



Regional Differences of Internet Technology Diffusion in China:

A Case Study of Shaanxi and Tibet

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Abstract. The regional differences of Internet technology diffusion in China exist not only between developed and underdeveloped regions, but also among provinces and cities in the same region. In the process of Internet oriented social transformation, it is of great significance to explore and overcome the problem of unbalanced diffusion within the country for the development of the whole country and the improvement of people's living standards. This paper tries to find out the regional influencing factors of Internet technology development through the study of Internet technology diffusion in Shaanxi and Tibet, which both located in Western China. In this paper, the regional differences of Internet technology diffusion are attributed to the regional economic development level, people's education level and cultural differences, government policy support, enterprise platform support and so on. The quantitative and qualitative research methods are adopted to analyze the causes of the unbalanced diffusion of Internet technology based on the data of Shaanxi and Tibet. The study found that the Internet policies of local governments in Shaanxi and Tibet play an important guiding role in the development of Internet technology. There are differences in the use of Internet technology between Tibet where Tibetans dominate the population, and Shaanxi where Hans dominate the population, reflecting the development of Internet technology diffusion needs an Internet platform compatible with regional education and cultural characteristics. At the same time, people's education level has a positive impact on the diffusion of Internet technology. Narrowing the gap in the level of educational development between regions will help balance the spread of Internet technology and ease the "digital divide".

Keywords: Regional Differences; Internet Technology; Diffusion; Shaanxi; Tibet

1 Introduction

As of 30 June, 2022, there are about 5.473 billion Internet users worldwide, accounting for the world's total population of 69%.^[1] The Internet is changing the social efficiency of human beings and is forming a new digital order.

Among many innovative communication technologies, the Internet is the fastest spreading information and communication technology so far. The Internet is rapidly becoming an important driving force for world economic growth and social progress.

Since China formally connected to the Internet in 1994, it has made remarkable progress. According to the 49th "Statistical Report on China's Internet Development Status" issued by the China Internet Network Information Center (CNNIC), as of December 2021, the number of Internet users in China had reached 1.032 billion, an increase of 42.96 million over December 2020. The Internet penetration rate reached 73.0%.^[2] After more than 20 years of rapid development, China Internet has taken shape, and people's study, work and life are increasingly inseparable from the use of the Internet. The Internet has a profound impact on Chinese work, life, and way of thinking.

As a new technology, the popularization of the Internet can be regarded as a process of spatial diffusion of technology to a large extent. The proliferation of Internet technology is a process in which the Internet as a new technology is adopted and promoted. The Internet is widely penetrating into various fields of social economy and culture, greatly promoting economic and social development and will lead to a comprehensive rise of knowledge and economy. However, various signs indicate that the spread and application of Internet technology and its positive effect on the economy over time have clearly shown a trend of commonality and differentiation.

The rapid spread of Internet technology throughout the world and the unbalanced proliferation has created new social problems, the "digital divide", which has the potential to become a new source of unbalanced development among and within countries. Hidden behind the Internet gap is the choice and run-in between advanced Internet technology and the inherent geographical environment, which promotes the differentiation and combination of Internet space activities and forms different degrees of Internet gap.^[3] Many Chinese scholars used the component analysis method to analyze the impact of indicators, such as per capita income, Internet infrastructure level, urbanization level and labor quality on the popularization of the Internet. The scholar Zou Hailin thinks obstacles to the diffusion and application of Internet technology, including people's knowledge level, backward ideas, lagging management model change and technological progress of enterprises, the government, as the policy maker, promoter, manager and supervisor, plays an irreplaceable leading role in the Internet technology revolution.^[4] Yan Nan selects some indicators that can reflect the level of Internet development competitiveness in various regions of China, categorizes the values of each indicator, and draws the corresponding degree of development of the index value in various regions of China.^[5] Based on the experience of China's East, Central and West, Shang Jie studies the regional differences in the diffusion of Internet technology, and finally finds that the level of economic development, the country's knowledge development ability, the degree of opening up and the level of Internet technology introduction will affect the level of national Internet penetration.^[6] Chen Weixuan and Wu Xuliang

believe that the diffusion speed of general technology is affected by the relative advantages of technology, technological infrastructure, technological compatibility, and cognition of technological innovation.^[7] Chen Dong, Gu Peiliang and Hou Wenhua believe that the Internet incompleteness of the IT market, market structure, Internet technology network characteristics are the reasons for determining the spread of Internet technology innovation.^[8] Scholars Liu Chunyang and Liu Jinyi pointed out that the scale of software and information technology service industry in the East is far higher than that in the central and western regions, and the gap between the scale of software and information technology service industry in the central and western regions is very small.^[9]

This article takes Shaanxi and Tibet Autonomous Region, the two major provinces in western China, as the research object. Through the comparison of economic development level, people's knowledge and education level, enterprise Internet technology level, government policy support, and geographic location, it studies the regional differences formed by the Internet technology diffusion and its impact.

This study is based on promoting the previous research on the diffusion level of China's Internet information technology to a more micro perspective for comparative analysis, advocating to shorten the development level of Internet information technology among different provinces in China, and to avoid creating a new "digital divide".

It is found that ①although Shaanxi Province and Tibet Autonomous Region both belong to western China, the diffusion level of Internet information technology reflects significant regional differences;②In terms of all the indicators adopted, Shaanxi Province is higher than that of Tibet Autonomous Region, and all the indicators are positively correlated with the diffusion level of Internet information technology; ③there are objective reasons for the formation of the digital divide, but it still needs to take measures according to local conditions, so that Internet information technology can benefit citizens in different regions in a relatively balanced way.

2 Methodology

Based on the related theoretical research and literature of innovation diffusion, it studies the factors or variables that affect the diffusion of Internet technology, and explores the reasons for the influence of regional differences in the diffusion of Internet technology. The research is conducted using a combination of quantitative and qualitative methods.

The research members are composed of people who are engaged in Internet technology work and Internet communication. It is considered that the participants can make more reasonable explanations and discussions from the aspects of theoretical analysis, data analysis, macro social environment and policy discussions.

Specific to the research procedure, first of all, conduct literature analysis on relevant research about the diffusion of Internet technology innovation and look for factors or variables that affect the diffusion of Internet technology; Then, use the obtained demographic, policy, and social environment databases such as government demographic bulletins, Internet development, economic development statistics and other related reports to analyze related variables that affect the spread of Internet technology; Lastly,

draw a conclusion about whether there is an imbalance in the diffusion of Internet technology, and how to reduce imbalance as much as possible through better innovation diffusion.

Correspondingly, in terms of the specific methods of data analysis, firstly, review relevant theories and previous research results through literature analysis, summarize and decompose the relevant variables that affect the diffusion of Internet technology through focus group discussions. Secondly, make mathematical statistical analysis on the collectible variable data affecting the Internet technology diffusion, and finally the group makes a comparative analysis with the observable actual social situation.

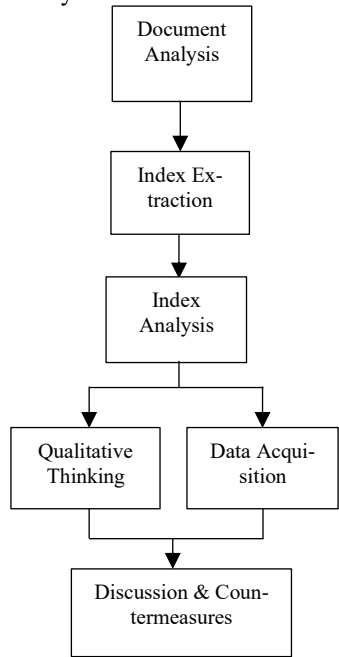


Fig. 1. Research Roadmap

3 Results and Discussions

3.1 Regional Differences of Internet Technology Diffusion

Compared with the Tibet Autonomous Region, which is located on the Qinghai-Tibet Plateau and has an average elevation of more than 4,000 meters, Shaanxi Province is located in the hinterland of China's inland. It is the region with the most developed economy and the largest population inflow in Northwest China. These two provinces have made great achievements in the popularization and promotion of the Internet.

The domain name data by provinces reflects the level of development of the Internet as a digital platform. Among the 31 provinces or regions under statistics, Shaanxi Province ranks 17th, and Tibet is at the bottom. (see Table 1)

Table 1. The number and proportion of domain names by province in 2021

Area	Domain Names	
	Numbers	Percentage of total domain names
Nationwide	35931063	100%
Shaanxi	592558	1.6%
Tibet	13411	0.0%

Data source: The 49th China Statistical Report on Internet Development (CNNIC)

The Chinese central government and various local governments play a vital role in advancing the construction of Internet infrastructure. The number of government websites can reflect to a certain extent the level of Internet disclosure and Internet government development in various local governments. Compared with Shaanxi, the Tibet Autonomous Region has a lower level of basic Internet development in terms of the absolute number of government websites (see Table 2) and the relative number of IPV4 (see Table 3).

Table 2. 2021-2022 Number of Provincial Government Websites

Province	2020.12	2021.12
Shannxi	602	609
Tibet	234	253

Data source: The 49th China Statistical Report on Internet Development (CNNIC)

Table 3. Percentage of ipv4 by province in 2021

Province	Percentage of the country
Shannxi	1.63%
Tibet	0.13%

Data source: The 49th China Statistical Report on Internet Development (CNNIC)

From the study selection of the three indicators reflecting the regional differences, we can observe the two provinces of Internet technology development level, Shaanxi province is better than the Tibet Autonomous Region in all indicators. From the longitudinal time dimension, we need to see that the Internet technology level of the two provinces is steadily improving, showing a good development trend. But there is no denying that as the provinces in western China, their Internet technology development level is in the middle and lower reaches of China.

3.2 Reason of the regional Differences

1)Traditional communication technology.

Traditional communication technology provides a platform for the Internet technology diffusion. At the same time, the Internet technology diffusion requires other innovative communication technologies to provide a platform and foundation, such as Radio, TV, telephone, cable TV, Wi-Fi. There is a strong positive correlation between personal computers, mobile phones and Internet usage levels. In areas where traditional communication technology is well popularized, emerging communication technology

also has advantages. It can be seen from Table 4 that the basic communication level of Shaanxi Province is much higher than that of Tibet, which is located on the plateau.

Table 4. Development of the communications industry in June 2022

Refers to the name	unit	Data as of June 2022	
		Shaanxi	Tibet
Total fixed telephone users	10000 households	677.9	84.07
Total mobile phone users	10000 households	4806.4	335.64
(Fixed) Internet broadband access users	10000 households	1638.2	124.43
Mobile Internet users	10000 households	4197.7	302.89
Internet of things end user	Number/100 people	*	120.16
Telephone user penetration rate	Number/100 people	138.7	*
Fixed telephone penetration rate	Number/100 people	*	22.97
Mobile phone penetration rate	Number/100 people	*	91.70

Data source: The completion of main indicators of the communications industry in Shaanxi Province, Tibet Autonomous Region in June 2022

2)Population and language.

The demographic structure and the proportion of different ethnic groups using a common language affect the adoption and application of Internet technology. According to the main data of China's seventh national census, the total population of the country is more than 1,411 million. The permanent population of Shaanxi Province is almost 39.529 million, accounting for 2.8% of the country's total population. The total permanent population ranks the 16th in the country. The permanent population of the Tibet Autonomous Region is 3.6481 million, which is only 0.26% of the total population of the country (see Table 5). Among the permanent residents in the district, the Tibetan population is 3,137,901, the population of other ethnic minorities is 66,829, and the Han population is 443,370. Tibetans and other ethnic minorities account for 87.8466% of the population.

Table 5. Population Percentage of Nationwide by province

Area	Population	Percentage	
		2020 year	2010 year
Nationwide	1,411,778,724	100	100
Shaanxi	39,528,999	2.80	2.79
Tibet	3,648,100	0.26	0.22

Data source: Main data bulletin of the seventh national census of Shaanxi Province, Tibet Autonomous Region

In China's Internet world, the language of most applications is Chinese. Tibetan Internet users who use Tibetan as the main language for daily communication may face the problem of language conversion, which hinders the popularization of Internet applications to a certain extent. Related to this, there is also a certain time lag in the independent update and development of Internet technology in Tibet. Therefore, under the premise of protecting the languages and cultures of different ethnic groups, on the one hand, the Chinese government is committed to improving the ability of ethnic minorities to use common languages through education. On the other hand, some more and more excellent ethnic language application software or versions are constantly being developed.

3) Education level.

The level of education directly affects people's concepts and skills about using the Internet, as well as their ability to become diffusers of innovative technologies and influence others. The higher the level of education, the higher the potential ability of people to accept and further spread new technologies. For every 100,000 people in Shaanxi Province, there are 18,397 people with a university education or above. In Tibet Autonomous Region, the population with university education is only 11019 for every 100,000 people (see Table 6). In comparison, the education level of citizens in Shaanxi Province is higher than that in Tibet, which also means that the quality of human resources affecting the diffusion of information technology innovation is better.

Table 6. Number of people with various education levels per 100000 population in each region

Area	University (Junior college or above)	High school (including technical secondary school)	Junior high school	Primary school
Nationwide	15467	15088	34507	24767
Shaanxi	18397	15581	33979	21686
Tibet	11019	7051	15757	32108

Data source: Main data bulletin of the seventh national census of Shaanxi Province, Tibet Autonomous Region

4 Conclusions

The emergence of new media represented by the Internet is or has changed the shape of the entire society and era. Humans' understanding of social civilization and development is coordinated by the emergence and popularization of important communication technologies. Under the background of the great rejuvenation of the Chinese nation, reducing the regional differences in Internet technology diffusion, improving the

quality of Internet use, and seeking effective ways for the Internet to promote the development of underdeveloped regions are practical problems faced by the government and academic circles.

The government should increase investment in Internet infrastructure in underdeveloped regions. The statistical results of China's Internet level show that none of the top 10 provinces, autonomous regions, and municipalities are in the west. Internet infrastructure is a highway for the flow of Internet resources. For the underdeveloped western regions, the government should continue to pay attention to investment. Build a basic platform for Internet popularization and Internet promotion to provide the western provinces, especially high-altitude areas, with the efficiency and quality of integrating into the Internet society.

The technical and innovative talents should be encouraged to provide support for Internet technology and related applications. People who have the means and skills to learn Internet should become "opinion leaders" in the diffusion of new technologies, gradually influencing local people's understanding and attitudes towards things, and becoming the main disseminators of new technologies.

For Internet Education and its research, we need to strengthen Internet technology education and improve people's Internet literacy. The "digital divide" is latent in the quality of the use of Internet technology. Technology is neutral, what effect it produces depends on how people use it. Whether in cities or in underdeveloped areas, it is of great practical significance to carry out media literacy education to cultivate people's ability to interpret and criticize various Internet, as well as the ability to use the Internet to serve personal life and social development.

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