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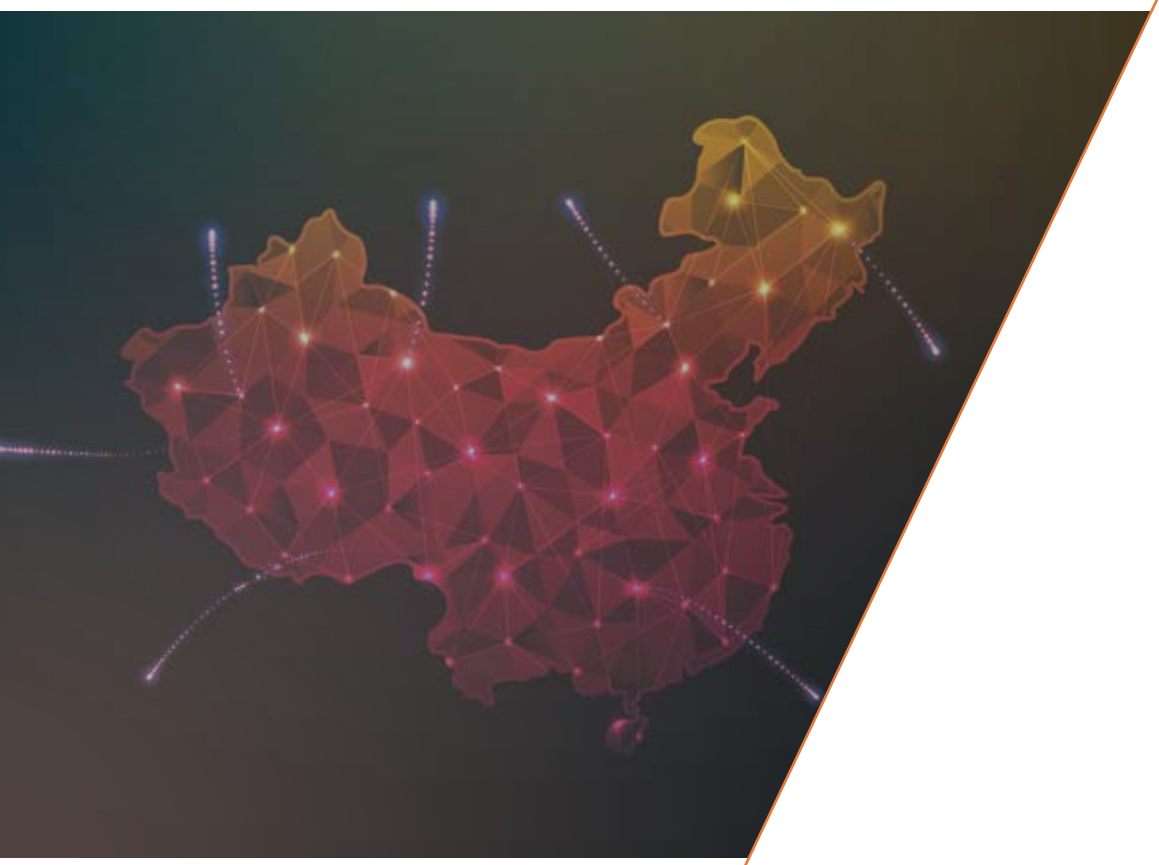

Understanding digital stakes to support business in China

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Editorial

It is no longer possible to consider the global economy without taking into account the growing importance of China in international trade. This is also true in the digital sector. China has become a major player in the international digital sector, with a clear desire to become a leader in key technologies of this early 21st century.

Eric Schmidt, former CEO of Alphabet and Chairman of the Pentagon's Defense Innovation Board, stated back in 2016: "*It's pretty simple. By 2020, China will have caught up. By 2025, they will be better than us. By 2030, they will dominate the industries of AI.*" This quote illustrates China's ambition and its recognition by the major players in the digital economy.

China's digital strategy has led to the emergence of Chinese digital champions. Very quickly and with the benefit of a significant domestic market, they developed in China and then set out to conquer the world. Only the current geopolitical tensions with the United States, and in particular the technological war, represent a barrier in the international expansion of these players. More importantly, an excessive conflict between these two superpowers would weaken the global economy.

Chinese President Xi Jinping said in his speech to Europe that he wants cooperation to prevail over competition, consensus over disagreement. There seems to be a strategic wish to collaborate, which was also confirmed to us by Nicolas Chapuis, EU ambassador to China.

For many of Cigref's member companies, China has become the leading market in terms of growth. This confronts us with the need to better understand all the economic, technological and cultural dimensions of this country and above all to try to understand its strategy like in a game of Go.

For a European company, knowing China also means understanding the issues of security, data protection and infrastructure deployment. It also means identifying constraints and barriers to entry in a country with its own digital ecosystem, often in competition with Western leading offers. This is what we shared during the Cigref working group and what this report is about.

When I decided to lead this work, we had not imagined the Covid-19 crisis situation we have experienced since January 2020, which started in China and has spread around the world, changing the global health, economic and social outlook. However, this does not change Xi Jinping's ambition, which is: "*China will rise to the top of the world in terms of global power and international influence*."

Jean-Michel André,
Cigref Administrator, at the initiative of the working group

Executive Summary

Working with China has become a necessity that offers important economic and technological opportunities for companies. The question that Europe, and more generally the West, is asking itself is how to work with this new, unavoidable and very special country. Cigref's members wanted to conduct this study to understand the digital stakes and challenges in China, by understanding its ecosystem, which is very different from ours, its technological strategy and its regulations.

China, a global power with a proactive digital strategy

For several years now, China has been the world's leading industrial power. It is also an economic power, certainly a technological one, and we can bet that it will soon be recognised as a financial power. The country accounted for 18% of the world's GDP in 2020 and is projected to account for 25% of the world's GDP in 2030, becoming comparable to the United States (US). China is also Europe's 2nd largest trading partner. The two powers are now interdependent in all sectors, especially in industrial and digital area. The "Belt and Road Initiative", a major infrastructure development programme, particularly in the digital field, enables China to take its place in international cooperation while defending its interests throughout the world.

Its "Made in China 2025" plan aims to internalise key technologies in China, with the idea of accelerating its leadership and mastering its entire value chain. China's policy is to develop national champions. They can develop on a very large and dynamic domestic market and then compete on an international level. This ambition has been reinforced and revealed by the Covid-19 crisis.

At the forefront of strategic technologies and ahead of the game in key sectors

In the digital sector, China has targeted its investments in strategic areas such as artificial intelligence, 5G, semiconductors, quantum computing and communication technologies. China is ahead of the rest of the world in many key areas such as e-commerce, super-apps - which encompass a wide range of functionality from messaging to online payment - and smart cities, which focus on security, mobility and flow management. The Covid-19 crisis and the associated lockdown have accelerated the adoption of digital tools in China, as the SARS crisis had already done: e-commerce, e-learning, drone delivery, collaborative tools, but also the development of artificial intelligence, 5G networks and the adoption of the cloud. China also started issuing its digital currency in April 2021.

Cloud market dominated by local providers

Among cloud infrastructure providers, China has seen the emergence of champions such as Alibaba, Huawei, Tencent and Baidu, who dominate the Chinese market. They have a strong domestic presence and are gradually expanding into the international market.

Alibaba Cloud, based on a model similar to Amazon Web Services, dominates the Chinese cloud infrastructure market, with almost 40% of the market in 2020. This illustrates its robustness and application coverage in various fields from online retail to smart cities and smart manufacturing solutions. Tencent Cloud, which came from the entertainment and messaging sector, is also developing a cloud that is very competitive in terms of application coverage, performance and response time.

AWS and Microsoft have "regions" in China that allow them to have a small presence, but foreign providers, especially American ones, can only offer cloud services in the Chinese market if they put in place a Chinese joint venture, either by setting up a dedicated entity or through a joint venture or close collaboration with a Chinese player.

Well-developed Chinese infrastructure but highly regulated

Any international company wishing to establish a sustainable presence in China must take into account infrastructure and network challenges. Due to Chinese regulations, the Great Firewall, and vendor strategies, cloud and network architectures in China are different from the rest of the world. The first constraint is therefore to build a network architecture using MPLS-type networks compatible with the national regulation and to ensure a reliable and correctly sized link with an operator approved on the Chinese market. National regulations, such as the Cybersecurity Law and the more recent Privacy Law, are major developments in the global privacy landscape and provide a very important regulatory framework for international businesses.

A market to be approached with caution

The Covid-19 crisis has exacerbated global and particularly Sino-American tensions, especially in the digital field. The technological rivalry and trade tug-of-war with the US are pushing China to support the development of its autonomy and to increase its international expansion. In this context, it is a major challenge for any European company to ensure its resilience in the face of growing geopolitical risks. The Chinese market is important, but it must be approached with vigilance, particularly with regard to confidentiality and data protection.

By addressing a number of these issues, this report aims to give Cigref's digital leaders, and more broadly anyone interested, some insights into the Chinese digital world.

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This document was written by Clara MORLIERE, Senior Mission Officer, Cigref.

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1. Introduction

In 2017, China became the world's largest factory. It has an output of the electronics industry almost 3 times that of the United States (at $682 billion compared to $234 billion). According to The Yearbook of the World Electronics Data 2017, the country was already the largest market for the sector, accounting for $470 billion compared to $425 billion for the US. The official article on the Xinhuanet website on the evolution of Chinese industry in 70 years, allows us to discover the perception that the Chinese have of their history and their path.

Thanks to a long-term strategy and great efforts, China has become the global player it is today. One of its ambitions is to regain its former position among the great powers and to increase its influence. China has an 'economic' approach to globalisation and international relations, notably through the deployment of the "Belt and Road Initiative", offering many countries strategic partnerships and technological tools for their development. These partner countries are located all over the world, on all continents. China pays particular attention to emerging countries in South East Asia, Central Asia and Africa.

On the domestic front, President Xi Jinping announced in February 2021 that China will have achieved its goal of eradicating extreme poverty by 2021, despite the crisis - thereby demonstrating to the world its ability to manage its own societal challenges and inspiring other countries to follow suit.

1.1. China, a global power today

Economic power

Chinese growth remains very strong despite the crisis. In October 2020, the International Monetary Fund (IMF) predicted that China would grow by 1.9% in 2020, and by more than 7% per year between 2021 and 2025, allowing it to return to its pre-crisis economic state very quickly. This estimated growth is much higher than that expected for most Western economies. China is expected to be the only G20 economy to grow in 2020 against a global economy that is expected to contract by 4.4%, the sharpest slowdown since the Great Depression, according to The World Economic Outlook, IMF.

China plays a very important role in international economic exchanges. Annual trade between China and the world, including the US, is worth $300 billion. China is Europe's 2nd largest trading partner.

As regards trade with France, China is France's 5th partner, its 2nd supplier (the Chinese market share in France is 9%) and its 7th customer (the French market share in China is 1.4%). The two countries are interdependent in the industrial and service sectors. In terms of presence, France has a special place in China, since there are about 1,100 French companies in China (with 5,500 establishments), providing almost 600,000 jobs, which makes France the leading European employer in China. This position is linked in particular to its strong presence in industry (chemicals, automobiles, computer and electronic equipment), according to the French Treasury.

China can rely mainly on its own market to develop. In 2019, China's domestic consumption accounted for 57.8% of its gross domestic product (GDP) growth. The Financial Times reports that it had already become an important factor in its growth, before the Sino-American trade war threatened to dampen export prospects. The OECD in its Economic Survey of China 2019 pointed out that the catching-up trajectory with other OECD economies continues despite a slight slowdown.

But it is in exports that China best demonstrates its footprint and growing global influence. In August 2020, Chinese exports jumped 9.5% in dollar terms compared to the same month last year. This rebound is well above expectations. The rise in exports highlights China's prominent role in world trade during the Covid-19 pandemic and China's recovery from the rest of the world.

In addition, the Regional Comprehensive Economic Partnership - RCEP between the ASEAN countries, which accounted for 30% of the world's GDP in October 2020, will further facilitate trade between China and its Asian neighbours and, according to some experts, probably strengthen China's place in the economies of these countries.

Scientific and technological power

China is one of the most modern countries in the world alongside other Asian countries such as Japan, South Korea and Singapore. In second place since 2006 in terms of scientific publications, just behind the United States, the country became number one in the world in 2020. China has become a technology leader in just a few years, ahead of the curve in future technology areas such as AI, 5G, facial recognition, e-commerce, mobile payment, supercomputers, super apps.

China's spending on research and development (R&D) reached 2.23% of its GDP in 2019, according to official data released by the Chinese Ministry of Science and Technology. R&D investment in the high-tech manufacturing sector represented 2.41% of the sector's total turnover.

China is no longer just a copycat country, it is making a number of scientific breakthroughs worthy of the leading economies (space exploration, satellite, space flight to the dark side of the moon, magnetic levitation train, geolocation). The French administration is closely following China's scientific progress via a monitoring system accessible to all (see March 2020).

From an information literacy perspective, the Chinese government is striving to be a leader in the development of international norms and standards for cyberspace (China's Military Strategy in the New Era). The numerous debates on China's influence within the World Health Organisation during the Covid-19 crisis have highlighted its strategic positioning in international organisations, whether in the World Health Organisation (WHO), the United Nations Industrial Development Organisation (UNIDO), or the International Telecommunication Union (ITU), which defines standards, frequency allocations, broadband Internet, Internet access, etc.

Military power

It should also be remembered that China has become a major military power, both in the physical realm and in cyberspace. For example, the country now has 400 warships, including two aircraft carriers, compared to 288 ships and 11 aircraft carriers for the United States. (US 2020 China Military Power Report). Furthermore, China recognised the importance of information in the military domain early on and attaches importance to the development of its cyber-offensive capabilities, especially for espionage purposes. The use of cyberspace for strategic ambition and as a space to assert Chinese power is growing. It reaffirms its vision of Chinese sovereignty in cyberspace, which was developed in 2010.

1.2. A changing international context

In the autumn of 2020, the international context changed somewhat. The Covid-19 crisis in March 2020 probably had a strong impact on China's domestic economy. Externally, strong tensions have developed around Chinese players and Chinese authorities' actions. They have overturned previous trends in international relations, and their consequences have yet to be defined. These include: the evolution of the "one country, two systems" concept with the establishment, after months of conflict, of the Hong Kong National Security Law; suspected minority control and population surveillance actions; the militarisation of the South China Sea; the armed conflict on the Indian border; and the increasing number of successful cyber-attacks, which are seen as worrying signs of aggression. In light of these events, many countries are realising the rise of China and are gradually reacting, each with a different approach.

In this context, Europeans and Chinese must be able to define and give meaning to the rules of tomorrow's economy, through dialogue and partnerships. While the political systems are different, with disagreements and differences in values, regular EU-China interactions show the need and the common will to move forward for the benefit of people and business. Europe thus wishes to consolidate its economic relations while trying to get certain political messages across (EU-China Summit in September, White Paper on market protection for foreign companies, Investment Agreement).

> *"China is at the same time a partner, a competitor and a systematic rival"*
> *Jean-Yves Le Drian, head of French diplomacy.*

2. From patent factory to technology leadership 2010-2049

For Jean-Dominique Seval, founder of Soon Consulting, President of French Tech Beijing, based in Beijing, and a speaker in our working group, China's spectacular growth over the last 40 years has been driven in particular by the considerable investments made in physical infrastructure (high-speed trains, metro, motorways, airports, nuclear power stations, photovoltaic parks, etc.). This momentum is now being extended to the digital age. Investments in fibre and 5G networks, data centres, global databases and AI-powered applications are all part of this huge effort to provide the Chinese Empire with the world's largest and most modern infrastructure on such scale. The idea now is to integrate the two worlds, physical and digital, to get the best out of them in terms of execution speed, productivity, and business opportunities.

The "China First" digital strategy has been very successful and has transformed China into a major technological power in a few years. Its policy is to condition access to its internal market while promoting its national champions. It initially relied on the imitation of Western IT technologies and services as previously done for industry. But the image of the Copycat, that of a copy factory, is gradually beginning to disappear. China still looks outside for inspiration, but then appropriates the ideas to adapt them and offer them to its population, eager for innovation.

FOCUS: Made in China 2025

The "Made in China 2025" plan aims to re-internationalise some key techniques and technologies in China, with the idea of accelerating China's supremacy and mastering the entire value chain. China has identified certain activities that must comply with the injunction: "*Made in China, by China, for China*". The plan is therefore to have Chinese companies not only produce in China but also manufacture in China. It could therefore be renamed "Made **by** China 2025". This plan represents about 2000 billion dollars of investments for technological self-sufficiency in ten key areas: electric cars, industrial robots, renewable energies, medical equipment, jumbo jets, etc. On the technological level, the country has established its ambition to become a world leader in the chosen strategic sectors: 5G, Electric battery, Semiconductors, Artificial Intelligence, Quantum computing, Industrial Internet of Things.

This plan was reinforced by the need for recovery after the Covid-19 crisis. Many Chinese companies will emerge in areas currently dominated by other companies. The "Made by China 2025" plan will lead to tougher domestic competition.

Today, Baidu controls the Chinese search engine market, and expands in the autonomous car sector via its Apollo programme. Alibaba is a major player in retail, e-commerce, Smart City and online advertising. Tencent is a leader in gaming, messaging and social media, and is diversifying into education and medical. Each is developing its own cloud and streaming platform. These three players

form the "BAT", sometimes complemented by Xiaomi's X, a manufacturer of smartphones and connected devices.

China has developed a large number of digital companies, some of which have already become leaders in their markets, starting with equipment (Lenovo, BOE, LG, Huawei, Alibaba, Xiaomi, Baidu, Tencent). BOE Technology, for example, is a hybrid company, world leader in displays - of all displays - ahead of Samsung and LG, with highly automated factories. These Chinese companies invest also heavily in R&D, up to 14% for Huawei and Baidu in 2018. Investment in R&D is very high in both large groups and start-ups.

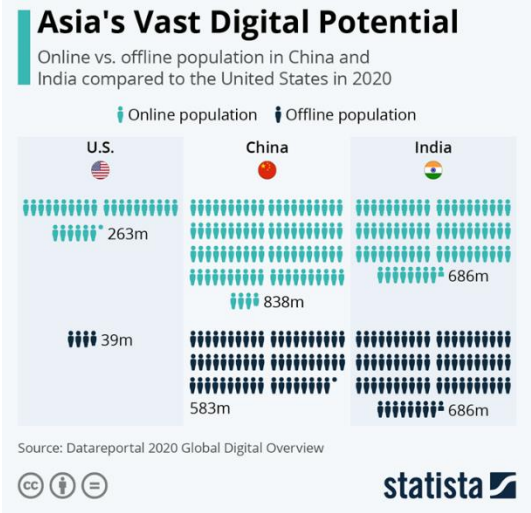

Figure 1: Growth potential of the Chinese digital market in 2020 - Source: Global Digital Overview & Statista

In terms of internet penetration, China was only at 60% in 2019, which is low compared to 90% in Europe. Yet it is already a very significant and growing domestic market: 854 million people have access to the Internet and 92% of them surf the Internet via mobile network. The Chinese domestic digital market therefore still has a very large growth potential.

The BAT companies have played a key role in Chinese innovation, with significant venture capital investments dwarfing even the US GAFA venture capital (ITIF). China is fostering a lot of start-ups. By 2020, 40% of the world's total number of unicorns are Chinese.

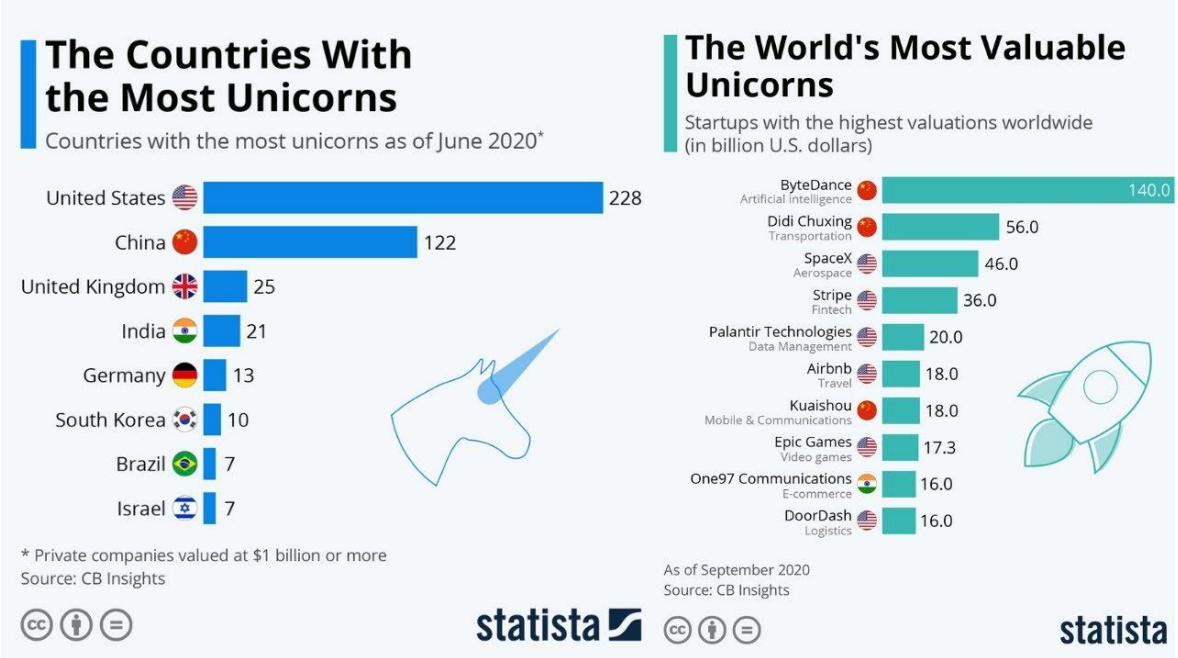

Figure 2: Ranking of the most valuable unicorns and countries - in 2020 - Source: CB Insight & Statista

The field of multi-application services is a good example of success. WeChat tops the list, followed by Alipay, each with over one million users. But the phenomenon also exists for social e-commerce with

players such as ByteDance, Taobao, Pinduoduo, whose ideas are even beginning to be copied by the American giants.

FOCUS: Belt and Road Initiative (BRI)

The Belt and Road Initiative or "BRI", also known as the "New Silk Roads", is a programme widely recognised as one of the most ambitious infrastructure projects in our history. It aims to get China to collaborate with almost the entire world through major infrastructure programmes. The country is now negotiating with all Asian, African and Latin American countries. Official statements suggest that the expansion of Chinese technology companies is an essential part of its wider plan to influence the world.

The BRI is well summed up by President Xi Jinping: "*China will actively promote international cooperation through the Belt and Road Initiative. In doing so, we hope to achieve political, infrastructural, commercial, financial and human connectivity and thus build a new platform for international cooperation to create new driving forces of shared development*".

Some analysts say that the BRI is above all a political initiative to promote Chinese influence and a way of exporting the Chinese model, particularly through digital projects and solutions.

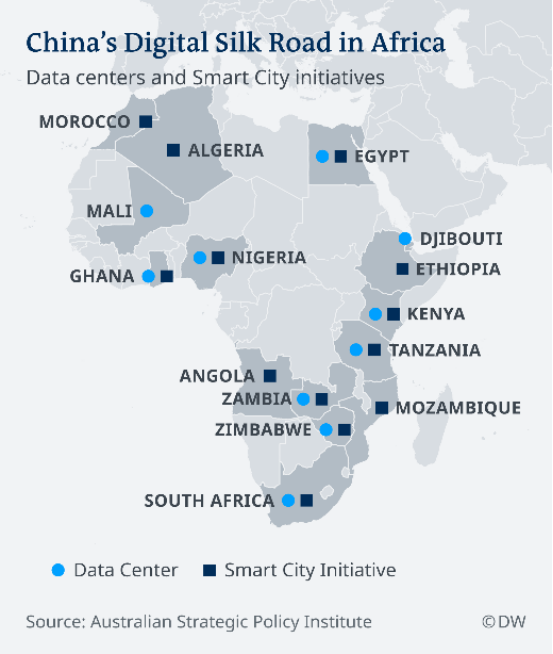

Figure 3: Digital projects of the Belt and Road Initiative in Africa - Source: Australian Strategic Policy Institute

© DW, 03.05.2019 - Courtesy of Deutsche Welle.

2.1. Technological ambitions for 2049 (AI, 5G, Semiconductors, Quantum computing)

Announced at the May 2020 legislative meeting, China's planned investment budget will amount to $1.4 trillion, deployed over 5 years, in strategic technology sectors defined by the Made in China 2025 plan. This amount reflects China's technological ambitions, reinforced by the dual challenge of economic recovery from the Covid-19 crisis and the technological race with the US.

The use of digital and technological tools to address the Covid-19 crisis, in China and elsewhere, has shown their importance for tomorrow's world. In addition, technological rivalry and the trade tug-of-war with the US are pushing China to support the development of its autonomy and to increase its international expansion. Among the most important technological sectors are high-tech, AI, 5G, semiconductors and quantum computing. China's strategy is to develop national champions in each of these disciplines who can compete on the international stage.

2.1.1. Artificial intelligence, the pillar of tomorrow's harmonious society

China's displayed objective is to become the world leader in artificial intelligence by 2030. The country has all of the ingredients necessary for the fast growth of AI: computing power, data and skills. These undeniable advantages allow the country to position itself as a leader in these fields which, for the moment, are the privilege of American players.

In 2017, a plan called "Next Generation AI Development Plan" entirely dedicated to AI, set out the outline of AI's evolution in China over the next 15 years. The priorities revolve around the medical sector and smart services for authorities (smart cities, national security, fluid social interactions). This plan's objectives consist in catching up with the US in 2020, overtaking it in 2025 and becoming the uncontested leader in 2030.

China has identified a few major strategic sectors in which AI is developing at high speed - autonomous vehicles, agriculture, smart cities, medicine, e-commerce, industry or security - with the aim of becoming a world leader in all of these areas.

According to official Chinese government figures, China's artificial intelligence industry was worth $7.5 billion in 2019. The BAT - Baidu, Alibaba and Tencent - are investing heavily in artificial intelligence. In particular, they develop and sell artificial intelligence technologies used for transport systems, connected objects and computer vision for facial recognition.

"If data is the new oil, then China is the new Saudi Arabia." Lee Kai-Fu

In Chinese, artificial intelligence is translated as "rengong zhineng" (人工智能), which literally means: "ren", human, + "gong", work, and "zhineng", knowledge and skills. For Gabriele De Seta, a media anthropologist, this etymology highlights the notion of human labour involved in the development of this kind of technology.

In the artificial intelligence sector, the leaders identified are Baidu for the autonomous car, Tencent for medical imaging, Alibaba for the Smart City, IFlytek for voice recognition, and Sensetime for image recognition and computer vision. These champions are among the companies investing the most in artificial intelligence according to MIT Technology Review.

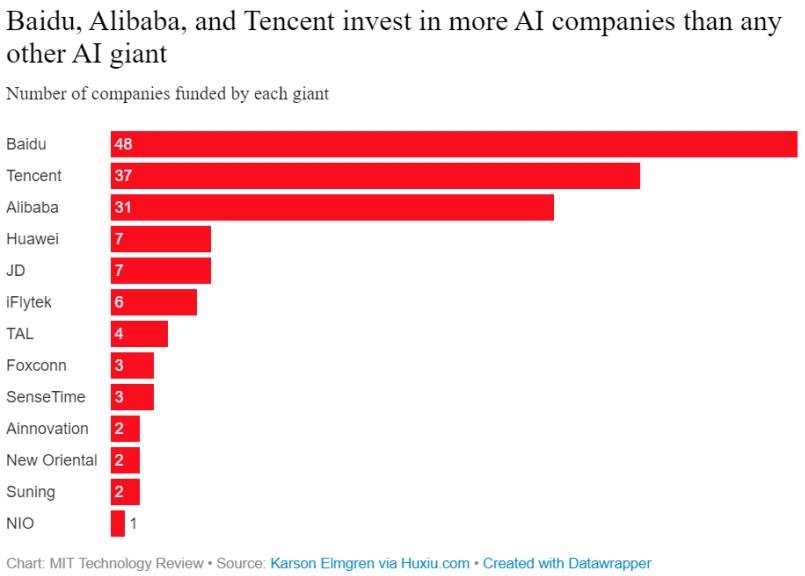

Figure 4: Chinese giants' investment in artificial intelligence in 2019 - Source: MIT Technology Review

In the long-term competition ahead, China's advantages lie primarily in its population of 1.4 billion - an unparalleled "pool" of data and talent - its domestic market being the largest in the world, and the vast amount of data available to train algorithms, in a culture that values security over privacy[1]. China trains four times as many fundamental science students as the US each year (1.3 million versus 300,000) and three times as many computer scientists (185,000 versus 65,000).

For Jean-Dominique Seval, as for other observers, the data is managed at the national level, and it is considered public. There is no notion of individual data, the "collective needs" take precedence over the individual ones. This is one of the reasons why AI is developing so quickly in China, which has a huge pool of data. However, according to him, there is a debate in China on the limits to be set on the use of private data, in all circles (public, academic and legal).

[1] Find more details in the article "*Is China Beating the U.S. to AI Supremacy?*" by Graham Allison and Eric Schmidt, presenting the views of some U.S. leaders and politicians on the current state of the US-China competition on AI.

2.1.2. 5G network to drive China's international expansion

> *"Whoever controls 5G controls the world."*
>
> *Stéphane Dubreuil*

Mastering the 5G network is one of China's major ambitions at both national and international levels. The deployment of 5G, as a new telecommunication technology, is presented as one of the great challenges of the 2020s. The deployment relies on three operators, China Mobile, China Unicom and China Telecom, and two equipment manufacturers Huawei and on a smaller scale ZTE. As China is the world's largest mobile market, with around 1.6 billion subscriptions, its switch to 5G is particularly awaited.

According to an Ericsson study, 220 million 5G subscriptions are expected by the end of 2020 worldwide, of which China alone with China alone accounting for 175 million (i.e. almost 80%). China's rapid growth is illustrated by its 11% 5G mobile subscription base. By 2026, the study projects nearly 3.5 billion 5G subscriptions, representing 60% of the global population.

Indeed, the 5G network is receiving more attention because it is more developed and essential than its predecessors. 5G is one of the fundamental technical foundations for the development of other technologies such as the Internet of Things.

China is also banking on the economic and social benefits of 5G. To this end, the Chinese government is currently investing more than 57% of its overall technology spending in its development and plans to invest more than $220 billion in 5G technology by 2025.

China relies on its huge domestic market to develop its technologies and then export them internationally, in particular by promoting its norms and standards to the International Telecommunication Union (ITU), which has been led since 2018 by a Chinese director. During the Covid-19 crisis, China did not stop the ongoing 5G projects. Indeed, the deployment of 5G antennas has continued, and the objective of 600,000 antennas in the country by the end of 2020 is maintained.

FOCUS: The case of Huawei, a player that crystallises current tensions

Founded in 1987 and headed by Ren Zhengfei, a businessman and former researcher for the Chinese army, Huawei has become one of the jewels of Chinese "private" industry in thirty years and probably the most striking Chinese success story on the international scene. In 2020, Huawei's revenue increased by 3.8% (compared to 19.1% in 2019) to €115.9 billion, of which 34.4% was generated internationally (48.4% in 2018). The company invested more than $14 billion in R&D in 2018, an increase of 13.2% compared to the previous year, and is the world's largest patent holder. Huawei is competing for tenders with the Europeans Ericsson and Nokia, but also with the Americans Cisco, Intel and Qualcomm. Beyond the financial gains, one of the challenges for these players is to succeed in prescribing favourable technical standards. Huawei has positioned itself worldwide with its efficient and cheaper equipment.

Huawei's lead in 5G equipment is a major concern for the US[2] due to its impact on the control of the infrastructure. However, it seems that this is less a technological battle than a geopolitical, ideological, economic and security battle as expressed in the recent reports "Huawei's Geostrategic Role" by the European Values Center for Security Policy and "The Economic Impact of Huawei in Europe" commissioned by Huawei and published by Oxford Economics. This latest study measures Huawei's total economic impact in terms of annual contributions to European GDP, jobs and taxes, estimating its total contribution to European GDP at €16.4 billion in 2019.

2.1.3. Semiconductors, a crucial sector for strategic autonomy

Since the 2000s, China has become an increasingly important part of the semiconductor industry for assembly, test and packaging.

According to the China Semiconductor Industry Association, China is one of the world's largest importers of electronic chips, with an estimated annual import value of over $300 billion for the third consecutive year in 2020. At a recent conference, it said that China was contributing to "most" of the global growth in the semiconductor industry. Indeed, in 2019, only 16% of the semiconductors used in China were produced in the country, and only half of these were manufactured by Chinese companies.

China lags behind in the design and manufacture of semiconductor integrated circuits, which require a high degree of technological sophistication and are provided mainly by an interdependent manufacturing network centred partly on the Pacific Rim. Nevertheless, China is putting considerable resources into developing its strategic autonomy in the processor sector to bring itself up to speed. In October 2019, it announced an investment of $29 billion so that it will no longer need American chips.

Only a few companies, including the US Intel Corp, South Korea's Samsung Electronics and Taiwan's TSMC, are currently capable of manufacturing the most sophisticated chips. Taiwan's central role in the semiconductor market and its geopolitics should be considered.

There is also a key type of manufacturing equipment that has never been delivered to any Chinese factory and therefore represents a developmental barrier for China. This is the Extreme Ultraviolet (EUV) scanner, which reduces the size of integrated circuit patterns for manufacturing. Today, there is only one commercial supplier of EUV scanners, the Dutch company ASML. According to Reuters, the Dutch government did not renew the export licence for ASML's EUV scanner at the end of 2019, which was to be sent to China's chip manufacturing specialist Semiconductor Manufacturing International Corp (SMIC), responding to insistent requests from the US.

[2] The United States has chosen to remove Huawei from its networks and has asked its allies to do the same. The US cites an emergency over the threat to national security. It is very concerned about the unproven but theoretically possible existence of backdoors in Chinese equipment and in particular in Huawei's equipment that could be exploited by Chinese services. Other observers believe that Western 5G players are not enough developed and that the US is trying to buy time by preventing Chinese players from conquering US markets. Some believe that espionage has a lot to do with these decisions and Huawei's technological capabilities. (Sources: *Huawei admits copying code from Cisco in router software*, The Wall Street Journal, 2003).

TSMC, caught up in tensions between China and the US, also said in July 2020 that it had stopped taking new orders from Huawei in response to US restrictions on supply to the Chinese company. TSMC is also planning to build a $12 billion factory in Arizona, giving an apparent victory to the Trump administration's efforts in 2020.[3]

2.1.4. Communication and quantum computing, tomorrow's leadership

China is also investing a lot in quantum computing. The country made headlines around the world in 2016 when the Chinese Academy of Sciences (CAS) announced the launch of the world's first quantum communication satellite, "Micius". In 2017, China announced that Chinese scientists had built its first quantum computer and, in 2018, that their quantum computer could already handle 18 qubits. In 2018, Chinese scientists filed 492 patents on quantum technology, slightly more than twice as many as their American counterparts. In February 2020, a team of Chinese researchers reported that they had succeeded in establishing, via the Micius satellite, a secure link by distributing quantum keys between two ground stations separated by more than 1,000 kilometres: the communications were unbreakably encrypted using the principles of quantum cryptography. China is therefore making rapid progress in research on ultra-secure communications using quantum technology. The challenge is to acquire leadership in cybersecurity through the technological advance promised by quantum technology and the creation of "unbreakable" encryption keys. At the end of 2020, Chinese researchers challenged the supremacy of IBM, Google and other major US players by announcing that they had achieved quantum supremacy (the point at which a quantum machine is shown to be superior to a classical computer for a particular task) with a photonic quantum computer. Finally, at the beginning of 2021, the start-up SpinQ proposed a "desktop" quantum computer for education and research: the aim being to prepare the younger generations of students and researchers for the future of quantum technologies by making them accessible ($5 k for 2 Qubits).

[3] For further information, see the publications "China's Pursuit of Semiconductor Independence", "Moore's Law Under Attack: The Impact of China's Policies on Global Semiconductor Innovation" but also the article "Semi-conducteurs : l'autre bataille de la souveraineté européenne".

2.2. Development of new key sectors ahead of the rest of the world

2.2.1. E-commerce as the spearhead of retail

China's digital economy is massive, with an estimated $1.5 trillion in online retail transactions in 2019, i.e. 25% of the country's total retail transactions - more than twice the volume and proportion of e-commerce in the US. This is all the more impressive given that while Internet penetration in China remains low, at only 60%, 99% of these users have mobile Internet (70% of whom use mobile payments). China is thus becoming the largest export market for global retailers.

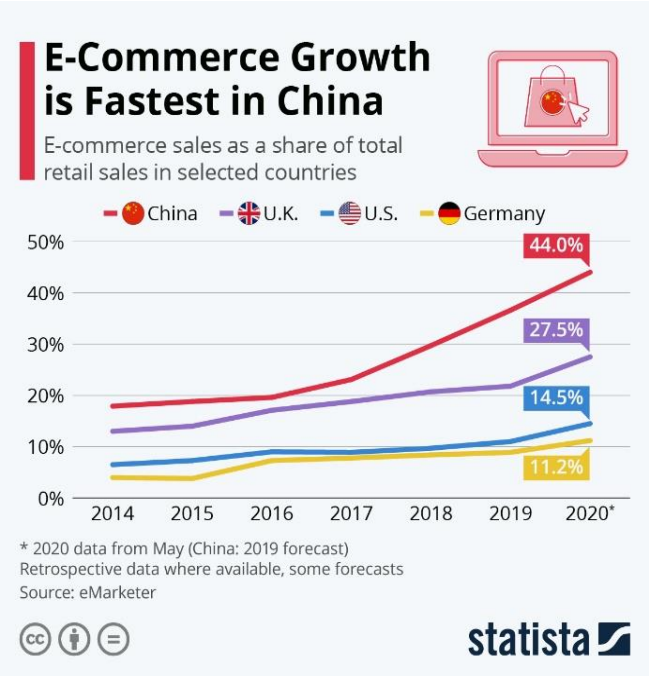

Figure 6: Share of e-commerce sales in 4 countries in 2020 - Source: eMarket & Statista

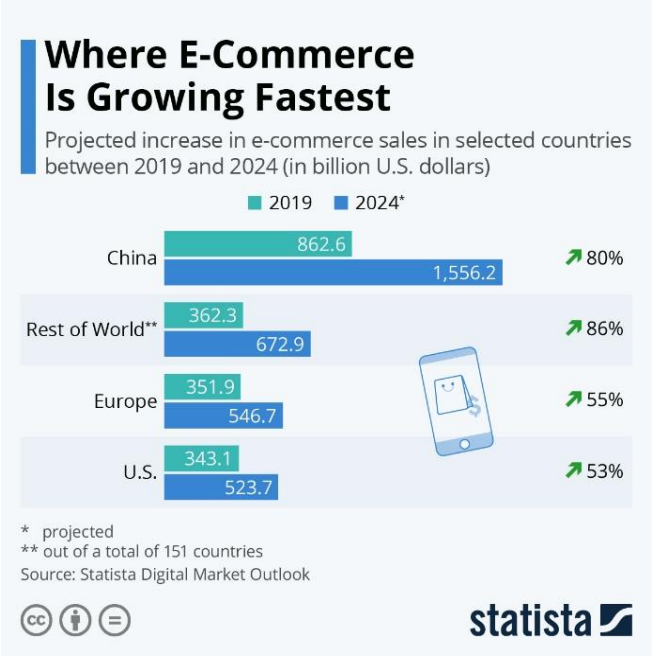

Figure 5: Projection of the Chinese e-commerce market in 2024 - Source: Statista

The Chinese e-commerce market is mainly held by Alibaba, which held 58.2% in 2018, followed by JD.com (16.3%). But Pinduoduo, a new player founded only five years ago, became the first to take market share from them, moving up to 3rd place with 5.2% market share. According to L'Opinion, "*Pinduoduo had 788.4 million users at the end of 2020, compared to 779 million for Alibaba (taking into account the number of people who have made purchases in the last twelve months)*". Its $9.1 billion in annual revenue is still small compared to Alibaba's, but it has almost doubled in one year. Combining shopping with social networks, Pinduoduo has turned shopping into a game, showing the dynamism of the Chinese ecosystem.

FOCUS: Alibaba Singles Day, the 11:11 event

In 2020, Alibaba broke last year's record for Singles Day (the 11:11 event) with more than $74 billion in business generated on its platforms, despite the pandemic context, almost doubling 2020. In fact, the size of this event is almost doubled every year. Alibaba said at the time that China's economy had returned to pre-pandemic levels, pointing to the 17% annual growth of e-commerce in China, according to Business Insider. This type of event is a way for Alibaba Cloud to test the infrastructure and innovations that it then offers to its customers.

Alibaba Singles' Day is also a major event for many brands, especially SMEs, which can achieve record sales with a reasonable investment on site. Maserati for example, which addresses the car luxury segment (premium, city), was able to sell 100 cars in 18 seconds in 2016. Such a physical sale would require having a branch in 100 Chinese cities with more than 1 million inhabitants, which is impossible for a medium-sized company, hence the interest in being able to make online sales. This trend has of course been further reinforced by the health crisis. For France in 2020, in an economic context impacted by the pandemic, 1,300 French brands participated and generated $1.76 billion in gross merchandise volume.

Figure 7: Top 10 e-commerce platforms in China in June 2018 - Source: eMarketer & Statista

The big trend towards "shoppertainment" is driving e-commerce platforms to invest in live streaming and one-click shopping solutions. Technology is at the heart of the sale. In addition, the tools developed allow for real-time translation of websites with personalised recommendations, amplifying the reach of these tools and simplifying their use for all merchants and shoppers around the world. Given the market numbers, the consumer behaviour, the growth potential and the fierce competition between brands, China has become the ideal playground for e-commerce innovations from around the world.

2.2.2. The advent of Chinese social platforms and super-apps

China has made the double bet of mobile and cashless, with "super-apps" that integrate many features in a single application: WeChat, Alipay, Taobao (Alibaba), Mogu, TikTok, etc.

One of China's leading super-apps, WeChat, accounts for an impressive 1.2 billion users/month and 30% of Chinese mobile internet usage time in 2020. The number of users is one of the main strengths of these ecosystems as well as their integration in all moments of life. Chinese users spend about 1.5 hours a day on the WeChat ecosystem. Chinese people log on to the Alibaba marketplace an average of 7 times a day. In addition, the integration of artificial intelligence makes all services more relevant and interesting for users, while retrieving a phenomenal amount of data on the evolution of their life habits. Indeed, super-apps accompany users throughout their day, recreating mini-ecosystems and thus bypassing the American application shops (Google Play or App Store).

The phenomenon is not only Chinese, since this ecosystem logic is now also adopted by Facebook, which has developed or bought super-apps such as Messenger, WhatsApp, and Instagram, which the company is gradually bringing together and enriching. Facebook has also created a dating application, a marketplace and is developing a shopping function. Super-apps are increasingly succeeding in bypassing the app stores as explained in the article on the advent of super-apps.

But Chinese millennials are much more connected than American consumers and they are very demanding. Their uses are socially taken into account, e.g. there are pedestrian lanes for smartphone users (marked areas without posts!). Chinese millennials also value ultra-personalisation and demand a high response time. It is estimated that the average time before Chinese Internet users give up when they have difficulty connecting to a site or application is 14 seconds.

Approximately 1 million Chinese people make transactions with Alipay in France. Alipay, the world's first FinTech, is a "lifestyle application", integrating three minimum functionalities: borrowing, payment and money transfer. It therefore offers the full range of banking and financial services. In addition, China has also started issuing its digital currency in April 2021. This desire to dematerialise the Yuan is intended to facilitate and control transactions.

China is one of the most dynamic markets, leading change in the FinTech sector on a global scale. In 2019, the global FinTech market was valued at $111 billion. It is expected to reach $158 billion by 2023. FinTech has contributed to financial inclusion and extended financial services to a large part of the Chinese population according to the Institut Montaigne which published in April 2021 the report: China's FinTech: the End of the Wild West.

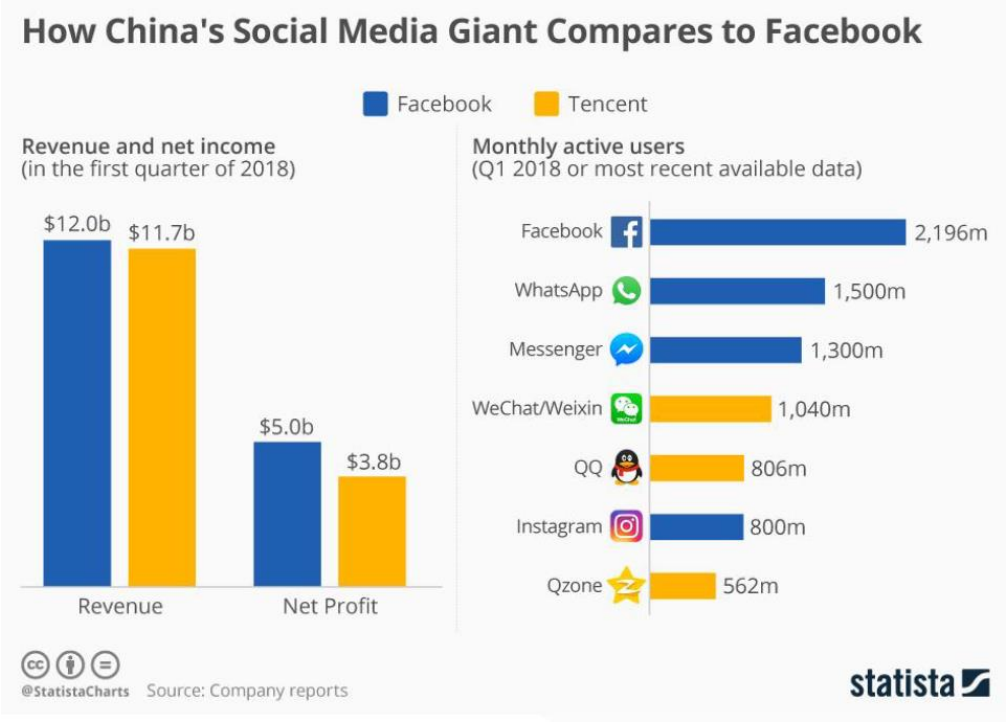

Figure 8: Comparison of Tencent and Facebook social networks - Source: Statista 2018

FOCUS: TikTok, the meteoric expansion

TikTok, the world's leading short video social network owned by the Chinese holding group ByteDance, is the biggest recent launch of a Chinese player on the international market. The application is available in more than 155 countries in 39 languages and has about 800 million active users per month. In 2020, TikTok reached 2 billion downloads worldwide and continues to gain momentum in international markets. Nevertheless, TikTok is not just another social network, it is the vanguard of Chinese companies, ready to go out and invest the international market. TikTok is a real artificial intelligence machine, both in terms of the power of recommendation and promotion of user/influencer content, and in the way its algorithms and infrastructure work, according to Jean-Dominique Seval and the Australian Lowy Institute. Beyond the attractive aspect of the application, there are important technological advances, thanks to which a post on TikTok is guaranteed to greatly increase its number of subscribers. TikTok influencers therefore have a significant impact on the e-commerce platforms sales. The social network is transforming itself into an e-shop and super-app that aims to compete with retail sites like Alibaba, JD.com, etc.

The social network, which made $500 million in 2020 in the US, has been singled out by the White House for national security concerns. Criticising the amount of data collected, the conditions under which it is stored and shared with the Chinese government, President Trump even signed an executive order to ban TikTok in the US in August 2020. Legal constraints, legal challenges, takeover proposals, and a change in presidency did not result in a ban, but TikTok found itself at the heart of the Sino-American technology battle.

2.2.3. Smart Cities, a domestic and international development opportunity

The grand strategy of mastering the smart city, which aims to make large cities more liveable, with the slogan "Better city, better life", is one of the central themes of China's strategy for its own megacities but also for export.

As described in Alice Ekman's report "La Smart City chinoise", China has relied for nearly a decade on the development of smart cities to address the structural problems of rural-urban migration.

These projects are part of a global planning of urban development in China based on technological means. It is a national priority and more than 500 projects completed or under construction were counted across the country in January 2019 including large and medium-sized cities (compared to 90 in Europe according to Deloitte). These projects concern the management of pollution, waste and transport, with the safety issue particularly highlighted by companies and the government and in the technological solutions developed. In the megacities with the most "Smart City" projects, the top 5 in 2018 were Shenzhen, Shanghai, Beijing, Hangzou and Guangzhou.

In September 2020, Zhejiang Province promulgated "Regulations of Zhejiang Province on Promoting Digital Economy" which sets out guidelines for the development of data sharing, digital infrastructure and the digitalisation of its industries. The law clarifies how municipal governments should handle data collected by the city's administrative agencies.

This national strategy is also being promoted internationally, with Chinese players bringing smart city systems and technologies to global market, as part of the BRI.

2.3. Acceleration of digital usages during and after the Covid-19 crisis

The technological management of the Covid-19 crisis is the culmination of the digital strategy and, more generally, of China's technological ambitions. All of the players, in particular the BATX, were mobilised to help fight Covid-19 from mid-January 2020. In addition to providing collaborative tools for companies and students (DingTalk by Alibaba and WeChat Work), China used emerging technologies such as artificial intelligence and 5G to manage the crisis in many sectors.

The SARS virus in 2003 had already been an accelerator for three main areas: mobile-first adoption, mobile payment and e-commerce. The Covid-19 crisis is also a new accelerator in these three areas, converting even the elderly to these uses. The field of "contactless" has also evolved considerably, based in particular on 5G with contactless deliveries by drones, delivery robots, remote payment, etc.

E-Commerce	TeleWorking	Entertainment	Health	E-Learning	Social Credit

The crisis has also propelled the needs of the still very archaic health sector in China. The "5G+" remote consultation system has been implemented in hospitals across the country, allowing medical experts located far from the hospital to work with medical staff via remote video connections. As with the online payment sector, the government favours the emergence of technology players over traditional companies. The giant Tencent has already invested in 200 hospitals and clinics and, through the WeDoctor platform, has created a special Covid-19 section for teleconsultation and appointment booking starting at the end of January 2020.

The same pattern applies to digital education (e-learning), which reached more than 278 million students at the time of the lockdown in February 2020. The State Council has invested $6 billion in AI and education technology in 2019. One player, TAL Education Group, has particularly stood out, growing from $872 million in 2019 to $2.5 billion in revenue in Q4 2020 as a result of the transformation of online education during the crisis.

Similarly for Blockchain, Lianfei Technology has launched a blockchain-based epidemic monitoring platform, which can track the progress of Covid-19 in all provinces of China in real time, and record relevant epidemic data for tracking and use without being altered.

The Chinese have a very resilient way of thinking, appreciating the present while looking to the future rather than the past. China is a test & learn country, which adopts very concrete and effective approaches. In Chinese culture, the collective needs take precedence over the individual needs, and this is reflected in public policy, in the reaction of the Chinese to the pandemic, and also in the way they manage data.

3. Cloud market dominated by local providers

Cloud computing has become a key component of the global digital economy. This is also the case for China. Several Chinese and international players are positioning themselves to provide competitive offers in China, taking into account the regulations in force.

According to analyst firm Canalys, the market for cloud infrastructure services in China will be worth $19 billion in 2020, compared to $11.5 billion in 2019. Alibaba Cloud dominates this market with a 40.3% share, followed by Huawei Cloud, Tencent Cloud, and Baidu AI Cloud in the last quarter of 2020. Baidu has the largest market share in public cloud services for AI in China, but remains positioned in this niche market. On the American side, AWS has 6% of the market, followed by Microsoft with 2%.

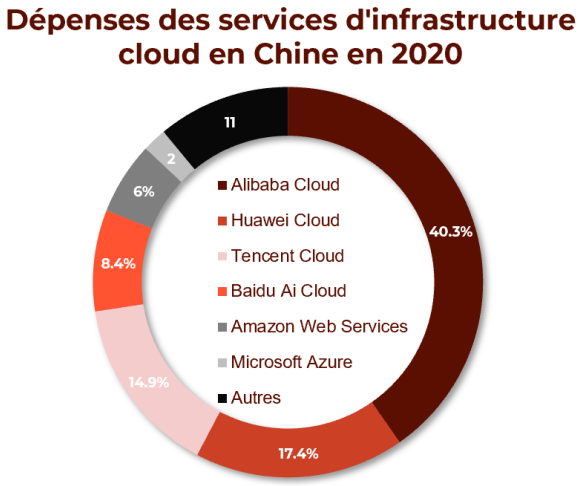

Figure 9: Market share of cloud providers in China in 2020 - Source: based on Canalys figures

According to Arete Research Services, in its 2019 study "The State of China Cloud", cloud adoption by Chinese private and public companies is a nascent market. This market is expected to grow at a moderate pace, as these companies would not have easy access to large databases - unlike companies in more developed countries. Alibaba Cloud and Tencent Cloud are reportedly mostly adopted by small businesses, which would mean that there is still huge potential for the development of this market in China.

Chinese and US cloud providers all have data centres in Hong Kong, Singapore and Tokyo, with several also located in Sydney or Seoul to serve the Asia-Pacific region, according to the Information Technology & Innovation Foundation.

In terms of global geopolitics, national champions dominate the markets in their own countries: American hyperscalers "rule" in the US and the Chinese in China. According to Canalys, this situation is expected to continue in the coming years. The real competition between these major suppliers is in other regions of the world such as Europe, Asia-Pacific and India in particular, the Middle East and Africa.

3.1. International expansion of Chinese players (Alibaba, Tencent)

3.1.1. Alibaba Cloud, the most international of Chinese players

Founded in Hangzhou in 1999, and now valued at $600 billion on the stock market, Alibaba is above all an e-commerce giant, generating higher revenues than Amazon. Originally an e-commerce marketplace, Alibaba quickly developed Alibaba Cloud to support its technology development and now offers near global coverage, robust infrastructure, alignment with US offerings, and attractive innovative services.

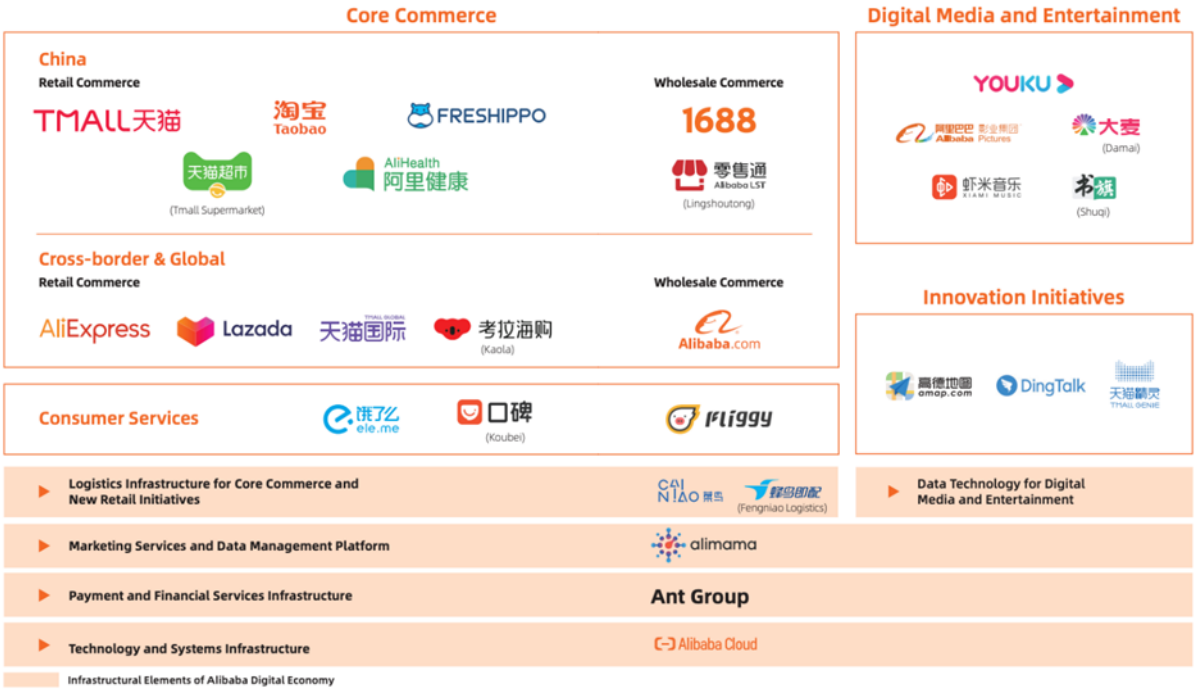

Figure 10: Alibaba Global Ecosystem - Source: Alibaba 2021

In 2020, Alibaba Cloud was the number one cloud provider in China and Asia, and holds the 3rd position in the global cloud IaaS market for the 3rd consecutive year with 9.5% of the market. According to Gartner, its revenues reached $5.2 billion in 2019, or 4.9% of the $107 billion global cloud market.

In 2018, Alibaba Cloud reported having over 1.2 million paying customers and about 47% market share in China, but estimated that about 35% of its cloud revenue came from the private cloud.

For its international expansion in 2015, Alibaba Cloud first expanded in the Asia-Pacific region. 7 of its 12 overseas data centres are located in this region. Since then, Alibaba Cloud has been growing rapidly around the world. In Europe, Alibaba Cloud teams are divided between Germany, England and France.

Europe is a very important development area for Alibaba Cloud, which has joined the European association, Gaia-X. It is the most international of the Chinese cloud providers.

For the time being, it is also the only provider that can connect to all platforms including China, with a single connection at scale. This international dimension and a certain interoperability make it possible to support the multi-cloud strategy of international customers.

Alibaba Cloud has seen its market share in education grow to 24.3% in 2020 from 18.8% in 2019, notably thanks to the support provided to student e-learning during the pandemic.

Alibaba Cloud has defined three levels of requirements to satisfy its customers:

1. Obtaining ISO certifications for its data centres (particularly those based in Europe);
2. Obtaining global and regional certifications, sometimes by industry: Alibaba Cloud has 80 security and compliance accreditations
3. Established in 23 regions, 69 availability zones, 2800+ CDN nodes, in order to offer more proximity.

Figure 11: Alibaba Cloud Global Infrastructure view Europe, Asia - Source: Alibaba May 2020

With a growing team in France, Alibaba Cloud uses integrator partners to help customers deploy their services. The France and European teams also help French companies to get in touch with the teams in China and to support the position of certain large groups (leverage effect). Indeed, a large European company may be perceived as a small local player in China due to the lack of knowledge of the company. This exchanges also allow for the deployment in Europe of services previously tested by customers in China.

3.1.2. Tencent Cloud, the best performer in terms of latency

Founded in Shenzhen in 1998, a year before Alibaba, and valued at $630 billion on the stock market, Tencent has developed an empire by diversifying into multiple sectors through technological innovation. Best known for social networking and the production of entertainment content (video games and films), the company relies on Tencent Cloud and its high latency computing capabilities to develop powerful and attractive services.

Tencent is a company initially focused exclusively on the end consumer, B2C. It is developing the "super-app" WeChat and its 1 billion monthly users as well as numerous video games used by 200 million mobile players. Tencent is the world's leading video game company. With a turnover of $20 billion, gaming still represents its main source of income today. Tencent evolved from video games to develop its current cloud services. Indeed, to be very competitive in the video game industry, it is necessary to offer very good connectivity, a very large number of secure microtransactions (20 milliseconds), high elasticity, etc. All these performances are also very useful when transposed to other (vertical) business sectors.

From a pure B2C positioning of content production, media and entertainment, Tencent has gradually diversified towards B2B, with the development of a 360° ecosystem to invest in all fields and all business sectors.

Tencent Cloud has become the backbone of this ecosystem, providing the link between the real and the digital. Tencent's brain is made up of all its AI research centres.

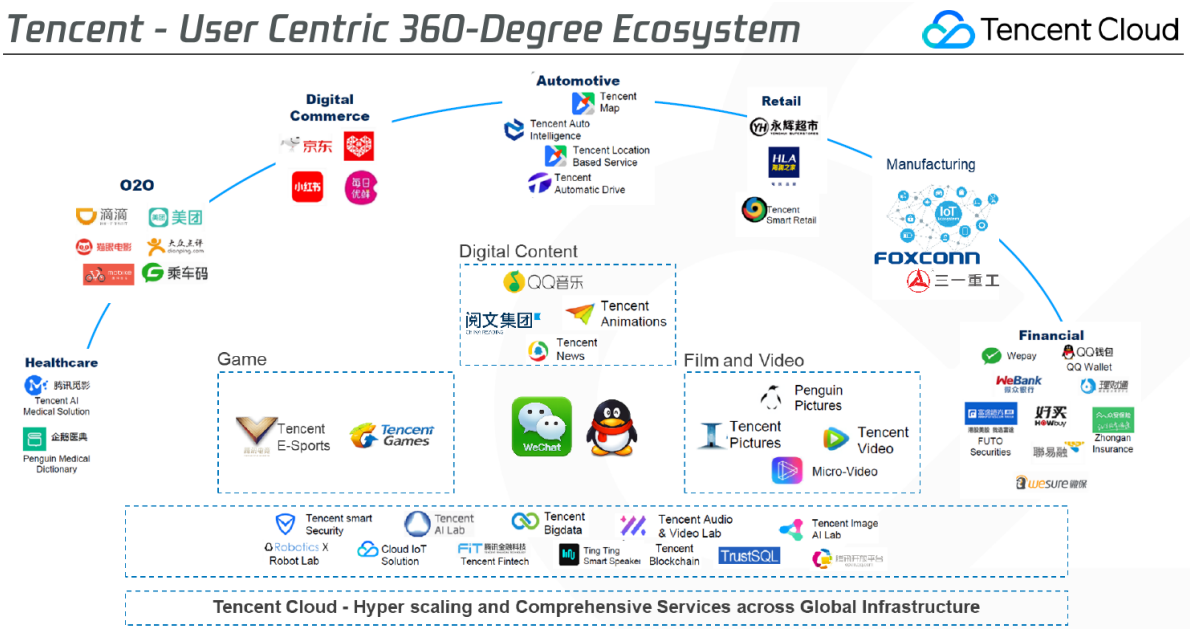

Figure 12: Tencent Cloud Global Ecosystem in May 2020

Figure 13: Tencent Cloud Global Infrastructure - Source: Tencent May 2020

The Tencent platform represents 2 billion users, the largest user database in the world. For each user, thousands of different characteristics are offered for precise and personalised targeting for marketing and commerce. This data is also used to simulate behaviour and to help select shop locations. In the field of smart manufacturing and industry 4.0, Tencent Cloud offers an IoT platform for the management of connected objects and machine equipment for predictive maintenance.

Furthermore, according to Greenpeace's ranking of Chinese technology players' sustainability efforts, Tencent ranks 1st in 2020 among Chinese cloud providers, notably for its positive track record on transparency, its increased purchase of renewable energy and its recent announcement of its intention to work on carbon neutrality.

3.2. Partnership for US players (Google, Microsoft)

International providers, such as Google, Microsoft or AWS, cannot obtain licences to operate cloud computing services in China. Therefore, they have to get a Chinese partner to develop their cloud solutions in China and localise their data in China as well. This has led all cloud vendors to offer their customers that they partner with a Chinese player. There is no magic formula for addressing technological and regulatory barriers. Each player has consequently adopted different strategies, as described below.

3.2.1. Google Cloud in China

Google Cloud's approach in China is based on its data centres in Asia Pacific, several Chinese telecom operators (China Telecom, China Unicom and China Mobile) and the deployment of its Anthos hybrid cloud solution.

Google offers its customers two different approaches depending on whether they want to host the GCP (Google Cloud Platform) cloud solutions in China or access GCP or Google Workspace outside of China.

- In the first case, Google offers to host its Anthos hybrid cloud software solution on a Chinese cloud chosen by the customers.
- In the second case, Google directs its customers to China Telecom, China Unicom, and China Mobile to provide connectivity and access to GCP or Google Workspace.

Google has 10 regions in Asia Pacific, 30 zones and around 30 connection points as well as data centres in Hong Kong, Taiwan, Singapore and South Korea.

In addition, Google recommends monitoring data volume and network consumption to control associated costs. It is observed that Google Workplace like other collaborative applications is widely used by employees in China. In an ultra-mobile world like China's, you have to be careful when choosing a phone and check the availability of the official app shop whether it is iOS or Android. If this is not possible, the administrator must deploy them on their own infrastructure.

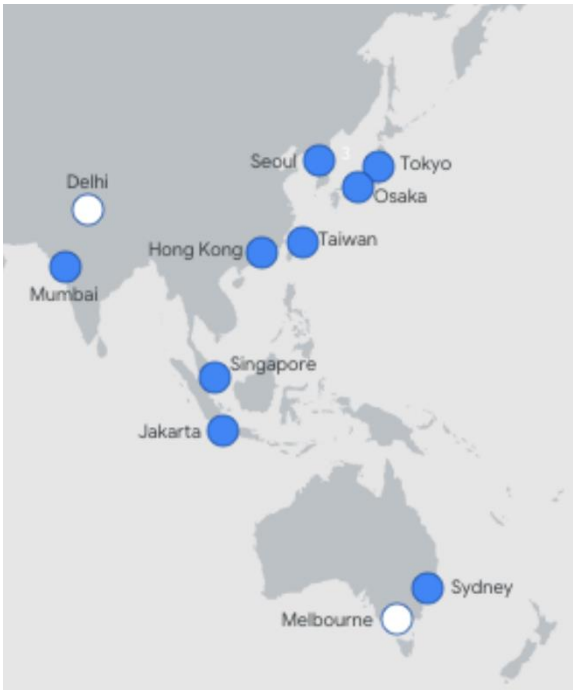

Figure 14: Google Cloud in Asia Pacific
- Source: Google April 2021

3.2.2. Microsoft Azure in China

Bill Gates opened the first Microsoft offices in China in 1992. From the beginning, the presence in China was seen as a long-term investment. The Chinese subsidiary is now Microsoft's largest subsidiary with more than 6,000 employees and the most important R&D centre, especially in AI, after the United States. Note that Windows 10 is managed in China independently of the rest of Microsoft's products such as Microsoft 365 and Microsoft Azure, which are discussed below. Indeed, in 2015, Microsoft and CETC (China Electronics Technology Corporation) formed a joint venture, named C&M Information Technology (CMIT), with the aim of enabling the sale and use of Windows 10 in all government entities across China. CMIT customises Windows 10 configurations for compatibility with high-security government networks. It also sells, grants licence and supports the "Government Windows 10" (GSKU) SKU[4] for the Chinese government and state-owned enterprises in critical infrastructure and other industries.

Microsoft has developed a network of 17,000 distribution partners to serve its customers with the main objective of allowing its Western customers to access M365 in their Chinese entities despite restrictive regulations. Microsoft Office 365 has been available for 5 years in China and Dynamics 365 for 1 year now. During the Covid-19 crisis, Microsoft strongly supported education in China with an explosion in the use of Microsoft Teams, which will gradually replace Skype, still widely deployed there.

In China, Microsoft relies on a partner, Shanghai Blue Cloud Technologies Co, Ltd (21Vianet BlueCloud), a "neutral and agnostic" Internet operator licensed by Microsoft.

21Vianet Blue Cloud is a wholly-owned subsidiary of Beijing 21Vianet Broadband Data Center Co., Ltd. It is the sole cloud services operator and strategic partner of Microsoft that operates Microsoft Azure, Office 365, Dynamics 365 and Power Platform in China. 21Vianet Blue Cloud ensures compliance and transparency and manages government requests and investigations.

Founded by former Microsoft employees, BlueCloud handles all transactions, from ordering to providing 1-2 support. Microsoft is in charge of pricing, product design, and conditions with multinationals and local companies (to be close to global policies). Microsoft's intention is to provide its partners with the same operational capabilities in China as in the rest of the world. However, there are still some missing features that are waiting to be compliant with national regulations before they are available, representing a major concern for Microsoft.

Two data centres are currently serving Microsoft customers, one in Beijing and one in Shanghai, but they are not connected to the Microsoft global network. Customer data remains in China, as required by applicable law. Microsoft has also announced the opening of its first data hosting centre in Taiwan, which will open in 2024.

[4] Encryption protocol

Figure 15: Microsoft in Asia Pacific - Source: Microsoft 2020

Microsoft has produced a guide for customers and partners preparing to move data and workflows from Azure Global to Azure China. This guide provides an understanding of China's local regulations. However, Microsoft points out that this is still a guide and that it is recommended that independent legal advice is sought.

4. Well-developed Chinese infrastructure but highly regulated

One of the most important issues for IT departments of international companies with operations in China is how to implement a data network in China.

In addition to the necessary choice between cloud players, the infrastructure must also be consistent with the company's strategy and allow for the best performance and connectivity for the proper functioning of its establishments.

For Setec IS, which assists French companies in carrying out these infrastructure projects, several issues must be taken into account when building network architectures in China. First of all, it is necessary to take into account the Chinese regulations which require the use of a Chinese operator. Secondly, technological means such as the Great Firewall require specific architecture choices, which are adapted to use cases, whether they are local or centralised.

Finally, the geopolitical dimension must be taken into account and the tendency of certain countries to regulate their Internet access leads us to believe that MPLS remains the solution for guaranteeing performance between the countries of the same company.

4.1. Telecommunication regulations

All Chinese cross-border telecommunications are regulated. Regulation is a central issue and explains the difficulties encountered in China in setting up corporate networks.

The purpose of transit through technical devices such as the Great Firewall is to control the information on the international Internet that is intended for the general public and that can be accessed by the Chinese population.

The main issue with the Great Firewall, apart from data confidentiality, is first and foremost the question of performance. With China's heavy traffic, the Great Firewall is very congested with high latency and packet loss. These performance problems vary according to the day/time of day. It is difficult to guarantee performance to users in China. For all cloud service providers not hosted in China, the Great Firewall can cause latency, especially with real-time file transfers and communications.

There are other problems: some sites are blocked, sometimes strictly, to discourage use. Information control mechanisms include, for example, IP range banning or blocking the site and forwarding to another IP address, URL filtering, TCP reset attacks, and even the use of more advanced tools such as official certificates to intercept traffic ("man in the middle" attack) used by several countries around the world.

FOCUS: "New IP" Internet promoted by China

In September 2019, a delegation of Chinese engineers presented **a new Internet protocol, called "New IP", to the International Telecommunication Union (ITU).** This new Internet proposes to replace the technological architecture of the World Wide Web, presented by China as a way to build a new, more efficient infrastructure to meet the technical demands of an ever-changing digital landscape. According to the Huawei representative, the technology will be *"open to scientists and engineers around the world*". The Western press has criticised this network for "*returning power to states rather than leaving it to individuals*" according to Courrier international. In this case, it would indeed represent a challenge to the historic decentralised and multi-player vision of the Internet. This modification of the TCP/IP protocol includes several ambiguous functionalities that are worrying "*in particular by the presence of a "kill switch", a sort of emergency stop button that allows a central player to isolate an IP address from the rest of the network, which would then no longer be able to send or receive data"*, and which, according to Phonandroid seems to facilitate the control of information.

4.2. Transit through Chinese operators

From a market point of view, three so-called Tiers1 operators have significant infrastructures: China Telecom, China Unicom, China Mobile. So-called Tiers2 operators such as DYXnet, CBCCOM, SST, etc., representing between 10 and 20 operators, are allowed to provide cross-border connectivity, based on the infrastructure of Tiers1 operators. In 2018, they formed a coalition called the China Cross-Border Data Telecommunications Industry Alliance (CDTIA), to ensure compliance with Chinese regulations for cross-border communications.

International operators and private networks use Tiers1 or Tiers2 operators to provide communications to China (e.g.: OBS with DYXnet). It is possible that international operators can "go to China" but they use underlying Chinese infrastructure and local loops. Telstra, the Australian fixed and mobile telecommunications operator, has set up a joint venture with a cross-border operator, and is able to offer an almost "seamless" service.

The "Private Wan" part of companies is also regulated but there are no intrusive devices at the border that would impact on access and performance of traffic in the company.

Relying exclusively on an Internet stream requires compliance with Internet regulations, which tend to be increasingly regulated in many countries.

Figure 16: The three Chinese Tiers1 operators

FOCUS: Cybersecurity and Privacy Law

The Chinese Cybersecurity Law was initially passed by the National People's Congress in late 2016. According to the White Paper on the Internet in China, it is introducing regulations on data management and Internet use in China by imposing new requirements on network and system security. Indeed, Article 9 of this law states that all critical players - Chinese or foreign companies - are obliged to cooperate with Chinese operators, who themselves must meet a number of requirements regarding the government. The analysis of the newspaper The Diplomat, describes this law as one of the key steps in China's jurisdictional control of Internet content.

Prior to 2010, China had focused on controlling access to the Internet within its borders through the Great Firewall, set up as part of the Golden Shield project in 1998 by the Ministry of Public Security, which provided a national filter to prevent politically-sensitive content from entering the national network. In 2010, it put forward the concept of China's sovereignty over the Internet on Chinese territory. Then in 2015, it introduced a series of laws and bills on Internet control and state access to private data, described in the following article: The Evolution of China's Great Firewall: 21 Years of Censorship.

Chinese law includes data localisation obligations that allow China to repatriate critical data from priority infrastructures to its territory. These texts require companies to host their data in China. The companies concerned are those designated as having critical infrastructure and can belong to any sector, transport, energy, banking, communication, with the voluntary use of a broad definition to adapt to the Chinese authorities' will - as well as for the types of data concerned.

According to some experts, in case of the need to "take out the data", it is still possible for the company to obtain waivers, but the company must submit the application to the local CAC (Cyberspace Administration China) for approval of Personally Identifiable Information (PII).

China is watching the evolution of European regulations closely. The new lines of the Chinese law on data protection come close to the European standards of personal data protection (GDPR). It seems to some specialists that a company that is compliant with the GDPR will also be compliant with the Chinese laws that are becoming more and more precise. In October 2020, China published a long-awaited draft law on personal information protection (PIPL). Stanford describes this Privacy Law as "*an important step in establishing a comprehensive privacy and data governance regime. If enacted, this law will not only reshape privacy legislation in China, but will also be a major force in shaping the global privacy landscape and set a very important regulatory framework for international businesses.*" The US Department of Homeland Security has issued a series of recommendations to US companies to address data privacy risks and improve their privacy and security controls.

5. Companies in the midst of great power tensions

5.1. Developing the domestic market and domestic players to boost Chinese growth

5.1.1. Impact of the Covid-19 crisis on Chinese growth

The Covid-19 crisis and the Sino-US trade war are impacting the Chinese economy due to global interdependence. However, it is doing better than the other major powers.

The government has put in place a recovery plan for 2020. The recovery finally allowed China to experience 2.3% growth for the year. In terms of employment, the shock of the crisis has mainly impacted on the least qualified jobs, but it has also affected the middle class, which was growing strongly before the crisis. In November 2020, researchers estimated that pandemic control policies by foreign governments have reduced new job creation in China by 11%.

Reported by Courrier International, the Chinese government has set an economic growth target of 6% for 2021. China anticipates a transition to a developed economy by 2035, Prime Minister Li Keqiang said at the opening of the annual parliamentary session in Beijing.

We are now witnessing the strengthening of a Chinese middle class on which the authorities are relying to boost and develop the domestic economy.

On the other hand, some municipalities and provinces seem to be in very worrying situations. They need public money to maintain their development. In the short term, the public demand shock will lead to a reduction in large contracts. This could lead to an increased risk of corruption to compensate for reduced income and state support.

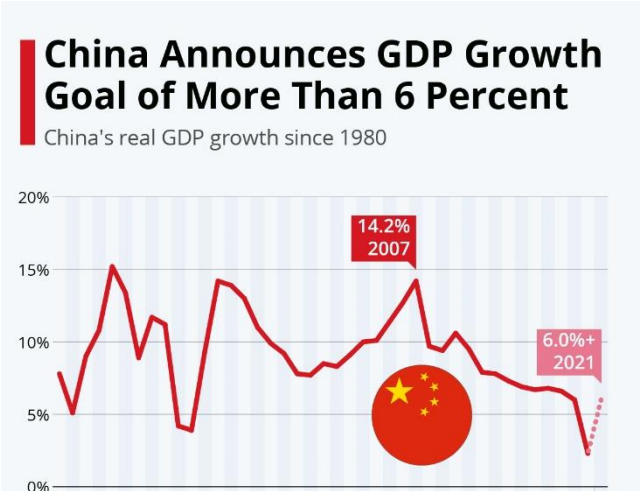

Figure 17: Announcement in February 2020 of a growth of more than 6% for 2021 - Source: Chinese Bureau of Statistics

5.1.2. Economic recovery through the development of its strategic autonomy

Chinese companies most involved in international trade outperformed others at the beginning of the pandemic, but much less so during the recovery, when Covid-19 spread around the world. In the health sector, the bulk of the production of masks and a large part of the ingredients needed to manufacture medicines is carried out in China, but this is also partly the case for the electronics industry, the textile sector or oil refining. Some Chinese companies have themselves relocated their production to South

East Asia. China's growing economic and political influence allows it to control its dependence on these countries.

In September 2020, China issued a directive to boost investment in strategic emerging sectors such as 5G, vaccines and electronic chip manufacturing.

The Chinese authorities will thus promote the development of technologies through very substantial investments in R&D and technology transfers, as well as the development of substitutes linked to natural resources, in order to circumvent certain dependencies on rare resource alternatives. For example, the state has invested heavily in the recycling of certain types of metals. This was already a logic implemented by China to protect itself from external instability. Its regularly updated "Made in China 2025" plan contributes to this strategy.

Whether in the industrial or service sectors, China offers measures and conditions that favour the creation of subsidiaries and the development of international companies on its territory for a certain number of years, while national players can emerge in these fields. Once the Chinese players have matured, it has been observed that the exception measures are gradually disappearing. The market returns to a competitive market that is particularly tough in a large country such as China, and which is likely to become even tougher due to the effects of the Covid-19 crisis and international tensions.

5.2. Consequences of Sino-US tensions

The Covid-19 crisis has exacerbated global and notably Sino-American geopolitical tensions, particularly in the technological stakes.

Several issues of disagreement have arisen during the Trump administration, such as trade imbalances, compliance with stock exchange regulations, notably the technology war on 5G infrastructure, but also geopolitical claims and differences in understanding of human rights.

For example, in terms of technology, the John S. McCain National Defence Authorization Act prohibited the use of certain telecommunications and video surveillance services or equipment for national security reasons, particularly for US government agencies. This greatly limits the purchase of these products and services, which are mainly offered by Chinese suppliers. Another example is the Clean Network programme, which is the Trump administration's approach to dealing with the threat and aggressive intrusions of malicious players, and which aims to protect the technology and telecommunications infrastructure that is vital to the US. There is a willingness on the part of the US and the UK to implement a "*democracy-business alliance based on democratic values*" at the G7 level, also involving Australia, South Korea and India[5].

[5] In addition, the US launched the Asian "Quad" with Australia, Japan and South Korea. Some thought it was an Asian NATO, but the major agreements of the 12 March 2021 summit were on the production of the Covid-19 vaccine, facilitating cooperation on emerging technologies and climate change mitigation. They want to develop digital projects, with an unstated but very real objective of countering China.

Following the implementation of this programme, Chinese retaliation was carried out against certain European and American companies.

In December 2020, partly in response to US sanctions, China also banned the use of all foreign IT equipment in Chinese government offices. According to the Financial Times, 100% of the IT equipment in Chinese administrations should be replaced by Chinese equipment within three years. This decision will further accelerate China's strategic autonomy from US equipment.

This makes the business environment unstable, especially for US companies. This could provide opportunities for European companies, but they will also face compliance issues due to these US requirements limiting the use of Chinese products - or even the sale, in the case of semiconductors.

As a result of these tensions, the resilience of Chinese economic players appears to be diminishing and some have announced significant financial difficulties. This still shows that they are dependent on other countries and vulnerable to trade restrictions. However, they still have the means to resist thanks to the large internal market and the fiscal measures taken by the government. The actions of the Trump administration thus seem to reinforce and accelerate the implementation of the country's strategic autonomy.

FOCUS: Tensions on Wall Street

After a massive fraud case by Chinese company Luckin Coffee Inc. (a competitor of Starbucks) in April 2020, the US Parliament voted in favour of legislation to allow Chinese shares to be expelled from the US for non-compliance with auditing rules. Indeed, "*Chinese law requires that business books and records be kept and maintained in China, and prohibits the transfer out of the country of documentation of work done in China by auditors*", according to the Public Company Accounting Oversight Board.

This expulsion is intended to force Chinese companies to comply with auditing rules - or leave US markets altogether. At the time of this decision, more than 217 Chinese companies are listed on US markets, representing a combined market capitalisation of approximately $2.2 billion as of October 2020, according to the annual report to the Congress of the US-China Economic and Security Review Commission.

6. Conclusion

The current health and economic crisis have shown China's centrality in globalisation in 2021. The strong dependence of other countries on its economy, including in the digital field, but also for everyday objects such as masks and medicines, has become a global fact. Numerous analyses also show that the crisis has played a role as a catalyst and eye-opener of Chinese ambitions (see the diplomacy of Chinese fighting wolves, the policy of vaccines and masks, etc.). Even to this day, it remains difficult to know the reality of the situation within China. This hindrance to understanding the situation, and the resulting growing uncertainty, does not make it easy to understand how the international context will evolve over the next few years.

China has privileged relationships with Eastern Europe and Southern Europe, particularly through the acquisition of critical infrastructures, businesses and debts and via strategic partnerships. This diplomatic, financial and technological influence is much more present than we might imagine. The influence of Chinese players in Europe is a fundamental trend. Europe is also considering the adoption of mechanisms to limit foreign investment, including Chinese investment, at national and European level. China's theft of intellectual property remains a subject of international tensions - regularly put on the table by the EU and the US in dialogues with China.

A major challenge for the Chinese regime is to be able to maintain its international expansion while maintaining its domestic control. In the past, we have seen experiences of great expansion and influence followed by a sudden contraction of the country. This withdrawal scenario could be envisaged following the strengthening of Sino-US tensions if the countries were not linked so much by multiple interests (military, economic, cultural, technological, etc.).

The United States and China, despite their apparent great economic, technological and political "war", are very interdependent. They know they need each other. Economic ties maintain a certain balance between China and the US. China remains dependent on the supply chains of the US and Europe but also and above all on the exports they represent.

President Trump has insisted on a possible technological or even market decoupling with the Chinese, but he has nevertheless continued discussions on their trade agreement in the midst of a health crisis. The arrival in office of Joe Biden has caused much discussion about the relationship with China, but for the moment he seems to be following a strong policy (Alaska summit).

What is certain is that the West and the Chinese will have to continue their cooperation at the economic, technological and environmental levels.

"Europe faces a dilemma "between fascination and demonisation of China"." Claude Meyer

The China-Europe Investment Plan Agreement beginning to be ratified, in April 2021, is a major milestone and represents an important step in the evolution of bilateral relations. It lays the foundations for a more equitable relationship, particularly in terms of investment, which is more favourable to the European Union while maintaining commercial interests for China. The agreement calls for China to be more in line with WTO rules on technology transfer and transparency of state subsidies. Various sectors of activity are concerned, particularly manufacturing, which accounts for more than half of EU investment, including 28% in the automotive industry and 22% in the production of basic materials. Driven by the German EU Presidency, the agreement is now entering a review and ratification phase that could take up to two years (EU-China: What can we expect from the agreement in principle on investments?). Sino-European cooperation could also be promoted by this agreement in the technological fields, whether for the development of artificial intelligence or quantum computing and their multiple uses.

China's future and its place in the world will be determined by the strategies of each country, from the US to Europe but also and especially other powers and developing countries, in terms of military alliances, partnerships, economic policies, and technological choices, as well as the impact of these strategies on the policies of international bodies, regional regulations and economic markets.

Working with China is a necessity and offers significant opportunities for companies. The cooperation between Apple and Samsung is an example of coopetition: a fierce rival in the global smartphone market, Samsung is also Apple's largest supplier of components. Similarly, rare earths, of which China is the main producer, are essential for US players to manufacture the components that China needs in return. Managing a relationship that is both competitive and collaborative requires vigilance, judgement and the agility to adapt.

The idea is not to demonise China, but to work with it while remaining vigilant, in control of data and with resilience in the face of growing geopolitical challenges.

APPENDICES

"The car of the 21st century will be Chinese" by Jean-Pierre Corniou

According to Jean-Pierre Corniou, China's road network built in 20 years is the best in the world (4 million km of roads in rural areas). Unlike India, the Chinese state has not only focused on the road infrastructure but also on the rail network and has just unveiled the first autonomous train.

In 2004, the country recognised the problems of its car market and put in place an appropriate policy. In 2009, it became the world's largest market. China, which accounted for only 1% of global vehicle production in 2000, manufactured 29% in 2017 of a global production that has also increased significantly.

With around 500 million electric cars, China is the world's largest market for electric vehicles and the world leader in 40 km/h city cars (known as NEVs - Neighbourhood Electric Vehicles).

Pollution is becoming a major problem that needs to be addressed because it could jeopardise the overall cohesion of cities. Thus, in Shanghai, only electric 2 and 3 wheelers are allowed. Ecological, health and quality of life indicators are spreading throughout the country. While cities' mayors had only the development indicator as a target, they need to take into account the quality of life as well.

After having largely developed the electric vehicle market, China is now focusing on hydrogen. Tesla was the market leader in battery electric cars in China in July 2020, but the Chinese company BYD is ahead of Tesla in total battery and plug-in hybrid sales. The NEV battle is global and China is now investing heavily in hydrogen.[6]

[6] For further information: read the US Center for International Strategic Studies brief "Implications of China's Advances in Electric Vehicles"

Reading suggestions

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