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Digital Economy Promotes Economic Development in the COVID-19 ERA

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Abstract: The continuous spread of COVID-19 has caused a great impact on the global economy and the lives of residents in various countries. How to sustain and effectively drive economic development in the post-epidemic era becomes critical. This article summarizes the basic situation of the development of digital economy, analyzes the digital economy from many angles to help prevent and control the epidemic situation and the impact on economic development. China is used as an example to explain how the vigorous development of the digital economy during the epidemic has brought about a change in the quality of economic development. The problems and challenges of digital transformation of the economy and society during the epidemic were analyzed. It is also pointed out that accelerating the deep integration of digital economy and various industries is still a new engine to promote economic recovery during the epidemic. The changes in market demand under the impact of the epidemic are the main drivers of the government's digital governance capacity, and strengthening the government's digital governance capacity, enhancing the supply of advanced digital technologies, cultivating talents in the digital field, and improving relevant laws and regulations and institutional mechanisms are important coping strategies for the government to turn the COVID-19 crisis into a new impetus for industrial development and cultivate new potential for economic development.

Introduction. Currently, the world Meyer into the era of information revolution, the rapid development of new-generation information technology, the latest production factors with data, the rapid industrial change brought about by information technology and science and technology development is affecting the world ,the frequency of major global public health events is also increasing, prevention and control is increasingly becoming a big problem for the modern international community. Since 2009, The World Health Organization (WHO) has declared six "public health emergencies of international concern " All have caused huge economic and social risks and disasters on a global scale [1]. By the end of 2019, the sudden outbreak of new coronary pneumonia has become a major global public health emergency, and have influence on the global economy, according to the WHO, as of 1 February 2021, over 102.1 million cases were reported globally. In the world registered about 2.5 million deaths occurred. China has a total of 100,000 confirmed cases and 4,823 deaths [2]. In addi-

tion to the enormous global loss of population, it led to the world's worst economic downturn since World War II in 1945. The recession caused by the new-crowned pneumonia epidemic is the fastest and largest decline in the growth consensus forecast of any global recessions since 1990[3]. COVID-19, although it has hit the transportation, travel, retail, and other service sectors hard. [4] But through the process of isolating people in their homes new generations of information technologies (NGIT) are being used more commonly for the prevention and control of epidemics, as well as for the production and livelihood security of people. It has further stimulated the global demand for digital services. The advantages of digital economy without space constraints are gradually highlighted and become an important engine of high-quality economic development during the epidemic. Digital new form; new model; new application accelerate popularization; all show the value and potential of digital economy. During this period, China seized the opportunity to promote the digitization process of the whole society and realize the positive economic growth by accelerating the overall digital transformation, which also brought enlightenment to many countries to find the breakthrough point of economic growth. The digital economy has played an important role in the response to the epidemic and has seen some opportunities for growth. A study published by the United Nations Conference on Trade and Development (UNCTAD) suggested that the epidemic crisis has increased the use of digital solutions, tools and services, and has also accelerated the transition of the global economy to digitalization [5]. How to promote economic development and how to bring about influence and change in the post-epidemic era has become an important topic of discussion.

Review of literature. With the rapid penetration of information technology in various fields of social economy, digital economy, as a new economic form, has been paid more and more attention by various countries. The origin of digital economy is the information economy put forward by Fritz Machlup in 1962. Its connotation is to apply information industry, information application and so on (digital industrialization part in digital economy) to traditional industry (digital integration part in digital economy).The first interpretation of the digital economy is the American economist home Don Tapscott in his 1995 book "The Digital Economy: Hopes and Dangers in the Age of Network Intelligence", which argues that the digital economy is a new economic model based on the networking of human intelligence[6]. The precise definition of the concept of digital economy has not been able to form a unified understanding . However, most experts agree more with the identification of the concept of digital economy in the "G20 Digital Economy Development and Cooperation Initiative" released at the G20 Hangzhou Summit in 2016, digital economy is a series of economic activities that use digitized knowledge and information as key production elements, modern information networks as important vehicles, and the effective use of ICT as efficiency to enhance and optimize the economic structure[7][8][9]. With the widespread popularity and commercialization of personal computers and Internet technology, the United States was the first to start the layout of the digital economy, from big data, artificial intelligence and other aspects to promote the development of the digital economy. Subsequently, governments and scholars of major countries around the world have paid more and more attention to the economic development brought by information technology, and countries have set off digital revolutions, competing for the industrial heights of the digital economy in the future, and have released a large number of government reports, academic studies and related policies related to the digital economy. In 2009, Britain's Digital program, committed to a digital country, reported that is possible to promote information technology for economic development. Japan has issued the "e-Japan Strategy "," U-Japan Intelligent Japan ICT Strategy, in order to give full play to the advantages of artificial intelligence, Build information, network, intelligent society. Germany has implemented "Industry 4.0", upgrading the technological level of industry, promoting the digital transformation of enterprises. Russia also released its <Digital Economy Plan> in 2017 to regulate information security in five areas, strengthen human resources and education development, and promote the development of Russia's digital economy and digital economy integration within the Eurasian Economic Union. According to the OECD's Digital Economy Outlook Report 2017, 67% of member countries have independently launched strategic agendas or projects to develop the digital economy. By mid-2020, more than 60 countries (OECD) have developed national AI Strategies. Choi.C by studying the economic develop-

ment of 207 countries in the period 19912000, Found that the network to promote economic growth positive role[10]. Hodrab by studying data on economic development in Arab countries, Also proved that the Internet has a significant role in economic upgrading [11].

In recent years, China has attached great importance to the development of digital economy, along with the government's vigorous promotion of digital economy development, the establishment of a digital economy development pilot zone, efforts to build a smart city, leading the digital economy to help the economy's high-quality development. According to the China Academy of Information and Communications Technology (CAICT) <Industry map>, till 2020 the number of AI companies in China account for 24,66% of the world's total, ranking second in the world. The China Internet Development Report 2020 shows that in 2019, China's 4 G base stations is total 5.44 million, mobile internet access data traffic consumption is 122GB billion ranked first in the world. China's digital economy is 35.8 trillion yuan in 2019, that is 36.2% of GDP. Digital economy contributes 67.7% to GDP growth, China's total digital economy scale and growth rate ranked the forefront of the world. As of June 2021, the size of China's Internet users reached 1.011 billion, an increase of 21.75 million from December 2020, and the Internet penetration rate reached 71.6%. The world's largest and most vibrant digital society has been formed [12]. How does COVID-19 affect the development of China's digital economy? How should the Chinese government turn the epidemic crisis into a new driving force for industrial development and better promote the high-quality development of China's economy? This paper first analyzes and summarizes the impact and significance of the main epidemic events on the economy in the world, and systematically analyzes the changes in the development of China's digital economy industry under the two public epidemics of SARS and the new crown epidemic in China in 20 years. What are the opportunities and challenges for the development of China's digital economy industry in the fight against the epidemic? Finally, some suggestions are put forward to accelerate the digital transformation of China's digital economy industry in the post-epidemic era.

The epidemic situation not only brings negative impact to people's life and national economy, but also brings development opportunities to digital economy.

Implications of public health emergencies for the economy. Analysis of major outbreaks worldwide. Through the discovery of economic data on the impact of public health emergencies in the past 20 years, the epidemic has not had a long-term impact on the economy, and the economic blow is heavy in the short term. As a whole, most of the outbreaks have a great negative impact on the economy in the short term, but the medium- and long-term impact is limited (Table 1.1). And as the epidemic is gradually controlled, previously suppressed consumption, investment and other demand accelerated release, bringing economic rebound. The Chinese economy began to grow in the third quarter after the SARS outbreak in 2003, and the more affected industries rebounded rapidly in the fourth quarter after the crisis subsided, the United States also experienced significant growth in consumption in the third quarter after the short-term impact of the new A-H1N1 influenza epidemic on the first two quarters, and West Africa was relatively short-lived due to the Ebola epidemic.

It can be found that relative to developed countries or major economies, the epidemic situation in developing countries has a greater negative impact on individual and economic longevity, while developed countries and major economies have a strong industrial base and a stronger ability to recover. By summarizing the economic impact analysis of various epidemics and response measures on the economy (industry), it is found that the economic impact of various epidemics is a widely discussed topic, but the overall economic impact results of epidemics (diseases) vary according to the size of the epidemic area, the duration, and the scope of impact, etc. (Table 2). Although the epidemic has obviously inhibited the development of tourism, real estate, hotel, catering and other industries [15-16], it is widely believed that major public health emergencies have driven the healthcare industry and created opportunities for e-commerce sales of healthcare products, and that suppliers and consumers have had a significant positive impact on e-commerce consumption of healthcare products [17]. With the development and popularization of ICT, the traditional Moore's Law will be ended and the IC industry, which is the foundation of the digital economy, will face a bottleneck. the new round of technological revolution led by the ICT industry has pushed the digital economy into the era of "deep digitalization" and the ICT service in-

Table 1. Impact of major global epidemics on the economy

Global infectious diseases	Outbreak country	Outbreak time	The overall impact on the economy In the occurred country
SARS	CHINA	Feb, 2003	The actual GDP growth rate in the current quarter fell from 11.1% in the first quarter to 9.1%, and the economic growth rate gradually recovered after a brief decline.
Birds virus	CHINA	Feb, 2006	The actual growth rate of GDP in the current quarter dropped from 13.7% in the second quarter of 2006to 12.2% in the third quarter of 2006, and the economic growth rate gradually recovered after a brief decline.
Influenza A (H1N1)	United State	April, 2009 [13]	Coinciding with the recovery period of the financial crisis, the year-on-year growth rate of the constant price of US GDP declined in the first two-quarters of 2009,respectively-3.29% and-3.92%, and then gradually recovered.
MERS-CoV	Saudi Arabia	April, 2012[14]	The GDP growth rate in 2013 was 2.71% lower than that in 2012; the GDP growth rate in 2014 was 1.75% lower than that in 2012, which was an increase from 2013
	South Korea	May, 2015	In May 2015, the GDP growth rate of that year fell by 0.55% points, and the GDP slowly recovered the following year, but it was never as good as the 2014 growth rate
Ebola	Guinea &West African countries	March, 2014	After the outbreak of the epidemic in March 2014, the economy fell by about 0.24percentage points that year, with little impact. Although the economic growth rate was still slowing in 2015, it has gradually stabilized. In 2016, the economy developed rapidly and got rid of the impact of the epidemic.
Zika virus (ZIKV)	Brazil	May, 2015	Although the epidemic was relieved in 2016, the economic growth rate has not recovered significantly. Until 2017, Brazil's economic growth rate turned positive again
Cholera	Tanzania	Aug, 2015	The economic growth rate that year fell from 6.73% to 6.16%. After the epidemic was brought under control in 2016, the economic growth rate has gradually stabilized, exceeding 2014and reaching 6.86%. The impact of the epidemic on the overall economy is limited
Ebola virus	Congo-Kinshasa	Aug, 2018	The outbreak further dampened the economic boost. Although 2018 has improved compared to before, the shift is not significant
Measles	Brazil	Feb, 2018	The plague hindered the speed of economic recovery. Compared with 2016, the economy in 2017 has been significantly boosted, but the epidemic in 2018 made the economic recovery slower than in previous years, with an increase of only 0.05%
COVID-19	CHINA	Dec, 2019	GDP decreases by 6.8% YoY in Q1 2020, increases by 3.2% in Q2, 4.9% in Q3, and 6.5% in Q4. GDP increases by 18.3% YoY in Q1 2021, 7.9 in Q2, and 12.7% in H1 2021

Sources: the authors' development based on [13]

dustry has become the pillar of the digital industry. China has been the largest exporter of ICT industry since 2017, accounting for about 38% of the global market share [18]. The empirical data based on OECD countries show that the advancement of information technolo-

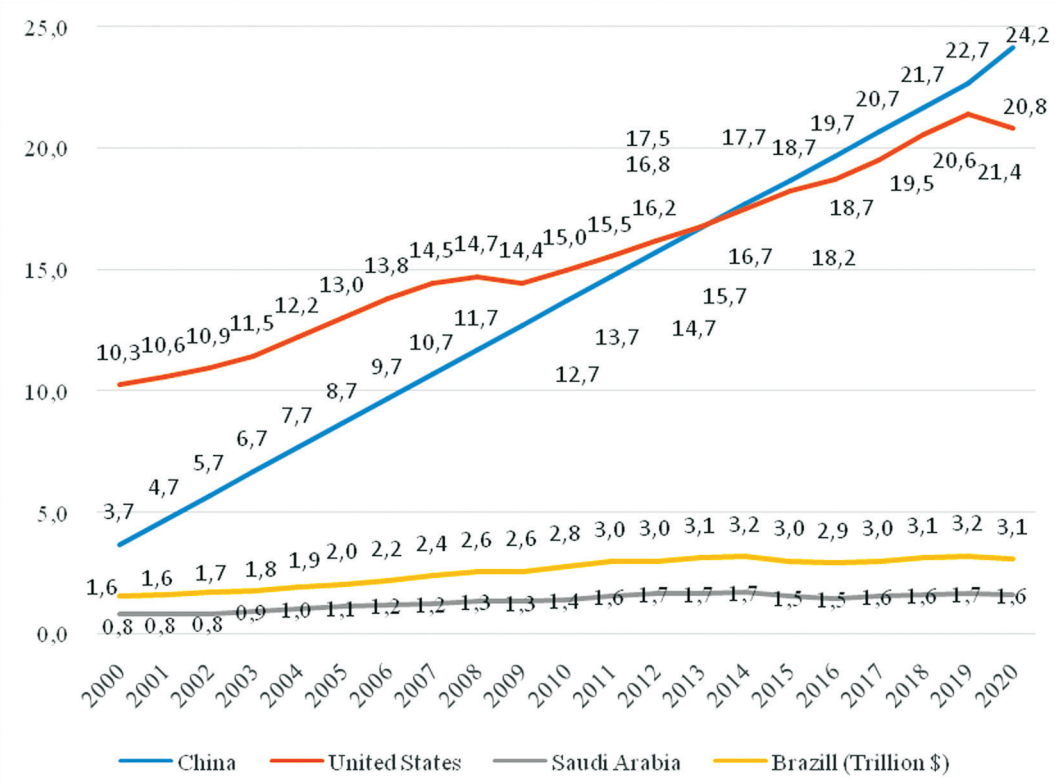

Figure 1. Dynamics of GDP by PPP($)

Source: the authors' development based on [29]

gy revolution is often accompanied by the adjustment of labor demand structure [19]. Further research shows that skill-biased technological change has led to a strong market demand for highly skilled workers. Note, however, that not all technological revolutions increase the demand for skilled labor, which depends largely on the substitution and complementarity between new technologies and unskilled labor [20]. Recent observations have shown that the demand for labor in various sectors of China's digital economy has changed significantly since the outbreak of the COVID-19, especially in digital health care, online education, online sports, entertainment and other industries increased significantly [21].

Table 2. Impact of various epidemics and their treatment measures on the economy

Study area	Research object	Research content	Data	Method	Main findings
High-, middle- and low-income countries in the world	International health status	Impact on population growth and economy	National Health Statistics, United Nations Population Yearbook	OLS、IV -2SLS	Greatly improved the health of the population. For every 1%increase in life expectancy, the population will increase by 1.7-2%, which has little impact on the total GDP [22].
China	SARS	Evaluation of tourism recovery after SARS	China Tourism Statistical Yearbook and China Tourism Net	ARIMA Model	SARS has little impact on the inbound tourism market; the government's transparency and active participation in international cooperation will help restore inbound tourism [23].

Sources: the authors' development based on [22] [23].

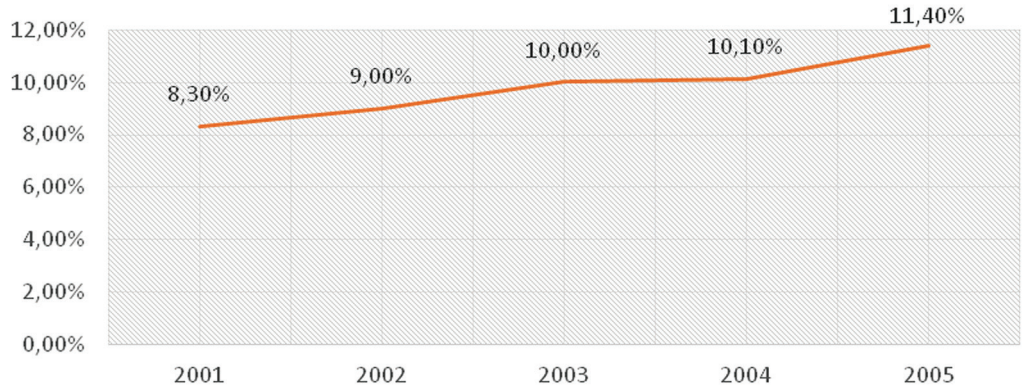

Figure 2. The year-on-year growth rate from 2001 to 2005(Year)

Source: 2020, China Statistical Yearbook.

Impact of Epidemic on Chinese economy. By comparing the number of patients, the severity of the economic impact of the epidemic can be roughly judged. During SARS, total global cases 8096, Chinese mainland 5327; COVID-19 sick people spread around the globe. As of 1 February 2021, over 120 million cases were reported globally, deaths exceed 2.5 million; There are 110,000 confirmed cases in China, and a total of 4823 deaths were recorded [2]. That the ongoing global spread of new coronary pneumonia, it's a huge test for every country's medical system. With the deep integration of the global economy, the negative externalities will affect the global industrial chain, Increase global economic instability. Economic impact of the COVID-19 epidemic was greater than SARS in 2003. The economic impact of the digital economy was found through a comparative analysis of China's GDP and industrial structure during SRAS & COVID-19.

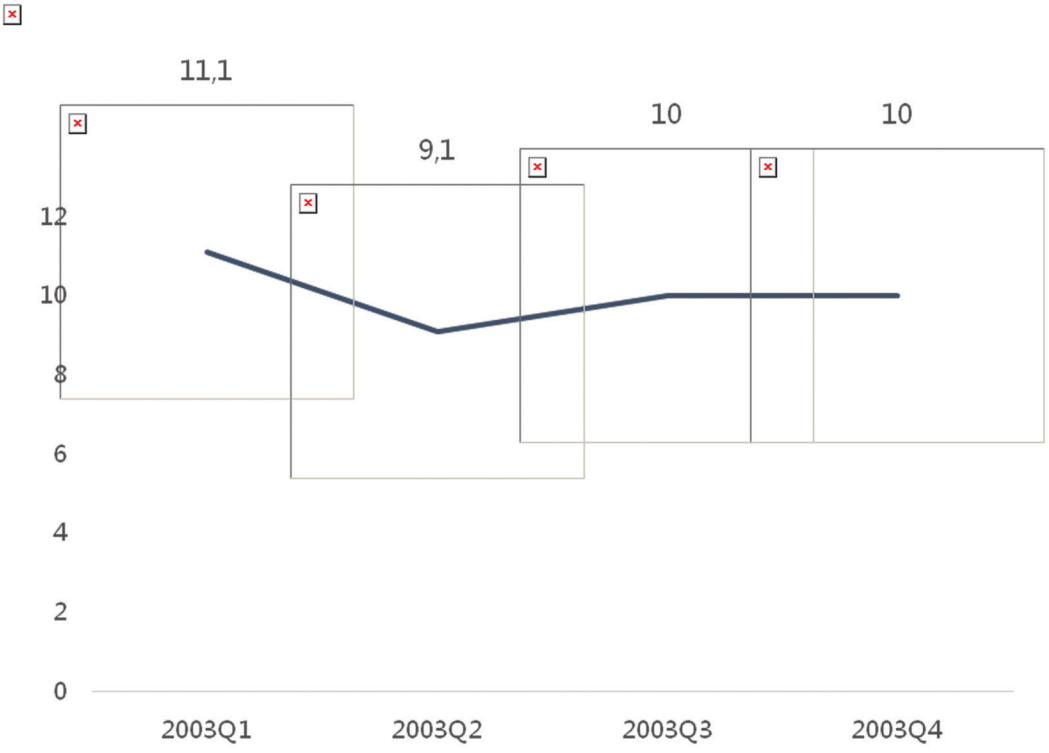

Figure 3. The quarter GDP growth rate in 2003

Source: 2020, China Statistical Yearbook.

Table 3. China industrial structure table

Industrial structure	Proportion (%)				
	2002(Year)	2003	2004	2019	2020(Year)
Primary sector	4.1%	12.3%	7.3%	3.8%	7.7%
Secondary sector	49.4%	45.6%	51.8%	36.8%	37.8%
Tertiary sector	46.5%	42.0%	40.8%	59.4%	54.5%

Sources: China Statistical Yearbook,2020.

SRAS & COVID-19 Comparative analysis of the impact on GDP in China

China's GDP growth rate rose from 8.3% in 2001 to 11.4% in 2005, show that SARS does not affect the trend of rapid economic growth in China's GPD (Figure 2). After the SARS outbreak in 2003, and a brief slowdown in economic growth, Maintain a fluctuating upward trend. Real growth rate of GDP fell from 11.1% to 9.1% in the first quarter, and in the second quarter GDP growth fell to late 2002 levels, followed by steady growth (Figure 3). China's GDP growth rate was 9.1% in 2002, In the first quarter of 2003, China's economy is still up year on year, on a quarterly basis, GDP growth in the second quarter of 2003 was 1.5 percentage points lower than the average in both quarters, demonstrating a brief shock to the GDP, but the impact is small, SARS didn't trigger an economic crisis, and its diffusion and impact are far smaller than this COVID-19.

2.2 Comparative analysis of the impact of SRAS & COVID-19 on China's economic (industrial) structure. Since 2003, China's industrial structure by 2020 has undergone a major transformation from the SARS period (Table 3), with the share of primary sector decreasing by 4.6% and the share of tertiary sector increasing from 42.0% to 54.5%. China has moved from the initial stage of rapid industrialization to the late stage of supply-side reform when it joined the WTO. The industrial growth rate began to slow, the tertiary industry grew rapidly about 12.5%. The tertiary industry has gradually developed into the core driving force of China's economic growth. The main core of China's economic growth in 2003 was driven by industry, Although second-tier

Table 4. SARS (2003) each industry GDP growth rate table

Industry	Growth rate (%)			
	Q1	Q2	Q3	Q4
Primary sector	2.80	1.70	3.30	1.90
Secondary sector	13.20	11.30	13.20	13.00
Tertiary sector	10.50	8.70	8.80	10.10
Industry	13.10	11.10	12.80	14.00
Construction	14.70	13.00	16.30	7.20
Wholesale & retail trade	8.30	10.30	13.80	7.60
Transportation storage &postal	7.70	2.30	7.60	7.10
Hotel & Catering	11.00	7.40	16.90	14.30
Financial Intermediation	11.30	7.70	7.20	3.70
Real Estate	11.10	12.70	6.90	9.00
Other	12.10	9.90	6.40	14.90

Sources: CEIC and the National Bureau of Statistics released the data.

GDP growth fell from 13.2% in the first quarter to 11.2% in the second quarter, and the third quarter rebounded again, To 13.2%, during SARS worst second quarter, industrial GDP still maintain a high growth rate. The impact on services is much greater than on industry, GDP growth in transport, warehousing and postal services was only 2.3 % in the second quarter, accommodation and catering are the sectors most affected by SARS, compared to the two quarters, GDP growth was only 7.4%. But in the third quarter of the same year, Both are inelastic, Even higher than the previous level (Table 4).

In the second quarter of the year of SARS, the accommodation and catering industry grew by 7.4% year-on-year, which was lower than the average growth rate of the two quarters before and after, and the value added of postal storage and transportation industry grew by only 2.30% year-on-year, lower than the average increase of the whole year. The real estate industry grew by 12.7% in the second quarter, the largest average increase of all industries for the year, and Chinese residents tended to invest their money in real estate to "preserve value" during the SARS period. The SARS outbreak is after the Chinese Spring Festival, and the COVID-19 outbreak occurred during the Chinese Spring Festival. The outbreak of SARS was after the Chinese Spring Festival, while the outbreak of COVID-19 was during the Chinese Spring Festival, and along with the issue of resuming work and production, the degree of application of digital information technology in the secondary industry was weaker, so the impact of COVID-19 on the secondary industry was more severe than that of the SARS period. The secondary sector grew 3% year-on-year in 2020, with the rental and business services sector also suffering a large impact, growing -5.3% year-on-year and the tertiary sector growing 2.1 (Table 5) and COVID-19 had the most serious impact on the secondary industry rather than the tertiary industry, which reflected both the adjustment of China's industrial structure and the change in residents' investment preferences. As a result of COVID-19 precautionary measures and quarantine means, the inherent properties of the industry make the accommodation and catering industry is still the most seriously affected by the epidemic, up -13.1% year-on-

Table 5. 2020 annual GDP preliminary accounting data

Industry	Absolute amount (100 million yuan)	Increase over the same period last year (%)
GDP	1015986	2.3
Primary sector	77754	3.0
Secondary sector	384255	2.6
Tertiary sector	553977	2.1
Agriculture, Forestry, Animal Husbandry and Fishery	81104	3.1
Industry	313071	2.4
Construction	72996	3.5
Wholesale & Retail trade	95686	-1.3
Transportation storage &postal	41562	0.5
Hotel &Catering	15971	-13.1
Financial Intermediation	84070	7.0
Real Estate	74553	2.9
Information transmission, software & IT services industry	37951	16.9
Leasing and business services	31616	-5.3
Other	167407	1.0

Sources: The National Bureau of Statistics (China) released the data.

year, the restrictions on the regional movement of personnel directly led to a significant decline in its revenue.

And when COVID-19 burst, when China faces sudden economic risks, the way Chinese people resist risk has quietly changed, From the real estate industry of the secondary industry to the tertiary industry. In particular, the information transmission, software and information technology service industries, which are providers or platforms for digital services, have become a way to address risk rushes in COVID-19's 2020, when China's information transmission, software & IT service industries achieved a growth rate of 16.9% (Table 5). Adoption of SARS, the comparative analysis of GDP between COVID-19 and industry status, it can be clearly perceived that China's macro environment has changed. First, Global GDP growth has fallen sharply, industries that traditionally drive economic growth have shown a lack of momentum, there is downward pressure on China's economic development, there is an urgent need to find a breakthrough that can support high-quality economic development; Second, China's industrial and economic structure has changed, The service industry develops rapidly to the individualization, the fine demand close. Finally, the development of the Internet has fundamentally changed the traditional way of economic operation, and the rise of a new generation of information technology has led the digital economy to a new era of development. The huge scale of Internet users provides a broad market for the development of digital economy. The famous Metcalfe's law defines that the value of a network is equal to the square of its number of nodes, and the traditional Moore's law will come to an end. 2003, the number of Chinese Internet users was 79.5 million, accounting for about 7% of the total population, and the degree of network development was not high, and China's overall informatization and digitalization were backward, SARS forced the Internet to get high growth and faster popularity. According to the 48th CNNIC Statistical Report on Internet Development in China, as of June 2021, the number of Chinese Internet users was 1.011 billion, twelve times the number during the SARS period, and the Internet penetration rate reached 71.6%[24]. In 2019, mobile telephone exchanges were more than eight times as large as in 2003, Fiber optic lines are nearly 80 times longer (Table 6) than in 2003. SARS was the beginning of the Internet outbreak in China, COVID-19 outbreaks are another singularity that has allowed the digital economy to concentrate. Because of the huge Internet group, the externality of the Internet can be brought into full play, and the global Internet users will still have a lot of room for growth. In this economic environment, the digital economy emerges as the times require. The large-scale commercialization of 5G will provide sufficient user groups and network infrastructure.

Besides the change of external factors, the digital economy also provides a good development environment for the digital economy, because it can provide fast, diverse and personalized services, it has also brought obvious changes to the economy and life in this COVID-19.

China's Digital Economy Industry Development Opportunities Under the COVID-19. As can be seen in Figure (4), Alibaba Group's annual revenue continues to increase, with a growth rate of 35.3% for 2019-2020, which can be described as huge." The "digital economy" was once out of reach, but is now approaching a key inflection point - economic development is entering an era of "deep digitization" and global mobile communication technology is entering a new phase of development. The new phase of global mobile communication technology development and the maturity of 5G also bring market opportunities for ICT and new economic opportunities for countries to promote economic

Table 6. Communication capacity of Telecommunications

Year	capacity of office telephone exchanges (Lines 10000)	capacity of office mobile exchanges (Subscribers 10000)	length of Optical fiber (km)
2003	35082.5	33698.4	594303
2011	43428.4	171636.0	12119303
2019	7198.4	272523.7	47412442

Sources: China Statistical Yearbook, 2020.P16-34.

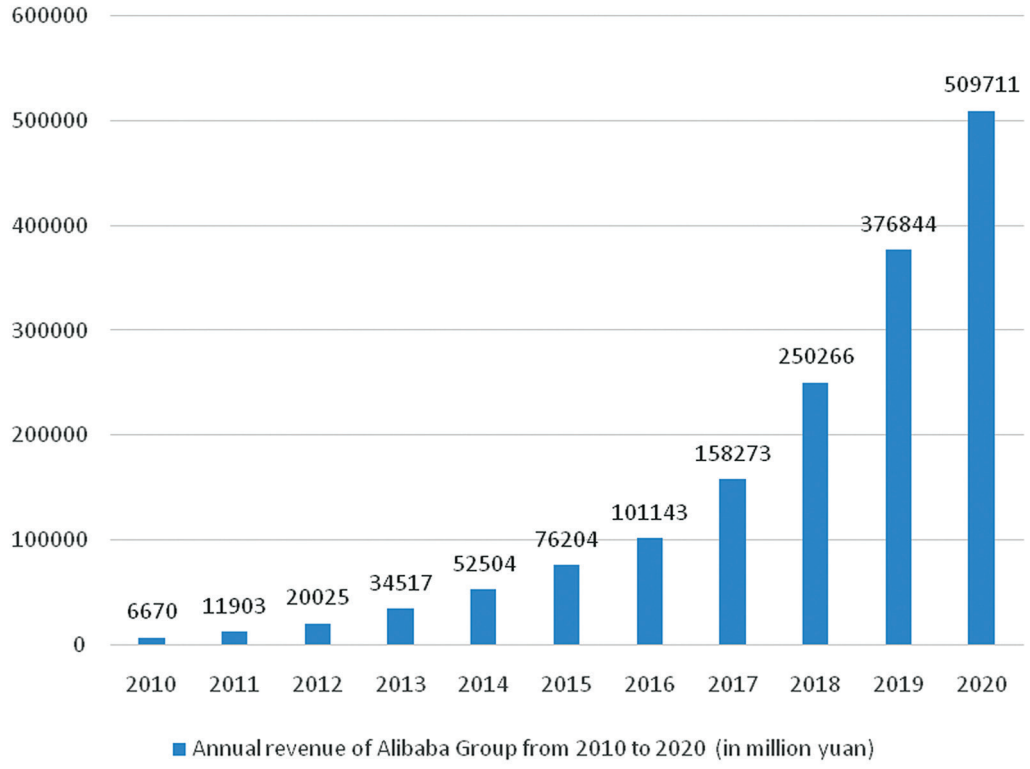

Figure 4. Annual revenue of Alibaba Group from 2010 to 2020 (in million yuan)

Source: statistic &fact

development in the post-COVID-19 era. The rapid development of the digital economy is inevitably accompanied by new opportunities and challenges. Dealing with the relationship between producers and innovators, using data to drive, unleashing the huge potential of digital transformation and promoting a new cycle of digital industrialization has become key.

China's Digital Economy. China's digital economy has flourished in recent years, and its contribution rate to GDP has continued to rise, becoming the core driving force of China's economic development. The digitization of information and knowledge as a key production factor, the modern information network as an important carrier, and the effective use of ICT to enhance efficiency and optimize the economic structure of a series of economic activities has become an important strategic goal for the development of China. The value added of the digital economy increased from US$339.9 billion in 2005 to US$543 billion in 2019. At the same time, the share of digital economy in GDP has increased year by year, from 14.2% in 2005 to 36.2% in 2019, accounting for more than 1/3 of the GDP and contributing 68% to GDP growth (Figure 5).

Digital industrialization is the pioneer industry for the development of digital economy, according to CAICT data, from 2014 to 2019, the scale of China's digital industrialization has increased year by year, and the scale of China's digital industry reached US$10739 billion in 2019, accounting for 7.2% of GDP, an increase of 10.54% year on year (Figure 6). Industrial digitization also brings production quantity and efficiency to traditional industries by applying digital technology, and is an important part of the digital economy. The scale of industrial digitization in China rose year by year during 2014-2019, and the scale of industrial digitization in China reached $435.64 billion in value added in 2019, accounting for 29.0% of GDP, which became a support country with a year-on-year growth of 15.56% and became an important pillar of national economic development (Figure 7).

By comparison, the scale of industrial digital development in 2019 accounts for 80% of the total scale of digital economy, which is much higher than that of digital industrialization. The continuous expansion of the scale of industrial digitization shows that China's digital technology and product services are accelerating the integration with traditional industries,

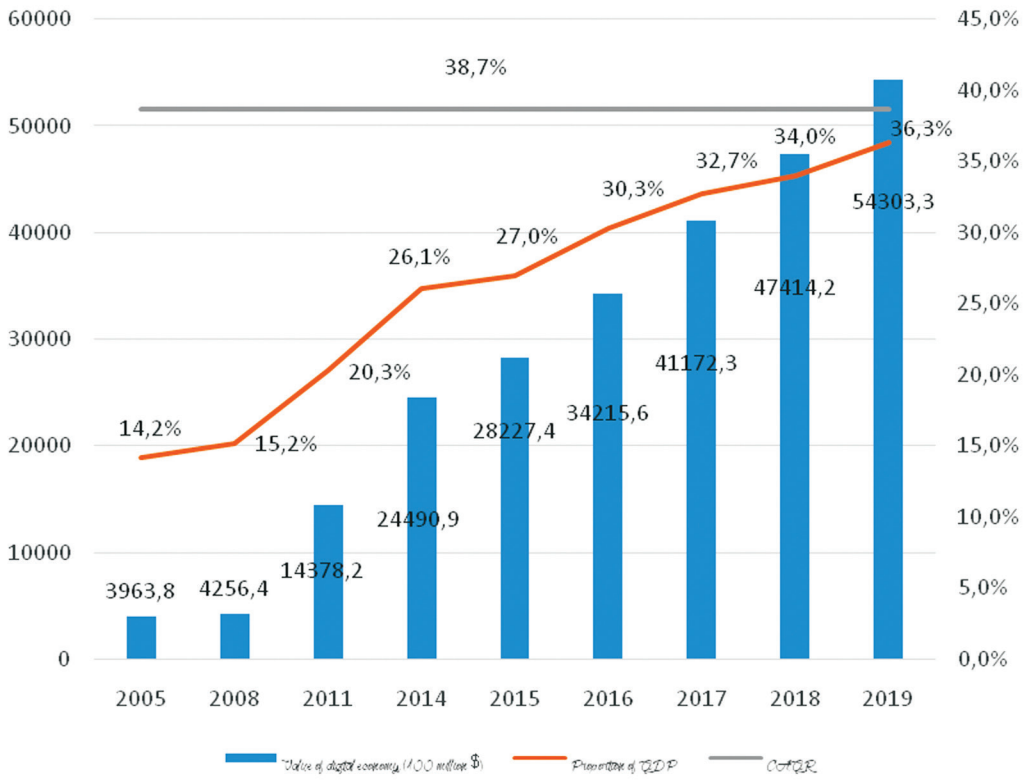

Figure 5. Trends in China's digital economy (2005-2019)

Source: CAICT, White Paper on China's Digital Economy Development,2020.

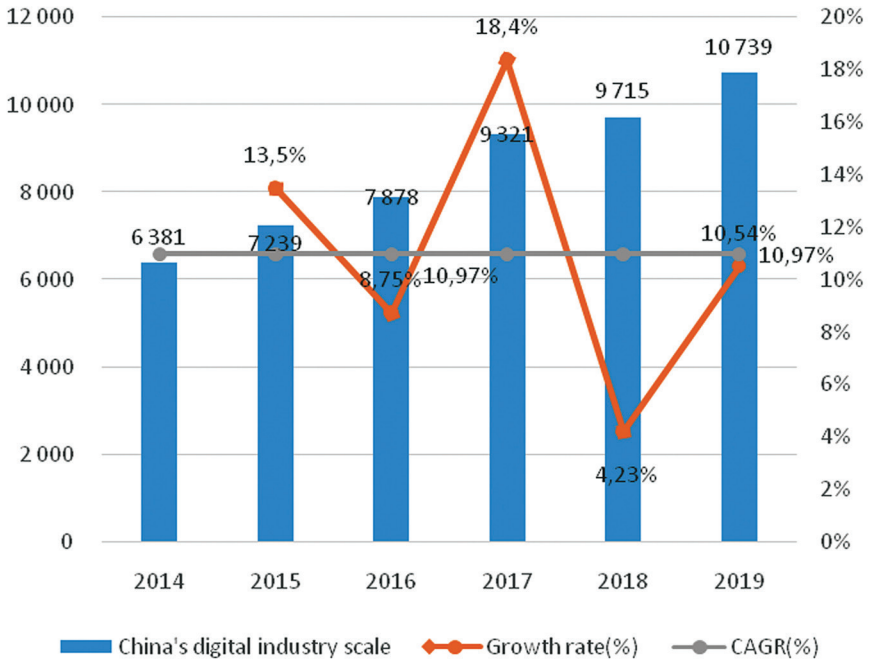

Figure 6. China's digital industry growth (2014–2019)

Source: CAICT, 2020

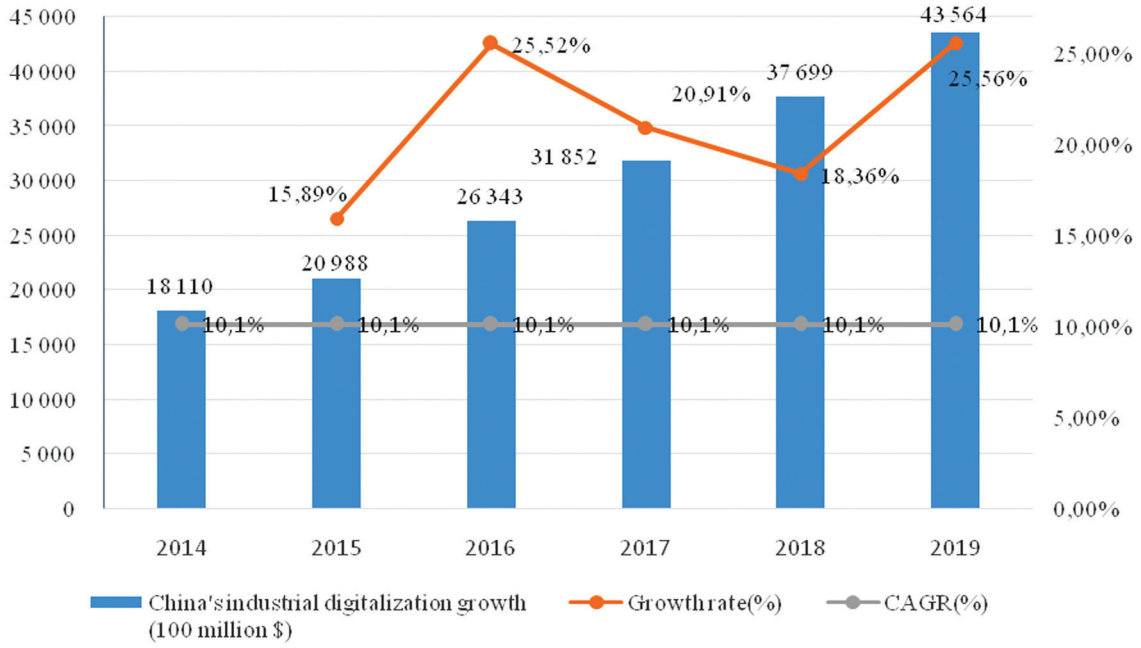

Figure 7. China's industrial digitalization growth (2014–2019)

Source: CAICT, 2020

and the pull effect on the growth and efficiency of other industries is increasing. With the industrial Internet, smart manufacturing, networking, platform economy and other convergent new industries, new models and new business models continue to integrate, the application of the digital economy continues to be highlighted.

COVID-19 the Development Opportunities of Digital Economy Industry. From the (Figure 8)we can know that the users of zoom has rapidly increase, Because of COVID-19, we don't have the ability to teach face to face, we have to teach through the online platform, and that's why we have increased the number of users on this platform. The COVID-19 epidemic has given a great opportunity to the digital economy industry. We work at home, we teach at home, we shop online.

Accelerating Government Digital Transformation. Faced with the impact of COVID-19, governments have rapidly promoted the development of digital application of epidemic prevention and set up a digital governance platform. Digital technology; represented by big data; cloud computing and artificial intelligence, has played a vital role in medical prevention, resumption of work and relief in various countries, fully reflecting the advantages of digital technology in dealing with mass epidemic diseases and optimizing public health and safety systems. More than 28 countries around the world have launched applications to track close contacts with the new coronavirus, and 11 more are speeding up the development of such applications. The South Korean government uses electronic bracelet to automatically transmit information about the epidemic situation, body temperature and other information to the information center. China uses National Government Service Platform health codes in more than 100 cities, to realize the precise intelligent health management of the workers, based on the existing regional epidemic prediction model, considering the effects of climate and environmental conditions and government control measures on the spread of the epidemic, The Global COVID-19 Epidemic Prediction System was developed [25]. Countries re-examine the relationship between regulation and application of the digital economy, temporarily untying the privacy code for remote visits, to allow a medical institution or physician to conduct remote consultations of various subjects through platforms or software such as FaceTime; Facebook Messenger; Google Hangouts and Skype, to meet the country's rapidly growing demand for online diagnosis and treatment. Federal Emergency Management Agency (FEMA) based on blockchain and big data

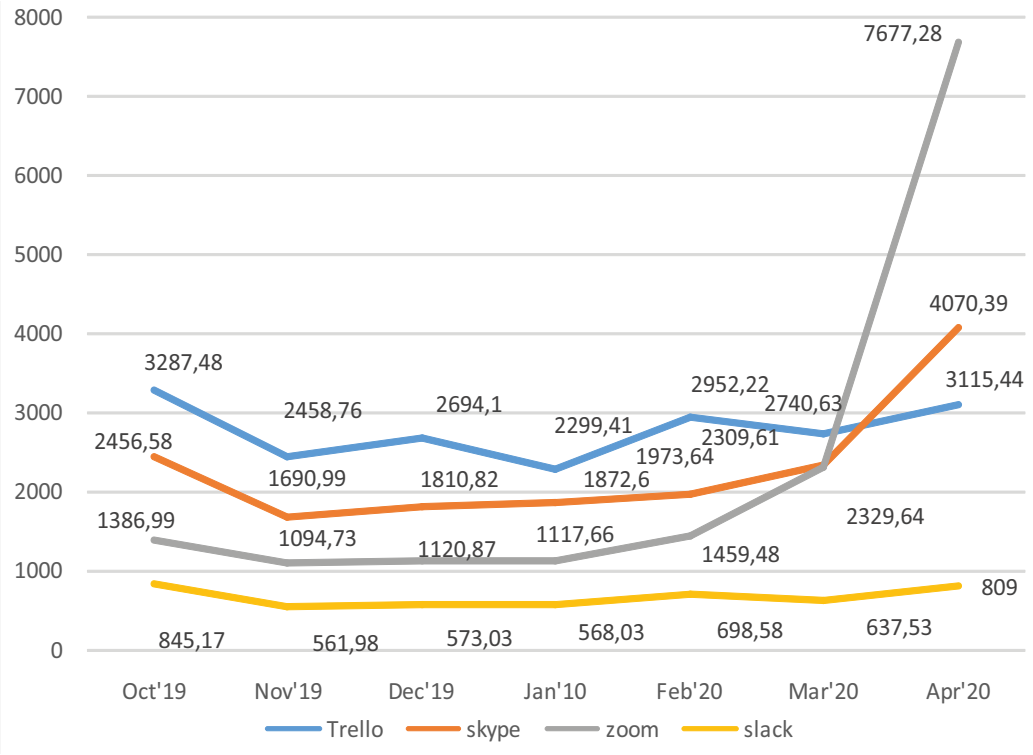

Figure 8. Monthly traffic on remote working platforms during COVID-19 in Russia from October 2019 to April 2020, by platform (in 1000s)

Source: Statistic & fact

technology, real-time allocation of materials, rapid use of funds and the whole process of information traceability. Countries have quickly formulated and launched policies to promote the digital transformation process related to epidemic prevention and control. The United States introduced a fiscal stimulus in March 2020, invest $500 million in anti-epidemic expenses to upgrade and update digital medical equipment. In its latest fiscal year 2021 budget, priority Euro1.34 billion was allocated to cyber defence and the Digital Europe Plan to support the digital transition in Europe, aimed at accelerating Europe's digital transformation in areas such as health care [26], The EU has unveiled a 1.1 trillion-euro interim budget proposal covering seven years (2021-2027) and a 750-billion-euro European recovery plan, both focus on digital transformation and green development theme. June 2020, Russian President Vladimir Putin, speaking on national television, adjust the tax policy of the IT industry, including a reduction in the mandatory social security rate from 14 per cent to 7.6 per cent, Reducing the profit tax rate from 20% to 3%, a policy that would make Russia the world's least taxed IT industry. Governments in COVID-19 enhance their capacity to serve through contactless digital technologies, has opened based on the computer, mobile phone applications and other "contactless" online channels, Chinese government through WeChat; Sina-Microblog and other software to carry out epidemic information, policy release; By December 2020, China's online government service reached 873 million yuan, it accounts for 85.3% of the Internet users as a whole [24].

Promoting Digital Industrial Transformation. Facing the COVID-19 home isolation measures, the physical store management is stagnant, and the offline real industry is transformed into an important way to solve the crisis. 1 Online education. As China's ICT infrastructure continues to improve, network fees become lower, online education with low delay, more extensive human-computer interaction, small and medium-sized city users can obtain more fair and personalized teaching resources and services through online education. The 2020 China Internet Development report shows that the number of online education users has reached 342 million, an increase of 109 million over the end of 2019, and 34.6 percent of Internet users have used the online education plat-

form. 99.7% of primary and secondary schools in China achieve 100 M bandwidth [27]. 2 online medicines. COVID-19 online medical advantages can be highlighted, ushered in an important opportunity for development. As of December 2020, the scale of online medical users in China is 215 million, accounting for 21.7 percent of Internet users as a whole. The implementation of qualified Internet medical institutions rely on their physical medical institutions, remote consultation online drug purchase continuity. With the distribution of online medical assistance, the user group expands to the whole age group, and the inquiry diseases show a diversified trend, and the industrial Internet platform optimizes the integration of medical services up and down to highlight the digital advantages.

Forces the enterprise digital transformation. COVID-19 severe impact forced enterprises to try and deeply consider digital transformation. 1 Office online. Before the COVID-19 is fully controlled, telecommuting brings low and convenient coordination and communication costs to become the first choice for enterprises to resume work. According to CNNIC statistics, China's telecommuting staff in 2020 more than 340 million people, accounting for 34.9 percent of the overall Internet users. COVID-19 the duration, the online office model will make enterprise management more flexible and resilient, and accelerate the application of enterprise digital management. Teleworking promotes innovation in traditional employment. Compared with the traditional employment mode, telecommuting has significant cost and efficiency advantages. The enterprises that use telecommuting can save about 14000 yuan per employee a year.[28]2 digitization mechanism. Teleworking solves the problem of employee collaboration during enterprise COVID-19, but COVID-19 makes enterprises realize more fully that to realize digitization, we still need to establish scientific and perfect enterprise digitization mechanism. Accelerated construction of new infrastructure such as 5G network, big data center, artificial intelligence, industrial Internet and smart city has strengthened the key capabilities of mass data processing, cloud storage and cloud computing, multi-program access and so on for the construction of remote office ecology. Also impels the enterprise level application hardware, the software foundation ability has the substantial enhancement.

To assist the digital transformation of society. With five of the world's ten most popular social media networks being Chinese apps (Figure 9), digital penetration accelerated into every corner of the economy during COVID-19, which took on a nationalized and socialized character.

Digitalization of the national lifestyle. By COVID-19 2020, The number of Internet payment users in China is 854 million, Up 86.36 million from March 2020, It accounts for 86.4% of the Internet users as a whole. Since 2013, China has become the world's largest online retail market for eight consecutive years. 2020, China's online retail sales amount to 11.76 trillion yuan, An increase of 10.9% over 2019. As of December 2020, China has 782 million online shoppers, 72.15 million more than March 2020, it accounts for 79.1% of the Internet users as a whole.

During the COVID-19 period, consumer categories, consumer groups, consumption areas showed a diversified trend. The rise of home online consumption and online content consumption, Online shopping, online shopping, online reading, online film and television, webcast has become a popular way. Webcast is growing fast, Developed into an "online drainage + physical consumption" of the new digital economy model. 2020, the number of Internet video users in China is 927 million, up 76.33 million from March 2020, 93.7% of Internet users, short video users were 873 million, up 100 million from March 2020, 88.3% of Internet users, TikTok and other short video applications are popular, the number of downloads reached an astonishing 850 million. Urban and rural online consumer market has been expanded. 2 Innovation of market service mode. COVID-19 push to accelerate the take-out business to urban, rural sinking layout, promote the local service model innovation and digital upgrading. It has also become an important means for upstream catering industry to accelerate the transformation of digital industry. Take-out enterprises through the acquisition of software service providers to become a digital platform for life services, through digital platform tools to speed up the efficiency of local life services, accelerate the upstream penetration of the industry and service expansion, driving hotel tourism, travel and other business. Starting from the take-out application, the digital platform realizes the ecological help of the all-round digital life service to promote the digital service industry to become a new power of economic growth.

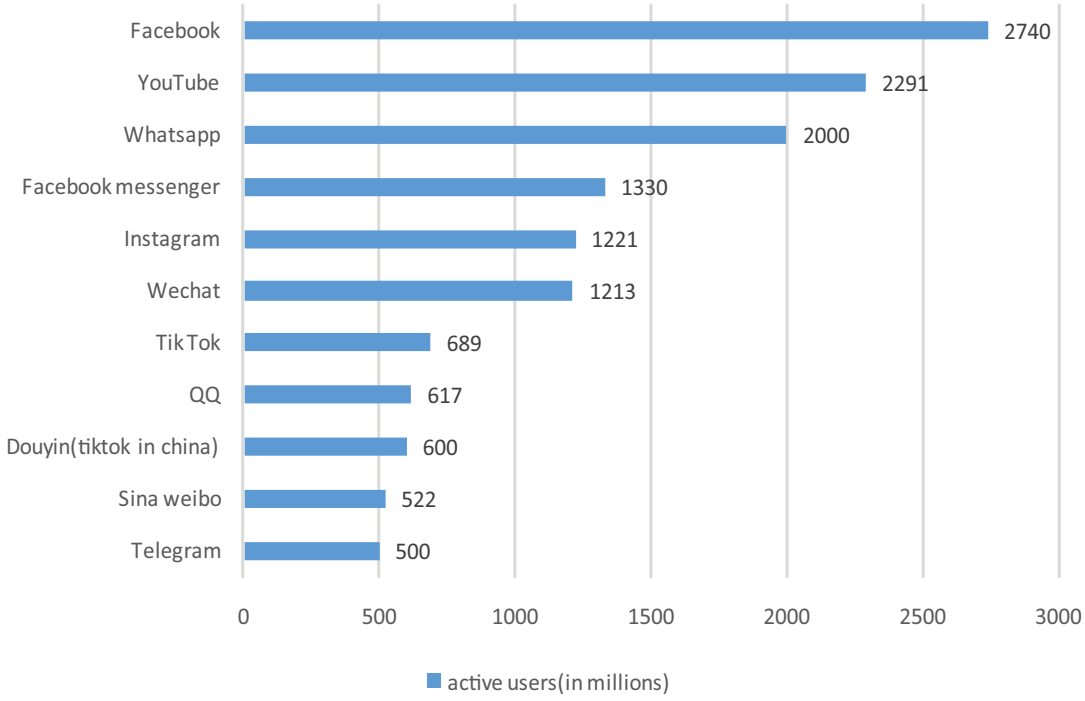

Figure 9. Most popular social networks worldwide as of January 2021, ranked by number of active users

Source: statistic & fact

Suggestions for promoting China's digital transformation. Accelerating Government's Digital Application Ability and Improving Government's Digital Governance. After the COVID-19, the information of government management is reported slowly, and the information disclosure lags behind, which is still the structure of vertical governance. In the age of digital information, it is necessary to spread information in real time and network. By establishing a flat governance structure, it can accelerate the response ability and improve the decision-making ability. We can take the intelligent city as the basis, increase the application of digital technology in government governance, designate unified standards, unify digital interfaces, promote information sharing in various regions and departments, enhance the government's digital thinking and concept of digital governance, and form a modern system of government governance with full coverage and gridding.

Integration and development of deep tillage digital technology in vertical subdivision to stimulate new kinetic energy. Digital economy includes big data, 5G artificial intelligence, block chain and so on need a new generation of digital technology in different fields, and deepen the research of core technology in vertical subdivision field, and promote the integration and development of digital technology in different fields has become a new trend in the future. Through the integration of development to form new economic growth points, the development of the digital economy to strengthen the foundation, leading to more economic structure transformation and upgrading.

Promote the balanced development of the digital level of industries and bridge the regional digital divide. The head enterprises of China's digital transformation industry mainly focus on provinces and cities with higher economic level and cities with better development of intelligent cities, while in the vast central and western urban areas, the digitization process of large, medium and small micro enterprises lags behind. Although the higher digital industries such as retail and entertainment industries have the advantage of flexible transformation of business models in the COVID-19, which effectively reduces the economic losses, the lower degree of digital transformation of most manufacturing industries has led to problems such as blocked supply chain, shortage of employees and difficult circulation of cash flow, which makes the overall output value of manufacturing industry decline. China should seize the strategic opportunity of the current

global COVID-19 period and promote the strategic layout of China's new digital infrastructure. Efforts should be made to speed up the construction of new information infrastructure, rationally distribute information infrastructure such as the industrial Internet, the new metropolitan area private network, the big data center, the new Internet exchange center, and the national industrial Internet, so as to improve the speed of communication connectivity, international export bandwidth and computing and storage capacity, and accelerate the construction of a new cornerstone of the digital society. Promote the intelligent transformation of existing road networks, pipe networks and power grids in the vast central and western regions of China, and create a smart city-type public service infrastructure system through intelligent cold chain logistics, intelligent traffic mapping systems, etc. To support the healthy development of the digital economy and digital society.

Enact digital economy laws and regulations to ensure data privacy. The rapid development of the digital economy and the corresponding data security and privacy protection risks are extremely heightened. The Internet and big data era, from mobile Internet, Internet of Things, to smart home, health monitoring, etc., behind the digital technology innovation is also accompanied by the indiscriminate mining and abuse of personal information. Through legislation, a more complete cyber legal system has been formed to promote the balance between economic development and protection of rights and interests in the digital era, so as to regulate the graded use of personal information data and improve the socio-economic value of data use. According to the law, the data sharing mechanism between the society and the country is improved, the data ownership, responsibility and obligation of relevant subjects are clarified around data control and jurisdiction, and the standardized and safe use of data is guaranteed by laws and regulations and technical means, so that data can be traced back to its source. Establish data trading laws and regulations and industry standards, and continuously maintain the standardization and standardization of data trading in the process of data trading; new technology such as block chain should be introduced to explore data resources and promote the orderly release of data value.

Emphasis on cultivating talents in the digital field and providing an innovative environment. The digital economy is booming, and the huge talent gap in China's digital economy has become the core bottleneck that restricts the development. In terms of talent training, higher education institutions, research institutes and head enterprises should set up relevant majors in the fields of basic research, R&D innovation, industrial development and industrial application of the digital economy to strengthen the training of frontier scientific and professional talents; they should also focus on strengthening the training of application-oriented and practice-oriented talents to enhance the supply of talents in the digital field, guided by market demand. The Chinese government should actively introduce preferential incentives and subsidies for digital talent training to provide sufficient talent reserves and sources of innovation for the sustainable development of the digital economy.

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