

Integrated Approach of Development Communication

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Abstract—Internet application in China has maintained a constant development tendency in the past decade. China is now one of the most populous countries in terms of internet user population. While offering enormous opportunities, the dramatic digitalization also brings about a series of challenges that demand urgent attention. Digital divide is one of the challenges that affect China as well as other countries in the world. This paper examines digital divide in the Chinese context from the perspective of development communication. Through a case study of a rural township under the backdrop of the rapid internet development in China, the paper discusses the economic, psychological and cultural roots of digital divide; and explores development communication strategies addressing the roots of digital divide. It is argued that development communication must be responsive to the potentialities and preferences of the specific society and serve the purposes of participation and sustainability.

Keywords—Development Communication, Digital Divide, Internet, communication media.

I. INTRODUCTION

INTERNET is one of the most influential information technologies developed in the twentieth century. Technically, internet allows interactivity among users, multidirectional and spontaneous flow of communication, boundary-free access by the public, publication without gatekeepers, and anonymity of participants. Therefore, it is hailed as a means for democracy that enables open, free, and public dialogues and debates in the civil society, and between civil society and government. However, as internet spreads throughout the world and penetrates into the fibers of human society, some alarming issues are brought forward. Digital divide and its consequence of widening inequalities is one of the most striking problems that exist globally. This paper aims to study digital divide in China, and to explore development communication strategies mitigating the problem of digital divide. The status of digital divide in China is mapped via secondary data analysis. The issue is examined further through a case study of media usage in a mountainous township in Guangdong Province. The paper brings to light hurdles hindering development of those who are marginalized in the process of digitalization and discusses development communication strategies responding to the potentialities and preferences of the society of concern.

II. MAPPING THE DEVELOPMENT

Internet development in China was started relative late, compared to many industrial countries in the world. China

commenced building its first backbone network - National Computing and Networking Facility of China (NCFC) in 1989 and formally connected to the worldwide internet in 1994[1]. Since then, the application of internet in China has maintained a rapid and steady development trend. China's fast advancement in digitalization is reflected in three facets, including infrastructure establishment, internet penetration rate, and e-Governance and commerce development.

A. Infrastructure Establishment

With the official launching of ChinaNet, China commenced its internet service for the public in January 1996[1]. The earliest users of internet in China were mostly researchers, information technology professionals, and university students. In 1997, there were only four backbone networks in China, providing an international export bandwidth of 25,408 Mbps [2]. By December 2011, the six major backbone networks in China was supporting 1,389,529 Mbps international export [3]. Table I showed data of key internet infrastructure indicators of 1997 and 2011 in China.

TABLE I
DEVELOPMENT OF INFRASTRUCTURE IN CHINA

Indicators	As of December 2011	As of October 1997
Website number	2.3 million	1500
International export bandwidth	1,389,529 Mbps	25,408 Mbps
IPv4 number	330 million	N/A
Domain name number	77.5 billion	4066

[2, 3]

One of the significant information communication technology infrastructure development initiatives was the "Cun Tong" (村村通 connecting the villages) project rolled out nationwide in 2006, as one of the priority targets of China's 11th national Five-year Plan. According to the Chinese Ministry of Industry and Information Technology, after 5 years' development, China's telecommunication networks, including telephone and internet, has achieved 100% coverage of the villages in rural area by 2011[4]. The growth of mobile phone connection rate was the fastest although it arrived to the Chinese market later than internet and landline telephone. As of May 2012, the connection rate of landline telephone in China was 21.3 % of the national population. Connection rate of mobile phone was 73.6% [5].

B. Internet Penetration Rate

The earliest internet applications in China were limited to education, research and IT industry. The First Statistical Report on Internet Development in China revealed that as of 1997, distribution of the Chinese internet users by occupation were

mainly in education, research, IT industry, and student. In October 1997, the Chinese internet user population was only 620,000 [2]. According to the statistical reports published by China Internet Network Information Centre (CNNIC), internet penetration rate has increased dramatically in the last 6 years. China now houses more than one quarter of the world's internet users. The 29th Statistical Report on Internet Development in China (here after referred to as the 29th Statistical Report) showed that Chinese internet user population had reached 513 million in December 2011 [3]. The world's internet user population at the same time was 2.26 billion [6]. The distribution of the internet population is now penetrating into various walks of life, albeit there are still obvious digital divides that will be discussed later in this paper. As of December 2011, the top-5 most connected occupations were students, self-employment, corporate employees, unemployed, and professionals[3]. Users of these five occupation types made up 73% of the total Chinese internet user population. Table II shows details of the distributions of the top-5 most connected groups.

TABLE II
TOP-5 MOST CONNECTED GROUPS

Occupations	% of the User population
Students	30.2
Self-employment	16
Corporate employees	9.9
Unemployment	8.6
Professionals	8.3
Accumulated total:	73

Internet penetration rate achieved fast growth since 2006. The Chinese internet user population in December 2005 was 111 million [7]. This represented less than 10% of the national population at that time. The penetrations rate was increased to 38.3% in December 2011, with an average increasing rate of 6% each year in the past 6 years [3]. The internet penetration rate of China has now surpassed the world's average, which was 32.7% in 2011 [6].

C. Development of e-Governance and e-Commerce

Despite the economic reformation since the 1980s, China is still a centralized state in terms of its political and economic systems. The centralization nature of China's society system determines the predominant role of the Chinese government in the country's information communication technology (ICT) development.

China has experienced two generations of political leadership since it formally connected to the world's internet. Leaders of both of the generations have explicitly stressed the importance of ICT for the development of the country. Development of ICT was first bought into the national economic and social development agenda in 2000. In the resolution passed by the 5th Session of the 15th National Congress of the Central Committee of the Communist Party of China, it was proposed that development of ICT was a strategic measure for the overall modernization of China [8]. In 2002, when reporting to the 16th National Congress of the Chinese Communist Party, President Jiang Zemin pointed out that

internet websites were the important battle field for communication of progressive cultures [9]. As a strategy to institutionalize socialist political democracy, the Central Government of China passed a regulation on government information transparency in April 2007, requiring governments of and above the level of country to make information concerning the public open to the society using internet and other information communication channels [10]. The transparent governance regulation was enforced from May 2008. President Hu Jintao demonstrated the government's determinacy to promote e-Governance by not only talking about it, but also acting on it. He paid a visit to the headquarter of People Network (www.people.com.cn) in Beijing and had a live chat with Chinese internet users on 20th June 2008 [11]. In response to questions asked by the internet users, President Hu said that he surfed on the web for three major purposes, namely viewing national and international news; understanding internet users' concerns and opinions; and understanding internet users' comments and suggestions for the (Chinese Communist) Party and the state. He affirmed that the Chinese government paid great attention to some suggestions and comments posted by the internet users, and viewed the internet as an important channel of knowing people's sentiment and pooling people's wisdom. President Hu's move was widely reported in various media in China and publicized as a symbol of advancement of political democracy in China. Since then, the term "wang shang ting zheng" (网上听政 meaning "online governance") became fashionable in China. Governments of all levels set up feedback links and government information sections (政府信息公开) on their official websites as a gesture of democracy. For example, presently all of the 31 provincial/municipal governments in the Mainland China have established links in their websites to receive public inquiries and feedbacks, and to publish government documents (e.g. policies and regulations, reports, local projects, etc).

Online shopping is the most popular e-Commerce application amongst Chinese internet users. According to the 29th Statistical Report, 37.8% of the internet users shopped online in 2011. This was followed by online payment, of which the usage rate was 32.5%. China Internet Network Information Center reported that China's online shopping achieved historical development from 2009 to 2010. Chinese online shoppers counted 87.88 million, with an annual trading turnover of 250 billion RMB (Chinese Yuan) in 2009[12]. In 2010 both figures were nearly doubled. Table III showed online shopper and trading turnover figures from 2009 to 2011[13].

TABLE III
ONLINE SHOPPING (2009-2011)

Year	Number of online shoppers (million)	Annual online trading turn over (billion RMB)
2009	87.88	250
2010	161	523.1
2011	200	756.6

As internet is penetrating into human's political, economic, social, and private lives, the issue of disparities between those who are connected and those who are unconnected is brought forward.

III. DIGITAL DIVIDE IN CHINA

Digital divide represents the differentiation of being benefited from the modern digital technologies. Commonly, it is referred to the gap between those who have and those who have-not access to the internet technology and connection [14]. The development of internet in China showed considerable digital divide across the existing societal divisions. Among others, significant disparities were found between divisions of age, education and region. According to the latest statistical data [3], a Chinese internet user is typically a young city dweller with a high school certificate.

A. The Age Gap

According to the 29th Statistical Report, the majority of Chinese internet users were of the age between 10 and 39. Aged people, particularly those were above the age of 60, were largely excluded from the net. The age gap has existed from the very beginning of the development of internet in China. In 1997, according to the first statistical report delivered by China Internet Network Information Center, the majority of the Chinese internet users aged between 21 and 35 [15]. Table IV compares the distributions of Chinese internet user population by age in 1997 and 2011. The age distribution of user population showed considerable movement towards younger age. There was a significant increase of teenage users. There are two explanations for this tendency. First, many families and schools, especially in urban area, have computers and internet connections now. The teenagers, most of them cannot afford the facilities by themselves, are benefited from the increased material accessibility in the society and family. Second, computing subjects are introduced into primary school education since the 1980s. Therefore, the young generation are equipped with digital capacity better and earlier than the older generation.

TABLE IV
COMPARISON OF AGE DISTRIBUTIONS OF 1997 AND 2011

1997 (% of the internet user population)		2011 (% of the internet user population)	
15 and under	0.3	10 and under	1.7
16-20	5.3	10-19	26.7
21-25	36.3	20-29	29.8
26-30	29	30-39	25.7
31-35	13.2	40-49	11.4
36-40	4.3	50-59	4.1
41-50	6.8	60 and above	0.7
50 and above	4.8		

[3, 15]

B. The Gap of Education

Compared with that of the earlier stage of internet development in China, the current distribution of internet user population by education displays a relatively more inclusive status. Before 1998, the majority of Chinese internet users had a university education background. The 29th Statistical Report indicated that the internet user population distributed across various education categories, with the majority moving from having university education background to high school education background. Table V presents data that demonstrating the change of distribution of Chinese internet user population by education attainments since 1998.

TABLE V
THE SHIFTING OF THE GAP OF EDUCATION AMONG INTERNET USERS
(% of total internet user population of the year)

Year	Primary school and below	Junior High school	Senior High school	Junior college	University and above
1998	10			90	
2006	16.2			24.4	29.2
2008	5.4	28	39.4	14	13.2
2010	8.4	32.8	35.7	11.8	11.4
2011	8.5	35.7	33.3	10.5	11.9

[3, 7, 12, 15-17]

The shifting of user population distribution from concentrating in people with higher education background to spreading out and including those with secondary education reflected the maturation of internet application in China. First, accessibility to the technology has developed from catering education and research needs of universities and research institutions, to meeting the needs of the society. Internet was first applied in education and research in China. China Education and Research Computing Network (CERNET) was the first Chinese network connected onto the world's internet in July 1994. The Chinese public did not have access to the internet till 1996 when the public network ChinaNet started operating. China now has 6 backbone networks providing an international export bandwidth of 1,389,529 Mbps [3]. Second, people's knowledge and skill to use internet technology has generally advanced. Computing education has been introduced into primary school curriculum. Many of the young generations actually grow up with a computer and internet connection at home and learn the knowledge and skill even before going to school.

Despite the fast increase of the percentage of high school internet users in the past 5 years, the disparities between people with different education backgrounds in terms of population penetration rate is still rather significant. There is a wide gap in internet penetration rate between people who received a formal education of or above senior high school level and those whose education level are under senior high school level. As of December 2011, the internet penetration rate among people completed senior high school education and university education were 90.9% and 96.1% respectively. Internet penetration rate of people completed junior high school education was 35.2%, below the national average penetration rate. Internet penetration rate among people with an education background below the level of junior high school was only 8.5% [3]. Table VI compares the current internet penetration rate by education with that of 2008. A rapid closing up of the gap between senior high school and university graduates is discerned. However, the gap between the two ends of the education categories (i.e. primary school and below/tertiary and above) does not show substantial decrease.

TABLE VI
INTERNET PENETRATION RATE BY EDUCATION
(% of population of the education level)

	Primary School and below	Junior High School	Senior High School	Tertiary and above
Dec. 2008	3.1	15.7	66.3	93.2
Dec. 2011	8.5	35.2	90.9	96.1

[3, 17]

C. The Urban-Rural Gap

As the result of the government's ambitious effort to promote ICT development in the countryside, China has announced its achievement of 100% coverage of the internet and telephony network over all the villages in rural area in 2011. This is a tremendous achievement to a country like China, with a rural population of 674.15 million [18] and poverty reduction remaining a fundamental challenge [19]. It is evidenced that the condition of infrastructure is a bottleneck of digitalisation in less developed countries, as governments of these countries challenge themselves with more pressing concerns, such as food shortage and health care demands, rather than technological improvements [20]. The completion of the nationwide network provides one of the essential conditions for internet development in China. However, a country's digitalization is beyond building the infrastructure. For a country to be benefited from the technology, a nationwide participation in the application of the technology is as important as the nationwide coverage of the network. Table VII compares the rural-urban gaps in China between 2005 and 2011. In 2005, before the government commenced the national Cun Tong development project, the number of internet users in rural area was 19.3 million, representing 2.6% of the total rural population at that time. The figure was increased by about 8 times in 6 years. According to CNNIC, as of December 2011 the number of rural internet users was 136 million [3]. Internet penetration rate among the rural population in 2011 was about 20%². Apparently, the government's effort in promoting ICT infrastructure development in rural area has contributed to the dramatic increase of rural internet users since 2005. However, it does not completely close the gap between rural and urban areas. Compared with the growth of internet user population in urban area during the same period of time, rural area still falls far behind.

TABLE VII
THE RURAL-URBAN GAP

Year	Rural area		Urban area	
	User population (million)	Penetration rate (% of rural population)	User population (million)	Penetration rate (% of urban population)
Dec. 2005	19.9	2.6	91.7	16.9
Dec. 2011	136	20	377	57

To sum up, internet development in China showed the lagging of older, less educated, and rural people in the process of digitalization. It is evident that this is a common problem that is also found in other parts of the world. Previous studies reported that the higher social categories are faster in adoption of the technology and connection to the globalization process while the other categories are stagnating [14]. The reasons of the existing of these gaps are economical, psychological, and cultural.

Economic resource is essential for adoption of technological innovation. Everett Rogers, one the pioneers in innovation

diffusion research, suggested that one of the major reasons causing socioeconomic gaps in innovation diffusion was that the earlier adopters usually possess greater slack resources for the adoption. He argued that this is particularly true if the innovation was expensive and technologically complex [21]. In the context of China, people belong to the above mentioned three marginalized categories (above the age of 60, with lower education background, and rural residents) are most likely to be economically deprived. The official retirement age for ordinary workers in China is 50 for female and 55 for male. Therefore, most of the people aged 60 or above are retired already. People of lower education attainment, usually earn less. The average annual income of rural residents is significantly lower than that of urban residents. The fundamental material conditions for using internet include a computer and an ongoing internet connection fee. This is a considerable investment for a retired or low income person.

Psychological resource is the force motivating an individual's choice behavior. Psychological research has established that influential factors affecting human's decision on behavior to accomplish something difficult include the need for the achievement, incentive for success in the achievement, and the probability that one will be successful at the task [22]. The perceived value of each of these factors is rather subjective. The lack of psychological resource provides an explanation for the digital divides in China. In the contemporary China, computing and internet capabilities have become basic skills of learning and working, particularly for university students and white collar workers. Therefore, the felt values of needs and incentives for using internet are expected to higher to people working in the cities and studying in universities. The third factor, possibility of success in the task, in the context of using internet, represents one's proficiency in using computer and internet. The elderly, less educated and rural groups are again being disadvantaged in this aspect.

Culture affects one's behavior by the norms of the system. System norms have been proven to be an important factor influencing individual's adoption of innovation. In human society each individual is connected to certain sub-system. The norms of the system tell the individual what is expected in the system s/he belongs to, and serve as a guide for the individual's behavior [21]. System norms can impede or facilitate adoption of innovation. For example, playing "Happy Farming" (开心农场), an online game, on the social network was popular in China in 2010. Many players were attracted to using internet simply because they wanted to play the game with their friends. As norms are a set of established behavior patterns, it can be expected that without special effort, system norms usually work to reinforce the existing tendency of adoption. The adopters usually belong to the same social networks (e.g. high school students) and their adoption behaviors (e.g. playing online games, using online resources for homework, etc.) will be reinforced by the norms of their social networks. On the other hand, the laggards (e.g. villagers in rural area) might observe and follow the non-adoption norms of their societal circles (e.g. watching television, playing mahjong and meeting friends at home) comfortably.

² This is calculated based on the rural and urban population data of China's 6th National Population Census carried out in 2010. 18. Ma, J., *Press Release on Major Figures of the 2010 National Population Census*, 2011, National Bureau of Statistics of China: Beijing.

IV. ICT IN RURAL CHINA

It is mentioned above that China claimed 100% coverage of the villages with internet and telephone networks in 2011. However, the 100% net coverage does not automatically generate a high internet penetration rate amongst the rural population in China. The actual internet penetration rate in rural area was only 20% of the total rural population, significantly lower than the world's average. Availability of the net in the rural area only gives the possibility for the villagers to connect to the internet. Whether and how the connection will actually be materialized is determined by economic and physical factors as well as psychological and cultural factors. Building the network infrastructure is an important step in physical readiness, however, has only limited contribution to psychological and cultural development. This section investigates digital divide further via the case study of Jintang, and explore communication strategies for development in marginalized communities. The study was carried out between September 2006 and August 2007. It included a questionnaire survey, home visits and individual interviews. 350 questionnaires were distributed randomly to the households in Jintang. 267 valid returns were received. 80 households received the visits and participated in the interviews.

Jintang is a township under the administration of Qingxin County, located in the inner north of Guangdong Province. It is one of the poverty alleviation targeted townships of Guangdong Province [23]. On the other hand, Guangdong is one of the richest provinces in China. The average household consumption expenditure in Guangdong has been on the top list of the provinces in mainland China and among the top 5 of the 31 Chinese provinces and municipalities. Table VIII shows the top five provinces and municipalities of China's average household consumption expenditure ranking between 2006 and 2008, when the case study of Jintang was conducted.

TABLE VIII
HOUSEHOLD CONSUMPTION EXPENDITURE RANKING
(100 Million Chinese Yuan)

year	1st	2nd	3rd	4th	5th
2006	Shanghai 20944	Beijing 16770	Zhejiang 11161	Guangdong 10829	Jiangsu 8302
2007	Shanghai 24260	Beijing 18911	Guangdong 12663	Zhejiang 12569	Jiangsu 9659
2008	Shanghai 27343	Beijing 20346	Guangdong 14390	Tianjin 14000	Zhejiang 13893

[24-26]

Guangdong has also been maintaining its position as one of the most digitalized provinces in China since the commencement of the country's journey of digitalization. During the period of time when the case study took place, the internet penetration rate of Guangdong was among the top 3 of the 31 provinces and municipalities. In the year of 2006 the internet penetration rate of Guangdong Province was 19.9%, ranked first of the 31 provinces and municipalities. In 2007 and 2008, the penetration rate was 35.9% and 48.2% respectively, ranked third in the country. The study of Jintang thus illustrates digital divide within a rich and digitalized region.

A. Economic Resource

Jintang is an agricultural township. As of 2006, 98% of its population was classified as agricultural population. According to the questionnaire survey and interviews, most of the households were engaged in crop and livestock agriculture. The living standard of the residents of Jintang was significantly lower than the province's average. 70% of the questionnaire respondents indicated an annual household income below 3000 RMB (an equivalent of about \$450 at the time when the study took place). About 29% reported an annual household income below 1000 RMB. This was under China's poverty threshold (1067 RMB) in 2007 [27].

The results of questionnaire survey revealed that the 3 most felt obstacles to poverty alleviation were lacking financial resource, lacking scientific knowledge and technology, and lacking information of the market.

The scarcity of economic resources affects the poor's accessibility to knowledge and information, and thus reduces the opportunity of development. Although internet has the potential to meet the needs for knowledge and information, it is not an option for most of the households of Jintang. Buying a computer was beyond their economic capability; don't mention the ongoing connection fees on top of it. Therefore, cheaper and more accessible media are needed for development communication in the case of Jintang.

B. Psychological Resource

The study showed the villagers of Jintang possessed considerable awareness of their poverty problem and were willing to make changes. More than 50% of the respondents expressed confidence about improvement of their economic conditions. The awareness of the important role of communication in development was very high among the participants. Most of them regarded finding and developing agriculture product market as the most important measure in tackling the problem of poverty. The second important measure agreed by the majority of the respondents was science and technology support.

The majority of the participants recognized the importance of education for improvement of economic conditions. 50% of the respondents indicated scientific and technological education and training was very important. 36% indicated that it was important. However, there were still some people being skeptical about the usefulness of education for development. 11% of the respondents chose "doesn't matter" and 3% chose "not important" regarding the role of education in poverty alleviation. This is related with the perception of economic resource scarcity as the main cause of poverty. It may also be related to the existing knowledge transmission pattern of the local area, which will be discussed below in the section on cultural resource.

The survey and interview showed that most of the Jintang residents were aware of the problem of underdevelopment and were willing to improve their situations. Shortage of economic resource and lack of information and knowledge were identified as the major constraints to tackle the problem of poverty. The challenge is how to help the Jintang people translating their awareness of underdevelopment and

willingness to develop into actions of making meaningful changes.

C. Cultural Resource

The study was concerned with development communication and thus the survey and interviews regarding the cultural dimension were focused on information communication condition and behavior of the Jintang residents.

Technically, Jintang has already been within the coverage of all kinds of modern information communication technologies, including networks of television and radio broadcast, cable television, mobile phone, and internet. However, the actual penetration and usage of these technologies displayed an uneven scenario. Television was the champion in terms of its penetration rate and frequency of usage. 79% of the questionnaire survey respondents indicated owning at least one television set at home. More than 50% of them watched television every day. The second most frequently used medium was mobile phone and telephone. About 20% of the respondents used mobile phone or telephone daily. This was followed by book and magazine (3rd), newspaper (4th), radio (5th), and internet (6th).

The penetration rate of computer was the lowest among all the communication media available in Jintang. Only 8% of the respondents had a computer at home. This was followed by newspaper (including magazine). Only about 10% of the respondents had newspaper or magazine subscriptions, although they were the 3rd and 4th frequent used media by the villagers. This means some of the readership took place in the public media facilities, including the village media rooms that were supported by the local government.

The centuries old channel of knowledge transferring that knowledge is transmitted from the older generation to the young generation by words-of-mouth is one of the most important knowledge transmission channels in Jintang. According to the survey and interviews, the most important channels whereby the villagers obtained agriculture knowledge were television and elder members of the family. This gives another explanation for why some villagers (11%) did not consider scientific and technological education and training being important for development.

The study found there were obvious gaps between the villagers' awareness of the importance of information technology for development and the actual applications of information technology in the society. Most of the villagers used information technology mainly for entertainment purpose. When asked about activities after work, most of the interviewees named watching television as one thing they usually did. For those watching television, most of them watched entertainment programs. None of them mentioned watching education programs. Apart from watching television, doing housework, visiting and meeting friends (including playing mahjong) were the activities most villagers did after work. The results of this study demonstrated that possessing awareness of and positive attitude towards the role of information technology does not necessarily make the villagers active participants in development communication. This concurs with the theory of distinctions between cognitive, affective, and behavior effects in media studies [28]. To communicate and learn is an activity that demands time, effort,

and financial inputs. Therefore, effective strategies are required to motivate the villagers to take actions and participate in development communication.

In contrast to the common belief in the dominance of digital technology in the contemporary world, the media preferences of the villagers of Jintang displayed the opposite tendency. It is found that interpersonal communication and printed media were preferred over electronic media by the villagers for development communication. When asked to indicate ways they preferred to receive information and education, most of the respondents (70/80) named onsite training by experts as the most desirable. The second most welcome way of communication and education was printed material, named by 60 respondents out of the 80. Educational television was named by 45 respondents, ranked third.

D. Development Communication Strategies for Jintang

The above discussions reveal that economic poverty, and shortages of information, knowledge and technology are the major hurdles constraining the development of Jintang. Financial support from government and other external sources is vital to provide the essential economic resource for development. On the other hand, communication and education are crucial in dealing with the information, knowledge and technology shortages; and building the capacity of the community for sustainable development. Based on the existing conditions of communication pattern and media availability, it is inappropriate to rely on the new information communication technology for development communication in Jintang. An integrated development communication approach is required for communication to be efficient and meaningful. The concept of integrated development communication approach first of all underlines integration of the strengths of media of all kinds, including mediated and interpersonal, modern and traditional, for development communication. Television is one of the most efficient mediated channels to use for development communication in Jintang. It is widely available to and used by the villagers. It can be used for distribution of development communication message among large amount of audiences. Interpersonal communication measures, such as onsite trainings and workshops, are suitable for diffusion of agriculture and other scientific knowledge and technologies that address specific needs. Furthermore, onsite training and workshops enable direct dialogue between the experts and villagers; therefore can enhance the effectiveness of communication and education. With careful designation and planning, the integration of mass media and interpersonal communication channels thus promotes effectiveness and efficiency of development communication.

Secondly, the concept of integrated development communication highlights the integration of all communication resources available to the society. Like most of other local governments in China, the government of Jintang supports running of media rooms in the villages, where the villagers can watch television and DVD, read newspapers and magazines. This is a useful resource that can be utilized for development communication and education. Peer learning has been proven to be efficient and effective in communication research of the earlier years. It still works in the information era. The proximity between the peer villagers makes the communication more

meaningful and credible. Printed media and radio are low-costing media and thus remain an option for development communication in deprived areas. The challenge is how to tailor the contents and format of the message to attract audience attention and meet their needs for development.

V. CONCLUSION

This paper observes that internet application in China has kept a continuous growth tendency since the country was connected to the global network in 1994. Significant advancements have been made in network infrastructure construction, internet penetration rate, and internet application in governance and commerce. However, the development of internet application is uneven in China. Considerable gaps exist across age, education and geography divisions. Through the case study of Jintang, the paper illustrates further the gaps between rural and urban areas in economic, psychological and cultural dimensions, and discusses development communication strategies to deal with the digital divide. The study of internet development in China and the case of Jintang establishes the following conclusions.

A. Technology and Digital Divide

Digital divide is a global problem affecting both developed and underdeveloped societies. Substantial evidences demonstrate that the inequalities between rural and urban areas, age groups, and education attainment categories in adoption of the new information communication technology are a common phenomenon in most countries in the world. The gravity of digital divide is due to the prevalence of internet in the human society, and the interwoven relationship between digital divide and existing societal disparities. On the one hand, internet has penetrated the whole realm of human life, including public as well as private spaces, through the expansion of e-Governance, e-Commerce, and e-Entertainment. Internet is no longer the rare technology reserved for researchers and students to use in universities or labs. Instead, it has now become a tool and resource of production, study, and daily life. It is integrated into the economy, politics, and culture of the human society. Therefore, connection to the internet gives the connected not only technological benefits but also economic and political advantages. On the other hand, digital divide is affected by as well as affecting societal divisions. Information communication technology is not the cause of digital divide, but potentially it is an amplifier of societal disparities. Digital technology does not create differentiations. The status of connection does. Digital technology arrived in a world full with disparities. These disparities cause uneven connections between societies and uneven connections amongst members within a society, and thus lead to digital divides between and within societies. Without effective intervention, digital divide in turn disadvantages further those who are marginalized.

B. Three Dimensions of Gap-closing Strategies

Digital divide is unlikely to be eliminated completely given the existing of societal and personal differences. However, the vicious cycle that is widening the inequalities in the human society needs to be broken. The problem of digital divide can be dealt with in 3 dimensions, which respond to the 3 main roots of

digital divisions illustrated in the above discussed Chinese case. The first is economic dimension. Economic strategies aim to promote physical accessibility of the society. Physical accessibility includes two major aspects. One is infrastructure development, which is fundamental for the digitalization of a society. The government and information communication technology industry are the main driver of infrastructure development. The other is the equipment connecting the users to the network. Terminal equipment and ongoing connection cost have been proven to be significant obstacle to low income earners' adoption of internet. The second dimension of the gap-closing strategies is psychological dimension. Psychological strategies aim to facilitate knowledge, needs, skills and motivation for internet applications in the society. The Chinese case demonstrated that universal coverage of the network does not spontaneously translate into universal adoption of internet. Apart from economic obstacles, lacking knowledge and skills was another major barrier hindering internet adoption. Education and communication are the major channels for getting the information across to the community and enhancing knowledge and skills of the citizenry of the society. For the purpose of closing the gaps, extra attention in education and communication among the laggard groups is demanded. Effective ways to optimize education and communication results include producing tailored education and communication programs and information and selecting appropriate communication media and methods that reflect the specific conditions and address the needs of the individual group. The third is cultural dimension. Cultural strategies aim to promote construction of supportive system environment for the connection of the society onto the global network society. Culture is the set of values and beliefs that inform, guide, and motivate the behavior of members of a society [29]. Understanding the impact of culture requires recognition of the two important facets of culture. On the one hand, culture is historical. On the other hand, culture is dynamic. The formation of the value and belief system is rooted in the soil of the society. It guides and affects operation of the society, and develops together with the evolution of the society. Culture is historically specific to the individual society. The effectiveness of development communication is subjected to its compatibility with the system. Although using computer and internet is becoming part of the mainstream culture in many industrial societies, it is not the case in other societies of the world. Among the elderlies and in many rural and deprived societies, watching television and listening to radio remain principle media behavior. Technically, internet promises a wide range of advantages over the preceding mass media. However, it may be a powerful and dominant information communication technology of the information era, but not the only communication medium available to the mankind. Emphasizing compatibility with the system means to identify the potentials of the society and to utilize the society's internal strengths for development. Culture guides communication and development, communication and development in turn reproduce culture. Compatibility with existing culture is the precondition for successful development communication.

Reproduction of a new culture for sustainable advancement of the society is a goal of development communication. These are two indispensable aspects of the cultural strategies of narrowing the digital divide.

Discussing economic, psychological, and cultural dimensions of the gap-closing strategies does not mean to ignore the interrelation and overlapping of these dimensions in the society. Economic status affects an individual's psychological characteristics and a society's cultural system. A person's psychological approach may simultaneously be affected by and affecting his/her economic status and cultural identity. The causes and consequences of digital divide are multidimensional. Therefore mitigation of digital divide requires a comprehensive approach taking the multicity and complexity of digital divide into consideration.

C. An Integrated Approach to Development Communication

Economic, psychological and cultural differentiations between industrialized (e.g. urban) and less industrialized (e.g. rural) areas cause digital divide. Financial aids from the government and other external sources are necessary to establish the fundamental material conditions for development. However, external conditioners, while necessary, are effective only if they coincide with the potentialities of the society [30]. Sustainable development of a society must be generated from inside of the society. Communication and education are imperative for building the capacity of the citizenry so that they are psychologically and culturally ready to initiate and participate in the long term ongoing development process. The internally-initiated and participatory characteristics of development require an integrated approach to development communication. The core concept of the integrated approach is the responsiveness to the local potentialities and preferences. On the one hand, development communication needs to integrate all types of media, on the basis of the conditions and preferences of the society and for the purpose of optimizing the effectiveness and efficiency of communication. On the other hand development communication needs to explore and integrate the strengths and resources of communication of the society for the purpose of maximizing community engagement and participation.

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