Enhancing cooperation between MERCOSUR and China for innovation

Fortaleciendo la cooperación entre MERCOSUR y China para la innovación

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ABSTRACT

Since the implementation of the "Made in China 2025" and Internet Plus Initiatives, China's Central government has focused on transforming the economy into an innovation driven. Their relative success impacted the country's recent position in the Global Innovation Index, climbing 26 positions from 2015 to 2022. This paper discusses the importance of China's foreign affairs approach to diminish the reliance on trade and infrastructure building and increase cooperation on science and technology particularly in Latin America in the MERCOSUR context, where the highest innovation rating is in the 50th position with Chile. Finally, this paper aims to propose enhanced cooperation between China and Latin American countries through an agreement with MERCOSUR that focuses on the Digital Economy and through joint efforts for investments and exchanges in technology and sciences-related topics in selected industries.

Keywords: trade; MERCOSUR; China; Innovation; Trading

RESUMO

Desde a implementação das iniciativas "Made in China 2025" e "Internet Plus", o governo central da China tem se concentrado em transformar a economia em um modelo impulsionado pela inovação. Esse sucesso relativo impactou significativamente a posição recente do país no Índice Global de Inovação, subindo 26 posições entre 2015 e 2022. Este artigo discute a importância da abordagem da China nas relações exteriores para reduzir a dependência do comércio e da construção de infraestrutura, aumentando, em contrapartida, a cooperação em ciência e tecnologia, especialmente na América Latina, no contexto do Mercosul, onde a classificação mais alta em inovação é a 50ª posição, ocupada pelo Chile. Por fim, este artigo propõe uma cooperação mais aprofundada entre a China e os países latino-americanos por meio de um acordo com o Mercosul focado na Economia Digital, além de esforços conjuntos para investimentos e intercâmbios em temas de tecnologia e ciências em indústrias selecionadas.

Palavras-chave: Comércio; Mercosul; China; Inovação, Trading.

RESUMEN

Desde la implementación de las iniciativas "Made in China 2025" e "Internet

Plus," el gobierno central de China ha centrado sus esfuerzos en transformar la economía hacia un modelo impulsado por la innovación. Su relativo éxito ha impactado la posición reciente del país en el Índice Global de Innovación, escalando 26 posiciones entre 2015 y 2022. Este artículo analiza la importancia del enfoque de China en sus relaciones exteriores para reducir la dependencia del comercio y la construcción de infraestructura, y aumentar la cooperación en ciencia y tecnología, particularmente en América Latina en el contexto del MERCOSUR, donde la calificación más alta en innovación se encuentra en la posición 50 con Chile. Finalmente, este documento propone fortalecer la cooperación entre China y los países latinoamericanos a través de un acuerdo con el MERCOSUR que se centre en la Economía Digital y mediante esfuerzos conjuntos para inversiones e intercambios en temas relacionados con tecnología y ciencias en industrias seleccionadas.

Palabras clave: comercio; MERCOSUR; China; innovación; intercambio.

1 INTRODUCTION

The definition of innovation as a vector of development predates gained new directions with Xi Jinping, with the philosophy of economic development, centered on innovation. The "Made in China 2025" and the Internet Plus Initiatives launched in 2015 were and still are the core government strategies to digitalize the country, through enabling infrastructure projects and investment in home grown technologies. China's manufacturing industry was responsible to attract foreign technologies was means of technology transfer in the decades of 19802 and 1990s. After, with the advent of the internet and the need to leverage from the growth of the e-commerce activities in late 1990s, both initiatives drastically impacted China's industrial modernization across ten main sectors, reducing the reliance on foreign technology and positioning China was one of the most innovative countries globally (Thiebaut, 2023).

China's Zero Covid policy has largely impacted the economy in recent years, impacting not only its domestic market but its relevance in the global trade conjuncture: the preliminary estimation GDP in 2022 was US$17,881.30 billion, a 3% growth compared to 2021, as released China's National Bureau of Statistics (NBS, 2022). In 2023, the country's GDP grew by 5.2% in real terms, reaching US$17.5 trillion (NBS, 2024). The country's "Open-Up" 2.0 highlights the need to enhance bilateral and multilateral relations that goes beyond trade and infrastructure building. In its first foreign trip after the pandemic started, Xi Jinping paid a visit to Saudi Arabia: Gulf Cooperation Council (GCC) has diversified its relations with China by further exploring cooperation and investments in green and renewable energy, aerospace, and tourism sectors (FMPRC, 2022).

China's need to lever pre-pandemic economic growth, resulted in a shift of its foreign affairs approach to be innovation-driven, which is expected to impact its status quo in the international arena and relations, particularly with emerging economies: China's technology development results were achieved in a relatively short period, being a model for other countries to be inspired from. To exemplify, in 2015, China held the 37th position in the Global Innovation Index from World Intellectual Property Organization (WIPO), achieving the 11th position in 2024,

thanks to public-private cooperation and efforts to diminish the reliance on technology imports (WIPO, 2024). In addition, more Chinese internet companies are succeeding in foreign markets, such as the giants Huawei, Alibaba, and Tencent, and e-commerce and entertainment companies SHEIN and TikTok from ByteDance. The role of innovation in the current Chinese development model is fundamental for the country's development of own technologies to be able to compete globally, as even surpass the United States, as stated in some of its main national directives, Made in China 2025, Internet Plus Initiative, 2017 New Generational Artificial Intelligence Development Plan and 14th Five-Year Plan (2021-204).

Though China's technological advancement efforts was first based on the need to decrease the dependence on imports through the development of indigenous innovation (Slosberg 2023), which can thus become a strategy for Beijing government to export to increase high-tech product exports. In the case of Latin America, this would result in a wider trade deficit, and this imbalance would pose as main challenge to the win-win trade policy with countries from Global South, as well as China's leading position to bring about infrastructure and overall economic development to other developing countries as showed in Belt and Road Initiatives and the Trans-Pacific Partnership (TPP).

The author adds that Brazil, *"*(…) an emerging economy reliant on commodity sales, faces a tech-oriented China that could amplify an already lopsided bilateral relationship" (Slosberg, 2023). Essentially, all other MERCOSUR member States rely on commodity exports, and it is for this reason that China-American Latin economic relations are a pertinent topic: bilateral cooperation with China can in a long run, support these member States' technological development at the same time it takes advantage of the importance of the trade relations with China, and set the foundations for a symmetric partnership.

Trade exports will be used as quantitative data will be analyzed to assess patterns in the balance of trade and identify current basket of goods in the trade balance between China and MERCOSUR members. The current exports of high-tech products of MERCOSUR members data will be helpful as a comparative analysis to understand the gaps between China's innovative economy compared to MERCOSUR members.

Qualitative data will be collected through policy and academics papers to understand the current programs existing in the sciences and technology fields, in addition to current publicized government releases to enhance cooperation with China particularly in Brazil, Argentina, Paraguay and Uruguay.

This manuscript adopts an empirical analysis approach, with a primary focus on examining the current relation between MERCOSUR member states and China, particularly regarding trading relations in order to investigate current gaps and possibilities for enhanced cooperation that will be translated into innovation fostering.

By combining these qualitative and quantitative research methods, this paper aims to provide a thorough empirical analysis of the potentialities in enhancing China's cooperation with MERCOSUR members – and potentially extendible to other Latin American countries – through a bilateral cooperation with MERCOSUR.

Finally, this paper aims to answer que following question: How can enhanced cooperation between China and MERCOSUR contribute to fostering innovation and reducing trade reliance in both regions? Policy recommendations of a specific agreement between MERCOSUR and China as means of capacitation and knowledge exchange, research and development in technology and sciences and funding program will be further explored. This research was conducted during the period of 2023-2024, providing context for the analysis and findings presented.

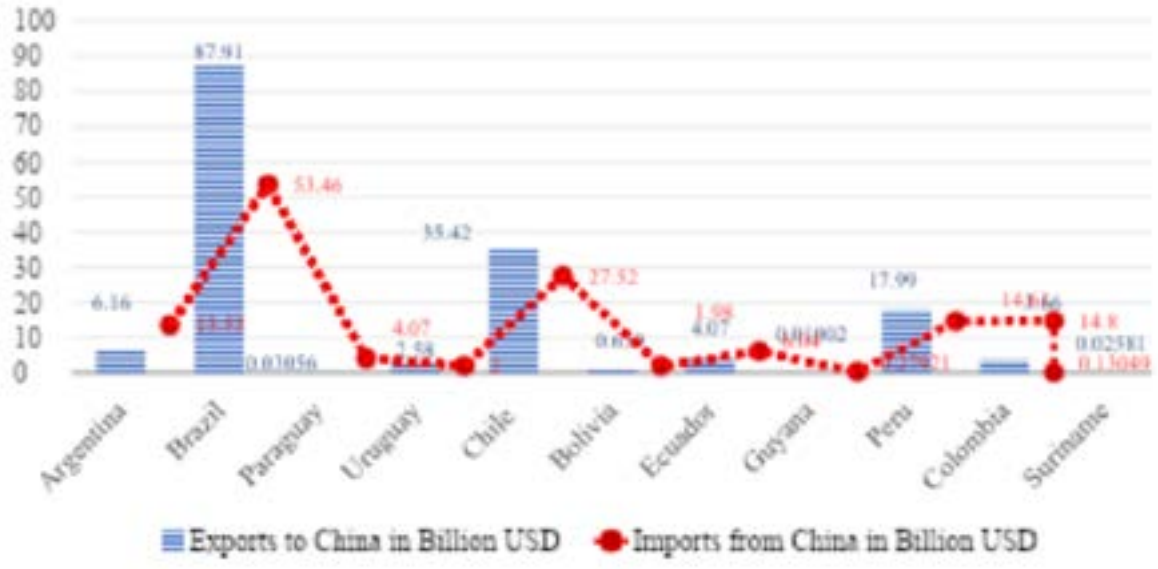
To answer the research question of the reasons China should enhance cooperation with Latin American countries through a bilateral cooperation with MERCOSUR, a qualitative method of empirical analysis is adopted. The literature review will be conducted to provide a comprehensive overview of the existing cooperation between China and individual MERCOSUR members, including relevant academic articles, policy reports, and official documents. An analysis of the theoretical framework applied to transnationalism will follow to provide enough argument on the need to establish joint sciences and technology initiatives.

2 LITERATURE REVIEW

Latin America can play an important role in China's technology expansion through symmetric relations to deepen technology transfer and joint investment for Research and Development (R&D) across sectors as strategic planning. China-Latin American relations are concentrated in trade and investments in telecommunication, mining, and renewable energy industries, depending on the country, being China the main or second main trade partner of the MERCOSUR member states. The balance of trade between China and MERCOSUR member states are in Graph 1.

1. MERCOSUR's founding members are Argentina, Brazil, Paraguay, Uruguay. Associate members are Bolivia, Chile, Colombia, Ecuador, Guyana, Peru, and Suriname. Venezuela is a full member, but it has been suspended from the bloc since 1 December 2016.

Graph 1. Import-Export between China and MERCOSUR member States (2021)[1]



Source: United Nations. 'UN Comtrade Database' available at https://comtradeplus.un.org
Note: x is the exports of MERCOSUR member States to China; y represents their imports from China.

The data value is in USD for the year 2021.

China is the largest trading partner of Brazil, Chile, Paraguay, Peru, and Uruguay and the second-largest trading partner of Argentina and Colombia (United Nations COMTRADE, 2021). Alongside trade, China has become one of the partners for infrastructure development across different industries, such as mining, renewable energy, and 5G. Overall, China's relations with Latin American countries are based in a mutually beneficial cooperation approach for common development (The State Council of The People's Republic of China, 2016).

The chart shows a trade deficit for Argentina, Bolivia, Ecuador, Guyana, and Colombia, with imports from China being 200% in Argentina, 13318% in Paraguay, and 404% in Colombia. For these countries, the dependence on imports from Chinese is directly related to the need to diversify the export basket, which can be done by opening the Chinese market for tech-goods.

Peru, Chile and Ecuador were the first Latin American countries to sign Foreign Trade Agreements (FTA) with China, with contained zero duty treatment for over 90% of products. Peru's FTA signature in April 2009 was an important document to give access to Peruvian agricultural products and seafood to diversify the trade reliance on minerals. Discussions started in 2022 to update the document to enhance cooperation in e-commerce, renewable energy, and technology, among industries, however, the current political turmoil shall jeopardize further negotiations.

Chile, on the other hand, adopts a relationship with China, with a strong reliance on copper exports in recent years (Jacob Gunter and Helena Legarda, 2022), however with the inclusion of sciences and technology in the scope of the upgraded FTA. Some of the projects established between China and Chile to enhance sciences and technology cooperation. First, the China-Chile Information and Communications Technology Joint Laboratory was founded by Datang Telecom International Technology, Harbin Institute of Technology and Universidad de Concepción to establish collaboration in the production, education, and research of technologies such as narrow-band internet of things systems for smart agriculture, smart ports, disaster management architectures and safe cities (Pezoa et al., 2021).

Second, the Chinese Academy of Science's South American Astronomy Center (CASSACA) was launched in 2013 aiming at developing astronomy research collaborations between Chile and China, but also extending to other Latin American countries. CASSACA also provides research funding to develop Astro engineering projects.

Finally, Huawei's data centers are investing in developing artificial intelligence, cloud computing, and 5G technologies in a market where it can also support other neighboring countries. While several countries have banned Huawei's services due to the fear of weak data security measures, Chile has benefited from the company's technology to develop its technology industry.

Though there is not enough evidence to measure the impact of the FTA on Chile and Peru to become the second and third trade partners of China, behind Brazil, the largest economy in the region, it is important to underline their trade performance compared to economies like Argentina and Colombia.

Ecuador signed an FTA with China in 2023, which will help the country to not only increase but also diversify its exports to China, which now is based on ores slag and ash, with a significant trade volume of 1.42 billion dollars, compares to wood, mineral fuels and edible fruits (Trading Economics. Ecuador Exports to China).

Among the founding members States of MERCOSUR, Uruguay has joined the BRI, the Asian Infrastructure Investment Bank and the BRICS New Development Bank as a prospective member, as an attempt to seek for investments and strengthen relations with China. The country has also engaged in a joint feasibility analysis with China to explore the benefits of a potential bilateral FTA that would be helpful in diversifying its exports, which is currently largely reliant on meat exports (The Dialogue, 2022). Uruguay's possible FTA signature with China outside of the MERCOSUR umbrella would put in check the bloc's legitimacy also highlighting the need to adapt to a fast-growing trade environment where the Digital Economy, that no longer has secondary importance.

Brazil's surplus is tightly connected with the increase in exports of meat and soybeans amid the Trade War between China and the United States as well as China and Australia. Brazil is however one of the few Latin American countries to have a trade surplus with China (Slosberg, 2023). China-Brazil High-level Coordination and Cooperation Committee (COSBAN), a dialogue channel to discuss commonalities in several topics and the BRICS are the most efficient platforms that have shaped Sino-Brazilian relations in the past years. Apart from leaning on the exports of commodities and raw materials, Brazil received investments in energy, oil and gas operations, and metal and mineral extraction. Industries such as manufacturing and high-tech, which to Celio Hiratuka, "Investment contributed little to the diversification of Brazil's economy and growth in more technology-based and skill-intensive sectors" (Hiratuka, 2022). Brazil, for instance, besides being part of the BRICS and enjoying fruitful relations with China, has voiced against joined the BRI.

Argentina has adopted both bilateral and multilateral approaches to strengthen its relations with China by joining the Belt and Road Initiative (BRI) in early 2022 and vowing to further support China-CELAC Forum. The country has sought China's support in an extended currency swap deal to increase its depleted foreign currency reserves, particularly the American dollar. Though the past Argentinean government aimed to strengthen relations with China through strategic relations and diversification of Argentine exports, with value-added products (Argentina Ministry of Foreign Affairs, 2016), the current one has adopted a more pragmatic stance towards its relations with China.

Paraguay is the only South American country to recognize the Republic of China, maintaining ties with Republic of China (Taiwan). Paraguay's exports to China include Copper, Wood and articles of wood, wood charcoal and raw hides and skins (other than furskins) and leather, and the government has stated its willingness to further explore trading opportunities with China. As long as Paraguay maintains diplomatic relations with Taiwan, there is a limited possibility of advancing any type of agreement between China and MERCOSUR. "One China" policy is a fundamental part of China's foreign affairs approach.

Arguably, China's relations with many MERCOSUR individual member States are shifting to be of pragmatism as the trade dominance with the United States and anti-communist standpoints became less relevant in recent years, benefiting from trade partnerships and foreign direct investments. Argentinean president Javier Milei who once sought an alliance with the United States has recently voiced the need to 're-establish' Argentina-China relations, seeking new opportunities for investments and trade (Giusto, 2024).

3 THEORETICAL FRAMEWORK APPLIED TO REGIONALISM

Intergovernmental organizations are a legal phenomenon justified by the increasing State interdependence. While in academia, scholars like Waltz, Keohanne, Abbot and Snidar have debated the formation of these organizations as well as their functional characteristics, the transnationalism school affirmed their importance as "[…] networks among non-State actors, international institutions, and domestic political structures as important mediating forces in international society" (Koh, 1997, p. 2624).

Outside of the United Nations umbrella, different types of intergovernmental organizations have appeared, differing by their forms and constitution, according to the needs of their State-members, however, few characteristics are more usual such as institutionalization, geography, and thematic area.

Intergovernmental organizations are mostly formed by a treaty or charter through which the members decide to adhere according to their internal process, as specified by their domestic laws. The treaties' importance is credibility and a joint stance that may alter the international status quo of developing States (Simmons; Steinberg, 2006).

The constitution of the great part of these organizations is done "[…] through a concrete and stable organizational structure and supportive administrative apparatus […] including membership and voting rules, external relations, finance, and the authority of specific organ." (Rezek, 2010, p. 259). The premises are defined by the founding members, in a process that may be time-consuming. Conventionally, the general assembly is the organ responsible for the voting process; the secretariat is the organ for administration and finance; and the council is the organ responsible for consultations (Waltz et. al. 1998, p. 11).

Regarding geography, regionalism is the traditional form of cooperation since proximity facilitates joint action in the common spheres neighboring States share about, being them trade, security, crime, environment. Geography is not limited to a specific continent; it also includes a specific economic region. The Organization of the Petroleum Exporting Countries (OPEC) is considered a regional group based on economic region of oil exporters, with members located in Asia, Africa, and America continents (Rezek, 2010, p. 280-281).

Some organizations are formed for specific purposes. Finance and trade relations may lead in number of organizations, while security and sustainable development cooperation have gained strength. The International Renewable Energy Agency (IRENA) has issued reports and

directives to more than 130 members, which have contributed to base fundamental arguments of this dissertation. Regionalism is thus identified as a paradox, as it presents limitations to globalism.

MERCOSUR's objective to promote free trade and free movement of goods, people, and currency, has engaged Brazil in its establishment in a process that took five years until the signature of the Treaty of Assunción. The bloc, which was inspired by the European Union, has headquarters in Montevideo and has the following institutional structure, which is detailed in the Ouro Preto Protocol, Chapter I: Structure of MERCOSUR. Article 1: Council of the Common Market (CCM); Common Market Group (CMG); MERCOSUR Trade Commission (MTC); Joint Parliamentary Commission (JPC); Economic-Social Consultative Forum (ESCF); and MERCOSUR Administrative Secretariat (MAS).

The Southern Common Market has, since its founding, purely regional characteristics, with Argentina, Brazil, Paraguay, and Uruguay adhering in 1991 as founding-member States. Aiming to expand its territory to other Latin American countries, Bolivia became an associate member in 1996, signing the Protocol of Accession in 2012 to become a full member soon, while Venezuela became an associate State in 2004, and after signing the Protocol of Accession in 2006, becoming a full member in 2012[2]. Other Latin American countries joined the group as associate states: Chile, in 1996; Colombia, in 2004; Ecuador, in 2004; and Peru, in 2003. Guyana and Suriname signed the framework agreement in 2013 to become associate States.

2. Venezuela in April 2023 for not following trade and human rights rules.

Mexico and New Zealand were granted observer status in 2013. This fact shows constraints on the internationalization of the bloc. However, regionalism no longer suffices to fulfill current trade needs, as hybrid forms of cooperation, bilateral or multilaterally, are now needed, which in the case of MERCOSUR can be done with individual countries or other blocs, through FTAs. In addition, due to the growing importance of digitalization and technology topics, FTAs should be specific to e-trade to have faster achievements which do not require complex customs adequations, which happens with regular trade.

4 MERCOSUR's FTAs WITH INDIVIDUAL COUNTRIES

MERCOSUR has seven FTA in force signed with individual countries, being only two with non-Latin American countries, as listed above[3]:

3. The table list FTAs MERCOSUR entered until 2021. Current, the bloc is negotiating other FTAs with Dominican Republic, India, Jordan, Korea, Lebanon, Mexico, Panama, Singapore, Turkey, European Union, Central American Integration System, European Free Trade Association, Gulf Cooperation Council, Central America, CARICOM, and Andean Community. The EU-MERCOSUR FTA was signed in 2019 but did not enter into force.

Table 1: Summary of MERCOSUR FTAs

Country	Type	Signed in	Entered into force in
Bolivia	FTA	1996	2006
Chile	FTA	2006	2007
Peru	FTA	2005	2009
Colombia	FTA	2006	2011
Venezuela	FTA	2004	2012
Egypt	FTA	2010	2017
Israel	FTA	2007	2019

Source: OAS. SICE's Trade Policy Developments section.

The FTA signed with Chile in 2006 and entered into force in 2007 contains provisions related to sciences, innovation, and technological development, which include information exchange, knowledge sharing regarding innovation, and promotion of joint research and development projects:

> TITLE XVIII. SCIENTIFIC AND TECHNOLOGICAL COOPERATION. Article 45. Cooperation may provide for different forms of execution and will include the following modalities: a. Exchange of knowledge and research results and experiences, b. Exchange of information on technology, patents and licenses, c. Exchange of goods, materials, equipment and services necessary to carry out specific projects, d. Joint research in the scientific and technological area with a view to the practical use of the results obtained, e. Organization of seminars, symposiums and conferences, f. Joint research for the development of new products and manufacturing techniques, production administration and technological management, g. Other modalities of scientific and technical cooperation whose purpose is to promote the development of the Signatory Parties. (OAS. MERCOSUR Economic Complementation Agreement – Chile, n.d.).

The FTA signed with Israel in 2007 and entered into force in 2019 contains provisions related to science and technology cooperation as means of joint research, R&D development projects and technology transfer:

> CHAPTER VIII: TECHNICAL AND TECHNOLOGICAL COOPERATION. Article 2 – Technological Cooperation. 1. The Parties shall establish a technological cooperation mechanism in order to develop their industrial sectors and infrastructure, in particular in the fields of agricultural and agro-industrial activities, banking, engineering and construction, chemistry, fine chemistry, fertilizers, pharmacy (especially active principles), automation and robotics, irrigation, alloys and super alloys, avionics, microelectronics, telecommunication, health, medical equipment, education, security equipment systems and other fields. The technological cooperation may be comprised of technology transfer and joint projects for the development of new technologies as well as other initiatives (OAS. Free Trade Agreement between MERCOSUR and Israel, n.d.).

The FTA signed with Israel in 2010 and entered into force in 2012 contains provisions related to e-trade of digital products and service as well as provisions to enhance cooperation in science and technology through joint research and R&D development projects and technology transfer:

> SECTION III. INVESTMENT AND SERVICES. Article 23 - Investment Promotion. The Parties recognize the importance of promoting cross-border investment flows and technology transfers as means for achieving economic growth and development. In order to increase investment flows, the Parties or Signatory Parties may cooperate through: a. exchanging information, including potential sectors and investment opportunities, laws, regulations, and policies, so as to increase awareness on their investment environments; b. encouraging and supporting investment promotion activities such as investment conferences, fairs, exhibitions and investment promotion missions; c. discussing the possibility of negotiating bilateral investment promotion agreements with a view to furthering investment flows and technology transfer; and, d. developing mechanisms for joint investments, in particular with small and medium enterprises (OAS. Free Trade Agreement between MERCOSUR and the Arab Republic of Egypt, n.d.).

These FTAs have provided a foundation for cooperation in the fields of science, technology, and innovation. However, the emphasis on these areas is relatively narrow compared to the broader scope of trade-related provisions.

The FTA's provisions reveal narrow efforts to technological cooperation and technology transfer, as the main scope of such agreements regard trade tariffs and non-tariffs. There is thus an eminent need to further enhance cooperation that aims to enhance Digital Economy through sciences and technology as well as cross-border e-commerce.

5 MERCOSUR's PROVISIONS ON DIGITAL ECONOMY

MERCOSUR's members have acknowledged the need to incorporate resolutions that translate new forms of trade: with the Covid-19 pandemic, e-commerce - and cross-border e-commerce - have seen considerable growth rates among its members, being hence a topic to be further addressed.

To promote the digital economy, the creation of the MERCOSUR Digital Agenda Group ("GAD") which happened in 2017, aiming to discuss further integration through e-trade, resulting in the publication of the MERCOSUR Electronic Commerce Agreement in 2021. Among the main provisions, the Agreement enables e-trade with facilitated customs procedures along with a series of consumer protection mechanisms to safeguard personal information and data transfer. The main resolutions are summarized as follows: prohibition on the imposition of customs duties on electronic transmissions; the acceptance of digital signatures; the alignment of national online consumer protection rules with the rules on the matter in force in MERCOSUR and the protection of personal data; and the cooperation through the exchange of experiences, information, and data to maximize e-commerce opportunities for micro, small and medium-sized companies (Brazil Ministry of Foreign Affairs, 2021).

To exemplify, Resolution No. 37/06 - Recognition of the Legal Efficiency of the Electronic Document, the Electronic Signature and the Advanced Electronic Signature in the MERCOSUR Scope and Resolution No. 34/06 - Guidelines for the Celebration of Mutual Recognition Agreements of Advanced Electronic Signatures in the MERCOSUR Scope) are important provisions to validate the integrity, safety, and authenticity of the electronic documents (Thorstensen; Delich, 2020). Because no standards or procedures are provided in the Electronic Commerce Agreement, Member States can enact their laws on e-trade (OEA, SICE).

MERCOSUR's Electronic Commerce Agreement can be enhanced by establishing a work plan with desired outcomes, domestic capacity-building initiatives, donor partner support, and financing for better actionable results among its member states, by also allowing non-members to cooperate within the scope of the Agreement, being hence conducive to promote a competitive business environment, in this case, between China and MERCOSUR's member states.

6 LESSONS FROM DEPA

The Digital Economy Partnership Agreement (DEPA) signed in 2020 by Chile, New Zealand, and Singapore has as its main goal to facilitate digital trade by creating a framework for the digital economy on three main topics: artificial intelligence, digital identities, and digital inclusion. South Korea, China, and Canada requested accession. DEPA shows to be a promising initiative to boost e-trade activities more efficiently, amid the current lack of an international document that regulates and encourages e-trade by International Organizations like the World Trade Organization (WTO).

DEPA contains provisions from other free trade agreements, such as the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP), with provisions to facilitate digital trade and

advanced technologies. For Warren and Fan, Digital Economy agreements are on the rise, but they face protectionism challenges. "Moreover, the absence of a global digital trade agreement further adds to the coordination challenges between digital economies" (Warren, 2022).

With the knowledge that the negotiations of a free trade agreement (FTA) with MERCOSUR can be lengthy, by taking the example of the MERCOSUR-EU agreement which surpassed 20 years of negotiations, it would be feasible MERCOSUR Electronic Commerce Agreement, by adding multi-party cooperation mechanisms which could benefit China's accession.

As the literature suggests, intergovernmental blocs cooperate through formal agreements by either charters or treaties, and that gives legal status within the international arena, enabling them to act beyond the realm of the State's sovereignty. Negotiations are, however, lengthy. A bilateral agreement on a specific topic, such as Digital Economy, can fast track MERCOSUR's international cooperation with other blocs and individual countries.

MERCOSUR and Pacific Alliance signed the AP-MERCOSUR Declaration in July 2018 calling for the members to evaluate the possibility to implement a digital platform through which regional providers can offer internet services to users. The Digital Agenda agrees to exchange experience and best practices in personal data protection, digital signature, cybersecurity, open data, frameworks for strengthening digital competencies, and policies to build a regional digital market. Similarly, the MERCOSUR-EU Agreement, which has not come into force, general ruling to remove unjustified barriers to e-trade and ensure consumer data protection (Thorstensen; Delich, 2020).

These two examples illustrate that MERCOSUR-China cooperation is feasible and beneficial to drive innovation in the South American region.

7 A NEW CHAPTER FOR CHINA-LATIN AMERICAN RELATIONS THROUGH MERCOSUR

China's foreign stance towards Latin American has been founded on trade and investment, however the country has long stated the need to diversity their relations to include sciences, technology cooperations, apart from other sectors. The progress of the White Paper from 2008, which focused on expand economic partnerships, and promote mutual understanding more broadly, to the China's Policy Paper on Latin America and the Caribbean which recognized China's strategic engagement with the region, reveal a shift in understanding the importance of Latin America to China.

The China- Community of Latin American and Caribbean States (CELAC) Forum, created in 2014, is their main dialogue channel. Some of the recognizable outcomes of the forum, particularly related to technological cooperation include the 2015 China-Latin America and the Caribbean Technology Innovation Cooperation Plan for renewable energy, telecommunications, and innovation and the China-Latin America and the Caribbean Space Cooperation Program (China Ministry of Foreign Affairs, 2021).

China's national policy strategy towards Latin America is dated from 2021, amid prioritization of its foreign affairs with Southeast Asia and Africa. The latest 2021 China-Latin America and the Caribbean Cooperation Plan

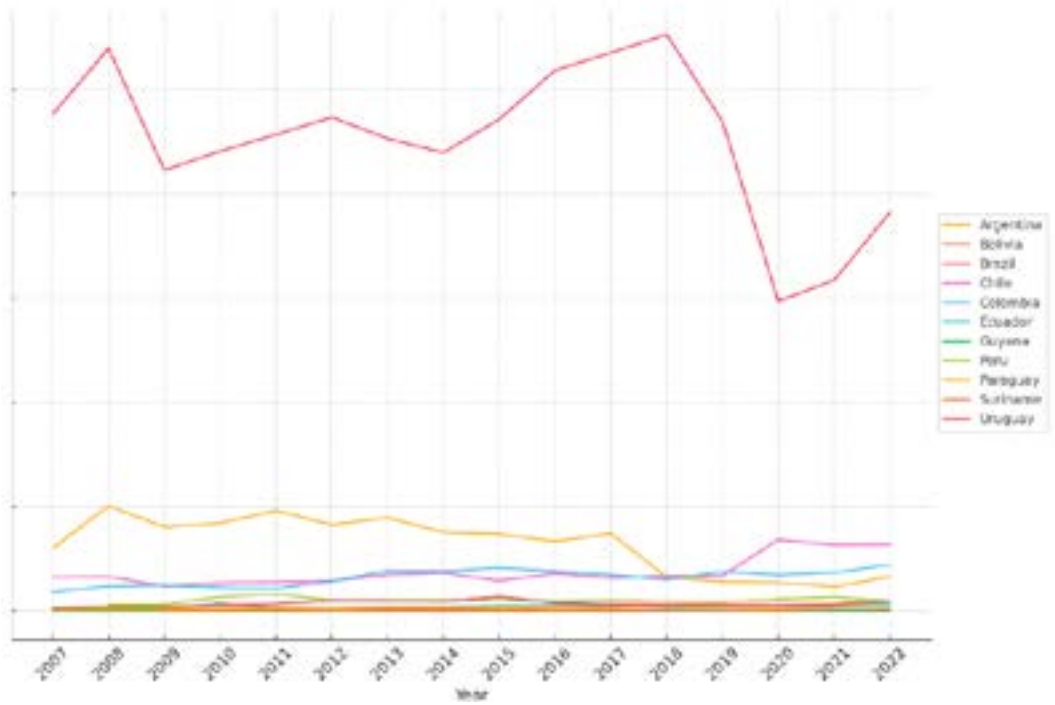
specifies several areas where relations can be further developed, including space, maritime, manufacturing, energy, and resource, infrastructure, scientific and technological innovation, however, no specific agenda is developed in this regard. The text is about scientific and technological innovation:

> 4.1 Strengthen exchanges between scientific and technological authorities, to increase synergies between the innovation, academic, and scientific sectors of the Parties, and intensify exchange and academic activities between their researchers and innovative scholars. In addition, promote exchange programs between young scientists and encourage scientific and technological personnel from CELAC Member States to actively participate in the "Work Program in China for outstanding young scientists from developing countries". (China Ministry of Foreign Affairs, 2021).

China's relations with MERCOSUR have only to fortify the bloc and establish joint efforts to facilitate cross-border trade, with unified customs provisions and simplified regulations. However, existing opportunities in Latin America through science and technology cooperation, which has its foundation in the Chinese companies' interests in exploring technology opportunities in the region through telecommunication (5G), bioenergy, submarine cables, and fintech, alongside cross-border e-commerce, indicates that opportunities go beyond e-trade, and beyond the scope of MERCOSUR as a regional trade bloc.

The cooperation should aim to create a common space for online business and investment opportunities through a consortium for sciences and technology, as herein proposed through an Agreement between China and MERCOSUR as a trade bloc, emphasizing the Digital Economy, and through different initiatives between MERCOSUR's members and China, extendible to other Latin American countries, for innovation development.

Graph 2. High-technology exports (current US$) – MERCOSUR's member states



Source: World Bank. High-technology exports (current US$). Available at https://data.worldbank.org/indicator/TX.VAL.TECH.CD
Note: x is the export of high-technology products of individual countries part of MERCOSUR from 2007 to 2022.

World Bank's high-technology exports are goods produced with high R&D intensity, such as aerospace, computers, pharmaceuticals, scientific instruments, and electrical machinery. The graph exposes a very incipience performance of all MERCOSUR member states except Brazil.

In 2021, high-technology exports for Brazil were US$ 6.35 billion, followed by Chile with US$ 1.26 billion. Colombia ranks third with US$ 735 million. Argentina has drastically felt the impact of the economic turmoil, reaching US$ 466 million. In 2017, the country exported US$ 1.48 billion in high-tech goods. The peak total value in Brazil occurred in 2018, at 11,062,943,508, and in 2021, the total value was 6,350,114,829. The peak total value in Argentina occurred in 2011, at 1,926,288,755, and in 2021, the total value was 466,425,814. Paraguay and Uruguay show relatively stable results, with occasional spikes, while Chile and Colombia demonstrate overall stability throughout the years.

As a matter of comparison, in 2021, China's high-technology exports totalized US$ 942 billion. China is currently the largest exporter of technology. The dataset is conducive to understanding the current scenario of innovation and its impact on the overall economy, also supporting the argument that Sino-Latin American relations can be a catalyst of innovation in the region.

The policy recommendations for MERCOSUR member states and China cooperation shall have an emphasis on:

7.1 Capacitation and Knowledge Exchange

Latin American countries have a relatively low position in the Global Innovation Index, revealing the need to invest in training and qualification to fill the digitalization gap and improve R&D in several yet selected sectors.

The proposed consortium of selected research and academic institutions from all parties involved will provide an environment of shared learning experiences for program exchanges, which include scholarships, research funding, and shared datasets on a project basis.

The private sector will also play an important role to support clustered initiatives per sector which will fulfill the gaps in the industry through both academic support and research. In other words, the three proposed initiatives should be aligned accordingly. The capacitation and knowledge program will enhance the accessibility of foreign companies in the selected markets.

7.2 Research and Development in technology and sciences

Despite the current opportunities to explore and implement technology advancements across industries, bioenergy, agribusiness, and industry 4.0 sectors can be the pilot industries for joint collaborations.

One priority area for cooperation is bioenergy. The current increase of green resource production in countries like Brazil and Argentina vis-à-vis China's need to reduce dependence on charcoal and traditional energy sources, highlight the fact that Latin America can play an important role

because of its existing technology on biomass to produce second-generation ethanol and biofuels, and China's dominance on solar and wind energy technologies can be of mutual interest.

Agribusiness should also be taken into consideration, considering that agricultural products are increasingly relevant to the balance of trade between Latin American countries and China. Improving efficiency by promoting sustainable production is directly correlated with the use of artificial intelligence and other technologies. The role of e-commerce companies in China in the reduction of the use of water and fertilizers came through PPPs as an effort from local governments to create job opportunities in rural areas has proven to be an effective model that can also be implemented in Latin America.

Amid the importance of technology disruption, data protection and storage security protocols in cloud computing have evolved to be one of the most searched technologies by corporations and governments, but also because they demand a robust network with a variety of processes to support cyber security, telecommunication systems organizations frequently dominate this industry. Electronics and computer industries, automotive, industrial machinery, maritime equipment, and pharmaceutical are some of the industries that can benefit from the technological advancements of Industry 4.0.

7.3 Funding Program

Due to the high costs which R&D requires, a funding program through public-private partnerships will support the research and development of innovative projects. The proposal highlights a multi-stakeholder approach between private companies and international and local development banks.

To exemplify, the European Union has launched the Research and innovation program, Horizon Europe, with a stipulated budget of €95.5 billion for the period between 2021 to 2027 which aims to boost "(…) collaboration and strengthens the impact of research and innovation in developing, supporting, and implementing EU policies while tackling global challenges. It supports creating and better dispersing of excellent knowledge and technologies" (EU, n.d.).

8 CONCLUSIONS

In recent years, China-Latin American relations have a growing importance in trade and FDIs. It is thus suggested that the current 2021 China-Latin America and the Caribbean Cooperation Plan2016 is updated with a roadmap for enhanced cooperation in core sectors, also prioritizing its relations with MERCOSUR.

Latin America can have a significant role in China's economic recovery after nearly three years of Covid zero policy, and enhancing institutional relations through CELAC and MERCOSUR as multilateral platforms can be more effective than focusing on bilateral relations instead. To do so, mutual interests based on the South-South cooperation

principles should aim to bring about innovation and enhance cooperation in science and technology.

To solve the innovation bottlenecks in Latin America which resulted in low positions in the Global Innovation Index, the main index which explores individual countries' metrics on innovation productivity and economic growth promotion, revealing to be strong dependence on foreign technology and North-South technology transfer. On the contrary, China's effective national policies have brought the county to one of the most innovative countries on the globe. Due to the growing importance of the Digital Economy to global trade and economic innovation, it is understood that Latin America and China have much to explore and diversify current relations, through an agreement between MERCOSUR and China in Digital Economy, and through joint efforts for investments and exchanges in technology and sciences-related topics in selected industries, including bioenergy, agribusiness and the industry 4.0.

Considering that MERCOSUR is the main regional trade bloc, it is of paramount importance to leverage its institutionalization, as other blocs are ahead in including e-trade as part of their mandate. The current political and economic environments suggest that MERCOSUR can and should have the due prioritization in the members' agenda, with the need to offer better economic results to its members, amid discontent from Uruguay and the possible interruption in the relations between Paraguay and Taiwan.

The second policy recommendation compiles a series of initiatives that are compelling to drive innovation. They are Capacitation and Knowledge Exchange, Research and Development in bioenergy, agribusiness and Industry 4.0, and a Funding Program.

Finally, it is important to highlight that such initiatives shall involve Latin American countries, because of the current lack of institutionalization between them as a trade bloc, they share commonalities and the need to transform the economy into an innovative driven one.

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