

北京邮电大学测度/缩小“数字鸿沟”高峰论坛
BUPT Summit on Measuring Bridging Digital Divide
背景资料 Background

一、 前言

1. Introduction

信息技术的利用，信息资源的开发，信息的交流和知识共享推动着社会的发展和繁荣。然而，信息化快速而极不均衡的扩张，也为这种繁荣带来了严重的隐患：一方面少数国家和地区在迅速地信息化或网络化，另一方面大多数国家和地区被边缘化或隔离化。数字鸿沟的存在阻碍了经济发展，影响了社会进步和稳定。从某种意义上讲，信息技术的发展中存在“马太效应”，从全球范围来看，数字鸿沟正在进一步扩大，因此，如何缩小数字鸿沟，如何制订缩小数字鸿沟的政策策略，引起了全世界的广泛关注。

Social development and prosperity are promoted through the use of information technology to explore information resources, exchange information and share knowledge. However, rapid and unbalanced expansion can lead to serious problems. Some countries and regions were rapidly covered by networks, while others were marginalized or segregated, creating a “digital divide,” which hinders economic development as well as social progress and stability. In some sense, there is "Matthew Effect" (i.e., the rich get richer) in the whole process of information technology development. From a global perspective, the digital divide continues to expand. Therefore, experts all over the world are increasingly focused on police and strategies for bridging the digital divide.

面对日益扩大的数字鸿沟，我国政府相继在“十五”和“十一五”规划中强调信息化和发展信息产业的重要性，制定了一系列相关政策并取得了一定成果。构建和谐社会、推进我国产业优化升级和实现工业化、现代化需要缩小数字鸿沟，缩小信息差距需要依靠政策，而制定有效的政策有赖于对数字鸿沟测量理论、数字鸿沟理论和信息政策理论的研究与发展，政策制定、目标实施策略与成果衡量有着紧密的联系。针对缩小数字鸿沟，研究既适合中国国情又能够与国际接轨的政策和策略，具有重要的理论与实际意义。

To address the growth of the digital divide, the Chinese government has emphasized the development of informatization [or “informationalization”] and the information industry in its "10th Five-Year Plan" and "11th Five-Year Plan". It has also achieved positive results by adopting a series of related policies. The benefits of bridging the digital divide -- building a harmonious society, promoting enterprise optimization and upgrading, and achieving industrialization and modernization -- depend on establishing appropriate and effective policies. Formulating such policies depends on the research and development of theories of: i) quantitative digital divide measurement; ii) social balance and the “digital divide; and iii) appropriate national information policy. The formulation of these policies, the implementation strategies to achieve their goals and the measurement of results all have close ties. To bridge the digital divide, we must find policies and strategies which are not only suitable for China's specific conditions, but are also compatible with international approaches. Thus, research in this area has great theoretical and practical significance.

至于数字鸿沟的测量，已有很多国内外学者提出了可借鉴的指标体系，可

分为如下三类：第一类是指数性模型（INFOSTATE 指数，DAI 指数，DOI 指数，IIQ 指数），这类模型主要从接入的链路数、通信和信息工具的普及程度、人们的受教育水平等基本指标出发进行衡量，最后利用门柱值等方法将每个指数进行归一化处理后综合加权得到最后的结果。这类方法只提供一个先后顺序来帮助人们横向了解差异的大致情况，至于具体的差距大小，该指数则无法体现，而且不同年份的单个地区或国家之间的纵向比较是无法实现的。同时我们还应该注意到高接入水平、高文化水平不等同于对信息和通信工具的高使用水平，而目前更应该从人们的实际使用出发衡量信息差距。

Scholars have put forward several kinds of measurement systems which we can evaluate digital divide. These can be divided into several categories: the first is the index model (Sciadas 2003, ITU 2003, Seoul 2005, Arquette 2001). This model measures the digital divide mainly by using indicators such as the number of lines, the penetration of communication and information tools, people's educational situation and other basic indicators. Then each indicator was processed by goalpost or similar methodology and the complex primary results brought to a final one. This method can provide a ranking to help people understand the general situation, but it is unable to show specific gaps in different countries in the same period or within a country at a different time. Meanwhile, it should be noted that a high level of access and education does not necessarily mean the good application of information and communication tools. The information gap should be measured based on specific applications and uses.

第二类模型（DDIX 指数，DDI 指数）涉及了人们的具体使用差异问题，DDIX 指数先将人群分层，根据不同层次人群的电脑和互联网使用者的百分比的差异来计算数字鸿沟。DDI 指数也是利用社会各阶层之间互联网使用者（简称“网民”）比例之平均差别来进行计算的，在一定意义上者两种方法具有一定相似性。同时 DDI 指数在一定意义上更好地反应了人们的实际使用，但这两者仅仅衡量的是互联网络的使用情况。

The second category of models involves application to ICTs. The DDIX ("Digital Divide Index"; Selhofer & Hüsing 2003) calculates the Digital Divide Index on the basis of the different percentage of Internet users who are in different social groups. The DDI (Zhu Jianhua 2001) calculates the ratio of Internet users ("netizens") mean difference among the various sectors of the community to describe the digital divide. In a sense, these two methods have similarities. However, the DDI reflects the actual use of the Internet better. However, it measures only the use of the Internet. And the gap is defined as the differences in using the Internet within one nation. Therefore, it is possible that the DDIX or DDI of a state with an overall balanced but lower level is better than that of a state with an overall unbalance but a higher level.

第三类是利用 NIQ 指数计算数字鸿沟，NIQ 是一套衡量中国信息化水平的指标体系，该国家信息化指数主要是来测评信息产业对于国民经济和相关领域的发展所做出的贡献，而数字鸿沟强调的则是信息和通信技术的使用对于人们在政治、经济、教育等方面的影响，因此这两者在研究内容和研究对象方面存在着比较大的差异，因此利用 NIQ 计算本课题所涉及的数字鸿沟是不合适的。

The third category of models uses the NIQ ("National Informatization Quotient") index to calculate the digital divide (Jin, J. & Xiong 2002.). The NIQ is an index

system for measuring China's informatization and is used to assess the information industry's contribution to the GNP and related fields' development. However, the digital divide refers to information and communication technologies' impact on people's economic, political, educational and other aspects. It is obvious that they (NIQ and information gap) have different research subjects. Therefore, using the NIQ to calculate the digital divide is not correct.

国外信息政策的研究则以信息法规为核心，注重对具体信息政策的研究，强调信息政策的研究方法，并关注信息技术在信息政策制定中的作用。美国政府相继制定了 NII、GII、NGI 以及 Internet 2 等计划，是美国为发展信息产业而制定的行动纲领。欧盟不仅制定了《欧洲信息社会行动计划》、《电子欧洲：全民信息社会行动计划》和《i2010——面向增长和就业的欧洲信息社会计划》，还建立了一整套指标体系，用以衡量信息社会。日本 2001 年和 2004 年先后提出两个大力推动信息通信科技（ICT）发展的政策，即 e-Japan 和 u-Japan 等。ITU 在 2003 和 2006 年发展报告分别提出了信息社会接入指标（DAI）和衡量 ICT 对社会和经济贡献的核心指标，并借助量化分析提出了发展 ICT 的指导原则。目前很多国家都将信息政策作为提高国家信息能力和缩小信息差距的主要手段，并非常重视信息政策的实施效果。

Information policy focuses on information policies and laws internationally. Researchers in this field pay attention to specific information policy research as well as to research methods for information policy. They also address information technology's role in information policy-making. The U.S. government has, at various times, discussed policies with respect to the NII ("National Information Infrastructure") and GII (Global Information Infrastructure"), as well as with respect to the Internet, Internet 2, and Next Generation Networks. These discussions are ongoing, and generally guide the development of the information industries in the U.S., within a market-driven structure. The EU not only made "A Plan for European Information Society Action", "e-Europe: A plan of an Information Society" and the "i2010 - growth and employment-oriented plans for the European Information Society," but also established a set of indicators to measure the information society. Japan has promoted two vigorous policies for information and communication technology (ICT) development, that is, "e- Japan" (2001) and "u-Japan" (2004). The ITU introduced the information society access index (DAI - "Digital Access Index") and core indicators for measuring ICT's contribution to society and economy in reports published in 2003 and 2006, respectively. Quantitative analysis is strongly emphasized in measuring ICT development as a guiding principle. At present, many countries look to information policy as the main method for enhancing their national information capacity and narrowing the information gap. Also, the effects of information policy implementation increasingly play an important role in more and more countries.

近 20 年来，我国信息政策的研究内容主要集中在科技情报政策研究、国内外信息政策的介绍评价、信息政策与信息法律比较研究、信息产业政策、网络信息政策和信息政策基础理论研究等方面。从政策的制定和实施来看，我国已经出台了一系列信息化政策缩小信息差距，2001 年 7 月公布了《国家信息化指标构成方案》，2004 年开始实施“村通工程”，并强调教育的均衡发展以减小由于教

育水平差距造成的信息差距,国家科技部还实施了“缩小数字鸿沟——西部行动”计划。

During the past 20 years, China's information policy studies mainly focused on the following fields: science information; the introduction and evaluation of information policy at home and abroad; comparative studies of information law and information policy; information industry policy; network information policy; basic theoretical research on information policy, and so on. In the area of policy-making and implementation, China's government has promulgated a series of information policies to narrow the information gap, such as "a plan national information indicators structure" announced in July 2001, and the "Telephone service in Each Village" project, implemented in 2004. Also, the government emphasizes narrowing the information gap by developing national education evenly. The National Ministry of Science and Technology has also implemented a plan called "Narrowing the digital divide - Western action".

从我国信息产业政策总体来看,存在宏观规划多于微观规划,定性目标阐述多于定量具体措施,只注意政策制定而不注意政策实施效果反馈等问题。

In general, China's information industry policy, while positive, has had some potential shortcomings, such as paying more attention to macro-planning than micro-planning, illustrating targets qualitatively rather than measuring them quantitatively, getting insufficient feedback on the implementation of policies, and so on.

二、 中国的信息化建设进程

2. China's Informatization Program

中国制定了全面的国家信息化建设的长期规划、战策方针、实施方案和评价策略以支撑国家的经济建设和社会发展。

China has a comprehensive long-term vision, strategic plan, and implementation schedule and evaluation strategy for the "informatization" of the country in support of its economic and social growth.

1. 中国发展信息化的必要性

2.1 Necessary of China's Informatization Development

从国际发展趋势看,信息化正日益成为全球竞争的战略重点,是人类社会共同面临的难得机遇和重大挑战。全球信息化与经济全球化相互交织,加剧了经济社会发展的不平衡,对国家竞争力对比产生了前所未有的影响。发达国家和发展中国家竞相制定和实施国家信息化战略与行动计划,力图抢占未来发展的战略制高点。

From China's perspective, informatization, which is increasingly the strategic focus of the global economy and competitive markets, offers both opportunities and major challenges to human society. The intertwined forces of global informatization and economic globalization impact heavily on the imbalance of economic and social development, due to their influence on national competitiveness. Developed and developing countries alike have formulated and implemented competitive national informatization strategies and action plans, to seize the strategic high ground of future development.

信息技术重大突破孕育着生产力的新飞跃。信息化突破时空局限,开创了

技术创新和生产力发展的新局面。进入新世纪以来,信息技术革命势头更加迅猛,微电子技术向纳米级、集成系统方向的发展加快,计算技术向超高性能、网络化方向演进,信息获取、处理、存储和传输能力持续跃升,通信和网络技术向宽带、移动、融合方向发展,模拟信息技术正全面向数字信息技术转变。信息技术与生物、空间、纳米等技术深度融合、相互促进,新一轮技术变革蓄势待发。技术创新不断催生新理念、新应用和新产业,深刻影响世界经济发展模式,推动生产力发生质的飞跃。

Major breakthroughs in information technology breed new leaps in productivity. In the new century, the momentum of the revolution in information technology is accelerating; the development of microelectronics, nanotechnology and integrated systems are speeding up; computing technology is evolving to ultra-high-performance networks; the capacity for information acquisition, processing, storage and transmission continually grows; communications and network technologies are directed to broadband, mobile and convergence; and analog information technology is fully converted to digital information technology. Information technologies are being integrated with biotechnology, space technology, nanotechnology and other technologies, building new cycles of technological development. Technological innovation continues to hasten the birth of new ideas, new applications and new industries, with a profound impact on world economic development, and setting the conditions for a qualitative leap in productivity.

在全球信息化进程中,中国正处于从被动应对向自主发展转变的关键时期,加紧实施国家信息化发展战略,强化信息技术创新,已成为支撑现代化建设、增强国家综合实力的必然选择。

In the global informatization process, China is in a critical period of change from a passive response to independent development. Stepping up its implementation of national informatization development strategies, and strengthening information technology innovation, has become the inevitable option to support China's modernization and enhance its overall national development.

信息化的全面渗透和深入应用,不断推动社会生产力迈向新高度,显著提升了经济发展质量和工业化水平。信息资源开发利用将极大提高自然资源利用率,信息资源日益成为重要的战略资源和生产要素。

The overall penetration and in-depth application of informatization promotes scientific development and social productivity, and significantly improves the quality of economic development and the level of industrialization. The development and utilization of information resources greatly improves the utilization of natural resources. Information resources have increasingly become important strategic resources and factors of production.

“十一五”(2006-2010)时期,我国经济发展面临越来越严重的资源、能源和环境压力,迫切要求全面转入科学发展的新阶段。面对新形势新要求,必须深化信息技术应用,深度开发生产、流通和其他经济运行领域的信息资源,大幅提高信息化对经济发展的贡献率,显著降低自然资源消耗水平,推动建设资源节约型、环境友好型社会;必须最大限度地发挥信息化在知识生产、利用、传播和积累方面的优势,加快建设创新型国家,实现科学发展。

In the period of "11th Five-Year Plan" (2006-2010), China's economic

development is facing increasingly serious resource, energy and environmental pressures. There is an urgent requirement to migrate into a new stage of scientific development. Facing the new situation and new requirements, China needs to intensify its application of information technology, develop in-depth information resources in production, circulation and other economic fields, substantially increase the contribution rate of informatization to economic development, significantly reduce the level of consumption of natural resources, and promote the building of a resource-saving and environment-friendly society. China needs to make full use of the advantages of information technology in knowledge production, utilization, dissemination and accumulation, to speed up building an innovation-oriented country.

信息化正在成为推进社会主义和谐社会建设的有效途径。信息网络日益成为拓宽群众参与、倾听群众呼声、沟通社情民意的重要渠道。构建民主法治、公平正义、诚信友爱、充满活力、安定有序、人与自然和谐相处的社会主义和谐社会，解决就业、社会保障、医疗卫生、教育、安全生产等人民群众最关心、最直接、最现实的利益问题，迫切要求社会信息化与经济信息化并重并举、协调发展。要切实提高公共服务和社会管理的信息化水平，努力减少信息化水平在不同地区、领域和社会群体间的差距，普遍提升国民信息技能，使全体公民更好地分享信息化成果。

Informatization is also an effective way of promoting the building of a harmonious society. Information networks are increasingly becoming an important channel to broaden participation by the masses, listen to the voice of the masses, and communicate for social conditions and public opinions. To construct a harmonious society with democracy, the rule of law, equity, justice, sincerity, amity, vitality, stability, orderliness, and harmony between human and nature, resolving employment, social security, health, education, safe production, and other direct and realistic problems people are most concerned about, China urgently needs social and economic informatization for simultaneous social and economic development simultaneously. It is necessary to improve the level of informatization of public services and social management. China needs efforts to reduce the informatization gap in different regions, areas and social groups and generally enhance national information technology skills to enable all citizens to better share informatization and its results.

在新阶段新起点，必须充分利用有利的国内国际发展环境，准确把握全球信息化的发展脉搏，积极应对信息安全挑战，抓住历史机遇，推进国家信息化取得新的更大进展。

In this phase of development, China must make full use of favorable domestic and international environments, accurately grasp the pulse of global informatization development, deal with information security challenges, seize the historic opportunity, promote national informatization and achieve new and greater progress.

实施信息化战略是我国经济社会发展内在的必然要求。第一，转变经济增长方式、走新型工业化道路对信息化发展提出了崭新的要求。第二，加快行政体制改革、促进政府职能转变迫切需要实现政府管理的创新。第三，建设社会主义和谐社会迫切需要创造公平、公正和机会均等的社会发展环境。第四，传播中华文明、增进国际交流迫切需要占领互联网阵地。

Having a strategy for the implementation of information technology is an

inherent and inevitable requirement for China's continued economic and social development. First, changing the mode of economic growth and taking a new road to industrialization creates new requirements for informatization development. Second, speeding up administrative reform and promoting the transformation of government functions is urgently needed to achieve innovations in government management. Third, the construction of a harmonious society urgently requires creation of a fair and just social environment with equal opportunities. Fourth, in order to spread Chinese civilization and to enhance international exchanges, it is necessary to strengthen China's presence on the Internet.

2.中国信息化发展之路:

2.2Development of China's Informatization:

1993年12月,中国召开了国家经济信息化联席会议,确立“实施信息化工程以信息化带动产业发展”的指导思想,启动“金卡”、“金桥”、“金关”等重大信息化工程,从此拉开了国民经济信息化的序幕。

In December 1993, China convened a joint meeting on national economic informatization, which established the guiding ideology of "the implementation of informatization projects so that informatization promote industrial development", launched the "Golden Card", "Golden Bridge", "Golden Customs" and other important informatization projects, which were the prologue to the national economic informatization program.

1996年1月,成立国务院信息化工作领导小组,确定了中国国家信息化的定义和国家信息化体系;提出了国家信息化建设的方针和原则;制订了国家信息化发展规划和一系列促进信息化建设的政策;国家重大信息化工程取得实质性进展;我国的信息化进入了有组织、有计划的推进阶段。

In January 1996, China established the State Council Informatization Leading Group, confirmed the definition and system of national informatization, put forward the guidelines and principles of national informatization construction, formulated a national informatization development plan and promoted a series of informatization construction policies. China's major national informatization projects started to make substantive progress and China's informatization entered an organized and planned boost stage.

1997年召开全国信息化工作会议,全面总结和部署了全国的信息化工作。1999年12月,成立国家信息化工作领导小组,进一步推动了国民经济和社会信息化建设的进程。

In 1997, China held a national work conference on informatization, creating a comprehensive plan and deployed a national informatization work project. In December 1999, China established a State Informatization Leading Group, to further promote national economic and social informatization. [CHECK DATES]

2001年8月,中共中央、国务院决定重新组建国家信息化领导小组,以进一步加强对推进我国信息化建设和维护国家信息安全工作的领导。领导小组负责审议国家信息化的发展战略,宏观规划,有关规章、草案和重大决策,综合协调信息化和信息安全工作。

In August 2001, the CPC Central Committee and the State Council decided to re-form the State Informatization Leading Group, to further enhance the leadership for

promotion of China's informatization construction and maintenance of national information security. The Leading Group took charge of the consideration of national informatization development strategy, macro planning, the relevant regulations, the Bills and major decision-making, and coordination of the work of informatization and information security. From 2001 to 2005, five meetings of the group were successively convened, led by two Prime Ministers, Zhu Rongji and Wen Jiabao, to discuss the major issues of China's informatization.

2001年12月,国家信息化领导小组召开第一次会议。中共中央政治局常委、国务院总理、国家信息化领导小组组长朱镕基强调大力推进国民经济和社会信息化。

December 2001, the reformed State Informatization Leading Group held its first meeting. Zhu Rongji, Political Bureau Standing Committee of CPC Central Committee, Premier of the State Council, the team leader of the State Informatization Leading Group, stressed promoting national economic and social informatization.

2002年7月,国家信息化领导小组召开第二次会议。会议讨论通过了《国民经济和社会信息化专项规划》、《关于我国电子政务建设的指导意见》,讨论了振兴软件产业的问题。

In July 2002, the State Informatization Leading Group held its second meeting. The meeting adopted the "special plans for national economy and social informatization" and the "guidance for China's e-government building" was adopted, and the issue about the revitalization of the software industry was discussed.

2003年7月,国家信息化领导小组召开第三次会议。会议讨论了《关于加强信息安全保障工作的意见》,听取了国家信息办关于电子政务建设的工作汇报。

In July 2003, the State Informatization Leading Group held its third meeting. The meeting discussed the "notion on strengthening information security work" and listened to the work reports on e-government construction by the State Information Office.

2004年10月,国家信息化领导小组召开第四次会议。中共中央政治局常委、国务院总理、国家信息化领导小组组长温家宝主持会议并作重要讲话。会议讨论了《关于加强信息资源开发利用工作的若干意见》和《关于加快我国电子商务发展的若干意见》。

October 2004, the State Informatization Leading Group held its fourth meeting. Wen Jiabao, Political Bureau Standing Committee of CPC Central Committee, Premier of the State Council, the team leader of the State Informatization Leading Group, presided over the meeting. The meeting discussed the "views on the work of strengthening of information resources development and utilization" and "views on accelerating the development of China's e-commerce".

2005年11月,国家信息化领导小组召开第五次会议。中共中央政治局常委、国务院总理、国家信息化领导小组组长温家宝主持会议并作重要讲话。会议审议并原则通过《国家信息化发展战略(2006-2020年)》。

November 3, 2005, Premier Wen Jiabao presided over the fifth meeting of the State Informatization Leading Group, to examine and adopt the "National Informatization Development Strategy (2006-2020)." After the CPC Central

Committee and the State Council agreed, on March 19, 2006, the CPC Central Committee General Office and the Office of the State Council issued the "2006-2020 National Informatization Development Strategy" (No. 11 [2006], hereinafter referred to as "Informatization Strategy "). On May 8, 2006, the Xinhua News Agency published the full text of the "Informatization Strategy."

3. 中国信息化策略

2.3 China's Informatization Strategy

党中央、国务院十分重视信息化工作。党的十五届五中全会提出要大力推进国民经济和社会信息化，十六大提出将信息化带动工业化、工业化促进信息化作为走新型工业化道路的战略举措。十七大又从贯彻落实科学发展观的高度，对推进信息化做出新的部署，要求我们全面认识工业化、信息化、城镇化、市场化、国际化发展的新形势、新任务，大力推进信息化与工业化融合。

The CPC Central Committee and State Council attach great importance to informatization work. The Fifth Plenary Session of the 15th Party Central Committee proposed to vigorously promote national economic and social informatization, the 16th National Party Congress affirmed the belief that informatization promotes industrialization, and the 17th National Party Congress made new arrangements for the promotion of information technology, and noted the need to fully understand the new development situation and new tasks of industrialization, informatization, urbanization, marketization and internationalization, and vigorously promote integration of informatization and industrialization.

《信息化战略》战略目标与具体目标清晰明确，《战略》提出，到2020年，我国信息化发展的战略目标是：综合信息基础设施基本普及，信息技术自主创新能力显著增强，信息产业结构全面优化，国家信息安全保障水平大幅提高，国民经济和社会信息化取得明显成效，新型工业化发展模式初步确立，国家信息化发展的制度环境和政策体系基本完善，国民信息技术应用能力显著提高，为迈向信息社会奠定坚实基础。

The strategic goals and objectives of the "Informatization Strategy" are clear. The "Strategy" proposed that, by 2020: an integrated information infrastructure will be basically popularized; capability of independent innovation of information technology will be significantly enhanced; the information industrial structure will be comprehensively optimized; the level of national information security will be substantially increased; national economy and social informatization will be achieved; the new industrialization development model will be initially established; the system environment and policy system of the national informatization development will be basically improved; and the ability to apply national information technology will be significantly improved. All this will lay a solid foundation for moving towards the information society.

《信息化战略》提出的具体目标是：促进经济增长方式的根本转变；实现信息技术自主创新、信息产业发展的跨越；提升网络普及水平、信息资源开发利用水平和信息安全保障水平；增强政府公共服务能力、社会主义先进文化传播能力、中国特色的军事变革能力和国民信息技术应用能力。

Specific objectives of the proposed "Strategy" are: to promote fundamental changes for the economic growth mode; to achieve independent innovation of

information technology; to develop information industry by leaps and bounds; to enhance network universal service; raise the level of development and utilization of information resources; upgrade the information security level; enhance the capability for governmental public services; expand the ability of advanced cultural communication; support the ability of military reform with Chinese characteristics; and increase the national application of information technology.

《战略》提出了我国信息化发展的九大战略重点:推进国民经济信息化;推行电子政务;建设先进网络文化;推进社会信息化;完善综合信息基础设施;加强信息资源的开发利用;提高信息产业竞争力;建设国家信息安全保障体系;提高国民信息技术应用能力,造就信息化人才队伍。

The "Strategy" document proposed nine main points for development: promoting national economic informatization; implementation of e-government; building advanced Internet culture; promoting the information society; improving the comprehensive information infrastructure; enhancing the development and utilization of information resources; improving the information industrial competitiveness; building national information security system; increasing the capacity of national application of information technology; creating information technology personnel.

4. 中国信息化评价指标体系

2.4 The National Informatization Evaluation System

随着社会信息化进程的不断发 展,信息化水平评价方法一直是国内外各信息机构及学者关注的热门话题。我国从信息化起步阶段就非常重视信息化评价体系的 建设工作,其中最具影响力和说服力的当首推信息产业部于 2001 年 7 月正式公布的《国家信息化指标构成方案》(以下简称《方案》),该《方案》被业内人士誉为“中国新的现代化标准”,也是全球第一个由国家制定的国家信息化标准。

With the continuous development of the process of social informatization, an informatization-level-based evaluation method has been a hot topic considered by domestic and foreign information agencies and academics. From its initial stage, China has attached great importance developing a system to evaluate the progress of its informatization program. The most influential work is the Ministry of Information Industry's (MII) "Indicators System Program on National Informatization" (hereinafter referred to as the "Program"), announced in July 2001. (FN Zhang and Taylor) The "Program" was reputed by the industry people as "China's new modern standards". It's also the first national informatization standard developed by any major state in the world. (FN website) <http://www.niec.org.cn/English/index2.htm>

《方案》以信息资源、信息网络、信息技术应用、信息技术和产业、信息化人才、信息化政策法规和标准为依据,提出了概括反映国家信息化水平的 20 项指标:每千人广播电视播出时间、人均电话通话次数、人均带宽拥有量、每百平方公里长途光缆长度、每百平方公里微波占有信道数、每百平方公里卫星站点数、每百人拥有电话主线数、每千人有线电视台数、每百万人互联网用户数、每千人拥有计算机数、每百户拥有电视机数、网络资源数据库总容量、电子商务交易额、企业信息技术类固定投资占同期固定资产投资的比重、信息产业增加值占 GDP 比重、信息产业对 GDP 增长 的直接贡献率、信息产业研究与开发经费支出占全国研究与开发经费支出总额的比重、信息产业基础设施建设投资占全部基础设施

建设投资的比重、每千人中大学毕业生比重、信息指数。

The "Program", incorporating information resources, information networks, the application of information technology, information technology and industry, informatization personnel, information technology policies and regulations, and standards as its basis, put forward 20 indicators to reflect the broad national informatization level: radio and television broadcast time per 1,000 inhabitants, the number of calls per capita, possession of bandwidth per capita, length of long-distance optical cable per 100 square kilometers, microwave channel number per 100 square kilometers, satellite sites per 100 square kilometers, the number of telephones main line per 100 inhabitants, cable television stations per 1,000 inhabitants, Internet users per million inhabitants, computer ownership per 1,000 inhabitants, the number of TV sets per 100 inhabitants, the total capacity of network resources database, the amount of e-commerce transactions, the proportion of enterprise information technology fixed investment accounted for investment in fixed assets for the same period, the proportion of added value of information production in GDP, the direct contribution of the information industry to the GDP growth, the proportion of the information industry research and development expenditures accounted for the country's total research and development expenditures, the proportion of the information industry infrastructure construction investment accounted for all of investment in infrastructure construction, and the proportion of university graduates per 1,000 inhabitants, the information index.

5. 国家信息化建设“十五”成就

2.5 Implementation of the National Informatization Program in the "10th Five-Year Plan"

经过“十五”的快速发展,我国信息产业规模已位居世界前列。“十五”期间,我国信息产业实现了持续、快速发展,在国民经济中的地位日益突出。2005年,全行业完成总收入4.4万亿元,是“九五”末的4.6倍;完成增加值1.3万亿元,占国内生产总值的比重由“九五”末的4%提高到7.2%。提前一年完成“十五”计划主要目标。

After its rapid development in the "10th Five-Year" plan period, China's information industry is ranked as a leader in the world in terms of scale. In the period of the "10th Five-Year Plan", China's information industry accomplished sustained and rapid development, and the status of the national economy became increasingly prominent. In 2005, the total income of the entire industry was 4.4 trillion yuan, which is 4.6 times that at the end of the "9th Five-Years". The added value was 1.3 trillion yuan, which accounts for 7.2 % of domestic gross product.

电信体制改革取得重要进展,竞争格局初步形成,监管体系基本建立,市场监管成效显著,资费改革迈出实质性步伐。固定资产投资累计完成1万亿元,建成了具有世界先进技术水平电信网络;年均新增电话用户1亿户,固定电话、移动电话用户规模稳居世界第一,互联网上网人数跃居全球第二;全国固定电话和移动电话普及率分别达到27.3%和30%,通电话行政村比重达到97.1%,服务水平明显提高;基础运营企业竞争能力不断提升,增值运营企业队伍迅速壮大;网络技术能力大幅提升,为业务创新奠定了良好基础。

By the end of the "10th Five-Years", telecom structural reform had made major

progress, competition had initially taken shape, a basic regulatory system had been established, market supervision had achieved remarkable results, and pricing reform had taken a substantive step forward. Fixed assets investment had exceeded 1 trillion yuan, and a telecommunications network with one of the world's most advanced technological levels was built. Annual average additional telephone subscribers reached 100 million. The scale of fixed telephone and mobile phone users was ranked the first in the world. The number of Internet access subscribers leapt to the second in the globe (now first). The penetration of national fixed telephone and mobile phones reached 27.3% and 30%. The proportion of administrative villages with a telephone reached 97.1 percent. The service level was significantly improved. The competitiveness of basic operating enterprises was continuously upgraded. Value-added operations offerings were rapidly increased. The capability of network technology was significantly enhanced, which laid a good foundation for business innovation.

电子信息产业持续快速发展。“十五”期间，销售收入由 6070 亿元增长到 3.84 万亿元，工业增加值由 1330 亿元增长到 9000 亿元；出口额由 550 亿美元增长到 2680 亿美元，占全国出口总额的 35%；五年累计合同利用外资约 1000 亿美元；部分产品产销量居世界前列；结构调整初见成效，软件、集成电路等核心基础产业迅速发展；产业集聚效应进一步显现。

In the period of the "10th Five-Year Plan", the electronic information industry steadily and rapidly developed. Sales income increased from 607 billion yuan to 3.84 trillion yuan, and the industrial added value increased from 133 billion yuan to 900 billion yuan, exports increased from 55 billion U.S. dollars to 268 billion U.S. dollars, accounting for 35% of the country's total exports. Cumulative contract utilization of foreign capital in the five-year was of about 100 billion U.S. dollars. Some of products were among the world's leaders in production and sales. Structural adjustment achieved initial results. Core infrastructure industries such as software and integrated circuits had developed rapidly. The industrial clustering effect had further emerged.

国民经济和社会信息化建设稳步推进，信息产业发挥了重要的支撑作用。通信网络快速发展，成为国民经济和社会信息化的关键基础设施；电子信息产品和软件在电子政务、电子商务、教育、金融等国民经济和社会重要领域的应用效果日渐显著，采用信息技术改造传统产业不断取得新的进展；《电子签名法》进入实施阶段，电子认证服务管理、信息化培训等基础工作有序开展。

The building of national economic and social informatization has steadily pushed forward, in which the information industry has played an important supporting role. Because of their rapid development, communication networks have become the key infrastructure for national economic and social informatization. The application effects of the electronic information products and software in e-government, e-commerce, education, finance, and other important national economic and social areas are growing significantly. The use of information technology to transform traditional industries continues to progress. The "electronic signature law" has been implemented. The electronic certification service management, informatization training and the other basic works are being carried out in an orderly manner.

三、“信息化”建设、缩小“信息差距”、跨越“数字鸿沟”等概念在中国的诠释

3. China's interpretation of the concept of "Informatization" construction, narrowing the "information gap", and bridging the "digital divide"

1. “信息化”及“信息化”建设

3.1 Informatization and Informatization Construction

关于信息化的表述，在中国学术界和政府内部作过较长时间的研讨。如有的认为，信息化就是计算机、通信和网络技术的现代化；有的认为，信息化就是从物质生产占主导地位的社会向信息产业占主导地位社会转变的发展过程；有的认为，信息化就是从工业社会向信息社会演进的过程，如此等等。

There has been a long time's discussion among Chinese academia and government regarding the concept of "informatization". For example, some people believe that informatization is the modernization of computers, communications and network technology; some believe that informatization is the development process from the society dominated by material production to the society dominated by information industry; some believe that informatization is the evolution process from industrial society to information society; and so on.

1997年召开的首届全国信息化工作会议，对信息化和国家信息化定义为：“信息化是指培育、发展以智能化工具为代表的新的生产力并使之造福于社会的历史过程。国家信息化就是在国家统一规划和组织下，在农业、工业、科学技术、国防及社会生活各个方面应用现代信息技术，深入开发广泛利用信息资源，加速实现国家现代化进程。”（智能化工具又称信息化的生产工具。它一般必须具备信息获取、信息传递、信息处理、信息再生、信息利用的功能。）与智能化工具相适应的生产力，称为信息化生产力¹。

In the first National Work Conference on Informatization held in 1997, the Informatization and National Informatization were defined as: "Informatization is a history process in which new productivity, which is delegated by intelligent tools, is nurtured, developed and used to benefit the society. The National Informatization means, under the state unique programming and organization, to apply modern information technology in every sector of agriculture, industry, science and technology, national defense and all aspects of social life, to in-depth develop and use of extensive information resources, and to accelerate the process of national modernization." Intelligent tools are also called informatization production tools. They must generally have the function of information acquisition, information transmission, information processing, and information regeneration and information utilization. Productivity adapted to intelligent tools is called informatization productivity.

《2006—2020年国家信息化发展战略》中指出信息化是充分利用信息技术，开发利用信息资源，促进信息交流和知识共享，提高经济增长质量，推动经济社会发展转型的历史进程。²

In the 2006-2020 National Informatization Development Strategy, it is defined that informatization means a history process in which people make full use of

¹ <http://www.c114.net/keyword/%D0%C5%CF%A2%BB%AF>

² <http://xxhs.miit.gov.cn/n11293472/n11295327/n11297172/11645862.html>

information technology, develop and utilize information resources, promote information exchange and knowledge-sharing, improve the quality of economic growth, promote economic and social development and transformation.

在中国，信息化建设包括了行业信息化，企业信息化，政府信息化，区域信息化等。

In China, informatization conduction includes industry informatization, enterprise informatization, government informatization and region informatization, etc.

信息化有两个层次：一个就是信息产业的发展。另一个层次就是信息技术和信息装备渗透到社会的各个方面，影响到社会的各个方面，这应该说是信息化更本质的内容，当然渗透需要信息产业的支持³。

There are two levels of informatization. One is the development of information industry and another is that information technology and equipment penetrates into all aspects of society and influences all aspects of society. The later is the essential meaning of informatization. Certainly to penetrate needs the support of information industry.

中国的信息化目前存在如下问题：①内容贫乏②法制不健全，到现在为止没有一个法律，互联网就更跟不上了，只有一些行政性的规定，监管是一个很大的问题；③城乡差别严重；④投资浪费⁴。

There are several problems in Chinese informatization: 1) the lack of content, 2) unsound legal system. There are no relative laws. As to the internet, there are only some administrative regulations, so the supervision is a big problem. 3) The gaps between urban and rural areas are serious. 4) Waste of investment.

信息化与工业化的“融合”、业务与IT的完全融合以及信息化可持续发展战略推动的绿色IT潮流，是目前中国信息化呈现出的三大主要趋势⁵。

There are three major trends of Chinese informatization: the integration of informatization and industrialization, the complete integration of business and IT, the green IT trend drove by informatization sustainable development strategy.

2. “信息差距”及缩小“信息差距”

3.2 Information Gap and Narrowing the Information Gap

对于信息差距的定义，不同的学者有不同认识。部分学者认为广义地信息差距是指一个国家或地区的信息发展水平与先进国家或先进地区的差距，包括信息生产、信息传递和信息利用三个方面的能力与水平⁶；狭义的信息差距就是指信息基础设施状况。另一些学者将信息差距等同于数字鸿沟（Digital Divide）。

There are different definitions of Information Gap. Some scholars believe that a generalized definition of Information Gap is that: it means the gap of information development level between a country or a region and advanced country or region, including the ability and level of information production, information transmission and information utilization, while the narrow sense refers to the situation of information infrastructure. Other scholars believe that information gap equals to digital divide.

³ 朱高峰，试论中国信息化之路，武汉理工大学学报（信息与管理工程版），2004年2月，Vol 26 No.1: 1-10

⁴ 朱高峰，试论中国信息化之路，武汉理工大学学报（信息与管理工程版），2004年2月，Vol 26 No.1: 1-10

⁵ IBM《中国信息化发展趋势白皮书》，2008年5月

⁶ 刘灿娇. 我国东西部信息差距的现状和对策研究[J]. 情报科学, 2002, (10): 1117-1120.

信息差距在我国呈现出三个层面上的分布差距, 首先是我国同发达国家之间的差距; 其次是我国东西部地区之间的差距; 第三是城乡差距⁷。

There are three levels of Information Gap in China: 1) the gap between China and developed countries, 2) the gap between China's eastern and western regions, 3) the gap between urban and rural areas.

我国信息资源的公共获取水平较低, 信息寻租的影响, 信息资源配置不均衡, 信息化教育差距影响等四大原因共同造成了我国信息差距的持续扩大⁸。

The low level of public access of information resources, the influence of information rent-seeking, the disequilibrium of information resources allocation and the gap in informatization education are the four reasons which together brings continually extension of China's information gap.

3. “数字鸿沟”及跨越“数字鸿沟”

3.3 Digital Divide and Bridging the Digital Divide

国内相关机构非常重视对于数字鸿沟的研究, 我国已经出台了一系列信息化政策缩小数字鸿沟。在国内学术界, 很多关于跨越数字鸿沟的论文相继发表。国情专家胡鞍钢的论文对数字鸿沟问题进行了较为详细的分析, 他认为“数字鸿沟”的本质就是以国际互联网为代表的新兴信息通讯技术在普及和应用方面的不平衡现象, 这种不平衡不仅体现在不同地理区域、不同人类发展水平的国家之间、不同经济发展水平的国家之间, 同时也体现在一个国家内部不同地区、不同人群之间。胡鞍钢的研究不仅提供了丰富的数据资料, 而且提出了一些缩小鸿沟的国家战略建议, 如规范竞争, 保护消费者, 提供激励, 保证落后地区基本的电信接入⁹。

Relative institutions in China have attached great importance to the study of digital divide. The Chinese government has already issued a series of informatization policies to bridge the digital divide. In the domestic academia, a lot of papers on bridging the digital divide have been published. Hu Angang, a China expert, analyzed the digital divide in detail in his paper. He believed that the essence of “digital divide” is the imbalance in the popularization and application of new information and communication technologies, which is represented by the internet. This imbalance exist not only among different geographical regions, different countries with different social and economic development levels, but also among different regions different groups of people within a country. Hu Angang's research provides not only plenty of data, but also a number of national strategy suggestions to narrow the gap, such as regulating competition, protecting subscribers, providing incentives, and ensuring the basic telecommunications access for undeveloped areas.

国内还有学者从信息理解的角度定义“数字鸿沟”, 认为基于信息理解的数字鸿沟是信息循环过程中内生的鸿沟, 即信息数量泛滥和信息理解接受能力贫乏之间的鸿沟, 是信息生产和信息消化之间产生的鸿沟¹⁰。

There are also some domestic scholars who understand information gap from the perspective of information understanding. They believed that the digital divide based on information understanding is an endogenous gap in the process of

⁷ 胡鞍钢,周绍杰. 中国信息化战略:缩小信息差距[J]. 中国工业经济,2001,(1):25229.

⁸ 姚维保, 我国信息差距继续扩大的原因分析及对策, 情报科学[J], 2005年12月, Vol.23, No.12: 1899-1902

⁹ 胡鞍钢,周绍杰, 新的全球贫富差距: 日益扩大的“数字鸿沟”, 中国社会科学[J], 2002年第3期: 34-48

¹⁰ 陈红星, 基于信息理解的数字鸿沟, 图书馆学研究[J], 2008年2月: 96-98

information circulation, i.e. the divide between the flooding of information amount and the sparseness of information understanding and acceptance ability, which also means the divide between information production and information digestion.

还有的学者从“信息量”的角度研究数字鸿沟，认为所谓数字鸿沟就是指不同群组的人们通过信息和通信技术所获得信息量大小之间差别，这种差别将通过信息量的差异多少来衡量。简单的说，就是把数字鸿沟视为从信息发出者到信息接收者的通路问题¹¹。

Some scholars researched the digital divide from the perspective of amount of information, they believed that the Digital Divide was the difference of the amount of information people get based on information and communication technologies. In other words, the Digital Divide is the transmitting channel problems from the information sender to the receiver.

《互联网周刊》主编胡延平发表了《跨越数字鸿沟、消除数字冲突》、《1990—2000，失去的10年》、《中国能否跨越数字鸿沟》等文章¹²，提出了新四化（全球一体化、政治民主化、经济自由化、社会信息化）这一新理念，认为数字鸿沟是结果而不是原因，世界各国在以新四化为核心特征的第二次现代化进程当中的不同表现和发展差距是问题的真正原因；北大张维迎教授认为要跨越数字鸿沟首先应填平制度鸿沟¹³；经济学家钟鹏荣则提出了解决数字鸿沟问题几点建议¹⁴。

Hu Yanping, the chief editor of Internet Weekly, issued 12 pieces of related paper, such as “Bridging the Digital Divide: Eliminating the Digital Conflict”, “1990-2000: the Lost Decade”, “Can China Bridge the Digital Divide?” and so on. He put forward a new concept of new “four modernizations”, including globalization, political democratization, economic liberalization and social informatization. He believe that Digital Divide is not the reason but the result and the real reason is the different performances and the development gap among countries in the second modernization process that has new four modernizations as its core characteristic. Professor Zhang Weiying from Beijing University believed that system gap should be bridged before bridging the Digital Divide. Zhong Pengrong, a Chinese economist, has put forward some suggestions to solve the problem of Digital Divide.

四、 中国学者就研究该领域所提出的实施建议总结

4. The Measures and Methods of "Measure / Bridging the Digital Divide" in China

1. 关于“信息化”建设的实施建议

4.1 Suggestions on Informatization Construction

中国学者关于“信息化”建设的实施建议多集中于行业信息化、政府信息化等信息化的某个方面，并就此提出信息化建设的意见和建议。针对中国整体的信息化建设，有学者提出了中国信息化道路的发展路径：1、建立一套有效的社会动员体系，2、不失时机地出台信息化发展政策，3、以信息化工程的实施推动信息化建设，4、以关键技术的自主研发提升信息产业的发展水平，5、以提高资

¹¹ Bin Zhang, Xiaomei Li, Measuring the digital divide: lessons for China's informatization, Confenis 2007, Beijing, China

¹² 胡延平编著.《跨越数字鸿沟：面对第二次现代化的危机与挑战》.社会科学文献出版社.2002年

¹³ 张维迎，跨越数字鸿沟必先填平制度鸿沟，国际商务，2001年第7期：8-9 张维迎，跨越数字鸿沟必先填平制度鸿沟，国际商务，2001年第7期：8-9

¹⁴ 钟鹏荣，“跨越数字鸿沟”高层研讨会，2000年10月

源的利用水平实现可持续发展¹⁵。

Chinese scholars' suggestions on the informatization construction are more concentrated in some aspects of the industry informatization and government informatization. For China's overall informatization construction, some scholars have suggested the development path for China's informatization: 1) to establish an effective system of social mobilization, 2) to introduce informatization development strategies in time, 3) to promote informatization construction by implementation of informatization projects, 4) to advance the development level of information industry by independent R&D of key technologies, 5) to achieve sustainable development by rising the level of resource utilizations.

2. 关于缩小“信息差距”的实施建议

4.2 Suggestions on Narrowing the Information Gap

总结中国学者关于缩小“信息差距”的实施建议，有以下几个方面：

Chinese scholars have some implementation recommendations on narrowing the “Information Gap” as following:

(1)全面开放电信增值服务业,形成有效竞争。优先开放西部电信服务市场,不仅要向外资开放,而且应当首先向民营资本开放。

1) There should be a full liberalization of the telecommunications value-added services in order to form effective competition. The telecommunications services market should be opened with priority in the western, not only to foreign investment, but also firstly to private capitals.

(2)实现电信网、有线电视网和计算机互联网的“三网融合”,加快发展城乡有线电视网,并使之成为互联网信息传输的重要载体之一;综合利用现有基础网络资源,转变传统的部门专线电信网的运营机制,实现专线电信网的企业化经营,使公用电信网和各部门专线电信网互联互通,发挥规模经济效益。

2) To realize the “Three Networks Convergence” of telecommunication networks, cable networks and the internet. To speed up the development of cable television network in urban and rural areas and make it become one of an important carrier of internet information transfer. To comprehensively utilize the existing basic network resources and change the traditional operation mechanism of sector telecom networks with dedicated line. To realize the enterprise management mechanism for telecom networks with dedicated line, so that the public telecom networks and sector telecom networks with dedicated line can be interconnected to bring scale economy efficiency into play.

(3) 制定政策鼓励对落后地区信息领域的投资：例如制定明确的信息政策导向；创造良好的信息化法律环境；给与财政支持，加大政府对中西部地区信息基础设施投入,同时鼓励有实力的非电信企业、民营资本、外资普遍进入信息基础设施建设,利用市场机制进行信息基础设施建设,同时也可以利用市场进行融资以支持基础设施建设，以及制定税收优惠政策；尤其要加强落后地区的教育信息化。

3) The government should make policies to encourage the investment in the field of information for backward areas. for example, to establish a clear direction on information policy; to create a favorable legal environment for informatization; to

¹⁵ 张晋平, 论中国特色信息化道路的发展路径, 甘肃社会科学[J], 2006 年第 6 期: 250-252

give financial support to increase the information infrastructure investment for the central and western regions, to encourage strong non-telecommunications enterprises, private capital and foreign capital enter the construction of information infrastructure in order to use the market mechanisms for information infrastructure construction, at the same time, use the market to raise funds to support the infrastructure construction, as well as to develop preferential taxation policies; To pay particular attention to education informatization in backward areas.

(4) 加快农村电信普遍服务建设, 缩小信息差距¹⁶。强化农村电信基础设施投资, 进一步降低电话初装费和电话使用资费, 提高乡镇公用电话普及率。

The construction of universal service in rural areas should be speeded up in order to narrow the information gap. The rural telecommunications infrastructure investment should be strengthened and the installation fee and the using charges for telephone should be decreased to increase the public telephone penetration in rural areas.

(5) 大力推进“政府上网工程”, 逐步实现政府行政管理和社会公共服务网络化、政府采购和公共工程网上竞标, 建立国家公用数据库以及工业信息网, 促进金融、保险、财税、贸易、统计、地理、环境保护等领域的信息化, 为国民经济与社会发展提供决策依据。¹⁷

5) The “Government Online Project” should be promoted vigorously, and the networking of government administration and public services should be realized progressively. The government procurement and public projects should realize the on-line bidding. It is need to establish national public databases and industrial information networks in order to promote the informatization in the fields of finance, insurance, taxation, trade, statistics, geography and environment protection, etc. to provide evidences on decision-making for national economy and social development.

(6) 推进信息资源的零障碍获取, 政府可以通过一系列措施提高我国信息资源公共获取水平: 例如实行政府信息公开, 实行国家许可证(National License)制度, 建立信息寄存制度和完善信息获取渠道, 积极推行电子政务。

6) The acquisition of information resources with no barrier should be promoted. The government can take measures to improve the level of public access to information resources, such as the implementation of opened government information, the mechanism of National License, the establishment of information storage system and information acquisition channels, and to actively promote E-government.

(7) 打破信息垄断, 实行价格规制。¹⁸

7) To break the information monopoly and to implement price regulation.

3. 关于跨越“数字鸿沟”的实施建议

4.3 Suggestions on Bridging the Digital Divide

中国学者认为, 要高度重视中国数字鸿沟的双重落差: 一方面是与发达国家之间的数字化差距, 另一方面是国内各地区间的数字化差距。积极借鉴国外的做法, 制定缩小数字鸿沟的战略与计划¹⁹。

Chinese scholars believe that China should attach great importance to the dual

¹⁶ 胡鞍钢, 加快农村电信普遍服务, 缩小城乡信息差距, 中关村[J], 2005年8月: 62-66

¹⁷ 胡鞍钢, 周绍杰. 中国信息化战略: 缩小信息差距[J]. 中国工业经济, 2001, (1): 25-29.

¹⁸ 姚维保, 我国信息差距继续扩大的原因分析及对策, 情报科学[J], 2005年12月, Vol.23, No.12: 1899-1902

¹⁹ 任贵生, 李一军, 欧盟缩小数字鸿沟的策略及对我们的启示, 管理世界[J], 2006年5月: 144-145

digital divide: one is the digital divide between China and developed countries; the other is digital divide among different regions in China. China need actively take other countries' activities as reference and develop its own strategies and plans to bridge the digital divide.

胡鞍钢认为,要有效地缩小“信息差距”,跨越数字鸿沟,中国需要采取如下的措施:

Hu Angang believed that, to effectively narrow the “Information Gap” and bridge the “Digital Divide”, China needed to take following measures:

第一, 电信领域的开放竞争。电信领域的开放竞争不仅可以充分发挥电信运营商利用市场机制加大对信息基础设施的建设²⁰, 同时还有助于网络接入和使用资费的下降, 有利于低收入群体接入和使用网络, 提高基础设施水平和信息技术服务的质量, 这对于发展中国家而言显得格外重要。

Firstly, China needs to open telecommunications competition. The opened competition in telecommunications not only can give full play for the operators to use market mechanisms to increase the information infrastructure construction, but also help to decrease the fee of network access and usage, which is useful for the low-income groups to access and use the internet, and to increase the level of infrastructures and the quality of information technology services, which is especially important for the developing countries.

第二、加强人力资源开发, 促进国际互联网和计算机在国家创新体系、社会管理和中小企业中的应用, 促进全社会分享知识的外溢效益。

Secondly, China needs to strengthen the human resource development, promote the application of international Internet and computers in the national innovation system, social management and small/medium enterprises, and promote the overflowing effect of the knowledge sharing in the whole society.

第三, 降低信息技术产品的关税, 尽早实现信息技术产品零关税。

Thirdly, China needs to reduce tariffs for information technology products and achieve zero tariffs on these products as soon as possible.

第四, 逐步提高社区、公共机构、农村以及边远地区的网络普及和普遍接入。

Fourthly, China needs to gradually improve the network popularity and universal access in communities, public institutions, rural and remote areas.

也有学者提出通过村通工程, 贫困地区的新农村建设以及尝试信息扶贫等方式缩小“数字鸿沟”²¹。

Some scholars have also suggested bridging the digital divide by Village-to-village Connection Projects, New Countryside Construction in poverty-stricken areas and information poverty relief.

中国学者还提出了对于西部少数民族地区, 构建图书馆 2.0²², 以利于消除

²⁰ 90 年代OECD 国家的电信改革的经验表明, 电信服务的开放竞争对于接入线(包括固定的和移动的)的增长、替代接入技术的引进、价格降低以及国际互联网的接入和使用的增长均起了重要的推动作用。

²¹ 姚春华, 消除数字鸿沟新方式的探讨, 现代电信科技, 2008 年 3 月第 3 期: 19-22

²² Sarah Houghton 将图书馆 2.0 定义为: 图书馆 2.0 其实很简单, 就是将图书馆的空间(无论是实体空间还是虚拟空间) 变得更有交互性、合作性, 并且是以交流需求为驱动的。应用起点可以是博客/ 智力游戏等活动, 其主要目的就是通过使图书馆与用户的日常生活更有相关性而将用户吸引回图书馆, 将图书馆变成他们

数字鸿沟²³。图书馆 2.0 平等, 开放, 协作共享, 张扬个性, 对于创造高度尊重, 用户可享受更加人性化、便利化, 更加丰富、优质的网络信息服务, 可享受网络上的社区、互动、资源的自我组织, 图书馆 2.0 给每一个用户以平等的待遇, 参与、共享成为最基本的价值观, 用户成为图书馆 2.0 的中心, 服务成为图书馆 2.0 生存与发展的基础, 这些都对跨越数字鸿沟有着重要的作用。

Chinese scholars also put forward suggestions of establishing library 2.0 in the western minority areas to bridge the digital divide. The characters of library 2.0 are as follows: equality, openness, cooperation and sharing, extend of individuality, high respect of innovation; Users can enjoy more humanize, convenient, and abundant web information services with higher quality; Users can enjoy online interactive resources self-organization in community; Library 2.0 gives every user the equal treatment while participation and sharing have become the basic values; The users become the center of library 2.0, and services become the basic of existence and development of library 2.0. Those characters for library 2.0 are all of great importance for bridging the digital divide.

五、 中国测度数字鸿沟方法

5. Measuring Digital Divide in China

1. 指标体系

从图 1 可以看出, 我国“数字鸿沟”的产生包括两个过程: 一个过程是由于经济发展水平、信息资源、科教投入和人才结构这四个因素对信息化水平的影响, 产生了“数字鸿沟”(图中实线箭头); 另一个过程是一个循环, 经济发展水平影响了信息资源和科教投入, 从而影响了人才结构, 进而影响到我国的“数字鸿沟”, 数字鸿沟又反过来影响到经济发展水平(图中虚线箭头)。如果这个循环过程是良性的, 那我国的“数字鸿沟”将会越来越小。

5.1 Index System

As can be seen from Figure 1, the creation of digital divide in China includes two processes. One is that the impact of four factors such as the level of economic development, information resources, science and education investment and human resources structure on the level of information technology leads to the digital divide (solid line in Figure 1); the other is a cycle. The level of economic development will influence information resources and science and education investment, thus affecting the human resources structure. Thereby that will affect digital divide. And the digital divide, in turn, will influence the level of economic development (dotted line in Figure 1). If this is a virtuous cycle, digital divide in China will get smaller and smaller.

的目的地而不是遥远的回忆。

²³ 赵青, 跨越数字鸿沟: 构建西部少数民族地区的图书馆 2.0, 情报杂志[J], 2008 年 2 月: 142-144

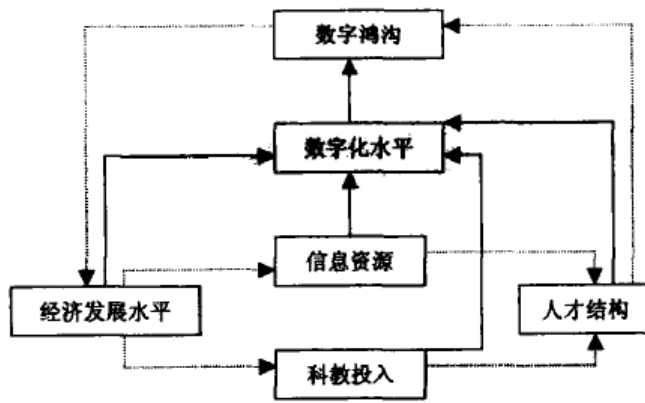


图1 我国“数字鸿沟”的产生机理描述

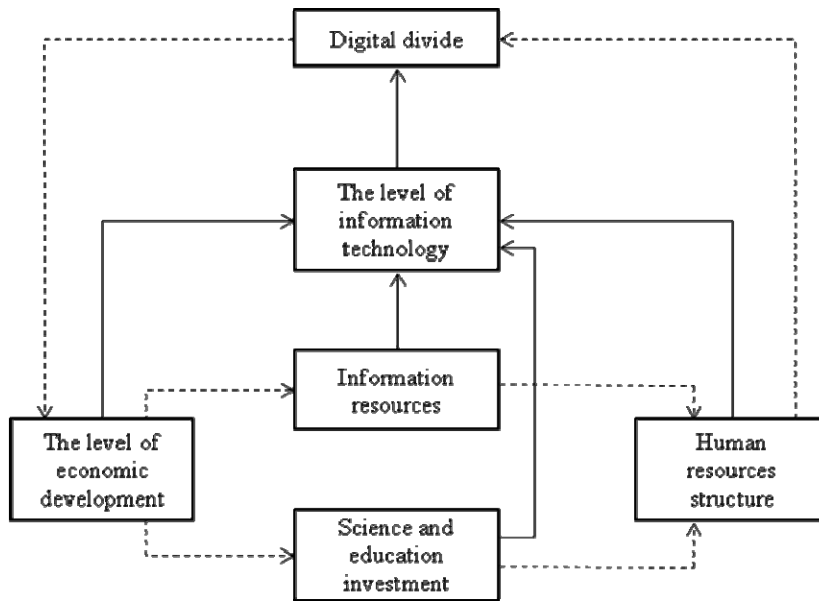


Figure 1 the creation of digital divide in China

国家统计局信息中心受原国家信息化办公室的委托,按照日本所使用的信息化指数法的思路,结合我国国情,对关系到经济和社会生活的各个指标进行了认真的分析筛选。分别按国家确定的信息化6要素(信息资源,信息网络,信息技术应用,信息技术和产业,信息化人才,信息化政策、法规和标准),将每个要素都分解为2~5项具体指标,共计21项指标(见表1)。这些指标的数据绝大部分都可从国家、地方和有关行业统计年鉴中查到,算法较简单,具有可操作性。可以从定量角度掌握同一地区在不同时期或不同地区之间的信息化程度或差距,进行横向或纵向比较,应用广泛。

Information Center of Statistics of China has a serious analysis of kinds of indexes related to the economic and social life of various indicators of a serious analysis of the filter, according to the ideas of informatization index method of Japan. Each of the six informatization indexes identified by our country (information resources, information network, application of information technology, information technology and industry, information technology professionals, Information policy, Regulations and standards) are broken down into 2 to 5 specific indexes. There are 21 indexes totally (shown in table 1). Majority of index data can be obtained from State, Local, and Industrial Statistical Yearbook. We will know the digital divide between

different regions and the digital divide at different time in the same area quantitatively. And it will be convenient to make horizontal and vertical comparison.

利用这种方法也有不足之处,信息化测度指标设置过多,而且有的指标具有较大的相关性,容易造成相同因素在计算中占有过大份额,从而评价结果有失合理性;另外,权数采用德尔菲法仍然存在主观人为因素,有的指标目前尚没有相应数据,要做特别调查,不便于各地区动态测度国家或地区的信息化水平;只重视对信息化现状水平的测度,而不重视对信息化质量和潜力的评估,其测算出来的信息化规模或信息化指数并不能真正反映信息化发展与建设的全貌。

There are also inadequacies in this method. The amount of informatization indexes is so large that some indexes have great relevance. It will lead to the situation that the same factors take larger share than it should be. So the result of evaluation will be unreasonable. In addition, it isn't objective enough to decide the weight of every index using Delphi method. And there is no data corresponding to some indexes, which will not be conducive to measure the level of information technology between different regions dynamically. At the same time we put emphasis on present situation of the information technology and ignore the quality and potential of information technology. So the result may not reflect the actual development situation.

表 1 我国信息化水平综合指数测算与评价的指标体系

要素	序号	有数据指标	指标名称	指标解释	资料来源及说明
信息资源开发利用	1	X1	每千人广播电视播出时间	传统音视频信息资源(H/千人)	广电统计
	2	X2	每万人图书、报纸、杂志总印张	传统信息资源的规模	邮电统计
	3	X3	每千人万维网站点数	按域名统计	CNNIC统计
	4		每千人互联网使用字节数	互联网的数据流量	
	5	X5	人均电话通话次数	电话主线使用率	邮电、统计系统
信息网络建设	6	X6	每平方公里光缆长度	皮长公里/百平方公里	邮电、统计
	7	X7	每平方公里微波通信线路	波道公里/百平方公里	邮电、统计
	8	X8	每平方公里卫星站点数	卫星站点/每平方公里	广电、统计
	9	X9	每百人拥有电话主线数	主线普及率	邮电统计
信息技术应用	10	X10	每千人有有线电视用户数	有线电视的普及率	广电、统计
	11	X11	每千人局用交换机容量	门/千人	邮电、统计
	12	X12	每百万人互联网用户	互联网的使用人	CNNIC

			数	数	统计
	13	X13	每千人拥有计算机数	指全部计算机	统计系统统计
	14	X14	每百户拥有电视机数	彩色、黑白电视机	统计系统统计
	15		每千人拥有信用卡数	金融系统信用卡	金融统计
信息产业发展	16	X16	每千人专利授权数		科技统计
	17	X17	信息产业增加值占 GDP 比重	邮电、广电、信息服务业	统计系统统计
	18	X18	信息业/ 全社会劳动力人数	(17) 指标行业	统计系统统计
	19		信息产业出口额/ 出口额	反映信息业国际竞争力	外经贸统计
	20	X20	信息业对 GDP 增长的贡献	当年新增/ GDP 新增	统计系统统计
信息化人才	21	X21	每万人大学生数	大专以上毕业生	统计系统统计
	22		信息化相关专业在校大学生数占比重		教育部统计
	23	X23	每万人拥有科技人员数	反映人口科技素质	科技、统计
信息化发展政策	24	X24	研究与开发经费支出/ GDP	对信息产业的政策	科技、统计
	25	X25	信息产业基础设施投资/ 全部基础设施投资	指能源、交通、邮电、水利等	各种统计

Table 1 Index system of informatization level in China

FACTOR	Serial number	Indexes with data	Name of indexes	Explanation of indexes	Data source and description
information resources	1	X1	radio & television broadcast time per thousand persons	Traditional video and audio information resources (Hours per thousand persons)	Radio, Film and Television Statistics
	2	X2	total print runs Books, newspapers, magazines per 10 thousand persons	The scale of traditional information resource	Posts and Telecommunications Statistics
	3	X3	The number of	According to the	CNNIC

			world wide web sites per thousand persons	domain name	statistics
	4		The number of bytes on the internet per thousand persons	data traffic on the internet	
	5	X5	The number of phone calls per person	Phone line usage	Posts and Telecommunications Statistics
information network	6	X6	The length of fiber optic cable per square kilometer		Posts and Telecommunications Statistics
	7	X7	Microwave links per square kilometer		Posts and Telecommunications Statistics
	8	X8	The number of satellite sites per square kilometer	number of satellite sites / square kilometer	Radio, Film and Television Statistics
	9	X9	The main Telephone line per hundred persons	main Telephone line Penetration	Posts and Telecommunications Statistics
application of information technology	10	X10	Cable TV subscribers per thousand persons	Cable TV penetration	Radio, Film and Television Statistics
	11	X11	Switch capacity per thousand persons	Number / thousand persons	Posts and Telecommunications Statistics
	12	X12	The number of people using the Internet per million persons	The number of people using the Internet	CNNIC Statistics
	13	X13	The number of computers per thousand persons	All computers	Statistics System
	14	X14	The number of TV per hundred	Color TV, black-and-white	Statistics System

			families	TV	
	15		The number of credit card per thousand persons	Credit card in financial system	Financial Statistics
information technology and industry	16	X16	The Number of Patents per thousand persons		Science and Technology Statistics
	17	X17	the proportion of increase of information industry accounted for GDP	Post and telecommunications, broadcasting, information services	Statistics System
	18	X18	Information industry / the number of labor force		Statistics System
	19		The information industry exports / total exports	Reflect the international competitiveness of information industry	Foreign Trade Statistics
	20	X20	The contribution of information industry to GDP	Industry increase / GDP increase	Statistics System
information technology professionals	21	X21	College students per 10 thousand persons	College graduates	Statistics System
	22		The number of college students in informatization related major / total number of college students		Ministry of Education Statistics
	23	X23	Scientific and technical professions per 10 thousand persons	Reflect the quality of science and technology	Science and Technology Statistics
Information policy,	24	X24	Research and development expenditure / GDP	Policy on the information industry	Science and Technology Statistics
	25	X25	Infrastructure	Energy,	Kinds of

			investment in information industry / total investment in infrastructure	transportation, posts and telecommunications, water, etc.	Statistics
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2. 指标体系构建原则

5.2. Index system principles

2.1 科学性原则

科学性是任何指标体系设计中应遵守的最基本原则。任何指标体系的建立都要有一定的理论基础，区域数字鸿沟测度指标体系依据的是信息化理论，区域发展不均衡理论。同时，指标的选择与层次划分必须符合基本的思维逻辑，紧密结合我国不同地区信息化程度不同的现状。

5.2.1 Scientific principle

Scientific principle is the most basic principle which should be complied with in the designation of index system. Any index system should have a certain theoretical basis.

Digital divide measure index system is based on informatization theory and uneven regional development theory. At the same time, the choice of index and division levels must comply with the basic logic and must be in close connection with China's information technology in different regions.

2.2 代表性原则

区域数字鸿沟测度指标很多。但是，系统化的指标体系，是由在众多可用的指标中筛选的那些具有代表性、不可替代性、排他性的指标组成。笔者列出了全部已有的相关指标以后，进行权衡、筛选，又添加了合理的指标，最终构成了区域数字鸿沟指标体系。

5.2.2 Representative principle

There are kinds of indexes in the digital divide measure index system. It is a composition of representative, irreplaceable and exclusive indexes selected from large number of standby indexes. After listing and weighting all the relevant indexes and adding some reasonable indexes, we finally constitute the digital divide measure index system.

2.3 可比性原则

可比性是选取指标的核心原则，决定着测度结果的可信度。只有具有可比性的指标，才能提供准确的信息资料，才有实际意义。本文全部采用了相对指标。

5.2.3 The principle of comparability

Comparability is the core principle when we select indexes. It determines the credibility of the results. That is because only comparable indexes can show accurate information.

2.4 可行性原则

指标体系并非越庞大越好，需要体现统计的工具性，数据需要易于获取，要考虑指标量化的难易程度平和可靠性。本文所构建的指标体系，其数据大部分能从《中国统计年鉴》、《中国信息年鉴》、《中国互联网发展状况统计报告》、《中国互联网络信息资源数量调查报告》等权威出版物中直接查到，或者是根据所查找到的数据作为初始数据，进行简单计算后得到所需数据。

5.2.4 The principles of feasibility

The amount of the indexes is not the most important. The index data should be easy to access. And we should consider the reliability of index data. Most of the index data in the digital divide measure index system can be directly found in authoritative publications such as “China Statistical Yearbook”, “China Information Yearbook”, “China Internet Development Statistics Report”, and “China Internet Network Information Resources report” and so on, or is calculated from the initial data obtaining from these publications.

3.我国区域数字鸿沟的测评

5.3. Regional survey of the digital divide

3.1 指标权重的确定

确定了区域数字鸿沟的指标之后，就是确定权重。在多项指标的综合评价中，权数的确定是一项关键的工作，权数值的确定直接影响着综合评价的结果。确定权重的方法很多，本文采用主观赋权法，根据各个指标含义和所反映的作用大小来确定相应的指标权数值，主要包括专家咨询法和层次分析法。

5.3.1 Determine the index weight

The index weight has a direct impact on the comprehensive evaluation of the results. Here we use subjective evaluation method and determine the index weight according to the meaning of every index and their affection, mainly by expert-consulting method and AHP (analytic hierarchy process).

准则层的权重，采用专家咨询法(德尔非法)来确定。请若干专家在彼此隔离的情况下分别填写权重凋奄表，回收后作出汇总整理，把统计结果返回给各位专家，请他们陈述理由再给出相应的权重。向多位专家进行多轮调查后将结果采用简单平均法得出权重。

Expert-consulting method (Delphi method) is used to determine the factor weight. A number of invited experts are separated to fill the weight table. After that we collect the data together and return the results to experts. Ask them to restate the reason and determine appropriate weight again. After several rounds of investigation, we take an average weight.

指标层的权重，采用层次分析法(AHP)来确定。先建立两两比较的判断矩阵。先建立判断矩阵，同一子目标层中的指标两两对比，根据相对重要程度按“0、1、2”三个标度来给出判断值，从而得到初始判断矩阵；按各项指标重要性程度进行排序，将三个标度初始判断矩阵转化为正式判断矩阵；再用方根法进行计算并通过一致性检验，如果总排序一致性比率 CI 小于 0.1，即一致性检验通过，就可以得出各指标的相应权重。

AHP (analytic hierarchy process) is used to determine the index weight. At first set up a judgment matrix, compare the index in the same factor index between each other. According to the relative importance of the indexes, give their judgment value (0, 1, 2) and get an initial judgment matrix. Then turn the initial judgment matrix into formal judgment matrix. At last use root method to calculate the final matrix and test its consistency. If consistency ratio CI of the final order of importance, it means that the order passes consistency test. Then we will get the corresponding weight of every index.

3.2 数据标准化处理

确定了权重，然后就是收集所测地区的数据，对数据进行标准化处理。参照我国企业信息化指标体系标杆测评方法，选择标杆区域的数值为基准值，其它区域的各个指标值与这个特定数值的比，便可得标准化数值。标杆区域是指在我国数字化过程中，与其它地区相比，走在了信息社会前列的区域(主要参考 1998、1999 及 2000 年国家公布的各省信息化指数排序)。相对于西部地区而言，所谓标杆地区，就是东部地区；相对于西部省份而言，所谓标杆省份，就是东部省份。

5.3.2 The data standardization

After determining the weight of every index, what we should do is to collect the data of target region and deal with data standardization. In the light of enterprise informatization evaluation index system the values of benchmark region are selected as benchmark values. So in some other regions standard data can be obtained after comparing every index data to this benchmark value. Benchmark region is such kind of region that informatization degree is higher than other regions in the process of society digitization. Benchmark region is eastern regions comparing to the western regions.

3.3 指数计算

在权重和标准化数值确定的情况下，就可以采用逐层计算的方式，测算出区域数字鸿沟的总指数。具体步骤是如下：首先，计算出单项指标的指数。其次，分别计算各指标对应的准则层指数，计算总指数((DDI)。

5.3.3 Calculate the index

After the index weight and standard data are determined, we can calculate the total index of regional digital divide. Steps are as follows. 1. Calculate the score of every index. 2. Multiply the score by index weight and get the digital divide index (DDI).

六、 数字鸿沟和经济鸿沟之间的关系

6. The Relationship between the Digital Divide and Economic Gap

在我国，学者对于数字鸿沟的成因和影响因素进行研究，从经济鸿沟、技术鸿沟、制度鸿沟、知识鸿沟等不同层面上进行讨论，其中大部分研究的结论是，经济鸿沟的存在是数字鸿沟形成的根本原因。

Many experts are doing research on the factors which influenced the digital divide from the aspects of economic, technology, system and knowledge. The main conclusion is that the key factor to create the digital divide is economic gap.

在 2002 年世界电信报告中曾指出：“数字鸿沟就是经济鸿沟”。报告通过对各国的因特网普及率和人均 GDP 关系进行回归分析，所得的结果来论证了上述观点。数字鸿沟问题的本质是经济增长的不平衡问题，它不是一个全新的问题，而是传统的差距在信息时代的延伸，而且这些差距在信息时代有可能进一步加剧，从而凸显信息在经济增长中的更大的意义[1]。

“Digital divide is economic gap.” The point of view was indicated in the world telecommunications report 2002. The point of view was proved by regression analysis between Internet penetration and GDP per capita. The essence of digital divide is unbalance of economic increase which is not a new issue, but the spread of the traditional gap in Information times. Further more, the gap is probably intensify in the information times so that the information has more significance in the economic growth.

刘迅[2]在研究中提到，信息化水平的差异反映了经济发展水平的差异性，不同国家、不同地区间经济发展水平之间的差异是造成“数字鸿沟”的最重要因素，信息富国与信息穷国的“数字鸿沟”正是它们之间“经济鸿沟”的结果。数字鸿沟首先表现为信息工具的拥有与否，使用者是否有机会获得信息主要取决于他们的经济资源。因为地区接入互联网离不开一定的物质条件，需要拥有骨干网等基础设施，而这些基础设施的健全与否与该地区的经济发展水平密切相关。对个人来说，上网需要一定的接入设备如个人计算机，需要一定的上网资费，在我国电信收费较为高昂的现实情况下，接入互联网对于经济较为落后的地区、人群来说是一种奢侈的行为。个人的接入也需要有一定的经济能力。

It mentioned in the article by Liu Xun that the difference of informatization level is reflected by difference of economic development level. The discrepancy of economic development level among different nations or regions is the key factor to cause the digital divide. The Digital Divide between information rich and information poor is the result of their economic gaps. The divide is firstly displayed by that the user whether has utility to access the information and the opportunity to attain the information mainly depends on their economic resources. That is because to access the Internet need some substance bases such as backbone network and other network infrastructure. Moreover, the healthiness of the network infrastructure is related to the level of economic development in this region. For individual, it is necessary to have some equipment to access the internet and need to pay fee for connecting to internet. Due to the high expenses for access internet in China, it is a luxury to connect to internet for the people in some economic-poor regions. Individual access also needs a certain degree of economic power.

韩晓静[3]认为，地区间信息差距的根源在于各地区经济发展不平衡。并在研究中，从网络信息资源这一衡量数字鸿沟的重要指标的角度出发，通过大量的数据对比和相关分析，分别从纵向（国民经济）和横向（地区经济）得到了国内数字鸿沟与经济发展状况之间的关系。一方面，不同地区人均 GDP 的差距是导致地区之间的互联网信息资源发展应用不平衡的重要原因，另一方面，互联网技术是创造财富的新手段，各个地区在互联网资源发展发展方面的不平衡必然导致新的贫富差距。拥有新技术和资源的地区将会促进经济的进一步发展，从而拉大与技术落后地区的距离。

According to point of view of Han Xiaojing, the root cause of information gap among different regions is the unbalance of economic development in different regions. In the research, the author take the point of view from the network information resources-an important indicator to measure the digital divide-to conclude the relationship between domestic economic development and digital divide from vertical (national economic) and horizontal (regional economic) aspect through a large number of comparative data and related analysis. On one hand, the gap of GDP per capita in different parts is the key factor to lead the imbalance development of the Internet information resources application. On the other hand, the Internet technology is a new means of wealth creation. The imbalance of Internet resources development will inevitably lead to a new gap between wealth and poverty. The areas have the new technology and resources will further promote economic development so as to widen the distance between the backward areas.

王青华等人[4]则在研究中通过各国人均国民收入 GDP 和每千人计算机拥有数量及网络用户数量做相关分析,得到的相关系数分别 0.909 和 0.836。可见,各国每千人拥有计算机数量及网络用户数量与经济发展水平之间都是存在高度的线性正相关关系。各个国家经济发展水平和互联网普及和使用程度的确存在着密切的正向相关关系。经济水平越低,互联网的普及和应用水平就越差;反之,经济水平越高,互联网的普及和应用水平越高。

In the research of Wang Qinghua, there is correlation analysis for many countries between GDP per capita and the number of computer per thousand persons as well as the number of network users obtained the correlation coefficient respectively to be 0.909 and 0.836. It is obvious that the economic development level has a high degree linear correlation with the number of computer per thousand persons and the number of Internet users in those countries. There is indeed close positive correlation between the level of economic development and popularization of Internet usage in each country. The lower the level of the economy, the worse the popularity and application of the Internet; on the other hand, the higher the level of the economy, the better the popularity and usage of the Internet.

同时,利用主成分、有序聚类和相关分析等统计方法,对我国 31 个省市区在互联网发展水平进行综合的比较和分类,揭示出我国互联网发展现状,不同经济发展水平的省市区之间存在着巨大的“数字鸿沟”,网民数量、域名数和站点数的地区分布都极不平衡。

At the same time, the article also uses the Principal Components Analysis, Hierarchical Cluster Analysis and Correlation Analysis to carry out a comprehensive comparison and classification for the level of the Internet development among China's 31 provinces. It is revealed China's Internet development situation, that is, there is a huge "digital divide" among the provinces, urban and regions with different levels of economic development. The number of Internet users, domain names and sites are very imbalance for regional distribution.

研究结论表明了在不同经济水平的国家和地区之间存在着巨大的数字鸿沟,而且互联网发展水平与经济发展水平在数量表现上有着高度密切的线性正相关关系。实质上,互联网的建设和应用,虽然会在一定程度上受到科技水平、政治环境、国民的观念和文化素质等诸多因素的影响,但是主要的还是受到经济实力的制约。

The conclusion of the study shows that there is a huge digital divide among countries and regions with different economic levels. There is a high degree of close linear relationship between the levels of the Internet development and the level of economic development in the number of performance. In essence, although the construction and application of the Internet is impacted to some extent by many factors such as the level of science and technology, political environment, the concept of nationals, and cultural qualities, it mainly will be constrained by economic strength.

薛伟贤等人[5]的研究中对互联网总人数和人均 GDP 进行回归分析,模型的拟合程度非常高,而且所有参数都是充分有效的,反应了数字化水平和经济水平的关系,即数字化水平每增加一个百分点,经济发展水平将增加 2.33 个百分点,也就是说,要想使数字化水平增加一个百分点,那经济发展水平就必须增加

2.33 个百分点，所以经济发展水平对数字化水平的影响是很大的，它们之间是正相关关系。随着我国人均 GDP 的逐年快速增长，对缩小我国“数字鸿沟”将产生积极的影响。

In the study of Xue Weixian, the Regress Analysis between the total number of Internet and GDP per capita is highly fit and all parameters are fully effective, which response to relations between the digital level and the level of economic relations. That is, each additional one percentage point for the digital level will lead to 2.33 percentage point increase in the level of economic development. That is to say, to make the level of digitalization increased by one percentage, the level of economic development must be increased by 2.33 percentages. Therefore, the level of economic development is of a great influence on the digitalization, and there is a positive correlation between them. China's GDP per capita was rapidly growing year by year, which will be a positive impact on closing the "digital divide".

另外，国内也有学者从信息化对经济发展的影响的角度讨论“数字鸿沟”与“经济鸿沟”的关系，在向蓉美[6]的文章中提到，经济发展与互联网发展程度是相辅相成的。经济发展在很大程度上也会受到信息技术的影响，信息化程度与经济增长基本上成正相关的。主要表现为以下几个方面：

In addition, there are domestic scholars do the research from point of view of informatization impact on economic development to study the relationship between the "digital divide" and "economic gaps". Xiang Rongmei mentioned that the economic development are mutually reinforcing with the levels of Internet development. To a large extent, economic development will be impacted by information technology. The degree of informatization is also basically related to the level of economic growth. It is mainly represented in the following areas:

1. 知识效应

信息产业是知识、智力密集型产业。当今世界，知识越来越成为主导地位的资源或生产要素，应用新的知识技术的直接好处就是可以增加信息的供给，减少生产和传输信息的成本，减小了不确定性，有助于更好的决策和新的组织形式的创新，也就减少了摩擦和效率损失。经济发展中知识含量的增加，提高了增长的质量，转变了增长方式，从而促进经济的发展。

6.1 Knowledge effects

Information industry is knowledge and intelligence-intensive industries. Nowadays, in the world, knowledge is increasingly becoming the dominant resources or factors of production. The direct benefits of the application of new knowledge and technologies is to increase the information supply, reduce costs of production and transmission of information, reduce uncertainty, contribute to better decision-making and innovation of new forms of organization, which will reduce the friction and the loss of efficiency. The increasing of content of knowledge in economic development will improve the quality of growth and change the growth pattern therefore to promote economic development.

2. 关联效应

信息产业具有极强的产业关联特点，它可以带动一大批其他相关产业的发展。据估计，我国在电信方面每投入 1 元，就会给其他行业带来 18 元的经济效益，因此，信息技术产业对经济发展有巨大的推动作用。

6.2 Association effects

The information industry has a very strong characteristic of industry correlation, which can bring major developments for a large number of other related industries. It is estimated that China's investment of 1 yuan in the telecommunications will bring economic benefits of 18 yuan to other industry. Therefore, the information technology industry is of a huge boost for the economic development.

3.倍增效应

信息技术以其特有的创新性和增值性特点，迅速成倍地提高劳动生产率，以低投入获得高产出，为经济增长提供了新的机遇，新市场、新产品和新业务正在创造新的收入来源。

6.3 Multiplier effect

Information technology with its unique innovative and value-added features have multiplied rapidly improve labor productivity. Low input brings high-yield which has provided new opportunities to economic growth. New markets, new products and new services are creating new revenue.

由上述学者研究可以总结得出，经济鸿沟和数字鸿沟并存，是相辅相成的。一般说来，经济越发达，互联网发展水平就越高，又必然会提高生产效率和效益，促进经济快速发展和人民生活水平大幅度提高。对于发达国家，这种互动关系是一种良性循环；而对于发展中国家来说，这很可能形成一种恶性循环，使这些国家在激烈的国际竞争中处于越来越不利的地位，使其与发达国家的差距越来越大。也就是说，数字鸿沟归根到底是经济鸿沟导致的结果，反过来数字鸿沟很可能又将进一步加深经济鸿沟。为了避免在网络时代因数字鸿沟造成恶性循环或出现新的贫富悬殊，就必须设法加快欠发达地区网络基础设施和网络应用水平的发展速度，竭力缩小或弥合数字鸿沟。

To sum up the researches mentioned above, the economic gap and digital divide are co-existed and mutually reinforcing to each other. Generally say, the more the economy developed, the higher the level of development of the Internet, which is bounded to increase productivity and efficiency, and promote rapid economic development and increase people's living standard. For developed countries, such interaction is a kind of virtuous circle; for developing countries, this is likely to form a vicious circle, which will lead the developing countries in a more disadvantageous position in the fierce international competition in line with a growing gap to the developed countries. In other words, the digital divide is the result of the economic gap, and the digital divide, in turn, will likely further deepen the economic gap. In order to avoid a vicious circle or the emergence of new wealth gap as a result of the digital divide in networks times, it is necessary to try to speed up network infrastructure construction and network applications in the underdeveloped area to narrow or bridge the digital divide.

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