netizens”, and accordingly propose several suggestions to indicate what we should do in near future for the harmonious development of society, economy as well as internet itself.

Frankly speaking, this is the first step towards the accurate and intact understanding on what Internet brings us and it still remains a long way to walk. In the next step, we will extend our research work to other sectors, such as culture, health care, and finance to go deep into such an interesting and challenging topic.

6 Acknowledgement

This work is supported by the National Natural Science Foundation of China under Grant No.60432030 and No.60503063. We also wish to thank the anonymous reviewers for their comments.

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