

DIPLOMACY, SCIENCE AND INNOVATION IN SINO-LATIN AMERICAN AND CARIBBEAN RELATIONS

Josette Altmann-Borbón
Sergio Rivero Soto

Editors



Cátedra China
Contemporánea
当代中国讲堂



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DIPLOMACY, SCIENCE AND INNOVATION IN SINO-LATIN AMERICAN AND CARIBBEAN RELATIONS

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Josette Altmann-Borbón. General Secretary

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Editors

Josette Altmann-Borbón

Sergio Rivero Soto

Translator

Helena Cascante Briones

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DIPLOMACY, SCIENCE AND INNOVATION IN SINO-LATIN AMERICAN AND CARIBBEAN RELATIONS

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PRESENTATION

THE CONSISTENCY OF LOOKING AT THE WHOLE SCENARIO

In this Age of Knowledge, contemporary diplomacy is immersed in a context marked by new actors, scenarios, and technologies. This transformation requires a dynamic and multi-stakeholder perspective, where the Academy plays a strategic role by acting as a generator of thought, an expert subject and a mediator between ideas, knowledge, innovation, technology, and culture.

At present, the international context is characterized by rapid scientific and technological developments. Rigorous approaches and commitment are required to seek solutions to the global challenges of the 21st century. This is where the social sciences play a key role in providing a solid basis for understanding and analyzing these transformations, as well as assessing their impact on societies. They offer tools for diagnosing reality and act as scientific means to promote its transformation and improve the quality of life of all living beings on the planet.

In recent decades, China has emerged as a scientific and technological powerhouse, acquiring a leading role in the global arena of science and innovation. The modernization of its economy and technological transformation are internal conditions that are having a direct impact on its foreign policy and its relations with developing countries, including the nations of Latin America and the Caribbean.

This publication compiles the reports of the third edition of the Latin American Lecture Series on Contemporary China, a space that has become a unique regional platform for the exchange of ideas and advanced academic dialogue, allowing scholars from various

disciplines and countries to share knowledge and approaches, discuss perspectives and raise new questions that contribute to the development of Sino-Latin American and Caribbean relations.

On this occasion, prominent specialists from FLACSO Argentina, Zhejiang University, Beijing Foreign Studies University, Nankai University, Beijing Normal University, and the University of the Pacific of Peru participated.

The presentations focused on aspects related to the digital economy, smart cities, digital assets, climate governance, and academic cooperation between China and Latin America and the Caribbean. Each chapter addresses the issues of diplomacy, science, and innovation from distinct perspectives, providing a comprehensive overview of the influence of scientific-technological innovation on today's societies and international relations.

With this publication, the General Secretariat of FLACSO, in collaboration with the People's Republic of China as an Extra-regional Observer, aims to provide inputs that enrich knowledge exchange, contribute to academic and policy dialogue on China's integration with the region, and provide the congruence to look at the full global scenario.

Globalization, the information society, and scientific and technological innovation mark a new stage that calls for strengthening cooperation in Sino-Latin American and Caribbean relations. To make the most of this opportunity, China and Latin America and the Caribbean should strengthen their capacities and promote transparent and constructive dialogue, conducive to the development of joint scientific collaboration and innovation strategies, ensuring equitable technological development and inclusive social progress.

Dra. Josette Altmann-Borbón
Secretary General
Latin American Faculty of Social Sciences (FLACSO)



INTRODUCTION

INNOVATION DIPLOMACY AS A CENTRAL DIMENSION OF SINO-LATIN AMERICAN AND CARIBBEAN RELATIONS

RIVERO SOTO Sergio¹ y VILLEGAS Priscilla²

The idea that China was a civilization that produced inventions such as the compass and papermaking during the Han Dynasty (206 B.C.-220 A.D.), gunpowder during the Tang Dynasty (618 A.D.-907 A.D.) or the movable-type printing by the alchemist Pi Sheng in the 11th century, and that these technologies spread to other parts of Asia and Europe through the Silk Road, reflects the cardinal role that China has played in the historical process of innovation and explains its active role in promoting Research and Development (R+D) in the contemporary era.

History suggests that China's innovative legacy is an example of its ability to create methods, technologies and inventions that contribute to global development and the exchange of knowledge between cultures, becoming a pioneering nation in innovation diplomacy³. An example of how, both in the past and today, innovation diplomacy can boost global cooperation and address common challenges.

In a multipolar world where innovation and technology have taken a preeminent place in global politics and economics, the importance of

1 Regional Coordinator of International Cooperation and Research and Director of the Chair in Contemporary China of the General Secretariat of FLACSO.

2 Assistant of International Cooperation and Research Projects of the General Secretariat of FLACSO.

3 Pascal Griset in his article "Innovation Diplomacy: A New Concept for Ancient Practices?", addresses the notion of innovation diplomacy and its relevance in the current context of international relations. Griset argues that innovation diplomacy, although not explicitly conceptualized, has been a practice that has developed over more than two centuries. This diplomatic approach manifests itself both in discursive terms and in concrete actions, playing a critical role in international cooperation and structuring global governance when necessary.

innovation diplomacy stands out even more. China, in particular, has emerged as a central player in this arena, leading in areas such as 5G technology and artificial intelligence, the digital economy, renewable energy and electric vehicles, smart cities, and even space technology, placing itself in a strategic position on the international stage.

China's innovation development model is not a fortuitous event. As Fu Xiaolan points out⁴, the debate on the role of the State and public policy is relevant to the analysis of the capacities and performance of national innovation due to its nature as a public good, the positive externalities that knowledge and ideas can generate, and the presence of market failures derived from the uncertainty related to the innovation process. This open innovation model involves openness to international knowledge, resources, and markets, and represents a case study in the transformation of a developing country into a prominent player in the global innovation landscape, successfully leveraging international cooperation in science and technology to further accelerate national progress.

In the current global context, China, characterized by its accelerated economic development and its determined focus on investment in R+D, emerges as a strategic partner for the Global South. Its active participation in technological cooperation and its ability to offer innovative solutions at the international level are substantially reconfiguring the dynamics of relations between developing nations.

In one sense, China has managed to forge strategic alliances with these countries bilaterally and/or through multilateral platforms such as the Belt and Road Initiative, providing technical and financial assistance in critical areas such as infrastructure, renewable energy, and information technology. These initiatives contribute to the promotion of economic development and modernization in countries that, on many occasions, have difficulty accessing financial resources and advanced technologies at affordable prices for their national realities.

4 Fu Xiaolan is the founding director of the Oxford Centre for Management and Development Technology, Professor of Technology and International Development at the University of Oxford, and a Fellow of Green Templeton College. In his book "China's Path to Innovation," Fu comprehensively studies Chinese innovation activities from an open innovation perspective. The author adopts the concept of the Open National Innovation System (NAISS) to understand how China was able to achieve economic transformation through innovation, examines how the Asian nation could sustain dynamic growth in the future, and offers recommendations for developing countries.

Still, China's innovation diplomacy has at times raised questions and challenges in some Western countries. Concerns about technological dependency and cybersecurity are a recurring subject. In addition, China's technological leadership sparks debates around data privacy protection and digital surveillance.

However, these concerns are not exclusive to Chinese cooperation, and should be addressed jointly at the international level. It is clear that the relationship between ethics and technology remains an unresolved issue in international relations and global trade. As technologies advance and become more ubiquitous in societies, the need to establish shared standards is becoming more and more pressing. Multilateral dialogue and cooperation are essential to finding effective and equitable solutions to these ever-evolving challenges.

Ultimately, innovation diplomacy and China's role in the Global South highlight the importance of striking a balance between cooperation and competition in an increasingly interconnected world. Innovation is undoubtedly a tool with the potential to address global problems, although its implementation requires the existence of a solid ethical and regulatory framework. International cooperation in the field of innovation, aimed at promoting fairness and transparency, can lead to effective solutions to global challenges, and China is at the center of this process.

In this way, this book seeks to offer a deeper understanding of the dynamics of cooperation in science and technology between China and Latin America and the Caribbean to provide a framework to understand China's innovative transformation, government policies and diplomatic strategies that promote collaboration in this dimension of bilateral and multilateral relations between China and the region.

José Carlos Feliciano, in his text *Digitalization in China: Current State, Trends and Case Studies*, presents the development of China's digital economy, as well as the development of companies and policies for digitalization. The author discusses how the digital economy is presented as a tool for economic and social development, which allows great advances in governance, international cooperation, industrial innovation, modes of operation of public services and contributes to the facilitation of activities in the daily lives of citizens.

Sun Xuan, in his text *Smart Cities Construction: Concepts and Practices in China*, presents the process of reflection, identification and development of smart city models applied in China. It exposes and explains the way in which the digital connection of urban spaces makes it possible to change the forms of habitation, facilitating exchanges between people, infrastructures, and technologies, which in turn raises new systems of urban governance based on data collection.

For his part, Wang Hua in the text *Digital RMB and digital assets in China* takes a tour of the experience of digital assets: their categorization, their reliability, and their regulation, situating the initiatives and efforts made by different States, including the regulation of digital assets in China in recent decades. This article allows for a broad understanding of digital assets, as well as state initiatives for their regulation and security. The bridge between the theoretical and the cultural exchange is detailed through the introduction of examples of the use of everyday life and the reflection on the change in the models of economic exchange and transaction.

Delfina Vila Moret focuses her article on the role of the People's Republic of China in terms of climate governance, presenting a valuable historical overview of the trajectory of greenhouse gas emissions and delving into the decarbonization of the Chinese energy matrix. Her text, *The People's Republic of China, and Climate Change. Approach and perspectives of China's role in Global Governance in recent decades*, allows an approach to China's internal and external policy that aligns with its new national development model and the enactment of a climate policy.

This same area of reflection but focused on cooperation in the field of Digital Economy is explored by author Song Wei, who in her article *Sino-Latin American Cooperation in the Digital Economy: Perspectives on Aid for Trade* establishes the importance of digital cooperation in the current global context. This article not only discusses how the reality of COVID-19 led to the acceleration of digitalization processes, but also details the efforts made in the China-LAC bilateral relationship in the digital economy since the Belt and Road Initiative.

Finally, Karla Zapata, in the article *Educational Cooperation, Cultural Exchange and New Technologies*, presents an approach to Educational Cooperation as an analysis proposal for the understanding of relations

between China and Latin America and the Caribbean, in order to identify bridges of knowledge and mutual understanding. The exchange and spaces for cultural training have been accompanied by technological transformations, which symbolically allow the geographical distance between the regions in exchange to be overcome. The author contrasts the attitude of openness to teaching and learning between the parties, while identifying how in the process of exchange –and in a context of technological transformation– new educational models and tools are naturally presented that allow the reconceptualization of teaching and learning forms.

This publication is presented as a process of reflection on three cardinal elements in the understanding of innovation diplomacy between China and the region. First of all, the material and technological development of China is highlighted, which has undergone a remarkable transformation in recent decades. Its current leadership in technologies for the digital economy, the development of smart cities, energy transition policies to address climate change, and the application of digital resources for the advancement of education are directly intertwined with domestic policy and open innovation. These technological advances have boosted economic development with immediate implications for national governance and international cooperation, but they have also permeated people's daily lives, generating an improvement in the quality of life of its citizens.

Second, there is an unmistakable relationship between this domestic technological development and China's foreign policy. Its position as a leader in innovation has allowed it to forge strategic relationships with different regions, and especially with nations in the Global South such as those in Latin America and the Caribbean. China, through its innovation diplomacy, positions itself as a potential key partner for developing countries, offering technical and financial assistance in areas critical to their international competitiveness. This imprint is not only based on technology, but also on China's ability to propose innovative solutions in infrastructure, digital economy, and renewable energies, transforming the dynamics of relations with the region.

Finally, how these negotiations are conducted and how China connects and operates in the global context is key. The Belt and Road Initiative

is an example of how China seeks to establish digital and economic partnerships in an increasingly interconnected world. Likewise, it projects itself as a nation committed to governance and multilateral cooperation on key issues for global development such as energy transformation and climate change. Even so, this process is not without challenges and dilemmas that require a cooperative approach at the international level to establish shared standards and find equitable solutions.

This publication proposes that innovation cooperation between China and Latin America and the Caribbean has the potential to boost the competitiveness and development of nations. As China seeks to advance its manufacturing value chain and boost investment in R+D, countries in the region can take advantage of this opportunity to diversify their economies through international trade and cooperation and create technological solutions tailored to local needs. In this sense, innovation diplomacy is presented as a central dimension that promises a more balanced and sustainable future for Sino-Latin American and Caribbean relations.

Prepared within the framework of the Chair in Contemporary China of FLACSO's General Secretariat, this book aims to provide a resource that contributes to broadening and enriching efforts aimed at understanding and analyzing the evolution of cooperation relations in science and innovation between China and Latin America and the Caribbean. We are especially grateful for the cooperation of the Embassy of the People's Republic of China in Costa Rica, Zhejiang University, Beijing Foreign Studies University, and Nankai University.

Likewise, we recognize the participating specialists who, with their knowledge, have contributed to the materialization of this project, which represents a significant contribution to mutual understanding and constructive dialogue between our countries. We hope that this publication will be a source of inspiration for future research and scholarly collaborations.

DIGITALIZATION IN CHINA: CURRENT STATUS, TRENDS AND CASE STUDIES

This report is based on the paper: "Digitalization in China: Current status, trends and case studies", presented on July 18, 2023 in the III Lecture Series developed within the framework of the Chair in Contemporary China.



DIGITALIZATION IN CHINA: CURRENT STATUS, TRENDS AND CASE STUDIES

*FELICIANO José Carlos*⁵

State of development of the international digital economy

The White Paper on Global Digital Economy that was published in December 2022 prepared by the China Academy of Information and Communications Technology (CAICT) analyzed the digital development of 47 developed and developing countries (Ireland, Mexico, Estonia, South Africa, Austria, Norway, Australia, Portugal, Brazil, Japan, Bulgaria, Sweden, Belgium, Switzerland, Poland, Cyprus, Denmark, Slovakia, Germany, Slovenia, Russia, Thailand, France, Turkey, Finland, Spain, South Korea, Greece, the Netherlands, Singapore, Canada, New Zealand, Czech Republic, Hungary, Croatia, Italy, Latvia, India, Lithuania, Indonesia, Luxembourg, United Kingdom, Romania, Vietnam, Malaysia, China and the United States).

From the analysis of this study, it can be observed that there is a clear trend of growth in the digital economy; in fact, the added value of the digital economy by 2021 (of the 47 countries) reached 38.1 trillion dollars which was equivalent to 45% of the total GDP of these countries.

The digital economy provided important support for the sustained economic recovery of both developed and developing countries, thus aiding the post-pandemic economic recovery (CAICT, 2022).

From the international perspective, the role of digital transformation constitutes an important point in the growth of industry, mainly in the

5 MBA from China Europe International Business School (CEIBS), with graduate studies in management and business in Asia at the University of Michigan. Specialization studies in Innovation and Entrepreneurship in Japan, India and Singapore and studies of Chinese and Chinese Culture at Peking University.

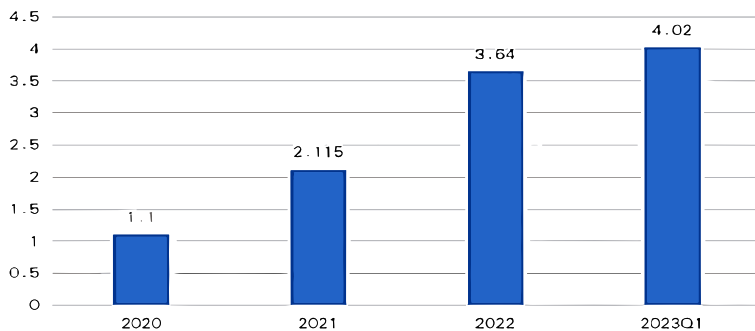
tertiary sector, reaching 45.30% of value added, as opposed to 24.30% in the secondary sector and 3.60% in the primary sector, according to CAICT figures (2022).

According to the World Economic Forum, a 10% increase in digitization in a country's industry can lead to an increase in GDP per capita of 0.5% to 0.63%.

When we think about digitalization worldwide, the number of users is also considered; from 2018 to 2022, the number of internet users has grown, reaching almost 5 billion people, which makes service platforms have millions of affiliated users, such as WeChat with 1.3 billion monthly active users, Amazon with 400 million users and YouTube with more than 2.5 billion users. The number of internet users is growing year by year; from 2018 to 2022, the total number of users has increased by 1 billion, amounting to the figure of 4950 million users (We are Social News, 2022).

Another important point that goes hand in hand with all digital development is the construction of infrastructure, and it can be analyzed for this case how 5G service operators have increased their installation around the world, as described in the following figure.

Figure 1. Global Deployment of 5G Base Stations (Unit: 10'000)



Source: Public information organization, TDIA

As of March 2023, nearly 257 global 5G service operators have installed more than 4 million stations globally. These stations enable interconnectivity and drive some cutting-edge industries such as autonomous transportation, telemedicine, and smart homes.

Digital economy in China

China's digital economy plays a key role in the country's economic and social development, and great progress has been made in the fields of digital infrastructure, industrial innovation, digitization of public services, governance, and international cooperation. The development of the last 15 years has allowed the scale of China's digital economy to continue to expand, making it the second largest in the world after the United States.

By 2022, China's digital economy reached 50.2 trillion Renminbi (RMB), which accounted for approximately 40% of China's GDP in that year.

From 2017 to 2022, the size of China's digital economy has doubled in size with a clear growth trend resulting not only from market factors but also from public policy elements driving the digital ecosystem.

A relevant data of China's digitalization is e-commerce; in 2022, online retail sales reached 13.79 trillion RMB, maintaining an increasing trend since 2018. This is explained due to the growth of digital infrastructure and the drive for innovation in new business models that, for example, connect China's urban economy with the rural economy, allowing the trade of local products to grow (China E-commerce Public Service Network, 2021).

Another important factor is industrial digitalization, which is basically reflected in the integration of data and reality, mainly in sectors such as agriculture, manufacturing, and the service industry.

For example, the application of 5G integration has been developed and integrated with 52 major categories of China's national economy, and the "informatization" ratio of agriculture in China reached 25%.

At present, there are more than 4,000 projects nationwide linked to "5G + Industrial Internet" technology, i.e., 5G technology is used to maximize the results of economic activities in various areas of the country.

All this digitization must also be accompanied by a benefit for citizens, and in the case of China, we see a lot of how public services or government services are also used digitally. As of December 2022, the number of users of digital government services reached 926 million people, which

represents almost 80% of the population at different levels, national, provincial, and local.

From a global perspective, in the E-Government Development Index ranking, China from 2012 to 2022 moved from 78th to 43rd place, as indicated in the figure below, reflecting the rise of digital governance and how the government itself promotes digitalization for its own services.

This environment of industrial digitization and digital governance in China has also created an environment conducive to generating solutions to problems linked to sustainable and social development.

Technology companies have also made commitments to sustainable development. For example, Tencent, which is one of China's largest internet companies, launched its "Tencent Carbon Neutrality Target and Roadmap Report" in 2022 with a view to transforming its logistics and operations into carbon neutral by 2030.

Digital services in China's rural areas focused on online education and health continued to grow. By 2022, users of these services accounted for 31.8% and 21.5% of total internet users in rural areas. It is interesting to see how, thanks to the digital infrastructure, initiatives are generated that connect the rural economy with the urban one, providing not only social benefits but also economic income possibilities for poverty alleviation.

The activities of Internet users in China are basically focused on instant messaging, video platform use, online payments, online shopping, news search, remote work, live streaming, online shopping for travel (hotels, tickets, packages), and health.

Business development and policies for digitization in China

A. Business Development (Focus on Research and Development)

In China's digital landscape, enterprises have been key contributors to its development, making it now the second-largest digital economy in the world.

Subsequently, here are some examples that focus on research and development (R&D) as an important part of their operations, driving China's success, as large internet companies invest much of their efforts and resources in creating products with scientific research.

Tencent: It is one of China's largest internet companies, the owner of the WeChat app, and is also a major player in the video game industry and other applications. As of 2022, according to the Tencent R&D Big Data Report, the company had invested more than 220 billion RMB in research and development (R&D) in the past 5 years, making it the company in China that invests the most in this area. Its R&D staff is 74% of the company, and it has more than 7000 new R&D projects per year, all of which demonstrate how the company's structure is focused on developing new products and services. By 2022, the company applied for 62,000 patents around the world.

Alibaba: According to Alibaba's 2022 financial report, the company's investment in new product development reached RMB 55.465 billion.

Meituan: A popular digital platform in China. According to its 2022 financial report, the company made significant progress in its digital strategy and continues to invest in key areas of scientific development. Its R&D spending reached RMB 20.7 billion, approximately 9.4% of its revenue for the year.

Pinduoduo: A pioneer company in social e-commerce. According to its 2022 financial report, R&D spending exceeded RMB 10 billion for the first time. This amount was 8% of its revenue for that year.

Jingdong: Digital e-commerce platform, in its 2022 financial report, its R&D spending for the third quarter was RMB 4.1 billion, with spending in 2021 being RMB 4 billion during the same period.

B. China's public policy in favor of digitization.

There are certain milestones in China's public policy that have provided the framework for the development and growth of its digital economy. Below is a table with the main dates and instruments that the Chinese State has generated to promote digitization in the country.

Table I. Main public policy milestones in favor of digitization in China

Date	Public policy
March 2015	The Chinese government's work report included the "Internet+" Action Plan for the first time to promote the integration of mobile internet, cloud computing, big data, Internet of Things (IoT) with modern manufacturing and other fields of economy and society.
July 2015	China's State Council issued an opinion guideline to actively promote the "Internet+" action plan, a vital measure to encourage the expansion of the consumer Internet and accelerate industrial development through innovation.
December 2018	The Central Economic Work Conference included the concept of "New Infrastructure" for the first time to define 5G, artificial intelligence, industrial internet, and IoT.
March 2020	The Standing Committee of the Political Bureau of the Central Committee of the Communist Party (7) held a meeting to promote the acceleration of the construction of the "new infrastructure." The measure included concrete actions for departments and local governments. Subsequently, this momentum was reflected in the market by initiating the "new infrastructure" business trend.
January 2022	The State Council issued the 14th five-year plan for the development of the digital economy, which clarifies the guiding ideology, basic principles, development goals, tasks, and measures, thus promoting the healthy development of the digital economy during the period of the 14th plan. China's economy is planned and there is an action framework every 5 years, and for this 14th plan, there are very specific actions regarding the goals of digital economy development.
February 2023	The Communist Party Central Committee and the State Council issued the "General Plan for Building a Digital China." The plan proposes that by 2025, a horizontal (consumption) and vertical (industrial) connectivity pattern should be formed and that by 2035, China's digital development level should be at the forefront of the world, which can be interpreted to become the first digital economy on the planet.

Source: Own elaboration.

Companies and Trends in China's Digital Economy

In China, there are private companies that have developed great innovations in their business models due to factors specific to the Chinese market, such as its size and digital infrastructure that is accessible to the entire population, such as:

A. Pinduoduo

It is the world's largest interactive E-commerce platform and a pioneer in trends such as Social E-commerce, group buying, and C2M (Consumers to Manufacturers).

It reached 600 million users in 5 years of existence (it took Alibaba 10 years) due to the effect of social networks and cooperation with WeChat (China's main social network). To understand the success of Pinduoduo is to understand the future of E-commerce due to its various innovations and functionalities.

Some of the platform's features include sharing group purchases (discovering offers and sharing them with your friends on social networks), involving the concept of more fun and cost-saving shopping, for example, discounts to encourage shopping habits and the use of online games to encourage online shopping actions.

It also has other initiatives such as the Logistics Information Platform in real-time, the Consumer to Manufacturer concept (capturing information from users to generate new products and services), support for many agricultural production chains, especially in rural areas, and support for entrepreneurs with brand development programs.

B. Xianyu-Second-hand products

This company offers an interesting model and approach for the country's digital ecosystem, is an e-commerce platform for second-hand products, and follows the trend of circular economy and sustainable development that China has.

Users can trade second-hand or recycled goods, including, for example, cameras, computers, clothes, furniture, etc. It uses a business model focused on geolocation to avoid the need for two users to move from one end of the city to the other and thus be environmentally friendly.

They also have the concept of "community" management that promotes the exchange between the members of this community, mainly coordinated by a staff of the company that manages and moderates it and allows exchanges and transactions to take place in a close geographical space.

C. Other trends

Another important trend in China is the streaming services of electronic platforms such as Alibaba, where many entrepreneurs in rural areas can offer their products to a mass audience, being an important trend in China for poverty alleviation. These tools have also served for the commercial promotion of Latin American products and should be exploited much more by our countries. A successful case is the promotion and sale via streaming of Chilean plums in China.

The digital ecosystem in China is very complex and diverse, and given the large number of applications and platforms, companies must choose, according to their market, which solution is the best to reach their target audience. As can be seen in the following image, the main commerce and content generation platforms are focused on very specific markets and consumer profiles.

The metaverse is another important trend in the Chinese market, especially because it is estimated that by 2025, about 37 million people in China will have a virtual identity in the metaverse, according to the global market intelligence firm IDC, leading many companies to offer their products and services in this space.

For China's 14th Five-Year Plan, there are specific strategies to leverage blockchain, virtual reality, augmented reality, and artificial intelligence. In 2021, China established the first metaverse association: the Metaverse Industry Committee, directly overseen by the China Mobile Communications Association (CMAC). Several regional governments have incorporated the metaverse into their economic plans with the aim of encouraging these industries, and at the national level, by 2022, the Ministry of Industry, Information, and Technology aimed to incubate more than 3,000 startups linked to the metaverse.

One example is the automotive industry that is creating virtual showrooms in which you can see the car models without having to go to a physical dealership and thus see the functionalities and applications of the new car models.

Digital philanthropy: Tencent Charity

The digital economy in China has also empowered philanthropy and social projects. Since 2015, Tencent started with an initiative called Giving Day (on September 9 every year), where users of its WeChat platform are allowed to donate money for social projects in education, health, environmental care, etc. It is currently one of the main philanthropy days in China, as can be seen in the figure below, in 2021, the total amount of donations was more than 600 million dollars, and in that year, 56 million people participated in this initiative.

Many companies and social projects have joined Tencent's annual campaign, allowing that, by 2023, the celebration will not only last one day but several days, from September 1 to 10. Transparency is a vital element in the initiative since it is possible to identify what kind of projects are being donated to, which organization is leading it, as well as to know the concrete use and results of the donation made.

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SMART CITIES CONSTRUCTION: CONCEPTS AND PRACTICES IN CHINA

This report is based on the paper: "Smart Cities construction: Concepts and Practices in China", presented on July 27, 2023, at the III Lecture Series developed within the framework of the Chair in Contemporary China



SMART CITIES CONSTRUCTION: CONCEPTS AND PRACTICES IN CHINA

*SUN Xuan*⁶

What is a Smart City?

In China, Smart City has become a really important topic in urban studies. That is why I would like to share an introduction of the concepts and practices about smart city construction and development in China.

Actually, the discussions on Smart City have been there for many years. So, what is a smart city? As a new area of knowledge, we were not so sure about the concept, just exploring and making practices in many aspects. There were no antecedents or any guide on how to implement it.

In the beginning, there was only the “smart planet” concept proposed by IBM in 2008. The idea of a smart city did not appear in Chinese government documents until 2012. In more than ten years, China has developed policies and conducted many projects on smart city construction. So, here we will go through 4 parts of content: 1) Concept development and transformation, 2) Technology support and application, 3) Data modeling and computation, and 4) Practice innovation and outlook.

Concept development and transformation

In the 21st century, countries around the world, especially in Asia and Africa, are experiencing unprecedented rapid urbanization. Now, more than 55% of people live in urban areas, and by 2050, this figure would increase to 68% (United Nations, 2019).

With the process of global urbanization, more and more megacities are popping up. And it is predicted that, by 2030, there would be 43

6 Associate Professor of Zhou Enlai School of Government and Director of Digital City Lab, Nankai University. Expertise in Urban Modeling, Urban Computing and Smart City.

megacities with a population of more than 10 million all around the world.

Against this background, urban management has become a very important domain of public management. And Smart City, as a comprehensive field, involves not only technologies but also organizations and people, making it an integral part of urban development.

A. Urban function changes

Nowadays, urban functions are undergoing significant changes. In 1933, the International Congress of Modern Architecture (CIAM) drafted the “City Planning Outline” in Athens, where we defined the four basic functions of a city: dwelling, work, recreation, and transportation.

But with the development of the economy and society, there are some new demands for urban functions, such as emergency response, public services, technology innovation, and more. These new functions establish a relationship between construction and protection, stimulate coordination between the city and the region, and ensure harmony between humans and nature. However, the priority has always been the people.

Now, we are working on an international cooperative project that involves China, India, the Philippines, Bangladesh, South Africa, Rwanda, Tanzania, and the UK. The project focuses on sustainable, healthy, and learning features of cities. These concepts serve as a key and the direction of city development, forming the basis of smart city construction.

In the projects, our interdisciplinary research and capacity-strengthening activities aim to shift the focus of the debate from the physical and environmental aspects of “sustainable cities” to a deeper understanding of how rapid urbanization and increasing migration are affecting the social and economic sustainability of neighborhoods within cities.

B. Urban life changes

Urban life is changing as well, with a rapid pace of urbanization and an increasing number of public events. When public events occur, more people tend to gather in one place, such as a stadium or a hall. The overcrowded people can easily make the operation of a city deviate from the expected order, and the departures from routine processes might

result in congestion, accidents, and some other unexpected conflicts and threats.

That is why we recognize the need for new approaches to urban management, with the characteristics of the timelessness of city operations, normalization of emergency treatment, and no prior experience of affair treatment.

In this respect, a lot of new ideas and modes, such as cooperative management, polycentric management, holistic management, and regulatory governance, agile governance, good governance, have been proposed out. However, theory and experience can only guide the direction; they cannot directly solve problems. Different cities have different economic backgrounds, social structures, and urban textures.

Thus, this reality poses a new challenge for urban management: how to deal with the practical problems in different cities?

C. Big data based urban management

In today's reality, we have access to a vast amount of data that can help to answer this question. Different kinds of data allow us to approach urban-social conflicts from various perspectives.

On one aspect, business data is generated by office automation systems, giving insights into how work is organized and distributed within cities.

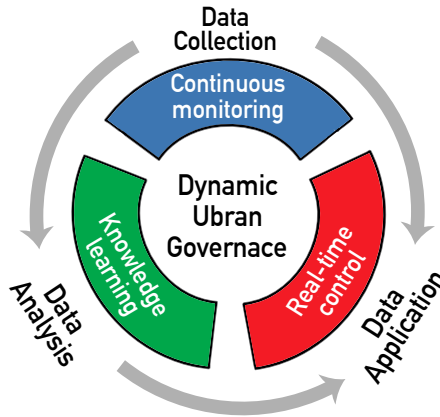
On another aspect, communication data is collected from social media, providing not only information about social connections and links between people but also a deeper understanding of the attitudes and preferences of different communities.

Meanwhile, environmental data and daily life data are collected using Urban IoT (Internet of Things) devices and different types of smart cards, making them valuable resources for studying urban-social dynamics.

C.1 Thinking transformation: Data flow city

In terms of thinking mode, a new concept, data flow city, has emerged in recent years. It means the dynamic generation of various types of data that enable the efficient operations of a city. IoT, cloud computing, office automation, the digital economy, and daily data all contribute to the stimulation of big data flow.

Graphic 2. Operating mechanisms of dynamic urban governance



Source: Own elaboration.

Technology support and application

New concepts allow us to understand what is best for urban management and give us directions for smart city construction. Without technology support, all the ideas are just illusions.

A. Urban management with technologies

Nowadays, urban management is increasingly related to technology. There are different kinds of technologies, such as big data, the Internet of Things (IoT), cloud computing, blockchain, and artificial intelligence (AI). These technologies can help us with the status recognition, problem discovery, process understanding, and system optimization of cities.

A.1 Digitally assisted management/services

The collection of large amounts of data allows for the creation of robust systems to address urban problems. Categorizing the collected data helps facilitate efficient problem-solving management and prevents future issues by effectively organizing people, resources, services, and connecting data.

A.2 Location-based management/services

There is a specific type of data known as location-based data, which provides various information about people and objects within urban

space. Based on the relevant spatial relationships and knowledge, it enables urban management and service systems to execute the functions with efficient and optimal approaches.

A.3 Intelligence-driven management/services

Intelligent algorithms and applications are crucial for urban management. Introducing intelligence-driven functions into urban management can help establish a more efficient system for urban life. For example, AI-powered vehicle recognition can be used for traffic speed regulations and travel management, and AI-based city brain can provide improved property management services in communities.

B. Digital Twin

Digital Twin refers to a precise and realistic computer-mapped representation of the real world. This data-driven “hyper-reality” environment has a significant impact on the work modes of various industries. Through data modeling and digital interaction, it enables urban managers to understand the operational status of cities, analyze urban issues, and make targeted planning schemes and decisions for improving the quality of life and operational efficiency of cities.

Data modeling and computation

Urban models can transform scattered information and knowledge into standardized content expressions and logical analysis frameworks, which provide direct information support for urban applications and services.

A. City information model (CIM)

The compilation of the city information data, functions to propose and study a city modeling. For example, you can establish a social economic dataset, looking for information of economic data, population data, city operation data, industry data, and so on. The access to well-categorized data and precise information works as a well-set data orientation project that allows well-structured city plans.

A city information model is a compilation of diverse city information and data, serving urban functions across different fields.

For example, it involves social-economic datasets and contains information on urban economy, population, industries, and more. Access to well-categorized data and precise information can help to develop well-structured city plans.

Meanwhile, the city information model also integrates dynamic operating datasets, such as mobile signal data, IoT sensing data, monitoring data, and traffic data, to help construct a well-interconnected data space for coordinated urban management.

A.1 Geographic space modeling

The geographic space is the region and environment where various urban elements exist. Based on high-precision surveying data, such as laser point clouds, we can model the geographic urban space in detail, obtaining accurate location and three-dimensional structure information of each building (Sun et al., 2018).

A.2 Semantic space modeling

Urban space encompasses not only geometric elements but also semantic attributes. With the aim of comprehensive description and efficient usage of urban space, semantic space modeling mainly focuses on the spatial definition, semantic connotations, and organizational relationships of entities (Sun, 2018). By incorporating various factors, such as population density, economic activities, and traffic status, semantic models can satisfy various demands in city operations.

B. Semantic world: massive parameters

In the past, based on low-resolution remote sensing images, we could only categorize urban spaces into a few areas, such as vegetation, built-up, water bodies, and bare land. However, today, with the development of remote sensing technologies, we can not only identify buildings, vehicles, and trees on the ground but also accurately determine their quantities, types, and various detailed features.

Currently, multiple types of surveying platforms, such as unmanned aerial vehicles (UAV) and mobile measuring vehicles, can provide us with multi-perspective image data, including aerial views and head-up views. In order to achieve a “Stereo” semantic description of target objects, we need more complete semantic models, more detailed parameters, and of course massive computational resources.

C. Urban computing

To address a variety of real-world problems encountered by cities, urban computing is extensively utilized in contemporary urban management practices. It integrates ubiquitous big data with various models to perceive, analyze, and optimize the conditions of cities.

C.1. City operations (complex relationships)

In the context of the mutual influence and dynamic interactions among various factors, the efficient and reliable operation of cities relies on precise and scientific computation. Taking urban transportation as an example, its efficient operation depends on the coordinated control of traffic conditions at each intersection and road segment. However, cities often have a vast number of factors that need to be coordinated. For instance, the main urban area of Tianjin alone has over 37,000 sets of traffic signals. How to control each traffic signal to achieve optimal operation of the entire transportation system is a complex computational problem.

C.2 Environment monitoring (cross interactions)

Compared with the static, isolated studies of urban environment in most of existing research works, much more attention has been paid to the dynamic, interconnected views of environmental flows in recent years. The latter focuses on not only material flows like water flow, energy flow, traffic flow, green products, greenhouse gases, waste, etc., but also non-material flows, such as the information, dialogues, and movements generated by humans in relation to material flows. Through cross-analysis and computation, the interactions between material and non-material flows in urban environments can be finely delineated.

C.3 Public health (multiple views)

The public health of a city encompasses both physical and mental health. The physical health of the public can be described through various sources of information, such as medical insurance records, health check records, internet consumption records, living environment conditions, and daily work status. Similarly, the mental health of the public can be assessed by considering social interaction information, social media data, web search information, and internet reading habits, among others. The fusion and analysis of these diverse perspectives require robust computational support.

Practice innovation and outlook

Currently, there are over 900 smart city projects under construction across various regions in China. These initiatives are aimed at addressing a range of pressing urban challenges, including traffic congestion, environmental pollution, resource scarcity, and the surge of diseases. Local government agencies and businesses are making concerted efforts to transform existing urban governance modes, systems, and methods through technological innovation. They have put forth specific plans for the construction of smart cities tailored to their respective needs.

A. Typical cases: Hangzhou

The City Brain is the core of Hangzhou's smart city construction. It integrates technologies such as big data, cloud computing, and artificial intelligence to achieve real-time monitoring and analysis of various aspects of the city's data. It provides scientific decision-making and planning support for urban operations, helping to address challenges such as traffic congestion and environmental issues, and improving the quality and efficiency of urban services. Additionally, the Hangzhou City Brain promotes information sharing and collaboration among different departments, facilitating overall coordination and efficient governance. It creates a smarter, more convenient, and sustainable living environment for the city's residents.

B. Typical cases: Shanghai

The Unified Network Management (UNM) is the representative of Shanghai's smart city construction, enabling comprehensive city management and service coordination by integrating data and information from various sectors. It utilizes advanced information technology to provide real-time monitoring and analysis, supporting scientific decision-making and intelligent transportation systems to address issues like traffic congestion and improve urban governance efficiency. Additionally, the UNM promotes information sharing and collaborative innovation, offering convenient public services and creating a more convenient, efficient, and livable living environment for citizens, thus driving Shanghai's sustainable development.

C. Typical cases: Tianjin

Smart and green dual-wheel drive development is the core feature of the smart city construction of Tianjin. As the representative district, Sino-Singapore Tianjin Eco-City integrates advanced information technology and ecological conservation principles to achieve efficient resource utilization and environmental sustainability. On one hand, it fully utilizes technologies such as the Internet of Things, big data, and artificial intelligence to realize intelligent city operations and management, improving energy efficiency, reducing traffic congestion, and optimizing urban space utilization. On the other hand, it focuses on ecological protection and restoration, constructing a green ecological network and ecological corridors to enhance the city's ecological quality and level of sustainable development. Additionally, it actively promotes the development of smart agriculture, smart education, and smart healthcare, providing residents with convenient living services and a high-quality living environment. Through Smart and green dual-wheel drive development, it has become a green, intelligent, and livable modern city, showcasing the successful integration of sustainable development and smart city construction.

Conclusions

From the concept of “Smart Earth” proposed by IBM, to green and low-carbon development projects in Europe and the pilot city program in China, to the current development of application platforms such as “Smart City Brain” and “Digital Twin”, the concept and requirements of smart city construction have been continuously deepened through practical exploration.

Regarding the construction of smart cities, some emphasize the application of new technologies, some believe the core lies in the construction of intelligent systems, and others focus on user participation and management mode innovation. It is undeniable that smart cities involve the application of a range of technological means such as sensors, big data, AI, and the Internet, but technology is only one of the core elements of smart city construction, not the entirety of it. The ultimate goal of smart city construction is the sustainable development of the environment, society, and economy.

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DIGITAL RMB AND DIGITAL ASSETS IN CHINA

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DIGITAL RMB AND DIGITAL ASSETS IN CHINA

WANG Hua⁷

The topic I will introduce is Digital Reminbi (RMB) and Digital Assets Regulation in China Briefings. As we all know there are many different kinds of assets, and digital RMB is just one of them. And how do we categorize it? Assets are also a developing area, so various assets and classification types exist.

There are some different types of assets that we can divide into different categories. In Table 1. you can appreciate some definitions and the nature of the types of assets. For example, the first one is crypto-assets that is quite the general asset that is used under crypt-code accountancy, bitcoins and Non-Fungible Tokens (NFTs), and other kind of tokens all belong to crypto-assets. Another example is the Security Tokens, these assets belong to the cryptocurrency. Security Tokens are also blockchain-based assets, they can be treated as a kind of security. For example, in the US or European countries, they have the certain to see if it is kind of a crypt code and the security tokens are out. If we see the definition of the domain of this category you can trade it, you can buy it, and sell it, almost like any other different national currency. Also, they have Utility Tokens, Stablecoins, and Central Bank Digital Currencies (CBDCs).

Utility Tokens are something you use more like security for products and services, you can use these kinds of Tokens to purchase and exchange services of some sort. Stablecoins are any cryptocurrency that maintains a relatively stable price. They are typically pegged to a legal currency, for example, pegged to US dollars. The last one is CBDC, which is a central bank of cryptocurrency. They are working out to provide the CBDCs cryptocurrency in the currency system.

7 Researcher with academic and industrial experience in Fin Tech IT and Financial Markets at SZTU, CSRC Research Center, Hong Kong Exchange, Credit Suisse, Barclays Capitals, among others.

Table 1. Classification and definition of digital assets

Classification	Definitions	Nature
Crypto-assets	A crypto-asset is a digital representation: 1) of value or rights, 2) which may be transferred and stored, 3) using cryptography and DLT or similar technology. Example: Bitcoin, NFTs. NFTs (Non-Fungible Token): An NFT is a record on a cryptocurrency's blockchain (an immutable ledger that can record more than just virtual coins) that represents pieces of digital media. It is not fungible. [Source: BARCLAYS]	General assets based on blockchain NFTs: Data file
Security Token	A "security token" is a blockchain asset that falls within the definition of security under US federal securities law. Example: Blockchain Capital (BCap), SpiceVC (SPICE). [Source: The Economist]	Emerge and circulate in financial market
Utility Token	Utility tokens are commonly issued during Initial Coin Offerings (ICOs) or Initial Dex Offerings (IDOs). Utility token holders enjoy certain privileges in exchange for their purchase, or vote on the improvement proposal of an upcoming decentralized application (dApp). Example: File coins, Siacoin, and Basic Attention Token (BAT). [Source: SEC]	Permissions for products and services
Stablecoin	Any cryptocurrency designed to have a relatively stable price, typically through being pegged to a commodity or currency or having its supply regulated by an algorithm. Example: Tether (USDT), USD coin (USDC), Paxos Gold. [Source: Ledger]	Payment tools on distributed ledger
CBDCs	A CBDC is a digital form of central bank money that is widely available to the general public. Example: Digital Yuan (China), Digital S and Dollar (Bahamas). [Source: Oxford Languages; Federal Reserve]	Fiat Currency

Source: Author's Data Collection from the institutions mentioned above.

Today we are talking about digital RMB, which is a form of CBDCs. In China, digital assets in use are CBDCs and NFTs. Security Tokens and Utility Tokens are not traded. As you can see CBDC is a part of the safest currencies for a central bank to introduce.

In China, like a lot of countries, Security tokens and utility tokens are not used. In China, we have the CBDCs with the RMB and also have one of the crypto-assets with the NFTs. Some kinds of cryptocurrency like Bitcoins are not traded in China, Regulations strictly forbid the secondary market of insecure tokens, but NFTs are traded. As you can see CBDC is one of the digital safest currencies for a central bank to introduce, and is RMB going into this category.

How Digital Assets be regarded as Security Tokens?

As we mentioned above, Security Tokens have certain types of digital assets. So the question is how to decide what kind of security token you need for the e-commerce? It would depend on the acceptance and security that a digital asset has in the market you are in. For example, in the US some conditions are established to regulate token's security. They have implemented some tools like the *Howey Test* and *Reves Test*.

These tests are necessary to prove that the token that had been tested is secure enough to be traded almost as a financial asset. Other countries (see Table 2.) as the European Union, Hong Kong, and Singapore implement these protocols. The test and process can be different, but they all have conditions to see if these tokens can be traded as security assets.

There are some regulations for e-commerce in China as well. As you can appreciate in Table 3. some of the digital assets regulations are Key regulatory bases, policy Features, and Policy Orientation, to track the movement of the asset

Table 2. Conditions and protocols established by countries to ensure digital security

Countries	Conditions	Examples
The United States	Under the Howey Test, a digital asset is considered a security if it meets the following criteria: 1) A party invests money; 2) In a common enterprise; 3) with the expectation of profiting; 4) Based on efforts of a third party. The Reves Test identifies four factors the balance of which can indicate whether or not a note is a security. They are: 1) motivations of the buyer and seller; 2) the plan of distribution; 3) the reasonable expectations of the investing public; 4) any risk-reducing considerations.	SOL (Solana), ETH, and BTC (for now) are not considered securities in the US. SEC orders
The European Union	The DLT financial instruments are: 1) Shares, the issuer of which has a market capitalization, of less than EUR 500 billion. 2) Bonds, other forms of securitized debt, with an issue size of less than EUR 1 billion. 3) Units in collective investment undertakings, the market value of the assets under management of which is less than EUR 500 million.	
Hong Kong SAR ⁴	According to the SFC, a virtual asset is considered a security if it meets the following criteria: 1) It is a share, debenture, or any other type of security. 2) It is a unit in a collective investment scheme. 3) It is a structured product.	Bitcoins futures and Ether futures traded on the Chicago Mercantile Exchange
Singapore	A digital token may constitute: 1) a share; 2) a debenture; 3) a unit in a business trust; 4) a securities-based derivatives contract; or 5) a unit in a collective investment group.	Payment tools on distributed ledger

Source: Extracted from the above government's websites.

Table 3. Summary of China's digital assets regulation

Countries	Conditions
Core content	Services related to virtual currency settlement and trader information provision are comprehensively prohibited.
Key Regulatory Bases	1) Announcement on Preventing Financing Risks in Token Issuance in 2017. 2) Initiatives on Preventing Financial Risks Related to NFT, 2022. 3) Notice on Preventing Bitcoin Risks 2013. 4) Announcement on Preventing the Risks of Speculations in Virtual Currency Transaction, 2021. 5) Notice of the National Development and Reform Commission and other departments on the rectification of virtual currency “mining” activities in 2021. 6) Notice on further Preventing and Dealing with the Risks of Speculation in Virtual Currency Transactions, 2021.
Policy Features	1) Comprehensive ban on financing practices related to blockchain digital assets with cryptocurrency use as the core; 2) Dual regulations by risk alert and traditional legal underwriting; 3) Giving full play to the self-regulatory role of industry organizations.
Policy Orientation	In which directions to improve? 1) Accelerate the construction of a standard system for data trading; 2) promote the construction of a data security supervision system; 3) Establish a data market risk prevention and control system; 4) Definition of data property rights. Encourage what? 1) Data asset trading product design; 2) Integrate data assets into the accounting system; 3) Data applications; 4) Pilot demonstrations of applications in key industries.

Source: Regulation extracted from the official the People's Bank of China site

The policy that China's government has implemented is oriented toward the prevention of risk, for example, in 2017 they extended an announcement on preventing financial risk in Token insurance, and in 2022 they promoted initiatives to avoid risks related to NFTs. In synthesis, regulations act to make sure digital assets enter a whole complex data security supervision system.

Research and Development of Digital RMB and the Digital Currency Electronic Payment

Let's start reviewing the development of the digital RMB, or as it is called in China, the DCEP that goes for Digital Currency Electronic Payment.

From the name you can tell that digital RMB is not just a currency but is also an electronic payment system, actually a very convenient one.

The development of digital RMB is linked to the interest of China to constructing a digital economy, one design and development of a new retail payment infrastructure that is adaptable to the requirements of the era, secure, and inclusive. Is important to understand that the creation and introduction of a new digital asset is not as simple as designing it and using it, to build and create a whole new payment infrastructure.

The functions and usage environment of cash are undergoing profound changes. The most common payment methods are e-wallets such as WeChat or AliPay. WeChat and Alipay are widely used e-payment systems which are developed by Tencent Co. and Alibaba Co. the two major IT giants in China. They are so popular that only a few people still use cash or credit cards, for electronic payments, purchase goods, and also transfer money.

The development of this payment system has allowed the instruction of digital RMB, and we can establish the difference between this digital asset and the e-payments mentioned above. In general digital RMB is inserted in this DCEP environment which is very important for the digital era, trying to make the payment system easy.

The international community is highly concerned and engaged in the research and development of the People's Bank of China's (PBoC) digital currency. The DCEP, issued by the PBoC is a digital form of legal tender. It is operated by designated institutions and is based on a broad account system. It supports loosely coupled functions with bank accounts and is equivalent to physical RMB. It possesses valuable attributes and legal liability.

Specific meaning:

- DCEP is of equivalent value to fiat currency.
- Centralized management, dual-layer operation.
- Cash-based payment vouchers (M0) and physical RMB will coexist.
- Retail-oriented central bank digital currency.
- Active participation of commercial banks and social operating institutions.

A. Technology Roadmap of DCEP

The establishment of the DCEP utilizes a layered hybrid technical roadmap. At the top layer, the Central Bank has the highest authority over DCEP, exercising centralized control. As you know, most cryptocurrencies are decentralized, for example, the bitcoin. This means that there is no central institution or company, in fact, it uses the blockchain system to make it decentralize. We are not talking in detail about the blockchain, but in general about the cryptocurrency. Usually, a CBDC is centralized, which means the central bank has the authority to look after the currency.

In the middle layer, there are banks and other institutions (mostly commercial banks), that act as secondary actual issuance entities of DCEP. The Central Bank receives the digital RMB and provides it to commercial banks. They also verify transactions of DCEP. This layer may employ a semi-public blockchain known as a consortium chain.

At the application layer, users can engage in dual offline transactions. The sending and receiving parties' mobile are offline, and the transaction is completed through NFC. Once both mobile phones are connected to the internet, the middle layer confirms the transaction.

B. Features of DCEP

What kind of features does the DCEP or the RMB have? These digital assets have unique features that look after security, usability, and accessibility. The first is combining account and value features. From the RMB you can do the transfer valuable of the enterprise coins by using the digital system. This allows a lot of facilities, you can move your assets through different digital environments. The DCEP or the RMB combines three modes: account-based, quasi-account-based, and value-based. It utilizes variable denominations and transfers value in the form of encrypted coins.

Second, digital RMB does not require any interest payment. DCEP is positioned as M0, similar to physical RMB within M0, category, and no interest is paid on it. Third is low cost, in the electronic or online transaction by payment system. Consistent with the management of physical RMB, no fees are charged for exchange and circulation services. Fourth, the payment settlement is linked to the bank account. There are

special e-wallets for the users that can be associated with commercial banks. From the perspective of the finality of settlement, DCEP is loosely coupled with bank accounts. The funds transfer is carried out through DCEP wallets, enabling automatic payment transactions between parties.

C. Operating Mode of DCEP

DCEP utilizes Dual-layer Operation, which refers to the issuance of legal digital currency by the central bank to designated operating institutions. These institutions are responsible for the exchange and circulation transactions.

In this context, PBoC is responsible for the issuance, cancellation, interconnection between institutions, and wallet ecosystem management of DCEP. It carefully selects qualified commercial banks as designated operating institutions to provide DCEP exchange services. Under the quota management of the PBoC, these institutions open different types of DCEP wallets for customers based on the strength of customer identity verification and provide DCEP exchange services. Additionally, designated operating institutions, together with relevant commercial entities, are responsible for the circulation services and management in the retail sector of DCEP.

D. Digital Wallet: the carrier and medium of DCEP

A digital wallet serves as the carrier of DCEP and the medium to reach users, providing inclusiveness. There are different digital wallet kinds depending on the purpose of the assets managed by the user. This means that wallets are classified into different levels based on the strength of customer identity verification.

1. *Personal and corporate wallets.* Individual users and self-employed individuals can open personal wallets, while legal entities and non-legal entities can open corporate wallets.
2. *Software and hardware wallets.* Software wallets provide services to users through mobile payment apps, SDKs, APIs, and similar tools. Hardware wallets utilize technologies such as secure chips to enable DCEP functionality and provide services to users through IC cards, mobile terminals, IoT devices, and similar means.

3. *Sub-wallets and parent wallets.* Users can create multiple sub-wallets, and personal sub-wallets have limited payment quotas. Enterprises and organizations can use parent wallets for consolidation, enabling financial management and distribution needs.
4. *Building an ecosystem.* The People’s Bank of China, operating institutions, and social organizations collaborate to build an ecosystem. This results in the formation of a multidimensional RMB wallet matrix and joint development efforts.

One of the unique features of the digital yuan is the ability to make transactions offline, using Near Field Communication (NFC) technology. This means that two users can make transactions without an internet connection by bringing their digital wallets close to each other.

There are some differences between Digital RMB and r-payment methods that we can highlight in Table 4. These differences are founded in legal and security issues as we had pointed out before.

Table 4. Differences between Digital RMB and E-Payment Systems (e.g. WeChat Pay/Alipay)

	Digital RMB	WeChat Pay/Alipay
Issuer	Issued and regulated by the People’s Bank of China	Owned by private entities (Tencent and Ant Group)
Nature of Currency	Central Bank Digital Currency holds value on its own	Digital platform to transfer traditional RMB
Anonymity	Offers “controllable anonymity”	Transactions can be traced back to users
Offline transactions	Capable of offline transactions via NFC	Requires Internet connection for transactions
Dependence on Banks	Doesn’t require a bank account to use	Requires users to link their bank accounts

E. Sample Cases in Zhejiang Province

Some examples of the usage of digital assets in China are the following:

1. **Subway System.** Since 2023, passengers can use the digital yuan wallet to purchase tickets, refund tickets, or make tickets at all automatic ticket vending machines and customer service

centers on the entire Hangzhou Metro network. Passengers can enter the station directly by swiping the QR code at the gate through the digital yuan QR code, which is more time-saving and convenient.

2. **Everyday life and purchasing goods.** Digital RMB is used as physical money but adapted to digital consumption transformation. This allows access to food, and non-primarily goods, using apps, codes, and digital delivery channels.

Digital Asset Development in China

A. Key issues regarding Digital Asset

For Digital Assets, in China, regulation is still in progress. Due to the short history of the development of the digital economy in China, there is no exact and clear concept of digital assets at present, and there are technical obstacles to the construction of a perfect and systematic legal system in a short period.

There still be low awareness of ownership and protection of digital assets. Owners of digital assets, especially the public, have a low level of awareness of the ownership and protection of digital assets, which is mostly limited to the protection of personal privacy, a lack of understanding of the socio-economic value of digital assets, and a low level of awareness of digital assets.

And these issues are linked to a developing market. The degree of marketization of digital assets is not high, the situation of digital delimitation, sectorial ownership, and local ownership has not been broken, and the problem of digital silos has not broken the ice. The degree of marketization of digital factors is very low, there exists the idea of two extremes of excessive digital closure and non-marketable digital openness, and there is no positioning of the management and use of digital assets by the law of market value and the intrinsic characteristics of digital assets. So the role of digital assets as a factor of production is not yet played to its full potential.

B. Regulation Policies on Cryptocurrencies, ICO and NFTs

On 13 April, the Internet Finance Association of China, the China Banking Association, and the China Securities Association jointly issued

an initiative on the prevention of financial risks related to NFT, calling on their members to launch an initiative to strictly prevent the risk of illegal financial activities (Xinhua News Agency, 2022).

- Not to disguise the issuance and trading of financial products.
- Not to disguise the financing of token issuance (ICO).
- Not to disguise the illegal establishment of trading venues.
- Not to use Bitcoin, Ethereum, TEDA coins, and other virtual currencies as the valuation and settlement.
- Tools for NFT issuance transactions.
- Actively cooperate with anti-money laundering efforts.
- Do not provide financing support for investment in NFT.

C. Regulation of Digital Assets-Policy Features

1. **A comprehensive ban on financing practices related to blockchain digital assets cryptocurrency.** In the “Announcement on Preventing the Risks of Token Issuance and Financing”(《关于防范代币发行融资风险的公告》) issued on 4 September 2017, it is clearly stated that it is not permitted to illegally engage in the issuance and financing of tokens (a form of application of blockchain digital assets) or to exchange legal tender with tokens and that all financial institutions or non-bank payment institutions are not permitted to provide services for the issuance and financing of tokens, either directly or indirectly.
2. **Dual regulation by risk alert and traditional legal underwriting.** In the “Initiative on Preventing NFT-related Financial Risks”(《关于防范 NFT 相关金融风险的倡议》) issued on 13 April 2022, the following red line rules are clearly stated about NFT (Non-Fungible Token non-homogenized passes): no settlement with tokens, prohibition of financial securitization, prohibition of fundraising, prohibition of speculation and money laundering.
3. **Giving full play to the self-regulatory role of industry organizations.**
4. **Data Article 20.** (People’s Bank website, 2017) Document that establishes (1) Data property rights: Data Article 20 establishes a framework for a data property rights system with three rights a) the right to hold data resources b) the right to use data processing c) the right to operate data products. (2) Mechanisms for authorization of data rights: states that “a system of classification, classification,

and authorization of public data, enterprise data, and personal data shall be established”. (3) “Efficiency and equity” benefit distribution system: It proposes to “let the market evaluate the contribution and determine the remuneration according to the contribution to give play to the decisive role of the market in the evaluation of the contribution and the distribution of benefits, and to allocate the factor remuneration according to the marginal contribution of the data elements to determine the factor price. (4) Security governance: The word “appears 48 times and “16 times in the entire text of Data Article 20 emphasizing the integration of development and security.

China’s policy orientation toward “data assets”

a) What to improve?

- Accelerate the construction of a standard system for data trading.
- Promote the construction of a data security supervision system.
- Establish a data market risk prevention and control system.
- Definition of data property rights.

b) Encourage what?

- Data asset trading product design: With RMB settlement as the main focus, it will study and launch several data asset trading products with a clear demand, high frequency of transactions, and a high degree of data standardization.
- Integrate data assets into the accounting system: Incorporate data assets into the accounting system and accelerate the promotion of the improvement of relevant regulations and policies and the adjustment of accounting standards.
- Data applications. Enhance the supply and consumption of industry, service industry, and agriculture based on data analysis, and improve the application of enterprise research, production, supply, and marketing data
- Pilot demonstrations of applications in key industries. Supporting various industries to sort out data application paths, modes and methods development priorities, and compiling.

c) Restrictions on what?

- i. **Restrict the data types** government-published data, company data, data from the trading platforms, data from the partners, data from the Internet: Restrictions on data types (1) public government data (2) internal data of legitimate enterprises that have been authorized generally legal and compliant data left by enterprises after production and accumulation (3) data suppliers, which provide data produced or owned by themselves according to the trading rules of the platform and the demand of the demand side (4) data of partners, which generally refers to relevant data supplied by alliances of the platform or cooperative enterprises (5) data crawled from the Internet through web crawlers A total ban on the securitized or financialization of digital assets
- ii. **Restrict the data trading venues:** combating black market data trading.

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THE PEOPLE'S REPUBLIC OF CHINA AND CLIMATE CHANGE

APPROACH AND PERSPECTIVES ON CHINA'S ROLE IN
GLOBAL GOVERNANCE IN RECENT DECADES

This report is based on the paper: "The People's Republic of China and climate change. Approach and perspectives of China's role in global governance in the last decades", presented on July 25, 2023 in the III Lecture Series developed within the framework of the Chair in Contemporary China.



THE PEOPLE'S REPUBLIC OF CHINA AND CLIMATE CHANGE. APPROACH AND PERSPECTIVES ON CHINA'S ROLE IN GLOBAL GOVERNANCE IN RECENT DECADES

VILA MORET *Delfina*⁸

This conference will address the role of the People's Republic of China (PRC) in the global governance of climate change. We will start with some basic definitions: what we mean by climate change and how it is addressed in global governance and international relations. We will then review the PRC's role within and beyond its borders on climate issues.

The Intergovernmental Panel on Change defines climate change as the “variation in the state of the climate identifiable, for example by statistical evidence, of the mean value variation or viability of its properties that persist over long periods of time, usually decades or longer periods that may be due to either natural processes or external forcings including solar-cyclic modulations, volcanic eruptions, or –what concerns us– persistent anthropogenic changes in atmospheric composition or land use” (IPCC, 2018).

At the same time, the United Nations Framework Convention on Climate Change in its Article 1 shortens the definition, understanding it as “... the change in climate attributed directly or indirectly to human activity that alters the composition of the global atmosphere and that is in addition to natural climate variability observed over comparable time periods” (United Nations Framework Convention on Climate Change, 1992). The difference is that there are changes in the average global temperature due

8 Lawyer by the Law School of the University of Buenos Aires (UBA). Master in International Relations from FLACSO Argentina. Professor of Environmental Law at the School of Law of the University of Buenos Aires (UBA). Lecturer at the Interdisciplinary Master in Energy (CEARE-UBA).

to natural factors, but in this case, we will address those cases resulting from human activities or anthropogenic factors.

Causes of climate change

The main cause is the emission of Greenhouse Gases (GHG)ⁱ, which refers to gaseous components present in the atmosphere naturally or by anthropogenic activities that absorb and emit radiation at certain wavelengths of the spectrum of terrestrial radiation emitted by the Earth's surface, by the atmosphere itself and by clouds. The greenhouse effect generates an increase in the Earth's average temperature.

Carbon dioxide (CO₂) is the most important gas for the purposes of climate negotiations as it is the one emitted and concentrated in the atmosphere in the greatest quantities; it represents 74% of the greenhouse gases from human activity, and it also has a very long permanence with approximately one hundred years of permanence in the atmosphere.ⁱⁱ

Main consequences of climate change

According to the most recent IPCC report (2022c), among the main perceptible consequences of climate change are: 1) non-linear variations of hydrological cycles, which cause and aggravate meteorological phenomena such as heavy rains; 2) a rise in sea level with the consequent possible disappearance of island countries and major consequences for coastal areas; 3) external climatic events with greater frequency and greater voracity: Droughts, floods or heat waves or cold waves; 4) acidification of the oceans with loss of marine biodiversity, in turn by the phenomena mentioned a loss of biodiversity globally, which endangers food systems and 6) large migrations as we see with the major floods that took place in Pakistan, for example, and in turn a collapse of economic and social systems in the worst case.

A. Proposed approaches to climate change from the global governance perspective

Firstly, there is mitigation, i.e., the treatment of the root of the problem. This refers to the reduction of GHG emissions produced in everyday activities to stabilize and limit the increase in global temperature. This approach is also commonly referred to as the “decarbonization” of the economy since it refers to sustaining economic growth decoupled from

the growth of GHG emissions. Other approaches emphasize the need to rethink these levels of growth and consumption, challenging the capitalist economic development model, but the decarbonization approach has been the most widely adopted at the international and national levels.

How is this achieved? Through what has been called the energy transition or, more comprehensively, the ecological transition, which establishes the need to decarbonize the energy and production matrix towards renewable sources. In the energy sector, specifically, there is a consensus that non-conventional renewable sources –solar and wind– generate the least climate impact, but it should be noted that hydropower is also considered for the energy transition, despite the environmental impacts of large dams (Ocko & Hamburg, 2019). Likewise, natural gas has been promoted as a transition fuel to support the intermittency of non-conventional renewables and for being, out of the three fossil fuels, the one that generates the least GHG emissions.

Another measure to achieve the transition is the electrification of mobility, which aims to replace fossil fuels in transportation. Another alternative fuel is green hydrogen. Despite this, the mobility sector is one of the most difficult to decarbonize due to the fact that current battery technology is not compatible with aircraft or cargo transportation (Smil, 2019). Likewise, it is proposed to increase the so-called CO₂ sinks or GHG sinks, mainly in forested areas, wetlands, and oceans.

Finally, among the alternatives being considered are CO₂ capture and sequestration and geoengineering technologies. The latter are options that have been less explored or are technologies that have been developed but whose costs have so far been prohibitive. However, due to the gaps between goals and targets, there is some scientific consensus that resorting to these measures will be essential to meet the objectives of the Paris Agreement (IPCC, 2022b).

Secondly, we have adaptation, an approach to those impacts that we are not able to mitigate in terms of GHG reduction to avoid these temperature increases. Adaptation proposes an adjustment to this projected climate and its effects in order to generate resilience by reducing risks and vulnerability. This is done mainly through investment in infrastructure, technology transfer, and mobilization of resources to the States and sectors most vulnerable to climate change.

Today, the global target set by the international community, established at the Conference of the Parties to the convention held in Copenhagen in 2009, is 100 billion US dollars per year. This target should have been met by 2020, but by 2023 it has not been. In addition, due to the delay in compliance and the occurrence of new climate impacts, the amount has become outdated.

B. Global governance for climate stabilization

We will pause for a moment to assess the governance arrangements in place to date and then look at the role of the PRC in this governance. First, in 1988, the Intergovernmental Panel on Climate Change (IPCC) was created, which has been essential for providing a scientific basis accessible to the entire international community. It is made up of experts and scientists from all countries around the world, and its reports have served as the basis for the adoption of commitments and objectives.

In 1992, the most important milestone was the signing of the United Nations Framework Convention on Climate Change. This convention established the first definitions and objectives in general terms for climate stabilization and –something that is very important in the context of this conference– the principle of common but differentiated responsibilities. This principle states that, although there is a common responsibility of all parties to provide for the stabilization of the Earth’s climate and to prevent such extreme impacts from occurring, historically, there have been different contributions to the aggravation of this problem. Therefore, there are States that have a greater responsibility in addressing this issue than others. This principle has been somewhat problematic from several points that will be addressed throughout this conference because it is very important to assess the role of the actor that summons us. In 1994, the convention came into force with the signature and ratification of more than fifty States, the PRC being the first to sign the convention in 1993.

The Kyoto Protocol was signed in 1997. In this instrument, a global quantitative objective was set to reduce GHG emissions by 5% by 2012, taking 1990 as the base year. There, the principle of Common but Differentiated Responsibilities (CBDR) was the main focus since only developed countries, listed in Annex I of the convention (United Nations Framework Convention on Climate Change, 1992), in accordance with

Annex B of the aforementioned protocol (Kyoto Protocol, 1997), which were the industrialized and developed countries, were obliged to meet quantitative mitigation targets. The PRC was not among them, as it was a developing country in the 1990s. Eight years later, the protocol entered into force with the significant absence of the United States (US), which at that time was the largest GHG emitter in absolute terms.

However, between 2005 and 2006, China dethroned the US as the largest emitter.ⁱⁱⁱ It should be recalled that the PRC was not obliged to mitigate under the Kyoto Protocol. Given this reality, the effectiveness of this instrument for the global governance of climate change is seriously questioned. Thus, the foundations were laid to reach a new agreement, which was frustrated in 2009 at the COP15, and in 2012, the Kyoto Protocol was amended, setting a new target: an 18% reduction in GHGs by 2020. This time, it was not ratified by the USA, Japan, Russia, or Canada, which were among the top ten GHG emitters globally. Nor did it bind the PRC.

In 2014, a historic milestone in global climate governance was reached with the announcement of the bilateral agreement between the US and China, which established that they would assume commitments regarding GHG reduction and sign a new global agreement for climate stabilization.

Thus, in 2015, the Paris Agreement was signed, which set as a global objective that the average temperature of the Earth should not increase by the end of the 21st century above 2°C, making maximum efforts not to exceed 1.5°C, taking the year 1850 as the baseline.

Under the Paris Agreement, all parties are required to submit their Nationally Determined Contributions and Commitments (NDCS), which are valid for five years and must be updated with increasingly stringent standards. In 2016, with the ratification of China and the USA, which accounted for approximately 39% of global GHG emissions, the agreement entered into force.

However, what is the status of compliance with these objectives to date? The IPCC announces that we are approaching 1.5°C –it is estimated that we are reaching 1.2°C, taking 1850 as the base year (IPCC, 2022b). And, although many countries have adopted commitments to net zero emissions by mid-century, the commitments are still insufficient.

As of 2023, the global governance developments very succinctly are the proposal of gradual abandonment of fossil fuels, especially coal, which has implications for the PRC; the proposal of new targets, such as the updating of the adaptation finance target; and the need to establish carbon neutrality targets, meaning that emissions are offset either by CO₂ sinks or sequestration and capture technology and that human emissions are net zero, with the measures to be met as close as possible within the century and by 2070 at the latest.

The role of the People's Republic of China in climate governance

What has happened to the CPM and the global governance of climate change? In order to answer this question, I will address three levels of approach: first, the climate profile, i.e., identifying material capacities and the historical record of GHG emissions, as well as climate vulnerability and trajectory; second, the approach to climate change within its borders, referring to internal management; and third, the PRC's climate foreign policy, i.e., its positioning on the climate issue within the G20 framework and on the issue of foreign direct investment in the energy sector.

A. Climate profile: Material Capabilities

It is important to start by highlighting that China's rise on the global stage has been vertiginous, and this is not exclusive to the issue of climate change but is notorious in many other dimensions. China, the fourth largest country in the world, by 2022 was the most populated country in the world, currently surpassed by India, and is currently positioned as the world's second-largest economy; it has had an accelerated growth rate with an average of over 10% per year for the first decade of the 21st century, reaching its maximum peak in 2007 when it grew by 14.2%, according to data from the International Monetary Fund (IMF, 2023).

For the second decade of this century, the growth rate slowed down to an average of 7% per year, and in 2020 there was a drop to 2%. In terms of extreme poverty, we will analyze that as a result of the changes in China's development model in recent decades, it has managed to lift more than 800 million people out of extreme poverty between 1980 and 2022, which is a very important human indicator. It also ranks fifth in comparative advantages in clean energy, but we are going to see that it is a leader in many of them, representing 70% of the global renewable energy market (IMF, 2023).

In terms of participation in world trade, its average Gross Domestic Product (GDP) in purchasing power parity increased from 7.25% in 2000 to 18.62% in 2021. These accelerated levels of growth effectively made China –as I mentioned before– the second largest economy in the world in 2010, only surpassed by the USA and surpassing Japan. By 2021 it had surpassed the EU as a whole and is projected to overtake the US to become the world's largest economy by 2030 (Centre for Economics and Business Research, 2021).

China is the world's largest exporter and the second largest importer; the most striking aspect of this indicator is how the contents of its exports and imports have been changing over time. In per capita terms, GDP in 2022 will be USD 12,720, exceeding the world average of around USD 12,262, but is well below the average of the Organization for Economic Cooperation and Development (OECD), which averages USD 42,098 (IMF, 2023). This speaks of a developing country, and it is important to keep in mind that although China is a rising nation and the second largest economy in the world, it is a developing country, so it does not exceed the levels of per capita spending as the countries belonging to the OECD.

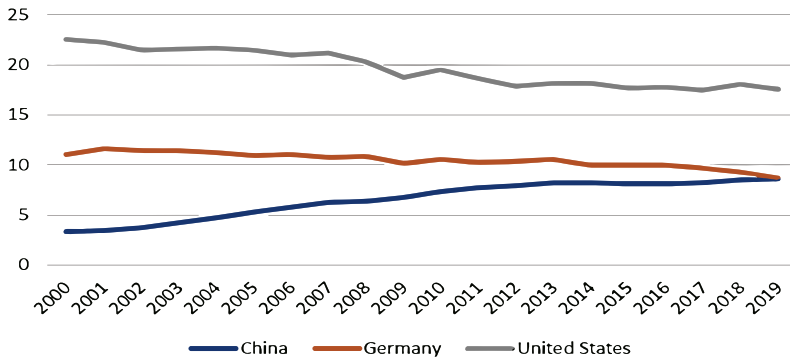
In terms of military capabilities, over the past three decades, China has become the third largest military investor in the world, with a total of USD 252 billion (Global Firepower, 2023).

These indicators show that China possesses high levels of material capabilities, is a true superpower, and therefore also has a special impact on climate governance. If we move on to the specifically climatic aspects of this actor's profile, it is possible to observe a significant jump in GHG emissions (Graph 1), which goes hand in hand with what was mentioned before, the vertiginous growth rates of this country. Above all, we are going to see a jump in the first decade of the 21st century, where the growth of emissions averaged 9.45% per year (taking into account that the GDP growth was 10%). With the above, it is possible to see this high correlation.

If we take a closer look at how these emissions are composed, we identify that the energy sector occupies the predominant place in total GHG emissions (World Resources Institute, 2023a). In turn, within energy consumption, it is essential to highlight that this is mainly explained by industries, as will be detailed below.

If we turn to per capita emissions (Graph 1), we see that their emissions remain below those of other states that have been historical emitters, such as the USA and Germany, but the difference is that those of the other states are in decline while those of China are on the rise.

Figure 1: GHG emissions per capita measured in tCO₂e for the period 2000-2019 for China, the United States, and Germany.



Source: Prepared by the authors based on data from World Resources Institute, 2023b.

It is important to keep in mind that 88% of emissions come from the energy sector, which is why it is important to analyze the way in which the energy matrix is composed.

How is China's primary energy and electricity matrix composed? Historically, its matrix has been highly dominated by coal. Coal is the main cause of China's carbon dioxide and GHG emissions, as it is the most emitted fossil fuel, and China is the world's largest consumer, producer, and importer of fossil fuels. The demand for coal in this country is for electricity and heat generation, as well as for the large, heavy industries needed for urbanization. Urbanization is a very important point because it is linked to levels of development and living standards within the country. We see that China's urbanization process is growing, given that they were very low when they began the process of opening and reform in the late seventies of the last century, and they have a significant demand for materials such as cement and steel, which are very energy intensive and therefore very intensive in coal (IEA, 2023).

Between 2000 and 2013, coal demand tripled with growth rates of more than 8% per year, making it a net importer in 2001. Between 2013 and 2019, coal as a percentage of primary energy production fell from 66% to 61%; however, as a result of the stimulus packages for the recovery from the economic crisis highlighted by COVID-19, annual consumption soared, reaching its historical peak in 2021, and although coal imports declined in 2021 compared to the previous year, local production increased by 4.7% with a record of 4070 million tons.

On the other hand, as for other fuels, gas is one of the important indicators to take into account when analyzing China's energy policy since it is betting on gasification as a transitional fossil fuel. Gas emits less GHG and less CO₂ than coal. So, it is not only China that has opted for this resource. The USA has significantly reduced its GHG emissions thanks to the transition from coal to gas. China's major investments are mainly in unconventional gas aimed at increasing its share of residential heat generation through increased local installed capacity, as well as imports (IEA, 2023).

China is the second largest importer of natural gas worldwide, and in the 2015-2020 period, the State of China allocated most of its budget allocated for energy research and development in fossil energies, mainly gas and unconventional oil. In relation to the emissions trajectories of the energy sector, energy efficiency, electrification, and the increased participation of non-fossil energies in the energy matrix, especially the electricity matrix, have been consolidated as axes of the national climate policy during the last decade.

A.1 Decarbonization of the energy matrix

There are great efforts and consolidated achievements in terms of decarbonization of the energy matrix, but mainly in the electricity matrix. In 2005, the share of non-fossil energy in China's energy matrix was 7.5%, and in 2020 it reached 29%. Today, it is around 31% and is projected to exceed the 2025 target of 36% (National Bureau of Statistics of China, 2022).

Renewable installed capacity in 2020 exceeded the domestic target of 715GW and reached 930GW. The 1200GW target was surpassed in 2022, and, in addition, so far in 2023, the installed renewable capacity in

the PRC has surpassed its own record of the previous year (China Daily, 2023). In order to understand the impact this implies at the international level, we can highlight that the total installed renewable capacity of the entire EU in 2021 was 765GW.

A.2 Economic Decarbonization: Decoupling GDP and GHGs

These efforts of a productive and energy transition, with a greater participation of renewable energies, are beginning to bear fruit in terms of the decoupling of GDP growth and GHG emissions growth.

In this sense, Our World in Data (2022) developed a calculation basis to measure the aforementioned decoupling based on the comparison of GDP growth and emissions based on production and consumption (Carbon Footprint). The German case represents a consolidated decoupling, with economic growth in line with the reduction of GHG emissions. In the case of India a coupling between GDP growth rate and emissions can be seen, while China shows an incipient decarbonization. Since 2013, the Chinese PIC growth rate has remained stable between zero or even at negative levels, while the economy continues to grow. This is evidence of a decoupling.

The conclusion, then, is that China is in a transitional period of decarbonization of the economy, which, if stable, would consolidate its classification as a Strong Decoupling –similar to the German case– for the next few years. (Our World in Data, 2022).

A.3 Climate vulnerability

When we talk about climate vulnerability, it is enough to simply pay attention to what is happening with the heat waves that have been hitting the People's Republic of China in recent years. These have wreaked havoc, especially between 2017-2019, with intense heat waves and droughts that compromised energy supply, in addition to endangering the most vulnerable populations in the face of these events (Wang & Yan, 2021).

China is considered a medium-high vulnerability country according to the Climate Risk Index (Eckstein et al., 2021). It is also important to note that China is considered highly vulnerable to the impacts of climate change and that the IPCC has also established that, without adaptation of resilient infrastructure to the impacts of climate change, China would

suffer the world's largest economic losses from sea level rise, flooding, and heat waves (IPCC, 2022a).

As mentioned above, China has witnessed heat waves and droughts during the summer and power outages due to system failure. Droughts and extreme storms have led to the evacuations of thousands of people. A clear example was when record levels of rainfall were recorded in the Guangdong region in 2018, which caused damages of approximately USD 400 million and caused the evacuation of more than 200 thousand people (Reuters, 2018).

B. Inward Boundaries

Based on the indicators outlined above, we will proceed to make an overview of the PRC's climate policy and identify the challenges it faces. To do this, we will first review the changes and trends in the national economic development model, and then go on to identify climate measures in terms of legislation and plans, policies, and measures adopted at the national level to address climate change. This will be done taking into account the five-year plans since they compose the most important public policy planning and measurement tool in the PRC. Finally, we will address the major challenge facing this actor: coal.

B.1 National development model

Since the process of reform and opening up, the market forms introduced in the Chinese development model and in the planning of the country's domestic economic policy have been traversed by the thinking tradition of a "Socialism with Chinese Characteristics" since 1978 and up to the first decade of the 21st century. This refers to a model based on comparative advantages in heavy industries focused on achieving and sustaining high levels of economic growth, which in turn caused high levels of air pollution due to the use of coal-based energy (Kong, 2019).

Other principles of this model of socialism with Chinese characteristics are that of accelerated urbanization, intensive in steel and cement, and therefore, in energy. Therefore, the application of this model represented high levels of energy demand. This was coupled with the implementation of birth control policies, as it was considered imperative to efficiently address the eradication of extreme poverty and stimulate a better allocation of resources. At the same time, one of the central objectives

of the model was to move up the global value chains (GVC) and leave behind economic primarization based on the export of raw materials. The application of the aforementioned measures, considering the size of the PRC economy and its population, led China to consolidate its position as the first absolute GHG emitter with a completely fossilized energy matrix.

During the second decade of the 21st century, there was a slowdown in the economic growth of the PRC, which, in contrast to what I commented previously on the accelerated growth at average rates between 8% and 10%, allows us to see some transitions that have been applied internally to the country. For this reason, a “Socialism with Chinese Characteristics for a New Era” is proposed as a “new way of thinking, which imposes a “New Normality” in the development model and international insertion and the introduction of the principle of “ecological civilization” (Hilton & Kerr, 2016).

Ecological civilization refers to a discursive guide that proposes the establishment of a comprehensive system to establish the strictest possible rules for environmental protection. It is a new paradigm that proposes an economic development with environmental sustainability, which addresses social inequality, as opposed to the vices of the historical industrial civilization (Sfahel, 2020). The model implies, for example, the establishment of red lines such as the protection of ecosystems, wetlands, forested areas, the increase of CO₂ sinks, and the protection of reserves of great biodiversity, which must be preserved in their entirety and cannot be used either for industrial purposes or for transportation or urbanization. This principle, in turn, has been included in the party's constitution, which speaks of its importance in the framework of state planning (China Daily, 2013).

The aforementioned model permeates climate policy through the establishment of targets for installed capacity and greater participation of renewable energies in the primary and electricity matrix, residential, industrial, and electromobility electrification, reduction of the energy intensity of GHG emissions, the setting of peak emission targets and the establishment of a carbon neutrality goal for 2060. It is also reflected in the setting of quantitative targets for the consumption and use of coal to reduce and mitigate GHG emissions, the increase of natural gas and

nuclear energy as a complement to decarbonization, the reduction of energy consumption and intensity, and the encouragement of “green industries.” Thus, the PRC seeks to implement a new development model based on less energy-intensive industries, with greater innovation and added value, in addition to encouraging diversification of the energy matrix, greater coverage of protected areas and ecological reserves with reforestation policies, the creation of “green cities” and the launch of a national carbon credit market.

B.2 PRC Climate Policy 2009-2021

As explained in the previous section, the changes in the national development model had a marked impact on the adoption of public climate policies. Thus, in the period between 2009 and 2021, two stages can be observed. During the first period, between 2009 and 2015, coinciding with the Five-Year Plans (PQ) 11 and 12, the first national plans to address climate change were implemented, just as quantitative targets with climate significance were incorporated for the first time. The achievement of the energy efficiency targets of QP12 and the achievements in terms of an incipient decoupling of emissions and growth suggest that climate change has been consolidated as a priority in China's policy planning.

The post-Paris Agreement period (2016-2021) reversed the ambitious trend. The outbreak of the pandemic, the decentralization of energy policy and authorizations for new coal projects, as well as extreme weather events that boosted energy demand, followed by the launch of a stimulus package that spurred greater economic and industrial activity, implied a failure to meet the targets set in QP13 and a relaxation of climate policy ambition in pursuit of energy security in QP14.

B.3 Major milestones

From 2000 to date, more than one hundred measures have been enacted, implemented, revised, and updated. This includes quantitative targets, more pilot tests in regions, the stimulation of electromobility (EV), and the installation of subsidies in the framework of renewable energies for private parties, among others. Of the most important central government policies, the following stand out:

- Quantitative energy efficiency targets.
- Quantitative targets for GDP and GHG decoupling.
- Quantitative objectives of total energy consumption.
- Quantitative coal use targets (annual/five-year).
- Peak emissions 2030 and carbon neutrality 2060.
- Three (3) National Plans to address climate change, including the last one in force until 2030 to reach peak emissions.

While in the 11th and 13th Five-Year Plans (FY11 and FY13), the national energy efficiency target was not met, China is expected to surpass the 50% renewables share target of primary energy consumption planned for Sectoral FY14 (China Daily, 2023). Also, the PRC leads the global EV market and, in 2021, officially launched its national carbon market (the world's largest with UD 1.52 billion in 2020, 40% of the country's electricity emissions) (IEA, 2022a; IEA, 2022b).

B.4 Challenges: Coal conflicts

As mentioned above, the PRC is a highly coal-dependent economy (Sönnichsen, 2023). Within the country, there are regions particularly attached to this fuel, as it is an important source of employment both from the coal industry and, indirectly, from energy-intensive industries such as cement and steel. Shanxi, Shaanxi, and Inner Mongolia Autonomous Region together account for 70% of total coal production in the PRC; and Shandong, Hebei, and Jiangsu are the largest coal consumers, as they are the main producers of cement and steel. In addition, promotion and promotion schemes for provincial and municipal officials play a negative role in decarbonizing (Heerma van Voss & Rafaty, 2022).

In 2020 alone, China approved new projects for the equivalent of 38 GW of installed coal capacity, which represented 80% of the aggregate global coal capacity. This is one of the challenges facing the PRC to achieve carbon neutrality and to reduce its share of total global emissions.

In recent years, coal demand has reached a record high, which has reached a ceiling as a result of post-covid stimulus factors. It is estimated that consumption will be reduced in the coming years due to a greater participation of renewable energies, gas, and nuclear energy, mainly because the economy is slowing down, and a productive transition is taking place towards less energy-intensive economies that are more focused on technological innovation and service.

C. Foreign climate policy

In this section, the focus will be on how the PRC has performed in the Conferences of the Parties (COPs) within the framework of the United Nations, with emphasis on recent years. Then, its impact on the G20 as a forum to promote climate governance and, finally, its role as an issuer of Foreign Direct Investment (FDI) in energy will be analyzed.

C.1 Conferences of the Parties within the framework of the United Nations Framework Convention on Climate Change

In 2009, at the Copenhagen summit, much of the international press and the academic sector, mainly from Europe and other countries of the global North, called China the “villain” of the climate negotiations, the culprit for having frustrated the new global agreement that was to be signed in 2009 (Lynas, 2009). This had an impact on the international image of this State, which began to modify its actions in the context of the conferences of countries, its allies, and its anchoring in the principle of common but differentiated responsibilities.

Although, from the beginning it supported the signing of international instruments to address climate governance, in 2009, it was reluctant to adopt binding commitments in terms of mitigation. At that time, the BASIC group, which the PRC formed together with other emerging economies, resisted pressure from developed and least developed countries, especially island nations. Pointing out their need and right to develop, this coalition stood out for making visible the discursive tensions of international pressures since the path to economic development has historically been one of industrialization based on heavy industries, which requires an increase in GHG emissions, as developed countries have done. But indeed, today, the PRC is also among the largest emitters in historical terms, ranking third (Ritchie Hannah, 2019).

Since the damage to the international image that COP15 left on the PRC, there have been noticeable changes in foreign climate policy. The adoption of voluntary commitments, the establishment of a communication group for climate change, and a greater proclivity for international negotiations with the establishment of a bilateral working group with the US are some of the points that demonstrate this (Hilton & Kerr, 2016). Thus, in 2014, after a profound change in diplomacy and foreign policy, a historic

bilateral agreement was reached with the US, committing both parties to sign the Paris Agreement and to adopt commitments in terms of GHG mitigation. We see a change, then, from being branded as a villain to being one of the parties that led the process towards the signing of the Paris Agreement.

The path followed was then deepened with new agreements with the United States in 2015 and 2016 that increased bilateral cooperation on climate change, but also committed, on the Chinese side, to launch carbon markets in 2017. This was intended to achieve and contain a quantitative target for emissions caused in the industrial sectors, mainly from the State.

In 2017, the year in which former US President Donald Trump announced the withdrawal from the Paris Agreement, an opportunity to lead the process of global climate governance opened up for China, but various internal, structural problems related to energy cuts, pressures from internal actors to authorize new coal plants to sustain the levels of economic activity, make these conflicts permeate into Chinese positions in the new sessions, mainly in what has to do with the abandonment of coal and fossil fuels, the maintenance of the goal of 1.5 °C, and much of academia and climate change journalism note that Xi Jinping did not attend the Katowice 2018 summit. In this case, we begin to see a retreat, a reinforcement of the principle of Common but Differentiated Responsibilities, to decide on their own resources, and further commitments are postponed for future COPs.

In the midst of the COVID-19 pandemic, the COP that had brought the Nationally Determined Contributions (NDCs) into force is postponed. Arriving at CAOP26 in 2021, Xi announced that China would commit to carbon neutrality by 2060, updating its NDC, while announcing that they would not invest in new coal plants abroad.

However, at the 2021 COP, the main discussion revolved around the gradual or complete abandonment of fossil fuels. In the end, the term “pass-out” was not included in the final document, and although most of the press pointed to India, China was also affected by this decision, which implied a reputational setback (Hook et al., 2021). Furthermore, the Asian giant did not sign the agreement on limiting methane emissions.

At the last COP at the time of this conference, which took place in the Egyptian city of Sharm El Sheikh in 2022, the PRC supported the creation of the loss and damage fund^{iv} but, despite being the largest global issuer in absolute terms and third in historical terms, it does not assume its role as the debtor. This is because it does not consider itself a developed nation that should compensate other states –mainly from the Global South–, but offers to finance as a liberality.

C.2 G20: Climate boost or fossil dependence caution?

Until 2015, the PRC was very cautious about being considered a “leader” so as not to be attributed greater responsibilities. However, with the Chinese presidency at the 2016 summit, which had also played a leading role in the signing, ratification, and entry into force of the Paris Agreement, this mutated considerably.

While relative to other summits, the Hangzhou summit did not adopt many climate change commitments –about 1%– it urged other nations to increase their ambition under the Paris Agreement, ratify it and become States Parties, connected national priorities to the Sustainable Development Goals, launched the Green Finance Study Group, and pushed for climate finance in the 2020 agenda.

With the administration of Donald Trump, this situation suffers some setbacks, mainly in the ability of the G20 to install greater ambitions at the level of all actors on climate issues because Trump positioned himself as a climate change denier, expressing his interest in withdrawing from the Paris Agreement. These tensions are evident in the commitments made during the period, but China continues to play a leading role, and climate change continues to represent an important part of the speeches of its leaders attending the G20 summit.

In Hamburg, in one of the tensest summits, the PRC, together with Germany, promotes the Climate and Energy Action Plan for Development, positioning itself as the driving force for ambitious climate governance, but between 2020 and 2021, China conflicts with the ratification of the 1.5°C target and does not subscribe to the document of the summit of environment ministers in Naples, since it knew it would be held responsible for emissions from carbon emissions.

As of today (2023), negotiations are resuming in order to generate a new bilateral announcement and reach this year's COP to be held in Dubai for a joint announcement of some level of increased ambitions in the climate scenario. It should also be borne in mind that the current energy crisis resulting from the Russian-Ukrainian conflict has an impact on climate ambitions and permeates the G20 with regard to decarbonization and the abandonment of fossil fuels.

C.3 Energy FDI in the 21st Century: Emissions Driver

The 21st century is characterized as a driver of emissions globally, i.e., FDI from China in the energy sector has served as a trigger for GHG emissions (Kong, 2019). Major institutions such as the China Development Bank (CDB) and the Bank Exports and Imports (BExIm) have invested between 200 and 2021 through State-owned enterprises (SOEs) more than 56GW of installed coal capacity abroad, representing 42% of the installed capacity by FDI in the world (González Jáuregui, 2021).

The investments of these two institutions are equivalent to 97% of the financing of the joint financing between the WB, IDB, Asian Development Bank (ADB), and African Development Bank (AfDB) (Kong, 2019). This gives us a picture of the volume of the flow. The focus of the PRC's international insertion during these last decades was concentrated on seeking the transfer of technologies, markets, energy, and financial stability to achieve the objectives of modernization and rejuvenation of its nation. To achieve these goals, it has implemented the Going Global development strategy followed by the Made in China 2025 strategy, conceived with the aim of becoming a global technology leader by 2030.

On the other hand, there is the Belt and Road initiative, launched in 2013 with a modern vision of the ancient Silk Road and comprising investments in infrastructure and strategic sectors through Chinese financing entities with state capital via state-owned enterprises in developing countries. Most of the FDI in renewable energy from China was from private sources, in contrast to BRI (Rubio & Jáuregui, 2022).

Some studies indicate that BRI has been a driver of GHG emissions in lower-middle-income countries such as Sub-Saharan Africa, Southeast Asia, and Latin America (Mahadevan & Sun, 2020). Also, it is worth bearing in mind that of the total financing provided for energy to

developing countries by CDB and BExIm between 2000 and 2017, 40% went to oil, followed by 19.9% coal, 17% hydro, 13% gas, 4.4% nuclear and 2.3% to non-conventional renewables (Kong, 2019).

C.4 New trends: Chinese FDI in Latin America

In 2021 and 2022, the FDI that grew the most was through mergers and acquisitions (M&A) for existing projects. The three most important investments coming from the PRC in 2022 were M&A in sectors related to the energy transition:

1. Lithium Mining in Pozuelos-Pastos Grandes, Salta (Argentina)
2. Lithium Mining in Tres Quebradas, Catamarca (Argentina)
3. Lithium-ion battery development and EV manufacturing (Brazil)

Globally, China accounted for 70% of the global renewable components market by 2022. In 2021, the BExIm and CDB committed no new loans for energy FDI, which by 2022 is perceived as a reversal at the rate of fossil-dominated FDI (Albright et al., 2022).

Conclusion

China has planned and implemented an ambitious climate policy based on the principle of ecological civilization with a development model based on technological innovation and is also leading the global race as a promoter of renewable energies, especially non-conventional ones such as wind and solar, and has contributed to lowering the costs of these technologies, which in turn generates important incentives and assistance for decarbonization at the global level. Although there are some concerns about dependence on Chinese products for the energy transition, it is true that their contributions at the international level have made the return on investment (ROI) of renewable energies highly competitive (IEA, 2022a, IEA, 2022b).

Despite the above, the PRC faces serious challenges due to its dependence on coal. The high energy demand, supplied mainly by this fossil fuel, will be a determining factor for its performance as the main emitter in the future. At the same time, the impacts of climate change also represent a threat to the country's energy security, which permeates its national climate policy planning as well as strongly influences its positions in international forums.

Finally, in terms of energy FDI, China has played a role as a promoter of fossil fuels at the global level. It is essential to change this trajectory in order to consolidate its position outside its borders in the fight against climate change.

Notes

- i. The best-known greenhouse gases, which also come from nature, are carbon dioxide (CO_2), water vapor (H_2O), nitrous oxide (N_2O), methane (CH_4), and ozone (O_3). In their case, gases emitted by human intervention are halocarbons or other substances containing chlorine and bromine, which are covered by the Montreal Protocol. In addition to CO_2 , N_2O and CH_4 , the Kyoto Protocol covers what are called fluorinated gases (sulfur hexafluoride (SF_6), hydrofluorocarbons (HFCs), and perfluorocarbons (PFCs), which have no natural sources and come mainly from the production of aluminum and semiconductors.
- ii. Methane (CH_4) in parts per million is hotter than CO_2 , although it is shorter-lived and accounts for 17.3% of GHGs; while nitrous oxide (N_2O), which is mainly emitted in agricultural activities by the issue of agricultural residues, fuel combustion, and the production of chemicals such as Nitric Acid (HNO_3) and Adipic Acid [$(\text{CH}_2)_4(\text{CO}_2\text{H})_2$], accounts for 6.2%. Fluorinated gases account for 2.1%.
- iii. In historical terms, it is important to note that China ranks third if we take the data from Our World in Data (Ritchie Hannah, 2019), which accounts for GHG emissions between 1951 and the present.
- iv. The incipient third line of action refers to compensation for losses and damages that have not been avoided, either due to lack of investment in adaptation or to climate change conditions.

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SINO-LATIN AMERICA'S COOPERATION ON DIGITAL ECONOMY

AID FOR TRADE PERSPECTIVE

This report is based on the paper: "Sino-Latin American Cooperation in Digital Economy: Aid for Trade Perspective", presented on August 3, 2023 in the III Cycle of Conferences developed within the framework of the Chair in Contemporary China.



SINO-LATIN AMERICA'S COOPERATION ON DIGITAL ECONOMY: AID FOR TRADE PERSPECTIVE

SONG Wei⁹

Since my research focuses on China's development of cooperation in these developing countries, this time I choose the Aid for Trade Perspective. My topic is mainly concentrated on how China uses Aid for Trade to promote Sino-Latina America's Digital Cooperation.

What is "Aid for Trade"?

"Aid for Trade" refers to the provision of aid to improve recipients' trade capacity and to strengthen their economic prowess. The goal is to achieve economic development goals through trade so that developing countries can benefit from economic globalization.

So, let's begin with the background. Why digital cooperation is very important? Why Aid for Trade is necessary?

COVID-19 has accelerated the trend of global digital transformation

Digital Transformation is a driving force for innovative, inclusive, and sustainable growth. Innovations and digitalization are stimulating job creation and contributing to addressing poverty, reducing inequality, facilitating the delivery of goods and services, and contributing to the achievement of the 2030 Sustainable Development Goals.

In recent years, the international community has paid more and more attention to digital transformation. Digital innovation in various fields has emerged in an endless stream, and countries of different development

9 Professor at the School of International Relations and Diplomacy, Beijing Foreign Studies University. Her research focuses on China's development cooperation within the framework of the BRI.

types even regard it as the key to winning national advantages. With the sudden spread of COVID-19 worldwide in 2020, digital transformation faces a significant opportunity in its development.

A. The speed of digital transformation in developing countries is accelerating

Digitalization is reshaping economic and social activities globally. More than half the people in the world now use the Internet; 1.5 billion people shop online; the roll-out of 5G technology, and the widespread use of artificial intelligence will further accelerate the shift to a genuinely data-driven digital economy.

In 2020, thanks to the greater use of digital solutions during the COVID-19 pandemic, global Internet bandwidth increased by 35%, exceeding the 26% growth of the previous year (OECD, 2021). Especially, digitalization is a lifeline for those lucky enough to have the Internet during the COVID-19 pandemic. It improved access to social protection payments, health care, jobs, and education. Although developing countries lag behind developed countries in the digital economy, their digital transformation has accelerated in recent years.

Digitalization offers new opportunities for developing countries and firms of all sizes to overcome existing trade cost disadvantages and deliver their products to a wider range of markets.

Access to cheaper, more sophisticated, and diverse digital inputs – including productivity-enhancing software, communications technology, or e-payment services– can help firms deliver their output to a wider customer base across different countries and overcome existing trade costs and disadvantages.

Recent evidence suggests that access to digitally deliverable business services, such as Internet banking or online accounting services, helps drive export competitiveness, especially in less developed countries.

Moreover, recent analysis shows that in developing countries, MSMEs with a digital presence in the form of a webpage are more likely to become exporters than those with no digital presence. Digital services can also help women-led firms, which are generally smaller than those led by men, overcome some of the barriers to establishing and growing

their businesses and trading on international markets, among them lowering the costs of accessing credit and obtaining information through professional networks.

B. The scale of financing currently used for digital development is increasing, and the financing instruments tend to be diversified

In terms of financing size, financing for digital development has grown significantly. During the five years 2015-2019, digital-related official development finance from bilateral and multilateral donors and philanthropic foundations totaled USD 18.6 billion. Bilateral and multilateral organizations mobilized more than USD 4.2 billion in additional private finance (OECD, 2021).

In terms of financing sources, multilateral institutions have become the main force supporting digital financing in developing countries. Multilateral institutions represented 62% of the total committed by multilateral and bilateral providers and philanthropic institutions in 2019 (OECD, 2021).

In terms of where finance goes, America –including the Caribbean, South and Central America– received 5.5% of the total bilateral development finance for digitalization, and 36.6% of the total multilateral development finance for digitalization (OECD, 2021).

In terms of the distribution areas of digital transformation finance, it is mainly concentrated in the communications sector including activities in communication and information technology, telecommunications, and related policy interventions (OECD, 2021).

The COVID-19 pandemic worldwide has shown the extent to which the Internet has become a major factor in resilience during crises and a major venue for retail, work, education, global trade, culture, and other daily activities. To remain operational, many countries and organizations brought forward investments in digital technologies. Across OECD countries, 21.15 million new fixed broadband connections – a record – were added in 2020 alone (OECD, 2021).

LAC's Development Need on Digital Economy

A. In Latin America and the Caribbean, digitalization can address structural development traps

The pandemic hit the region at a time of economic stagnation. Economic growth and socio-economic advancements have slowed since 2011, halting the progress the region experienced earlier in the century. The pandemic also affected digital transformation across countries, accentuating existing structural development traps (OECD et al., 2019). Low labor productivity, growing middle-class aspirations, and the social and economic impact of the COVID-19 pandemic signal an evolving situation in the region.

Nonetheless, the COVID-19 crisis has spurred the development and adoption of digital technologies, particularly in the business and education sectors where telework and online learning became mainstays during lockdowns. There is great scope to expand the benefits of digital transformation, especially for the micro, small, and medium-sized enterprises (MSMEs) that represent nearly two-thirds of all employment across the LAC region.

B.2 Internet usage is growing overall, but gaps persist in firms' uptake of digital tools

Uptake of digital technologies varies by the size of firms in the region, with larger firms using digital tools far more frequently like websites and email. In some LAC countries, the gap between small and large companies that own their website is more than 30 percentage points.

Digital transformation in the labor market brings both challenges and opportunities. Two in ten jobs are at risk of automation in the LAC region and four in ten jobs might substantially change in terms of tasks, with variation in the region (OECD et al., 2020). In the Plurinational State of Bolivia, only 5% of jobs are at high risk of automation, while in Uruguay this figure rises to 29% (ECLAC, 2019).

B. The pandemic revealed persistent digital divides across the region

The socio-economic impacts of COVID-19 in the LAC region were dramatic. The region ended 2020 in the worst economic downturn of the last 20 years, with annualized gross domestic product (GDP) growth slightly below -7.0% (OECD et al., 2021).

Against the backdrop of this stagnation across the region, the COVID-19 crisis increased momentum to undertake reforms necessary to ensure the benefits of digital transformation for all (OECD et al., 2020). The challenge now is to ensure that digitalization realizes its potential to be an engine for renewed economic growth and help address the region's development gaps and traps.

C. Digital transformation to escape development traps

Digital transformation can help LAC economies address development traps that emerge when countries with long-standing weaknesses confront new problems. Digital technologies can increase productivity by helping firms access new markets, create new goods and services, and produce more efficiently and productively.

It can create new jobs and make public services more accessible, mitigating social vulnerability. Digitalization can help governments become more reliable, effective, open, and innovative. This can help to rebuild the trust between governments and citizens. Finally, it can help create green and sustainable growth. Alongside these opportunities, some risks need to be managed.

D. The social vulnerability trap: Increasing access and skills to overcome digital divides

The social progress that the region experienced earlier in the decade slowed and, in some countries, reversed due to the economic slowdown and impact of the pandemic, particularly on the most vulnerable. Protecting vulnerable informal workers with no social safety net and avoiding widespread poverty are now particular challenges (OECD, 2020). It is estimated that in 2020, the poverty rate in LAC climbed to 37.3% of the population (OECD et al., 2021; ECLAC, 2020), a level not seen for the past 12 years (OECD et al., 2021)

Despite progress in recent years, there remain wide gaps between socio-economic groups in digital skills and access to and use of digital technologies. During the pandemic, these disparities widened, creating winners and losers. For instance, fewer than half of the LAC population had enough experience using digital tools to carry out basic professional tasks, meaning they were effectively excluded from remote activities (OECD et al., 2020).

E. The institutional trap: Addressing regulatory and equity issues

Governments face new regulatory challenges to both manage issues that arise from digital transformation and ensure that it benefits all (OECD, 2019). They also must grapple with their digitalization.

LAC country governments are at different stages of digital transformation. They fall into two groups in the United Nations E-Government Development Index. Argentina, Brazil, Chile, and Uruguay are among the top 50 performers of the 193 countries surveyed in the 2018 edition. Belize, Cuba, Haiti, and Nicaragua are among the worst performers (UN, 2019).

Digital transformation can help governments be more innovative in policy design, delivery, and evaluation, improving the policy-making process. Technology and the digitalization of societies and governments are generating massive amounts of data, which can be assets to spur innovation and develop better-informed and targeted public policies and services.

China-LAC's Digital Economy Cooperation

In this part, I will address some issues regarding China-LAC's Digital Economy Cooperation. There are three main subjects: the current situation, cooperation opportunities, and financial challenges.

A. Current situation

A.1 China and Latin America have a good complementary basis for digital economy cooperation

- Huge potential of the Latin American digital market: Although Latin American countries are still in a relatively backward position in the process of global digital economy development, the Latin American region has a digital demographic dividend, with huge development potential and attractiveness to Chinese enterprises.
- Strong willingness to develop digital economy in Latin America: At the same time, under the dual reality of insufficient power of traditional sources of growth and increasingly fierce international digital competition, Latin America has the

urgent need to use the digital economy to promote structural adjustment to promote growth and accelerate the pace of development of the digital economy, and the development of the digital economy has been the focus of regional policy.

- China and Latin America have complementary conditions in the digital field: at present, the lack of ICT infrastructure, talent, and capital is still the main constraint on the development of the digital economy in Latin America. Latin American countries urgently need to seek international cooperation to make up for the lack of funds, technology, and experience, and China, with its technological and financial advantages, has formed a complementary relationship with the Latin American region.
- *Technology*: Under the general trend of international cooperation in the digital economy, Chinese Internet technology enterprises are also expanding their overseas business. Currently, more than 6,000 Chinese digital technology enterprises have entered overseas markets, and more than 10,000 digital products have been launched in overseas markets. More than dozens of countries and regions around the world already use the two payment platforms Alipay and WeChat Pay.
- Alibaba has successfully built a global e-commerce platform that connects merchants and consumers in more than 200 countries around the world. As Chinese digital technology companies continue to invest more in the Latin American market, China has become the largest investment partner in Latin America's booming tech sector.

A.2 Dovetailing of digital development strategies between China and Latin America-BRI

China: The Outline of the Fourteenth Five-Year Plan for the National Economic and Social Development of the People's Republic of China and the Vision 2035 explicitly mention the development of the digital economy as a strategic area in the construction of a new development pattern.

Latin America: The “Digital Agenda 2022 for Latin America” adopted at the Seventh Ministerial Conference on the Information Society in Latin America and the Caribbean in 2020 strongly advocates the use of the digital economy as a driving force for innovation and development, which will provide new opportunities for the economic recovery of the Latin American region in the post-pandemic era.

Docking: Under the cooperation framework of “Belt and Road”, Latin American countries are increasingly strengthening their policy support for the development of a digital economy. In recent years, China and Latin America have reached a consensus on building a “Digital Silk Road”, and in the face of new historical opportunities, China and Latin America should take digital economic and trade cooperation as an opportunity to promote China-Latin America relations toward broader fields, higher levels, and deeper levels, and lay a solid foundation for building a more stable China-Latin America community of destiny.

B. Opportunities

B.1 Digital economy cooperation for high-quality development of the new economy

Digital economy refers to a new economic form that takes digital knowledge and data resources as key production factors, uses the Internet as the basic carrier, and promotes efficiency enhancement and optimization of economic structure through the in-depth integration of digital technology and the real economy. Under the complex international environment of economic globalization and the impact of the pandemic, digital economy cooperation plays a crucial role in promoting global economic recovery. As an important part of China’s “Digital Silk Road” construction, China-Latin America digital economic cooperation has become an emerging growth area that effectively promotes the high-quality development of China-Latin America relations in the post-epidemic era on the premise that the development of digital economy is limited by the traditional forms of economic cooperation.

B.2 Digital economy cooperation promotes the optimization of the complementary economic structure of China and Latin America

Against the backdrop of a century of change and the pandemic, China and Latin America’s economic development is in a critical period of

transition and needs kinetic energy to promote the optimization of economic structure. China needs to transform from an investment-driven to a domestic demand-led economy, while Latin America is transforming from a low-investment, export-oriented economic development model to a high investment and rationalization of industrial structure.

The growth rate of bilateral trade between China and Latin America is slowing down, and breakthroughs are needed to promote the depth of interaction between the two sides. According to the statistics of China's General Administration of Customs, the growth rate of total bilateral trade between China and Latin America has been slowing down since 2015 due to the impact of declining demand in the Asian region and falling prices of energy products. It is a general trend to promote the high-quality development of China-Latin America relations by taking digital economy cooperation as a breakthrough.

B.3 Digital economy cooperation is conducive to China and Latin America facing the challenges of the world economy together

In the process of combating the epidemic, more and more countries realize the important role of the digital economy represented by blockchain, big data, artificial intelligence, and other digital technologies in the post-epidemic economic recovery, and the epidemic has also pushed the world's countries to cooperate more strongly in digital information technology. China has the advantage of a total digital economy, while Latin America occupies the advantage of a demographic dividend. The two sides carrying out digital economy cooperation can more effectively play the key role of digitization for sustainable economic development and inclusive growth, and better cope with the situation of the world's economic competition in the complex international context.

Table 1. China's digital transformation

Infrastructure	Content & applications	E-Commerce
<ul style="list-style-type: none"> • Investment stimulus • Regulatory harmonisation • Reduce interconnection dependency, increase affordability of regional communications 	<ul style="list-style-type: none"> • Innovation, R&D • Cultural Heritage • IPR and Copyright • SME, start-ups, new business models • Funding 	<ul style="list-style-type: none"> • Consumer trust • Data Protection & flows • Payment systems • Logistics • Taxation

Source: Based on CAF. (2018, March 6). Digital economy in Latin America:

Cullen International leads policy debate at Mobile World Congress.

B.4 China and Latin America can cooperate on artificial intelligence and big data to better address public health challenges

Since the outbreak of the epidemic, governments have generally realized the outstanding contribution of digital technology in epidemic prevention and control, and in sustaining and promoting socio-economic operations, and they have all taken the further promotion of digital economic development as an important engine for sustainable economic and social development in the post epidemic period. The governments of China and Latin America are also striving to actively utilize digital technology in the process of epidemic prevention and control from their own country's practical point of view, and at the same time, they further realize the need to increase investment in this area. During the new coronavirus pneumonia epidemic (COVID-19), Huawei Cloud collaborated with more than 20 hospitals in Ecuador, Chile, Colombia, Brazil, Peru, Mexico, and other Latin American regions to use the AI-assisted screening system jointly launched by Huawei Cloud and its partners to conduct rapid screening for the new coronavirus pneumonia COVID-19, and to assist the local community in fighting the epidemic.

C. Challenges

C.1 The lack of stability in the political situation in Latin American countries hinders the stability of cooperation

Competition between left and right political forces in Latin America is intense, with traditional political parties facing a crisis of confidence

and emerging parties rising at an increasingly rapid pace. The outbreak of the pandemic has had a significant impact on the Latin American region, and social contradictions in Latin America have frequently emerged, the national election agenda has been slowed down, and there have been occasional outbreaks of public dissatisfaction, with frequent risks of political unrest. 2019 has also seen the outbreak of large-scale violent demonstrations and protests in several countries, such as Chile, Colombia, Argentina, Ecuador, Peru, and other countries.

C.2 Structural contradictions in the development of the digital industry in Latin America, restricting cooperation and sharing

In recent years, the economy of Latin America has entered a state of sluggishness, and the outbreak of the Pandemic has made the structural problems of Latin America's digital economy industry more prominent. Structural contradictions such as the low level of the industry, structural sameness, low level of enterprise production technology, and inappropriate regional industrial layout are the main problems restricting the development of Latin America's digital economy. Most of Latin America is an emerging resource market country, the export products are mainly primary products and low value-added industries, the industrial structure is single, the endogenous growth momentum is insufficient, the economic development is affected by the changes in the external environment, and the deep dependence on the international market makes it very difficult to form the industrial development chain with the digital economy as the core. The lack of innovative technology in Latin American enterprises and the inappropriate regional industrial layout limit the breadth and scale of economic cooperation between China and Latin America.

C.3 Institutionalization of technology and standards is lagging, which reduces the anticipation of cooperation

China-Latin America digital economy cooperation is still in the initial exploration stage, and the obstacles and challenges existing in the process of digital economy cooperation between the two sides are difficult to dissolve in the short term, which has become the key factor restricting China-Latin America digital economy cooperation. The information security guarantee mechanism of China-Latin America digital economy cooperation is insufficient; China and Latin America have not yet reached

a consensus on the standardization of digital trade. Due to the different national conditions and development differences among Latin American countries, it will be a big obstacle to the effective interaction between China and Latin America if we have to sign different technical contract standards with all Latin American countries.

China's Aid for Trade Practices

In 2005, the World Trade Organization (WTO) proposed the "Aid for Trade" Initiative at the 6th Ministerial Conference held in Hong Kong, China. This was to encourage developed countries to use trade as a means to reduce poverty and raise living standards in developing countries. Since the launch of the Aid for Trade initiative, some 60 donor countries that report their official development assistance (ODA) to the OECD's Creditor Reporting System (CRS) have provided a total of \$409 billion in ODA to support Trade-related infrastructure and capacity building, of which \$146 billion flows to Africa, second only to Asia (OECD/WTO, 2019). While Aid for Trade has been paid more and more attention by the international community, it has also been increasingly regarded as an important tool to promote trade diversification and enhance the competitiveness of developing countries.

As an important member of WTO, China has actively responded to the Initiative and stepped up its efforts to help other developing countries. China has helped African countries improve their trade infrastructure and capacity, laying a solid foundation for Belt and Road Initiative participants to achieve unimpeded trade.

Trade is an important engine for economic growth and an important channel to promote independent development in the least developed countries. Therefore, China has implemented five main practices to help African countries to improve trade facilitation and capacity.

A. China assisted the other developing countries in building trade-related infrastructure, facilitating regional logistics, and fostering new forms of trade

On one hand, by assisting in the construction of transportation and communications infrastructure, China has been able to promote physical connectivity and intraregional trade. This has led to the streamlining

of regional logistics and the promotion of e-commerce. With rapid socioeconomic progress, the underdevelopment of international airports, ports, bridges, and other transportation hubs in developing countries has become increasingly stark. As a result, logistical costs have increased dramatically.

To this end, China has supported the construction of many transportation hubs, including International Airports, Ports, and so on. These projects have become international trade logistic hubs, bolstering regional connectivity, trade transactions, and integrating regional economies.

On the other hand, the promotion of digital connectivity has conditioned transborder e-commerce development. China has supported the construction of fiber-optic networks in other developing countries, bringing about benefits in the expansion of network coverage, reduction of local communication costs, development of e-commerce, convenience to people, and impetus for socio-economic development.

China has assisted other countries in implementing telecommunications infrastructure projects covering telecommunications networks and government information networks, to help them develop information and communications industries and narrow digital gaps.

B. Under the multilateral framework of WTO, China supported the least developed countries to enhance their trade negotiation capabilities

From 2011 to 2014, China contributed US \$400,000 per year, and started from 2015, China contributed US \$500,000 per year to set up a Chinese Project to support the LDCs to join the WTO. The project is comprised of mainly five parts:

- 1) Participating in WTO internship projects. Each year, five young students with relevant academic backgrounds are selected from the LDCs and other developing countries and invited to join WTO internships. So far, China has founded more than 20 interns from more than a dozen member countries.
- 2) Joining the WTO roundtable. So far, the special project has supported and organized nine WTO roundtables. Affected by the COVID-19, the 9th roundtable was held online on December 11, 2020

- 3) Supporting LDCs to participate in WTO meetings. The Chinese special project funds the travel and living expenses of coordinators from LDCs when they visit the WTO. China has supported delegations from the “Cotton Four” countries to attend special meetings with the WTO director-general in Geneva and also helped delegations from other LDCs participate in trade policy reviews and various WTO activities.
- 4) Facilitating the South-South dialogue with ambassadors of other developing countries in the WTO. This strengthens coordination among the LDCs and between the LDCs and other developing countries.
- 5) Supporting follow-up seminars on trade policy reviews concerning the LDCs. The Chinese special project funds experts from the WTO Secretariat to participate in trade policy seminars organized by the LDCs. It also helps to publicize the results of the reviews, discuss the need for policy reforms, and highlight areas that require more technical support and capacity building.

C. Through training programs, China supported the African countries in enhancing their capacity for trade development

From 2013 to 2020, China has organized several trade-related seminars for other developing countries. The topics cover international logistical transportation and intermodal transport service enhancement, railway connectivity and cooperation, international production capacity cooperation, infrastructure connectivity and energy supply cooperation, agricultural product circulation and trade, and so on. These seminars have strengthened communication between China and the countries.

In particular, China has actively assisted related countries in capacity building for services trade, through holding nearly 160 training courses in key areas of services and training nearly 4,400 personnel.

D. China has announced measures such as zero tariff treatment for exports to China, launching industrial cooperation, and promoting service exemption, which effectively promoted exports from the least developed countries to China

To promote exports from the least developed countries to China, China placed zero tariffs on 190 items from 25 LDCs in Africa in 2005. Later,

it expanded the coverage of this zero-tariff. In November 2011, Chinese leaders announced at the G20 Summit in Cannes that China would confer zero-tariff treatment to 97% of the products from the LDCs that have established diplomatic ties with China. By the end of 2012, exports comprising nearly 5,000 taxable goods to China by the LDCs enjoyed zero-tariff treatment. According to statistics, China has been the largest export market for the LDCs since 2008.

Following the Preferential Treatment To Services And Service Suppliers Of Least-Developed Countries and the Operationalization of the Waiver Concerning Preferential Treatment to Services and Service Suppliers of Least-Developed Countries adopted by the Ministerial Conference of the WTO, since 2005, China has actively implemented preferential measures for Services and Service Suppliers of the LDCs in terms of market access preferences, capacity building, and facility assistance, to enhance its capacities to export services to China.

E. By providing trade-related equipment and facilities, China helps other developing countries enhance their competitiveness in the global supply chain layout and promote the modernization of trade flows

China assisted Ecuador, Peru, Uruguay, Costa Rica, Bolivia, and other countries by providing container inspection equipment. The smooth implementation of these projects has helped recipient countries improve the efficiency of clearing goods through customs, facilitate trade, develop transportation networks, promote international trade, combat smuggling and drug trafficking, and safeguard national security.

China's Aid for Trade to Improve China-LAC's Digital Cooperation

Given the basic assumption of development economics, two basic elements should be met to promote growth: one is to increase the input of factors of production, and the other is to improve the efficiency of resource allocation.

Trade is undoubtedly the most effective way to improve resource allocation and an important engine for development in the context of the pandemic and the lack of increased development assistance.

Aid for Trade is to address trade-related problems of developing countries through visible, unconditional, coordinated, and predictable financial support. Therefore, “Aid for Trade” will be an important way to promote Sino-LAC digital economic cooperation.

A. Strengthen assistance to digital infrastructure to facilitate digital connectivity in LACs

In 2020, the UN Secretary-General’s “Roadmap for Digital Cooperation” proposed that digitization should give priority to connectivity, and that access to the Internet and affordability of equipment are fundamental issues in the process of digitization. Therefore, China should continue to give full play to its advantages in supporting LAC’s infrastructure construction, focusing more on ICT-related fields.

B. Compared with traditional foreign aid, international development cooperation in the field of digitalization attaches great importance to capacity building and human training

Digitization is not only the goal of cooperation but also an important means and approach to achieving development goals. The digitalization strategy proposed by international organizations focuses on enhancing the awareness and capacity of international development cooperation practitioners and projects to leverage digitalization. Typically, UNDP’s “digitization Strategy” includes two pillars: digitization of organization operations and digitization of development projects, that is, leveraging digital technologies to enhance the efficiency and influence of the organization, and leveraging digital technologies to enhance the development capacity of partners and digitization of development projects.

Therefore, in the process of providing assistance to LAC, China should especially strengthen the training and experience sharing of digital skills and digital applications in LAC. Cultivate Latin American talents in the fields of payment, mobile office, artificial intelligence, mobile communication, quantum technology, and other fields.

In addition to cultivating specialized digital talents, China should actively share and transfer its development experience in e-commerce, free trade zone construction, and e-government to promote LAC’s all-round improvement of digital development capability.

C. Put people first and promote inclusive development of LAC's society while facilitating digital transformation

Digital transformation is an important opportunity, not only because it is crucial to economic development, but also because the process of digital transformation will effectively promote the development and improvement of vulnerable groups in relevant countries. Therefore, China's Aid for Trade to LACs should focus more on the training of vulnerable groups.

D. Expand partnerships and jointly strengthen aid and support to Africa

Achieving sustainable development requires gathering all wisdom and strength. A sub-goal of the UN's 17th Sustainable Development Goal "Building Partnerships" is to "strengthen global partnerships, leverage multiple stakeholders, mobilize knowledge, experts, technical and financial resources, and achieve the Sustainable Development Goals, especially in developing countries". International development cooperation in the field of digitalization also attaches great importance to the formation of multi-party synergies.

The "Digital Development Partnership" initiative proposed by the World Bank and the United Nations Secretary-General's "Digital Cooperation Roadmap" both propose to mobilize the interests of member governments, the private sector, civil society, think tanks, and other stakeholders to jointly promote digitalization.

Therefore, in the process of Aid for trade, China should actively expand partnerships and discuss specific cooperation paths with DAC countries, international organizations, and private sectors, to expand resources and jointly promote the digital development of LACs.

Of course, the expansion of partnerships should not only be limited to the international level but also give full play to the participation of various domestic entities.

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EDUCATIONAL COOPERATION, CULTURAL EXCHANGE AND NEW TECHNOLOGIES

This report is based on the lecture: "Educational cooperation, cultural exchange and new technologies", presented on July 11, 2023 in the III Lecture Series developed within the framework of the Chair in Contemporary China.



EDUCATIONAL COOPERATION, CULTURAL EXCHANGE AND NEW TECHNOLOGIES

ZAPATA Karla¹⁰

China's growth and bilateral relations with Latin America and the Caribbean (LAC)

The measures implemented by China -in its national and international policy- for the development of a sustainable country model, with a representative growth within the nation and world geopolitics, has had among its lines the establishment and improvement of international relations with the rest of the countries of the world. Obviously, this includes Latin America and the Caribbean.

We can say that the starting point of China's growth was established in 1978, with the reform and opening up, a transformational event focused on improving the aspects that constituted the country's basic economy, especially agriculture. Thus, during 1978 and 1984, the guidelines were established for a change that was not only at the economic level but also at the political level. During this period, the first phase of economic reform was carried out, which, although it did not allow China to achieve significant economic development, did make it possible to lay the foundations for what would emerge in the mid-1980s.

Between the end of the 1980s and the beginning of the 1990s, China established a marked transformation at the commercial level and allowed improvements in technological advances to develop its industries with the help of foreign companies and expertise. In the late 1990s, with the opening of the Shanghai Stock Exchange, the foundations were laid for what eventually became China's economic growth path.

10 Coordinator of Language and Culture and teacher of Spanish in the subjects of reading, writing and Hispanic culture in undergraduate studies at Beijing Normal University-Maxdo College.

Between 1999 and 2010 China achieved a representative economic positioning, establishing itself as a second power by 2010, thanks to a major restructuring of the public and private business sector, which allowed the country to consolidate itself as it is today. From 2010 to the present, China has maintained its position as an economic and political power on the world stage, establishing close relations with Latin America and the Caribbean by becoming a key partner of the region, even playing a fundamental role during the difficult years of the pandemic.

Bilateral relations between China and LAC are characterized by a deep interest in getting to know and understand each other, which has led to the creation and strengthening of relations between governments and between the various actors involved in the social, economic, educational, and cultural development of the two regions, not only in the commercial and social spheres, but also in the academic sphere. Among the sectors that have the greatest impact on this exchange are trade, agriculture, culture, education, infrastructure, defense, science and technology, and even justice, taking into consideration national and international legislation.

China-CELAC 2021 Forum

The third ministerial meeting of the China - CELAC Forum, held in December 2021, made it possible to establish parameters for action between the two regions for the period 2022-2024, taking the following aspects as a premise:

Cooperation in the *political and security* sector with a commitment to strengthening relations between leaders and representatives of both regions, as well as promoting dialogue and cooperation in various areas of national and international interest, among which are the fight against terrorism, the fight against hate in cyberspace, cooperation against organized crime, arms trafficking, financial flows and against illicit drug trafficking. It also includes a section promoting cooperation in the fight against corruption and weapons of mass destruction.

The second line of cooperation was named *Pragmatic Economics*, which strives to strengthen cooperation in trade and investment, finance, agriculture and food, science and technological innovation, the latter area directly affecting the scientific and technological sector, as well

as academic exchange. Also included is cooperation in industry and information technology, aviation and aerospace, energy and resources, tourism, customs and taxation, and quality control.

The third line of cooperation is *Infrastructure*, which is aimed at cooperating to promote infrastructure and transportation projects. The fourth line is aimed at the *social and cultural sector*, establishing an agenda for issues of social, cultural, and educational interest, including public health, sustainable development, and poverty eradication, as well as media and local and community exchanges. This section includes cultural cooperation in arts and sports, cooperation between institutions of higher education, and Think Tanks, which are laboratories of ideas and institutes established for research and, of course, youth networks.

It is important to note that the China-CELAC Forum maintained the premise of consolidating cooperation between institutions of higher education and research institutes, as well as in the areas of cultural heritage and cultural promotion in China and LAC.

The fifth line discussed in the forum, was associated with *Sustainable Development*, where the activation of the *2030 Agenda for Sustainable Development* is implemented, as well as the exchange and cooperation to solve together problems of environmental origin. The 2030 Agenda also includes aspects related to education, cultural cooperation, and educational development.

International Affairs, the last line of action agreed upon within the forum, seeks to support dialogue and cooperation in the United Nations, as well as in the various international and regional bodies.

Educational cooperation: Academic work, a way to get to know each other

One of the premises highlighted in recent years is the need to deepen knowledge about China and LAC, and educational cooperation is a fundamental tool for this purpose.

It is important to note that LAC is generally viewed as a bloc with a unified culture. However, it is valuable that educational cooperation allows for a closer approach to the idiosyncrasies of each of the countries since there is definitely a wide cultural diversity beyond the three main languages used in the region (Spanish, Portuguese, and English).

As for educational cooperation, there are two lines; the first one arises from the exchange at the governmental level, it is established mainly between countries and is led by the *Chinese Government Scholarship*, under the following characteristics:

- It is aimed at students, teachers, and academics.
- Educational offerings include Chinese language, bachelor's, master's, and doctoral degrees.
- It has two modalities: full scholarship (includes payment of tuition, room, and board) and partial scholarship (expenses to be covered depend on each case).
- The responsible body is the China Scholarship Council.
- The call for applications is annual. Application dates begin in January or February, depending on the country, and close in April.
- The maximum age of candidates is 25 years for a Bachelor's Degree, 35 years for a Master's Degree, and 40 years for Doctorate.

The scholarship application procedure varies from country to country. In some countries, the application is made exclusively through the Chinese Embassy. In others, through the Educational Credit Institutes, as is the case in Colombia, or through the Ministry of Foreign Affairs, as is the case in Mexico. In other cases, the Ministry of Education is in charge of receiving the applications. In any of these scenarios, the candidate can choose between two academic options, that is, apply to two universities and prioritize the one that interests him/her the most.

The other way to apply for the Chinese Government Scholarship is directly with a Chinese university; in this case, the application for the academic option is unique.

In keeping with the line of academic cooperation at the governmental level, there is a second option through the scholarship program The Great Wall, which is managed directly through UNESCO and is administered by the Scholarship Council of the Chinese Government. The characteristics of this offer are:

- It is aimed at professionals and academic researchers.
- In the educational offer, there are cases in which it is granted to undergraduate students. However, most of them are aimed at

specializations and postgraduate studies, especially at the level of research related to China.

- The type of scholarship is full or partial, and UNESCO covers international travel.
- The responsible agency is UNESCO, and the Scholarship Council of the Government of China is responsible for the administration of the scholarship.
- In 2022, 75 scholarships were offered.
- The maximum age of candidates is 45 years for general academic programs and 50 years for senior academic programs, the latter including research programs.

Educational exchange between countries

Only three specific cases will be presented in this section:

A. Mexico

A.1 At the government level

- 50 scholarships are awarded annually to Mexican students in China. This year, 16 scholarships were awarded.
- Mexico is also committed to providing annual scholarships to Chinese students who are willing to travel to Mexico.
- Another aspect of academic exchange at the governmental level between Mexico and China is through the Mexico-China Rectors' Forum to be held in September of this year.

A.2 Between Universities

There is also direct educational exchange between universities; in the case of Mexico, the initiatives of the Universidad Nacional Autónoma de México-UNAM, the Instituto Politécnico Nacional, the Universidad Autónoma de Guadalajara, the Tecnológico de Monterrey, the CETYS Universidad, and the Universidad Veracruzana stand out.

B. Colombia

B.1 At the government level

The Educational Work Plan executed by Colombia for the period 2019-2022 established:

- 50 annual scholarships for Colombian students in China (30 postgraduate scholarships).

- Colombia committed to 20 scholarships per year for Chinese students.

The institution in charge of managing the application to the Chinese Government Scholarship is the Colombian Institute of Educational Credit - ICETEX.

B.2 Between Universities

At least 16 institutions of higher education have an educational cooperation agreement with Chinese counterparts.

C. Argentina

C.1 At the government level

The 2019-2023 Joint Action Plan is developed as follows:

- 50 annual scholarships for Argentine students in China (35 unilateral + 15 bilateral).
- 25 scholarships per year for Chinese students in Argentina.

C.2 Between Universities

Some of the universities that have agreements with Chinese universities are the University of Buenos Aires, the National University of Cordoba, the University of Congress, and the National University of La Plata.

In the case of Argentina, a complete list of universities that maintain educational agreements with Chinese universities has not been found. The search must be made on a university-by-university basis.

In general, it is interesting that there seems to be no database containing the exact number of higher education institutions that have cooperation agreements with Chinese counterparts.

Cultural exchange: Language and cultural manifestations bridging a country's worldview

A. China in Latin America and the Caribbean

China's cultural presence in LAC, as well as in the rest of the world, is carried out through the Confucius Institute, an institution responsible for:

- Chinese language teaching.
- Promote Chinese culture and language.
- Maintain centers for the promotion of the Chinese language and culture and generate educational exchange and international cooperation.

To meet these objectives, a joint action is established between the Chinese International Education Foundation (CIEF), formerly Hanban, a national university in the host country, and a Chinese university.

The following is a list of Confucius Institutes in the region. In total, there are approximately 53 Confucius Institutes and Confucius classrooms in the region.

Table 1. Confucius Institute in Latin America and the Caribbean

Country	Local University
Antigua and Barbuda	Antigua and Barbuda
	University of Buenos Aires
Argentina	National University of Cordoba
	National University of La Plata
Bahamas	University of The Bahamas
Barbados	The University of the West Indies. Cave Hill Campus.
Bolivia	San Simon University
	FAAP
	University of Brasilia
	University of Pernambuco
	State University of Campinas
	Federal University of Goiás
Brazil	Pontifical Catholic University of Rio de Janeiro
	Federal University of Minas Gerais
	Pará State University
	Federal University from Rio Grand Do Sul
	Federal University of Ceará
	Sao Paulo State University
	Fluminense Federal University
	University of St. Thomas
Chile	Catholic University of Chile
	Universidad de la Frontera
	EAFIT University and University of Antioquia
Colombia	Universidad de los Andes
	Jorge Tadeo Lozano University
	Nueva Granada School

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Country	Local University
El Salvador	University of El Salvador
Grenada	T.A. Marryshow Community College
Guyana	University of Guyana
Haiti	Quisqueya University
Jamaica	University of the West Indies
Mexico	Xuaxia Chinese Cultural Institute, A.C.
	University of Guadalajara
	National Autonomous University of Mexico
	Autonomous University of Chihuahua
	Autonomous University of Nuevo Leon
Panama	Autonomous University of Yucatan
	University of Panama
Peru	University of Panama
	Ricardo Palma University
	Catholic University of Peru
	University of Piura
Suriname	Catholic University of Santa Maria
	Anton de Kom University of Suriname
Trinidad and Tobago	University of the West Indies, St. Augustine Campus
Uruguay	University of the Republic (Udelar)
Venezuela	Bolivarian University of Venezuela

Source: Own elaboration.

B. Latin America and the Caribbean in China

Regarding the cultural presence of LAC in China, the situation reflects a marked difference since the countries of the region do not have an institution that fulfills the role of the Confucius Institute. However, the diplomatic missions -through their cultural affairs offices- are responsible for establishing ties of cooperation and cultural exchange, thus becoming centers for dissemination. In this sense, the institution where the Spanish-speaking countries of our region have been able to congregate, at least, is the Instituto Cervantes. In this way, and through a joint organization, the diplomatic delegations carry out activities such as film cycles, round tables, book presentations, and other activities related to the cultural manifestations of each country. In the case of Mexico, in addition to the activities carried out by the Embassy, there are also cultural promotion activities organized by the UNAM headquarters in Beijing.

Educational innovation and new technologies: Towards a definition of Educational Innovation

If we pay attention to the RAE definition of the term *Innovation*, we will obtain the following concepts:

1. It is the action and effect of innovating. It implies the effect of changing or altering something, introducing novelties.
2. The act of creating or modifying a product and its introduction into a market.

As we continue to review the literature, we will find other definitions that speak of, for example, processes that seek to create and develop ideas, products, services, and creative solutions to existing problems. In this case, we are no longer talking exclusively about creating products that take us to the purely economic-commercial field, but it invites us to get involved in existing problems in the social and educational fields. Proposing that innovation helps us to generate actions that generate value for people, as well as the possibility of improving the way things are done, supporting experimentation and continuous learning.

The concept provided by the Oslo Manual (OECD, 2018), a purely economic-commercial concept, speaks to us of “using knowledge and generating it, if necessary, to create products, services or processes, which

are new to the company, or improve existing ones, thereby achieving market success.”

So, we ask ourselves, what does innovation in education mean? In the current era, many think that educational innovation has to do with the modernization of the tools used in education, which leads us to review the concept of modernization, finding the following:

1. A conjunctural process in accordance with the adaptation of the human being to the characteristics of the social, cultural, economic, etc., context in which he/she has had to live.
2. Societies progress and progress requires renewal of situations, environment, resources, and assets.
3. It is the use of the technological resources available for the development of a task.

Since this last aspect leads us to confuse the use of new educational tools with educational innovation, I understand that modernizing educational implements does not necessarily represent a basic educational innovation.

Educational Innovation, from the approach of Vanesa Orrego Tapia (2022), speaks of a *conceptual proposal* that has 5 phases:

1. *Proposing a different way of doing something.* In this section, we understand that innovation in education may be different in each LAC country, so proposing a different way of doing something is directly related to the environment of which we are a part. That is to say, with the reality of each country, the specific educational situation, its routine, and its history.
2. *Innovation has a pro-change character.* In this sense, it promotes the change of an existing thing.
3. *It requires planning.* Educational Innovation requires the establishment of timeframes of setting a chronogram in the process of improving educational practices.
4. *It requires an appropriate period for its understanding.* That is to say, if we establish a change in the educational system in any of our countries, and this change is accelerated and between processes, the necessary time is not generated for the system to adapt to the new proposal; inevitably, we will be leaving the field of innovation, creating a certain rupture in the educational system.

5. *Means to improve the quality/equity of education.* We innovate to improve the quality of the education we are offering to students, which implies a greater effort to obtain new and better results than those already existing. In this sense, the teacher innovates within the classroom, and the educational system innovates within the country, so there are different levels of action when innovating or promoting educational innovation.

This approach proposes a sort of transition between the *conceptual proposal* and the *coexistence of paradigms* because our societies are navigating between different paradigms of knowledge, and these are reflected in the social, political, cultural, and historical components of each country.

Innovation processes are different but with certain similarities among the countries of the region. Therefore, policy at the governmental level is important. While the guidelines established for educational innovation at the macro level, in the ministries of education they are important because of the social and cultural impact they have. In addition, the history of each country determines what the innovation path has been within each educational system.

As for the *coexistence of paradigms*, there are three areas of action of major importance:

1. Research and development.
2. Social interaction.
3. Problem solving.

In this area, the light is beginning to shine on educational cooperation and the importance of developing more and better research mechanisms in LAC. According to UNESCO reports on the evolution of scientific research, LAC is not yet among the regions with the greatest development in this area.

Research undoubtedly promotes a social interaction that will promote the solution of problems through innovation. These factors lead us to a dimension of action that is the didactic generation of a curricular plan and of educational and academic policies. These policies are, at this moment, in a stage of maximum disruption thanks to the appearance of technology and, beyond its appearance, to its implementation in the educational system.

Technological transformation of education

A. Online Education

During the COVID-19 pandemic, the implementation of online education for the region (LAC) generated a serious impact because it was not prepared at either the instrumental or infrastructure level. It is evident that the teaching staff was also inexperienced in performing within such dynamics.

For its part, the Chinese education system also faced problems when moving from face-to-face education to online education. It is necessary to take into account the resistance that was generated within the education system itself when having to implement online education. Before the appearance of COVID-19, the Chinese education system was strictly face-to-face, unlike the education system in LAC, where many countries have universities with open-distance systems.

One of the benefits that can be rescued in the post-pandemic era is the possibility of thinking of a hybrid education system. This transformation and the implementation of technology for online education allow the establishment and increase of academic exchanges between the two regions, establishing courses and training that can be carried out at a distance, taking into account the geography that separates us.

In this regard, it is important to mention the work being done by Tsinghua University, which is one of the most visible. Tsinghua has developed a platform and has begun to establish dialogues with different actors in the field of higher education. For example, in April 2022, the university held a forum *on China-Argentina Online Education Dialogues: Reimagining Higher Education in the Digital Age*, with the participation of Argentine representatives from the National University of Rosario, the University of Buenos Aires and the National University of Cordoba. On the Chinese side, representatives of the Global Alliance of MOOCs (Massive Open Online Courses) and the leaders of the Online Education Office of Tsinghua University.

Also, in April 2022, Tsinghua University coordinated the meeting “*Digital China and Cooperation in Online Education*” with the participation of 21 representatives from LAC countries and Chinese university authorities involved in the project. At this meeting, it was established:

1. Promote, maintain, and increase the number of Chinese language courses.
2. Enable the bilateral development of high-level courses designed by LAC countries.
3. Generate collaboration and exchange for the courses designed by Tsinghua University in its XuetangX platform. Courses aimed at the relationship between the two regions, such as: “Exploring the countries of Latin America and the Caribbean” and “Getting to Know China.”

One of the interests expressed by the project leaders is that the *Exploring Latin American and Caribbean Countries* course can be improved and fed bilaterally. That is, with the support of each of the countries in the region.

In September 2022, Tsinghua University held the meeting *Visions for the Digital Transformation of Higher Education* jointly with the National Autonomous University of Mexico - UNAM. A dialogue between both universities, with the aim of reviewing the possibilities of cooperation in online education.

As for the UNAM, the Mexican university has extensive experience in distance education through the Coordination of Open University, Educational Innovation and Distance Education (CUAIEED) and the Open University and Distance Education System (SUAYED), highlighting the development of 28 careers in the open system, 22 careers in the online mode, online postgraduate degrees and 116 MOOCs, in 11 different specializations. This experience undoubtedly encourages Tsinghua University to establish a cooperation agenda with UNAM.

Among the results of the 2022 meeting was the exploration of possible cooperation between XuetangX and UNAM. According to information presented by UNAM spokespersons, it is planned that representatives of the two institutions will meet again during the last quarter of 2023. At this meeting, a cooperation agreement could possibly be signed.

It is worth mentioning the work carried out by the UNAM headquarters in Beijing, exploring, with various Chinese academic institutions, the possibilities of academic exchange and the implementation of joint teaching and research projects in the areas of applied sciences and technology.

B. Artificial Intelligence in Education

With the future possibility of cooperation meetings between representatives of both regions, it is important to take into consideration an area that is having a significant impact: the technological transformation of education and the presence of Artificial Intelligence (AI) in education. In this regard, many analyses are being generated at the international level. LAC is just beginning to develop research and to realize that the future of AI is no longer far from the present, and that there are other regions of the world where AI is already being used in the classroom, in some sectors of everyday life, and even in business development, marketing, and planning management.

The study “The future of Artificial Intelligence in Education in Latin America” (ProFuturo and OEI. 2023), was a research developed in the year 2022 by three Argentine researchers and promoted by ProFuturo, which is part of the Spanish Telefónica Foundation and the Organization of Ibero-American States (OEI). Three main sectors of Latin American life were consulted in the research: academia, government, and the private or business sector that is in direct contact with AI.

One of the questions asked to the sample was: What is the impact that AI is having on education, and what will be the future impact? According to the study *The Future of Artificial Intelligence in Education in Latin America*, conducted by Fundación ProFuturo in conjunction with the Organization of Ibero-American States (OEI), it is stated that currently, there is not a very high reach of AI in the sectors of initial education (present: 1.3%; future: 1.9%), primary education (present: 2.9%; future: 3.7%) and secondary education (present: 1.6%; future: 2.5%). While the impact on tertiary and university education (present: 3.3%; future: 4.3%), both now and in the future, is shown with a higher rate (2023, p.18).

What are the risks that we could have within the educational systems? There is the possibility that scenarios of manipulation or disinformation of youth may arise. For that reason, from now on, it is necessary to start planning and establishing an agenda to generate frames of reference regarding the use of Artificial Intelligence, and to establish agreements that can help us to better understand each other and develop good practices regarding its implementation in education.

C. Artificial Intelligence and the Learning Process

Currently, not only the academic sector linked to education and technology is addressing the issue, but also neurosciences and other sciences applied to cognitive development are developing research on the high impact that AI can have on learning systems. As has been observed throughout human history, the emergence of new technologies eventually permeates the lives of ordinary citizens, as well as the life and work of institutions. It is to be assumed that AI will not have a different course, however, it leads us to observe -very closely- what will be the role of the student and the use he/she will make of it, which begins to generate fear and much suspicion, at least in the teaching sector.

Within this scenario, the role of the teacher is no longer limited to identifying topics of study but also requires the ability to generate a greater awareness of how AI can be used to generate knowledge.

Teachers have also been evaluating the advantages of AI in terms of transformations in learning environments, increased student motivation, learning beyond the school, opportunities for students, support for educational management at the institutional level, as well as support for teaching and learning.

In these aspects, it is very important that, both in China and in Latin America and the Caribbean, dialogue tables are established and that our region can begin to review the regulatory frameworks so that the education system remains the center of motivation to generate critical thinking since it is a factor that can help the student to differentiate the limits of AI in the acquisition of knowledge.

In this sense, countries require a control agenda and establish regulations that help to develop a sense of ethical use, both of the applications to which they have access and of the generation of content precisely because they can generate sources of disinformation within the population.

Another difficulty that can be observed, and not only from now on -with the implementation of AI- but also from the use of information technologies in the classroom, is the lack of technical infrastructure and the impossibility for LAC countries to easily reach each of their inhabitants through the Internet system. This factor could generate in the future a fairly representative gap in terms of the populations that are educated in relation to those that do not have access to education.

D. Digital skills development and teacher training

In this regard, it is essential to develop state and ministerial policies to increase the digital competencies of teachers. It is also important to support private initiatives and those of other groups that contribute to clarifying the panorama of what is being developed locally and globally. For example, in China, there is a network of interconnected teachers, in response to the need to know what is happening in terms of the application and implementation of artificial intelligence tools in education.

For its part, Banco Santander is awarding scholarships for a Technology Innovation Program. A scholarship aimed at teachers located in Germany, Argentina, Brazil, Chile, Spain, the United States, Mexico, Poland, Portugal, the United Kingdom, and Uruguay.

As for the role of institutions and governments, the Beijing Consensus is setting the course of action in regulating the use of Artificial Intelligence in education. Meanwhile, UNESCO is continuously elaborating documents that serve as a guide for the people in charge of formulating state policies and recommendations for teachers and the educational system.

As for what is being generated in LAC, ECLAC is also developing approaches to the transformation of education based on sustainable development in terms of the implementation of technologies. In March of this year, the Ibero-American Charter of *Principles and Rights in Digital Environments* was published to try to create a much safer environment for the use of new technologies in the education sector.

In terms of prospects for cooperation in the education sector, it is very likely that new opportunities for growth are just emerging for both Latin America and the Caribbean, as well as for China. By way of conclusion, I would like to refer to the Chinese proverb that states:

*If you want a year of prosperity, grow grains.
If you want ten years of prosperity, grow trees.
If you want a hundred years of prosperity, grow people.*

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ABOUT THE AUTHORS

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FELICIANO José Carlos

MBA from China Europe International Business School (CEIBS), with graduate studies in management and business in Asia at the University of Michigan. Specialization studies in Innovation and Entrepreneurship in Japan, India and Singapore and studies of Chinese and Chinese Culture at Peking University. Recognized as a young sinologist by the Ministry of Culture of the People's Republic of China and the Chinese Academy of Social Sciences. Industrial Engineer PUCP. Lecturer, columnist and contributor to various media in China on issues of technological entrepreneurship and the China-Latin America relationship. Current Deputy Director of the Center for China and Asia-Pacific Studies at the University of the Pacific in Peru and Professor of the Department of Marketing and International Business at the same university.

SONG Wei

Professor at the School of International Relations and Diplomacy, at Beijing Foreign Studies University. Her research focus is on China's development cooperation under BRI. She has been working as deputy director of the International Development Cooperation Research Institute, deputy director of the World Economy Research Institute, and executive deputy director of Hongqiao International Economy Forum Research Institute with the Chinese Academy of International Trade and Economic Cooperation. She is a Fulbright Scholar at Columbia University majoring in Africa and development assistance policies.

SUN Xuan

Associate Professor of Zhou Enlai School of Government and Director of Digital City Governance Lab, Nankai University. Expert in digital governance, urban informatics and smart cities.

VILA MORET Delfina

Lawyer by the School of Law of the University of Buenos Aires (UBA). Master in International Relations from the Latin American Faculty of Social Sciences (FLACSO) Argentina. Professor of Environmental Law at the School of Law of the University of Buenos Aires (UBA). Lecturer at the Interdisciplinary Postgraduate Program in Energy (CEARE-UBA). General Director at the Legislature of the Autonomous City of Buenos Aires. Member of the Environmental Law Center (CeDAF) of the UBA Law School. Assistant Researcher at the International Relations Area of FLACSO Argentina. She researches on issues related to the People's Republic of China and its role in the global governance of climate change, economic decarbonization and ecological transition

WANG Hua

Professor Wang, Ph.D. CFA, Academic Director of Master of Finance Program, has long-term Academic and industry experience in FinTech, IT, and Financial Markets (more than 15 years) at SZTU, CSRC Research Center, Hong Kong Exchange, Credit Suisse, and Barclays Capitals, among others. He has also rich international experiences in Japan, the United Kingdom China, etc.

ZAPATA Karla

Spanish teacher in the subjects of reading, writing and Hispanic culture, in undergraduate studies at Beijing Normal University - Maxdo College. Master's Degree in Administration and Advanced Project Management from the Universidad Católica San Antonio de Murcia (UCAM), Spain. Social Communicator from Universidad Católica Andrés Bello (UCAB), Venezuela, specialized in Internal Communication and Human Talent Management. Specialist in Organizational Change Management, Change Management to Agile, Organizational Culture, Scrum Framework,

Educational, Organizational and Executive Coaching; as well as in the Management and development of cultural and educational projects. Before dedicating herself completely to the educational sector, she worked for six years as General Coordinator of events and commercial tours at the Mexican Chamber of Commerce in China (MEXCHAM). Her areas of research are focused on: teaching-learning processes, educational evaluation and teacher guidance, and emotional education in teaching and educational management, in the face of the accelerated changes that technological advances are driving in the Knowledge Society.

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