Report on World Internet Development 2017

Overview

The Internet, as an important achievement of the development of the world's civilization, is becoming an important drive for innovative development and social progress, benefiting the whole humankind. This report, with reference to the existing research results from both China and other countries, tries to establish the Global Internet Development Index to make a comprehensive assessment and quantitative assessment of the Internet development of major countries, so that it can be used as a reference for all countries in promoting their Internet development. Generally speaking, the explosive growth of the global mobile Internet is coming to an end and the world's Internet connection scale growth is entering a power conversion period. The Internet development is seeing a transfer from "person-to-person connection" to "connection of all things". Rising network information technologies like artificial intelligence have become the new highlands; and digital economy, the new power for all countries' economic growth. Cyberspace has become the new area of the global governance system revolution; smart society, the new social formation of people's production and life; and the Internet, the common home connecting you and me. All countries and the international community should take the wellbeing of humankind as the fundamental consideration and adhere to the philosophy of built, shared and governed by all. We should make the global Internet governance system more equitable and reasonable, and work together to build a community of shared future in cyberspace featured equality, respect, innovative development, openness, sharing spirit, security and order.

I. General Situation of the World Internet Development

In today's world, the Information Technology Revolution represented by the Internet is still in progress. It has become the locomotive of innovation-driven development, fundamentally changing people's life and work and pushing the society forward. By June 2017, the total number of Internet users worldwide had reached 3.89 billion, with a coverage rate of 51.7%[1]. Almost all major countries are speeding up informatization and reaping digital bonus to cope with the sluggish growth in the post-financial crisis era, to realize inclusive and sustainable growth and to enhance their international competitiveness. In the Internet sector, they will accelerate infrastructure deployment, foster innovation capacity, promote the development of the industry, tap the potential of its applications, spare no effort to safeguard cyber security, and direct the global governance system towards a more just and equitable future.

(I) Globalization has entered the new era of being driven by data, and the Internet sector is now the strategic focus and development priority across the world. At present, as the world is undergoing re-balance of power and readjustments, globalization is at a new turning point: it was driven first by international trade in version 1.0 and later by international finance in version 2.0, and now it is driven by data in its latest updated version 3.0. Major economies in the world are riding the new tides of information technology revolution and accelerating the development and use of the Internet to promote their own economic and social development and maintain or enhance their overall strength and international competitiveness. At present, 100 countries and regions have promulgated or updated national strategies for cyber security or informatization. For instance, the United States is stepping up its efforts to deploy next-generation network facilities, big data, advanced manufacturing and artificial intelligence to consolidate its technological and industrial leadership; the EU is trying to remove the digital trade barriers among its member states and accelerate

[1] Data source: www.internetworldstats.com.

the formation of a unified digital market; Germany has adopted "Industry 4.0" as a national strategy to consolidate its status as an industrial power; Russia has issued the "Roadmap for the Development of Information Technology Industry" to enhance its overall advantages in its information industry; India is promoting the building of a "digital India" by speeding up its development of optical network, software and cyber security; China is trying to build itself into an Internet power by promoting the integration of the Internet, big data, artificial intelligence and real economy and enhancing its economic innovation capacity and competitiveness. Both emerging and developing countries are seeking to go digital and strengthen their competitiveness by developing the Internet.

(II) The energization level of the Internet is producing increasing influence and informatization has become the great engine of economic development and social progress. At present, the energization level of the Internet is playing an increasingly important role in driving and leading economic and social development. It is embodied in four “new things”, namely, new production elements, new infrastructure, new economy and new governance. First, data as a new production element are playing an obvious role and the opening up, sharing and application of data can help to optimize the allocation and use efficiency of traditional elements and thus to improve the total factor productivity of resources, capital and talents. In his book *Powershift: Knowledge, Wealth, and Violence at the Edge of the 21st Century*, Alvin Toffler, a futurist, points out, “The world has bid farewell to the era dominated by violence and money, and the magic of the world’s future politics will be in the hand of ‘information as power’.” The more data are developed, the more valuable they are. It is estimated by 2019, the global data flow will have increased by 66 times in comparison with that in 2005. Secondly, the Internet has become the new infrastructure in economic and social development. From 2013 to 2017, there has been an increase of 196Tbps in the bandwidth of the Internet, and now the bandwidth is 295Tbps, with an annual increase of 30 percent[2]. A research by the World Bank

[2] Data source: Telegeography.

shows that every 10-percent increase in the broadband popularity can help the GDP to increase by 1.38%. The Internet is becoming the kind of infrastructure like water and electricity. It is the "main artery" of economic and social development. The energization efficiency of "Internet+" is emerging and intelligent medical care, transportation and education are thriving. Thirdly, to develop digital economy has become the common option of major countries and regions in enhancing their global competitiveness. G20 released the *G20 Digital Economy Development and Cooperation Initiative* at the Hangzhou Summit 2016, which is a centralized demonstration of the consensus of all participating countries on knowing and developing digital economy. Research shows that 22 percent of GDP of the world is closely related to digital economy covering techniques and capital. The application of digital techniques and technologies will help the world's economy to witness an added value of two trillion US dollars by 2020, and half of the increment of the total global economic gross will come from digital economy by 2025[3]. Fourthly, information promotes the modernization of the national governance system and governance capability. With the increase of the technical level of infrastructure, computer, Internet, and program development software and hardware, e-government is witnessing the shift from electronic stage to network, data and intelligence stages. A survey made by the UN Department of Economic and Social Affairs shows that from 2003 to 2016, all countries were promoting e-government construction, and the e-government index rose from 0.402 in 2003 to 0.4922 in 2016, with an annual steady increase of about 1.6 percent. Developed countries from Europe and America are building the "online government" to boost delayering, precise and standard national governance. Emerging countries in the Asian and Pacific Region are also promoting modernization of government through informatization and have made great achievements.

(III) The revolution of information technologies represented by the Internet is progressing and new technologies like artificial intelligence are the new height of global innovation. Information technologies are the area with the most intensive

[3]Accenture: Digital Disruption: The Growth Multiplier.

R&D, the most active innovation, the most extensive application and the greatest influence in the world. A report by the World Intellectual Property Organization (WIPO) shows that in the past two decades, among top 30 companies of the world with patent registration, 80 percent are Internet-related companies. At present, there is another round of innovation in information technologies. Following the three waves of innovation, namely PC, communication equipment and Internet, and intelligent terminal, the fourth wave keeps updating day by day, represented by cloud computing, big data, Internet of things and artificial intelligence. These technologies are witnessing upgrading, overall penetration and accelerated innovation. According to the analysis by the World Semiconductor Trade Statistics Organization (WSTS) and Ccid think tank, the sales volume of semiconductor all over the world increased from 298.3 billion US dollars in 2011 to 360.9 billion US dollars in 2017. The year 2016 marked the entry of the global chip manufacturing techniques into post-Moore's law period. Intel, Samsung and Taiwan Semiconductor Manufacturing Company (TSMC) have all announced that they have realized the mass production of 10-nanometre chips. The United States, Japan, Republic of Korea and China are competing in chip industry and technology. Data from Gartner shows that cloud computing has become the focus of Internet giants, with Amazon, Microsoft and Alibaba as the top three on the global cloud computing market in 2016, accounting for 50 percent of the market share. New technologies like 5G, quantum communication and satellite communication are accelerating, with the mature standard of 5G to be completed and officially used for commercial purposes in 2020. In the new technical revolution and industrial revolution, artificial intelligence in multiple disciplines including integrated mathematics, statistics, mathematical logic, computer science and neuroscience is playing an increasingly important role. According to the prediction by the International Data Center (IDC), the compound annual growth rate of the income from artificial intelligence from 2016 to 2020 will be 54.4 percent, which is expected to boost the market value of trillions of US dollars and to bring about new revolutions in its industry and other industries.

(IV) The Internet is becoming the spiritual and cultural home, so the

governance and order of cyberspace are becoming ever more important. The Internet has totally broken the traditional information dissemination way and cyberspace is becoming the major center for people to exchange their ideas and cultures. According to statistics from Global Mobile Suppliers Association (GSA), by June 2017, the number of global mobile users had reached 7.72 billion and the cellphone has become the most frequently-used Internet terminal, followed by the PC. The development of mobile Internet has led to the rapid expansion of social media like Facebook, Twitter and WeChat. By June 2017, the number of active users of social media in the world had amounted to 3.028 billion, and that of active users of mobile terminals to 2.78 billion. With news push, payment transaction and live video show being added to social media, the mobilizing competence and public opinion influence of social media are being enhanced. In particular, as populism is spreading worldwide and pan-ideologization tends to rise, there are greater challenges to the governments of different countries in safeguarding the order of cyberspace and governing the content in it. In recent years, many countries have made investigations into unfair competition and privacy invasion of Google, amazon and Facebook. All countries have carried out comprehensive administration over the cyberspace by means of legislative governing, administrative supervision and technical monitoring to prevent the emergence and spread of bad information in cyberspace. The United States has set up Social Network Monitoring Center and launched the Social Network/Media Capacity and other projects to monitor the social media like Facebook, Twitter, MySpace and YouTube. Russia has set up the world's leading cyber data monitoring system – "Action Monitoring System" to completely monitor the telephone, voice over Internet phone and Internet communication within its border. Large social media like Facebook, Twitter, YouTube and WeChat are controlling harmful information with advanced technologies like artificial intelligence.

(V) There are obvious non-traditional security problems, so cyber security is becoming the priority of priorities of national security. At present, there are frequent threats to cyberspace information security. There are more obvious security problems such as cyber attacks, cyber crimes and privacy leak. Cyber security is an

important issue concerning the security of all countries and regions. According to the European Network and Information Security Agency (ENISA), 78 percent of websites have security holes, 15 percent of which are serious ones. According to FBI, the loss caused by bot-net to the United States has amounted to 9 billion US dollars, that to the world has amounted to 110 billion US dollars, with about 500 million mainframes harmed in the world every year. *Global Phishing Report* shows that 2016 witnessed the highest number of phishing attacks and the highest number of domain names used for phishing, with at least 255,065 phishing attacks, an increase of over 10 percent in comparison with that in 2015. Blackmail attack number is explosively growing worldwide. Research by Kaspersky shows that by the end of 2016, 44,000 blackmail attack software variants had been discovered and at least 114 countries and regions had been affected by blackmail attack events. With the intelligence and cyber development, more and more physical devices are connected, so they are subject to attacks and their cascade amplification, resulting in domino effects. Statistics from HIS, a market survey organization, show that by 2025, the sell-in of relevant devices will have increased to 1.2 billion, but there is insufficient protection or no protection for the devices of Internet of things. Especially, key information infrastructure cyber security is being threatened. According to statistics, since 2016, many different sectors have been attacked on the cyberspace by hackers or terrorists, for instance, governmental sectors like Irish Government, Indian Ministry of Foreign Affairs and military network, NASA, United States Department of Defense and US National Security Agency Data Center; financial sectors like Japanese banking; energy sectors like Ukrainian Grid, Israeli Electricity Authority and German nuclear power stations; medical and health sectors like Australian Ministry of Health, American medical care institutions; hydraulic sectors like the server of American Hydro and sewage treatment plants; and transportation sectors like the Utah Airport Website. Besides, because some countries keep improving their cyber military strength, there seem to be cyber wars coming. The United States set up its cyberspace command in 2009, and announced in August 2017 that this command would be upgraded to be the highest-level United Combatant Commands and the country is planning to build 133

cyber armies with synthetic battle capability before 2018, including 40 attacking ones. It is also developing cyber weapons, for instance, wireless intrusion, that can break physically insulated measures. Military or economic powers like Germany, Israel, Republic of Korea and Japan have all channeled cyberspace into their military security area. Their cyberspace military transformation is inevitable since they are setting up cyber armies to develop their capacity of cyber military fighting.

(VI) Global cyberspace governance has entered the multilateral and multi-party governance stage. The governments of all countries are more and more dominant in the cyberspace governance. Four special agencies and mechanisms like the UN group of governmental experts on cyber security and its framework and regional multilateral organizations represented by Economic Cooperation Organization (ECO) and APEC, and bilateral dialogues between China and the US, China and Russia, and the US and Russia provide the basic framework for the inter-governmental cooperation in global cyberspace governance. The voice advocating the cyberspace sovereignty principle and multilateralism becomes louder, forming the situation that can contend with multi-stakeholders, and there have been substantial results in ICANN mechanism reform. There is also rising voice for surpassing the confrontation between two patterns and seeking for inclusive solutions. Traditional and emerging powers and inter-governmental organizations like the UN, Internet communities and relevant research institutions are promoting the formulation of rules on global cyberspace. Great progress has been made in the formulation of basic principles on global cyberspace governance, and Internet technical standards and norms, as well as in cyber crime punishment and digital economy development.

II. Status Quo of Some Major Countries' Internet Development

This section, centering on the Global Internet Development Index that includes six dimensions (infrastructure, innovation capacity, industry development, Internet

application, cyber security and Internet governance), through synthesized and quantified assessments, provides a comprehensive, scientific and objective analysis of the status quo of the Internet development in some major countries and the overall trend of the world's Internet development.

(I) Main considerations of the Global Internet Development Index System

1. The Global Internet Development Index is the specification, standardization and indexation of President Xi Jinping's thought on global Internet governance. In the past few years, Chinese President Xi Jinping elaborated on global Internet governance ideas on several important international occasions. In his keynote speech delivered at the opening ceremony of the Second World Internet Conference, he put forward four principles for the transformation of global Internet governance system (*The four principles are: respect for cyber sovereignty, maintenance of peace and security, promotion of openness and cooperation, and cultivation of good order*) and five proposals on building a community of shared future in cyberspace *(First, speed up the building of global Internet infrastructure and promote inter-connectivity. Second, build an online platform for cultural exchange and mutual learning. Third, promote innovative development of cyber economy for common prosperity. Fourth, maintain cyber security and promote orderly development. Fifth, build an Internet governance system to promote equity and justice.*), winning wide applaud and recognition from the international community. These proposals were lauded as China's intelligent contribution to global Internet governance. The Global Internet Development Index is the specification, standardization and indexation of President Xi Jinping's thought on global Internet governance, aiming to provide quantifiable, referable and comparable data and evidence for countries to assess their own status quo of their Internet development so that they can make good plans and take corresponding measures.

2. As an assessment of the overall status of the Internet development across the world is missing, the Internet Development Index will fill this gap. The

attempts to assess Internet development level are long-standing; the United Nations, the International Telecommunication Union and the World Economic Forum have all made such attempts: the Global E-Government Development Index, the Global ICT Development Index, and the Networked Readiness Index have gradually been accepted by the international community. They have helped countries to know about their current status of Internet development, the stage they are in and their strengths and weaknesses in that aspect. These indices, however, are mostly special ones to measure such specific dimensions as informatization or cyber security. They fail to reflect the big picture and the overall trend of Internet development across the world. The Global Internet Development Index System contains 6 first-level indicators, 12 second-level ones and 32 third-level ones, concerning six dimensions, namely, infrastructure, innovation capacity, industry development, Internet application, cyber security and Internet governance. They are adopted to comprehensively analyze the development of the Internet in various countries. It will help countries learn from each other and make progress together to promote the development of the Internet in their regions and benefit the people and the society at large.

3. The Global Internet Development Index involves both per capita and aggregate indicators of Internet development level and thus provides a more comprehensive, accurate and scientific system for assessment. To assess the Internet development of a country, per capita indicators are, without a doubt, important; aggregate indicators such as technological input, number of talents, industry development and scale of application are also valuable tools. According to Metcalfe's Law, the value of a telecommunications network is proportional to the square of the number of connected users of the system, indicating that aggregate index is crucial in measuring Internet development level. To redress the neglect of aggregate indicators in existing systems, the establishment of this system is aimed to evaluate both aggregate and per capita indicators and therefore is more comprehensive, objective and accurate.

(II) Specific content and assessment results of the Global Internet Development Index

Given the experimental nature of this newly-established Index and the limited availability of data, the 2017 Global Internet Development Index has involved 38 countries, covering major economies of five continents and countries with better Internet development. It can basically reflect the latest development of the Internet across the world. These 38 countries include:

America: the United States, Canada, Brazil, Argentina, Mexico and Chile;

Asia: China, Japan, Republic of Korea, Indonesia, India, Saudi Arabia, Turkey, UAE, Kazakhstan, Malaysia, Singapore, Thailand and Vietnam;

Europe: the United Kingdom, France, Germany, Italy, Russia, Denmark, Estonia, Finland, Netherlands, Norway, Portugal, Spain, Sweden and Switzerland;

Oceania: Australia;

Africa: South Africa, Egypt, Nigeria and Kenya.

The Index contains six dimensions: infrastructure, innovation capacity, industry development, Internet application, cyber security and Internet governance. The infrastructure section mainly refers to each country's broadband construction level; Innovation capacity, to the capability of innovating, including technology, human resources, investment, etc; The industry development section, to the development level of the Internet industry in these countries; the application section, to their Internet application level from three dimensions: personal application, e-commerce and e-government; the security section, to their cyber security level; the governance section, to their managerial expertise and participation in domestic and international cyberspace governance.

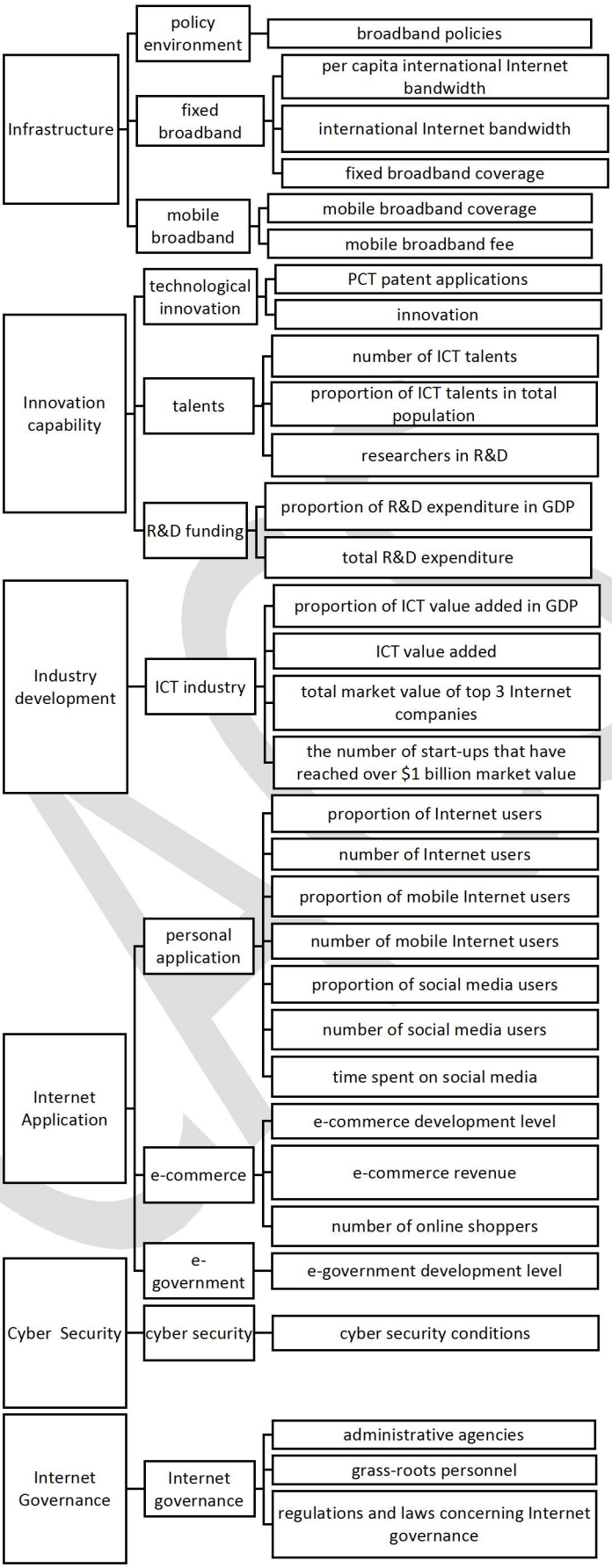
Infrastructure
policy environment
broadband policies
fixed broadband
per capita international Internet bandwidth
international Internet bandwidth
fixed broadband coverage
mobile broadband
mobile broadband coverage
mobile broadband fee
Innovation capability
technological innovation
PCT patent applications
innovation
talents
number of ICT talents
proportion of ICT talents in total population
researchers in R&D
R&D funding
proportion of R&D expenditure in GDP
total R&D expenditure
Industry development
ICT industry
proportion of ICT value added in GDP
ICT value added
total market value of top 3 Internet companies
the number of start-ups that have reached over $1 billion market value
Internet Application
personal application
proportion of Internet users
number of Internet users
proportion of mobile Internet users
number of mobile Internet users
proportion of social media users
number of social media users
time spent on social media
e-commerce
e-commerce development level
e-commerce revenue
number of online shoppers
e-government
e-government development level
Cyber Security
cyber security
cyber security conditions
Internet Governance
Internet governance
administrative agencies
grass-roots personnel
regulations and laws concerning Internet governance

Figure 1 Global Internet Development Index System

Table 1 Global Internet Development Index System

First-level Indicator	Second-level Indicator	Third-level Indicator	Specification	Data Source
1. Infrastructure	1.1 broadband environment	1.1.1 broadband policies	importance attached to broadband development	ITU databases (2015)
	1.2 fixed broadband	1.2.1 per capita international Internet bandwidth	development level of international Internet	ITU databases (2015)
		1.2.2 international Internet bandwidth	coverage of International Internet	per capita international Internet bandwidth* the number of population (2015)
		1.2.3 fixed broadband coverage	construction level of fixed broadband	ITU databases (2015)
	1.3 mobile broadband	1.3.1 mobile broadband coverage	construction level of mobile broadband	ITU databases (2015)
		1.3.2mobile broadband fee	mobile broadband fee	ITU databases (2015)
2. Innovation capacity	2.1 technical innovation	2.1.1 PCT patent applications	innovation level and ability in ICT industry	World Development Indicators from the World Bank (2014-2015)
		2.1.2 innovation	innovation environment for ICT industry	WIPO (2016)
	2.2 talents	2.2.1 number of ICT talents	ICT talents	ILO databases (2015-2016)
		2.2.2 proportion of ICT talents in	proportion of ICT talents in total population	ILO databases (2015-2016)

		total population		
		2.2.3 Researchers in R&D	Researchers in R&D	World Development Indicators from the World Bank (2013-2015)
	2.3 R&D funding	2.3.1 proportion of R&D expenditure in GDP	proportion of R&D expenditure in GDP	WIPO statistics (2013-2015)
		2.3.2 total R&D expenditure	R&D input	proportion of R&D expenditure in GDP*GDP (2013-2015)
3. Industry Development	3.1 ICT industry	3.1.1 proportion of ICT value added	ICT value added	The UN databases (2016)
		3.1.2 ICT value added	ICT value added	ICT value added*GDP (2016)
		3.1.3 total market value of top 3 Internet companies	total market value of top 3 Internet companies	World Startup Wiki statistics (2014)
		3.1.4 the number of start-ups with over $1 billion market value	the number of start-ups with over $1 billion market value	The Washington Times statistics (2013-2015)
4. Internet Application	4.1 personal application	4.1.1 proportion of Internet users	proportion of Internet users of the total population	ITU databases (2016)
		4.1.2 number of Internet users	total number of Internet users	proportion of Internet users of the total population*total population (2016)

		4.1.2 proportion of mobile Internet users	proportion of mobile Internet users of the total population	Global Web Index statistics (2015)
		4.1.3 number of mobile Internet users	total number of mobile Internet users	proportion of mobile Internet users of the total population*total population (2015)
		4.1.4 proportion of social media users	proportion of social media users of the total population	Global Web Index statistics (2015)
		4.1.5 number of social media users	total number of social media users	proportion of social media users of the total population*total population (2015)
		4.1.6 time spent on social media	time spent on social media	Global Web Index statistics (2015)
	4.2 e-commerce	4.2.1 e-commerce environment	e-commerce environment	UNCTAD statistics (2014)
		4.2.2 e-commerce revenue	e-commerce revenue	Statista Inc. Statistics (2017)
		4.2.3 number of online shoppers	number of online shoppers	government websites (2016-2017)
	4.3 e-government	4.3.1 e-government development level	e-government development level	The UN statistics (2016)
5. Cyber Security	5.1 cyber security	5.1.1 cyber security conditions	cyber security level	ITU statistics (2016)

6. Internet Governance	6.1 Internet governance	6.1.1 administrative agencies	central-level Internet administrative agencies	government websites
		6.1.2 Administrative personnel	Internet administrative personnel	government websites
		6.1.3 regulations and laws concerning Internet governance	regulations and laws concerning Internet governance, including content management, privacy protection, market order and crackdown on cyber crimes, violence or terrorism	government websites

By giving these indicators reference values, we now have the Internet Development Index scores of 38 countries. It is clear that developed economies score the highest in terms of average Internet development level. They are followed by some European countries and emerging Asian countries. Developing countries in Latin America and sub-Saharan Africa are stepping up their efforts to catch up.

Table 2 Global Internet Development Index

Ranking	Country	Score
1	The United States	57.66
2	China	41.80
3	Republic of Korea	38.86
4	Japan	38.11
5	The United Kingdom	37.85
6	Singapore	37.71
7	Sweden	36.64
8	Finland	35.72
9	France	35.39

10	Germany	35.22
11	Australia	35.21
12	Canada	34.63
13	Netherlands	34.60
14	Estonia	34.59
15	Norway	34.25
16	Switzerland	33.84
17	Denmark	31.47
18	Russia	30.52
19	Italy	30.09
20	Spain	29.96
21	Malaysia	28.83
22	United Arab Emirates	28.18
23	Brazil	27.87
24	Portugal	27.57
25	India	26.72
26	Mexico	26.68
27	Thailand	25.83
28	Argentina	25.70
29	Turkey	23.84
30	Egypt	23.39
31	Saudi Arabia	22.96
32	Chile	21.88
33	Indonesia	21.69
34	South Africa	21.30
35	Kenya	20.33
36	Vietnam	19.96
37	Kazakhstan	19.33
38	Nigeria	16.27

1. Progress has been made in infrastructure, but its development is still quite uneven.

The number of Internet users has increased from one billion in 2005 to 3.89 billion today, two thirds of which are found in developing countries. Mobile Internet usage has surpassed fixed broadband Internet usage. In addition, the number of mobile phone users in developing countries is 5.5 billion, while the figure in developed countries is merely 1.5 billion.[4] Such a large user base ensures promising future for the development of the Internet in developing countries.

Asia is home to 49.7 percent of the world's total Internet users, but its Internet coverage rate is merely 46.7 percent, lower than the world's average. Fixed broadband access in East Asia and Northeast Asia is as high as 74.89 percent, and that in the Middle East is 58.7 percent, but in other Asian regions, it is less than 10 percent[5]. Among them, Singapore tops the list in terms of infrastructure and Internet coverage rate. Its mobile broadband coverage rate is as high as 142.2 percent, with 4G coverage reaching 82 percent and speed reaching 46Mbps, the fastest in the world.[6]

North America and Europe rank first and second in terms of Internet coverage rate, with 88.1 percent and 80.2 percent respectively. In Europe, 218 million (99.9 percent) households have access to fixed or mobile Internet: fixed broadband coverage in Finland, Sweden, Estonia, Norway and the United Kingdom has reached 97.5 percent; mobile Internet coverage has generally exceeded 95 percent, with the exception of Germany (92.1 percent) and Slovakia (90.7 percent).

As a less populous continent, Oceania is home to only 0.7 percent of Internet users, but its Internet coverage rate is as high as 69.6 percent. The rate in Latin American region is 62.4 percent, close to the global average. In recent years, the

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[4] Harnessing the digital economy for developing countries，http://www.keepeek.com/Digital-Asset-Management/oecd/development/harnessing-the-digital-economy-for-developing-countries_4adffb24-en#page13

[5] http://www.unescap.org/resources/state-ict-asia-and-pacific-2016-uncovering-widening-broadband-divide

[6] ITU IDI 2016

development of the Internet is gaining momentum in Brazil, Chile and other countries.

The Internet sector in most African countries is relatively backward and the Internet coverage rate in Africa lags behind that in all other regions. As the second largest economy on the continent, South Africa enjoys the highest level of Internet development that the continent has seen. By November 2015, 71.4 percent of African population still had no access to the Internet.

Table 3 Infrastructure

Ranking	Country	Score
1	Singapore	3.37
2	Finland	2.93
3	Sweden	2.82
4	Estonia	2.75
5	The United Kingdom	2.69
6	Norway	2.58
7	Republic of Korea	2.51
8	Denmark	2.26
9	Switzerland	2.21
10	Australia	2.20
11	The United States	2.20
12	Netherlands	2.20
13	Germany	2.15
14	Japan	1.90
15	France	1.89
16	Spain	1.70
17	Canada	1.67
18	Russia	1.65
19	Italy	1.61
20	Portugal	1.61
21	United Arab Emirates	1.59

22	Saudi Arabia	1.55
23	Brazil	1.43
24	Chile	1.33
25	Kazakhstan	1.29
26	Malaysia	1.27
27	China	1.23
28	Argentina	1.21
29	Thailand	1.16
30	Turkey	1.15
31	South Africa	1.05
32	Mexico	0.89
33	Egypt	0.80
34	Vietnam	0.72
35	Indonesia	0.66
36	India	0.39
37	Nigeria	0.37
38	Kenya	0.37

2. To cultivate Internet innovation capacity, a favorable environment must be created.

Innovation capacity is a major indicator of the development potential of a country. North America generally attaches great importance to technical innovation. The United States has been generously supporting research projects of cutting-edge information technology through government funding, and hence such famous Internet companies as Google have risen as giants. In Latin America, although Argentina, Mexico, Brazil and other countries lag slightly behind in innovation capacity, governments of these countries are actively introducing top-level design and providing tax and financial incentives to encourage the development of high-tech

industries.

Europe enjoys a better start for Internet development. To stay ahead, high-income economies such as Sweden, Switzerland, Denmark, Germany, Finland, the United Kingdom and the Netherlands are committed to improving their innovation environment, human capital and R&D investment, hence higher innovation level.

In Asia, Republic of Korea and Japan are top innovators in the world, and they stay far ahead in patent and R&D investment. China is also catching up and it is relatively strong in patent registration.

The foundation for innovation in Africa is weak; African countries, however, are making great efforts to create a favorable environment for innovation by actively cultivating Internet talents and enhancing digital literacy of the public.

Table 4 Innovation capacity

Ranking	Country	Score
1	The United States	8.91
2	Republic of Korea	6.87
3	Japan	6.73
4	China	6.35
5	Sweden	5.85
6	Germany	5.80
7	Switzerland	5.65
8	Denmark	5.40
9	Finland	5.20
10	The United Kingdom	4.96
11	Netherlands	4.77
12	Singapore	4.67
13	France	4.65
14	Australia	4.46
15	Norway	4.31
16	Canada	4.24

17	Estonia	3.80
18	India	3.70
19	Spain	3.43
20	Italy	3.37
21	Portugal	3.20
22	Malaysia	2.91
23	Russia	2.73
24	Brazil	2.61
25	United Arab Emirates	2.45
26	Turkey	2.41
27	Mexico	2.21
28	Saudi Arabia	2.10
29	Thailand	2.06
30	Vietnam	1.94
31	South Africa	1.88
32	Argentina	1.86
33	Chile	1.79
34	Indonesia	1.63
35	Egypt	1.52
36	Kazakhstan	1.32
37	Kenya	1.16
38	Nigeria	0.72

3. The development of the Internet industry assumes various forms and corporate performance is a key factor.

Enterprises are the main force in promoting the development of the Internet industry, and the main bodies in scientific innovation and industrial transformation,

supporting the development of digital economy in a country. Generally speaking, Internet companies are actively expanding the scope of their business and rushing to secure their places in emerging high-tech industries, spawning new technologies, new businesses, new models and new services.

North America leads the world in Internet industry. The United States is home to a large number of leading Internet companies: such Internet giants as Apple, Google, Microsoft and Amazon are trend-setters of the global Internet scene. The rapid development of the Internet industry in Latin America provides a good investment environment for foreign Internet companies.

Europe's great language diversity and small average population are adverse to the making of Internet giants. For this reason, by far, none of the world's top 20 Internet companies in terms of market value is from Europe.

The development of the Internet industry in Asia is extremely uneven. Internet companies from China, India, Japan and Republic of Korea are major players. It is particularly worth mentioning that Internet start-ups in China are growing rapidly. The Billion Dollar Start-up Club now has 8 Chinese members (accounting for 11 percent of the total) and 4 Indian members. Companies from Republic of Korea and Malaysia have also made the list[7]. In the Arab world, Internet companies can provide a full range of services including online music, e-commerce, e-payment, fashion, travel, job hunting, cab hailing, education and social commerce. Souq, an e-commerce company, and Careem, a transportation network company from the United Arab Emirates, are regional leaders.

Although Africa has not yet been able to turn out a world-famous Internet company, its cooperation with ICT giants such as Google, Microsoft, Huawei and others has attracted growing foreign investment in science and technology into Africa, with South Africa, Nigeria and Kenya being the biggest receivers. This inflow of investment will promote the development of local technology start-ups in Africa.

Table 5 Industry Development

[7] http://www.cankaoxiaoxi.com/finance/20150225/678201.shtml

Ranking	Country	Score
1	The United States	15.14
2	China	5.96
3	The United Kingdom	2.28
4	Japan	2.11
5	India	1.81
6	Sweden	1.63
7	Republic of Korea	1.55
8	Malaysia	1.49
9	Germany	1.47
10	Estonia	1.43
11	Finland	1.40
12	Canada	1.35
13	France	1.35
14	Netherlands	1.24
15	Denmark	1.14
16	Switzerland	1.12
17	Spain	1.07
18	Singapore	1.04
19	Indonesia	0.98
20	Norway	0.97
21	Italy	0.91
22	Brazil	0.90
23	Chile	0.83
24	Australia	0.82
25	Portugal	0.78
26	Kazakhstan	0.73
27	South Africa	0.67
28	Turkey	0.67

29	Mexico	0.57
30	Kenya	0.27
31	Russia	0.25
32	Vietnam	0.21
33	Argentina	0.12
34	United Arab Emirates	0.06
35	Nigeria	0.06

Note：Thailand, Saudi Arabia and Egypt are not listed due to lack of data.

4. The Internet has huge potential in its application and can lead to profound social and economic changes.

The Internet directly impacts economy, society and the general public through its application. In Asia, thanks to their wider Internet coverage, China, Republic of Korea and Singapore have higher public Internet application level. China has become the largest B2C e-commerce market in the world. In Korea, most of online time is spent on games and social media and therefore the two sectors are exceptionally well-developed. Singapore has become a model smart city-state. Mobile TV and mobile wallet have been widely used in Japan.

The overall development of the Internet and digital economy in Europe is relatively high as e-government and industrial digitization in the region have drawn worldwide attention. As part of its post-Brexit plans, the UK government launches the Digital Strategy to maintain its position as a world leader in digital government built on the concept of "Government as a Platform". Germany, proceeding from Industry 4.0, vigorously promotes the digital transformation of its industrial production. The European Union also presented "digitizing of European Industry Plan" [8] to help European industry, SMEs, researchers and public authorities make the best use of new technologies.

By the end of 2016, 4G coverage in Latin America reached 68 percent of the

[8] Commission sets out path to digitise European industry. http://europa.eu/rapid/press-release_IP-16-1407_en.htm?locale=en

total population, with smart phones accounting for 55 percent of total mobile connections in the region. Thanks to the development of the mobile Internet, Latin America and the Caribbean regions have higher rate of mobile payment than other parts of the world, with commercial payments done via mobile means accounting for 57 percent of the total number of transactions (the global average is 5 percent) and bulk electronic payments accounting for nearly 7 percent (the global average is just over 2 percent)[9].

With better access to the Internet, Africa has also seen the Internet being more widely applied in various sectors: communication, social networks, e-commerce, entertainment and media. Notable examples include M-Pesa, a mobile phone-based money transfer service and Ushahidi, an open source crisis response site in Kenya[10].

Table 6 Internet Application

Ranking	Country	Score
1	The United States	13.22
2	China	13.20
3	Republic of Korea	11.40
4	The United Kingdom	11.34
5	Australia	10.74
6	Singapore	10.64
7	Japan	10.62
8	France	10.45
9	Canada	10.39
10	Sweden	10.32
11	Germany	10.26
12	Netherlands	10.25
13	Denmark	10.24

[9] http://www.businesswire.com/news/home/20170302005560/zh-CN/

[10] http://mgafrica.com/article/2016-04-29-africa-connectivity

14	Finland	10.03
15	Spain	10.03
16	United Arab Emirates	10.03
17	Norway	9.98
18	Argentina	9.45
19	Estonia	9.31
20	Italy	9.23
21	Russia	9.21
22	Switzerland	8.90
23	Brazil	8.75
24	Chile	8.51
25	Malaysia	8.49
26	Portugal	8.40
27	India	8.24
28	Mexico	8.16
29	Turkey	8.05
30	Saudi Arabia	7.72
31	Thailand	7.53
32	Kazakhstan	7.23
33	South Africa	6.92
34	Vietnam	6.64
35	Indonesia	5.94
36	Egypt	5.60
37	Kenya	4.55
38	Nigeria	3.93

5. Cyber security is universally stressed but tactics and capacity against cyber attacks are to be improved.

Cyber threats and hazards have become a problem that concerns all countries. Although cyber security is an issue of national strategic significance for almost all countries, currently only 38 percent have released relevant strategies and 12 percent are formulating strategies. This means that 50 percent of the world's countries have no clearly defined strategies against cyber threats[11].

Cyber security is uneven in Asia. Singapore, as a sovereign city-state, tops the list thanks to its high level of digitalization[12]. Malaysia is a dark horse as it actively advocates strengthening cyber security. China, India and Thailand are in the middle, with room for improvement.

American countries, such as the United States and Canada, generally stay ahead. Compared with other countries, the United States has the largest number of and the most comprehensive laws and regulations concerning cyber security. Its level of cyber security is second only to that of Singapore.

Europe is quite strict with the protection of personal information. The promulgation of *General Data Protection Regulation* extends the scope of the EU data protection law to all non-European companies processing data of EU residents.

The situation of cyber security in Africa is grave: disconnections occur from time to time, hampering the development of the Internet. Cooperation with other countries, however, has been stepped up to crack down on cyber crimes that are increasingly rampant.

Table 7 Cyber Security

Ranking	Country	Score
1	Singapore	9.25

[11] Global Cyber Security Index 2017 released by ITU，http://wemedia.ifeng.com/21651005/wemedia.shtml

[12] http://www.ccpit.org/Contents/Channel_4126/2017/0905/872246/content_872246.htm

2	The United States	9.19
3	Malaysia	8.93
4	Estonia	8.46
5	Australia	8.24
6	France	8.19
7	Canada	8.18
8	Russia	7.88
9	Japan	7.86
10	Norway	7.86
11	The United Kingdom	7.83
12	Republic of Korea	7.82
13	Egypt	7.72
14	Netherlands	7.60
15	Finland	7.41
16	Sweden	7.33
17	Switzerland	7.27
18	Thailand	6.84
19	India	6.83
20	Germany	6.79
21	Mexico	6.60
22	Italy	6.26
23	China	6.24
24	Denmark	6.17
25	Brazil	5.93
26	Turkey	5.81
27	Kenya	5.74
28	Saudi Arabia	5.69
29	Nigeria	5.69
30	United Arab Emirates	5.66

31	Spain	5.19
32	Portugal	5.08
33	South Africa	5.02
34	Argentina	4.82
35	Indonesia	4.24
36	Chile	3.67
37	Kazakhstan	3.52
38	Vietnam	2.45

6. The importance of Internet governance has been recognized and the governance system in all countries is in urgent need of improvement.

The sound development of the Internet cannot be achieved without the active participation and effective governance of all countries. In recent years, all countries are exploring Internet governance models that suit their own conditions with such concerns as privacy protection, digital trade regulation, web content administration, competition regulation and crackdown on cyber crimes. Generally speaking, in a region where the Internet sector is more developed, the Internet governance is better. For instance, in the United States and Canada, policies and regulations pertaining to the Internet are relatively well-developed and strictly enforced, and specialized agencies and personnel concerned with the Internet have been set up.

Given the fact that Europe is an early adopter of the Internet, its Internet users are better educated and its related laws and regulations are relatively sound, most European countries, such as the UK, Germany and France, usually have their Internet sector supervised by self-regulatory organizations under the guidance of the government and in accordance with laws and regulations or voluntary agreements.

Emerging countries in Asia have formed two types of Internet governance models: one is government-regulating (e.g. China and Singapore), as the government retains high regulatory authority over Internet governance; the other is self-regulating (e.g. Japan), as regulatory power mainly rests with associations, societies and other

non-governmental organizations while government interference is limited.

As the Internet sector is booming in Africa, governments of African countries, recognizing the importance of Internet governance, are also working to speed up its institutional design in the hope of blazing a trail that befits their own development. By the end of 2016, African Internet Governance Forum had been successfully held for five sessions, a testament to the commitment of African countries.

Table 8 Internet Governance

Ranking	Country	Score
1	The United States	9.00
2	Japan	8.90
3	France	8.85
4	Estonia	8.85
5	China	8.80
6	Canada	8.80
7	Russia	8.80
8	The United Kingdom	8.75
9	Germany	8.75
10	Australia	8.75
11	Finland	8.75
12	Singapore	8.75
13	Italy	8.70
14	Republic of Korea	8.70
15	Sweden	8.70
16	Switzerland	8.70
17	Netherlands	8.55
18	Norway	8.55
19	Spain	8.55
20	Portugal	8.50
21	United Arab Emirates	8.40

22	Brazil	8.25
23	Argentina	8.25
24	Mexico	8.25
25	Indonesia	8.25
26	Kenya	8.25
27	Thailand	8.25
28	Vietnam	8.00
29	Egypt	7.75
30	Denmark	6.25
31	Saudi Arabia	5.90
32	India	5.75
33	South Africa	5.75
34	Turkey	5.75
35	Chile	5.75
36	Malaysia	5.75
37	Nigeria	5.50
38	Kazakhstan	5.25

III. Trend of the World Internet Development and Suggestions on Policies in this regard

Generally, the explosive expansion of the Global mobile Internet is coming to an end and the growth of the global Internet connection scale is coming into the stage of power conversion. The Internet development is transferring from “person to person connection” to “Internet of everything”. Artificial intelligence, block chain, and quantum communication are rising; Internet of things, cloud computing and big data are developing fast, and the 5G era is drawing near. The benefits brought about by the digital era keeps emerging, the four factors boosting the global Internet

evolution and innovation, namely, capital, technology, data and demand, are evolving and there is more serious conflict between new and old systems. When we look into the future, we suggest that all the countries and the international community should take the well-being of the humankind as the fundamental consideration, and contribute to the building of a community of shared future in cyberspace. We should make the global cyberspace governance more equitable and reasonable and strive to realize the goal of building the cyberspace with more equality, respect, innovation, openness and sharing, security and order.

First, we should promote innovations and creations in the field of the Internet and realize common development of all countries. The Internet plays a leading role in promoting innovation-driven development. It is an important option for all countries to realize better economic development in the post-financial-crisis era. All countries should encourage and support all kinds of innovations and creations based on the Internet, speed up the development of the new-generation information technology such as cloud computing, Internet of things and artificial intelligence, as well as the cultivation of new technology, new application and new type of business of the Internet. We should also accelerate the in-depth integration of the Internet and the real economy and promote the digitalization, network transformation and intelligence transformation of traditional industries. All countries should deepen their cooperation in technical R&D, cross-border e-commerce and innovation of small and medium-sized enterprises on the principle of opening and coordination, and thus create more interest convergences and new cooperation highlights in terms of cyberspace.

Secondly, we should speed up cyber coverage to better benefit all the peoples. The essence of the Internet is the interconnection, and the value of information lies in intercommunication. There remains a big digital gap across the world. Statistics released by the UN show that least developed countries will have had only 17.5 percent of Internet coverage by the end of 2017. With the acceleration of informatization, the Internet has become the big artery of economic and social development and the indispensable new type of infrastructure of modern society.

The international community has the responsibility for boosting universally beneficial development of information technology worldwide, and provide fund, technology and talent support for developing countries and least developed countries in enhancing their Internet development capacity and thus create conditions for eradicating poverty and promoting common development. All countries should strengthen strategic link between countries and between regions, and their communication and cooperation in distant medical care, online education, e-government and smart city building. We should try to discover new means of and approaches to making the Internet more convenient and beneficial to the people, so that the Internet development results will better benefit all nations.

Thirdly, we should expand humanity communication through cyberspace and promote exchanges between civilizations. The Internet is an important carrier of excellent cultures and a tool of positive energy spread. By March 2017, the number of Internet users speaking top 10 languages in the world had reached 2.9 billion, accounting for 78 percent of the total number of Internet users of the world, while the number of Internet users using other languages only accounted for 22 percent[13]. All countries should work together to construct cultural exchange platforms on the Internet to show the diversity of civilizations and to seek ways for common development. We should give full play to the role of the Internet in disseminating civilization, promote digitalization and network communication of excellent cultural products, and spread positive things like justice, kindness, liveliness and goodness in the cyberspace. We should enhance the cyber ethic construction and website opening and visiting in good manners and thus reinforce the protection of juveniles.

Fourthly, we should face and handle together the challenges to cyber security and safeguard the order of the cyberspace. To safeguard cyber security is the common responsibility of the international community, so all countries should have common and sustainable cyberspace philosophy of mutual trust and cooperation. We should not allow the situation to occur in which one country is safe while another

[13] Data source: internetworldstats-www.internetworldstats.com/stats7.htm.

is not. No country is allowed to seek its own security by sacrificing another country's security. All countries should strengthen communication and negotiation concerning cyber security and strategic mutual trust in this field. We should establish the normalized emergency responding mechanism and deepen cooperation in technical R&D, rule and regulation making, information sharing and talents cultivation, enhance key network infrastructure security protection, improve the awareness of protection and guarantee competence in global cyber security, and jointly tackle threats to it. We should enhance the punishment of cyber crimes such as cyber-attacks and cyber terrorism, protect intellectual property rights, personal privacy, national security and public interests, and thus jointly build peaceful and safe cyberspace.

Fifthly, we should formulate complete cyberspace governance rules and promote the reform of the global governance system. Cyberspace is the space of activity for all human beings and its future should be controlled by all countries together. At present, the global Internet development governance is at a key turning point, so it requires all counties to be visionary, to treat one another equally and promote equity and justice. We should promote the establishment of a multilateral, democratic and transparent global Internet governance system, taking respect for cyberspace sovereignty as a basic principle, safeguarding the equal right to develop, participate and govern, reforming any unjust or unreasonable arrangement in the global Internet governance system and improving emerging market countries' and developing countries' right to represent and speak. No cyberspace hegemony is allowed, neither is single domination or only a few countries' decision. The governments, international organizations, Internet businesses, technical communities, private sectors and individuals should all play their role through effective and constructive cooperation to build a community of shared future in cyberspace. We should work together to build a safer and healthier global cyberspace which is more peaceful, open, cooperative and prosperous.