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Climbing the Ladder: Technological Innovation, the Chinese State, and the Political Economy of Development

Escalando a Escada: Inovação Tecnológica, o Estado Chinês e a Economia Política do Desenvolvimento

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Abstract: Since the end of the 1970s, the People's Republic of China (PRC) has stood out in the international conjuncture with impressive growth rates, in many years with up to two digits. In a development strategy coordinated by the Chinese State, foreign investment associated with national companies produced, in just over three decades, the largest GDP worldwide by purchase power parity, in 2014. Among theoretical perspectives of Arrighi on the dynamics of the Chinese rise; Mazzucato on the role of the State in technological investment; and Chang on State regulation and intervention in the promotion of development, the thesis that the Chinese State has a crucial role as a promoter of economic and technological development, and leader of the PRC in the advent of the Fourth Industrial Revolution - the so-called Industry 4.0 – is defended. In a favorable conjuncture in terms of systemic accumulation, the PRC is projected as a major power in the international system, with economic and technological capacity in disputing hegemony as a result of its successful strategy of international insertion and development.

Keywords: Technological Innovation; Political Economy; China; Development.

Resumo: Desde os anos finais da década de 1970, a República Popular da China (RPC) destaca-se na conjuntura internacional com taxas formidáveis de crescimento, em muitos anos com até dois dígitos. Em uma estratégia de desenvolvimento coordenada pelo Estado

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chinês, o investimento estrangeiro associado a empresas nacionais produziu, em pouco mais de três décadas, o maior PIB mundial em paridade do poder de compra, em 2014. A partir das perspectivas teóricas de Arrighi sobre a dinâmica da ascensão chinesa; de Mazzucato sobre o papel do Estado no investimento tecnológico; e de Chang sobre a regulação e intervenção estatais na promoção do desenvolvimento, é defendida a tese de que o Estado chinês possui papel crucial como motor e promotor do desenvolvimento econômico, tecnológico e dirigente da RPC no advento da Quarta Revolução Industrial – a chamada Indústria 4.0. Em uma conjuntura favorável em termos de acumulação sistêmica, a RPC projeta-se como grande potência no sistema internacional, com capacidade econômica e tecnológica de disputa de hegemonia como resultado de sua bem-sucedida estratégia de inserção internacional e de desenvolvimento.

Palavras-chave: Inovação tecnológica; Economia Política; China; Desenvolvimento.

1. Introduction

The fast Chinese development, since the end of the 1970s, coincides with the period known as "Reform and Opening", after the death of Mao Zedong, leader of the Chinese Communist Party until 1976. After a transition period led by Hua Guofeng (1976-1981), another generation of leaders, led by Deng Xiaoping, took power. Beginning in 1978, the implementation of economic reforms, first proposed by Zhou Enlai and followed by Deng, aimed to raise the Chinese Gross Domestic Product (GDP), in order to project the country as a major economic power in a long-term perspective. Therefore, the great objectives of modernization of China consisted of, based on the GDP of 1980, to double it in 1990 and to quadruple it in 2000, as well as the ongoing modernization of the country (PIRES; MATTOS, 2016, p. 76).

In order to guarantee fast economic growth and the modernization of industrial standards, in the 1980s the Special Economic Zones (ZEE), led by Hong Kong, and later expanded to other regions of the Chinese coast, were promoted. Such zones are dedicated to the production and export of consumer goods, and were first established with expatriate Chinese capital, which subsequently attracted foreign investment. Such an investment, which reached more than US$ 450 billion in the early 2000s, according to Arrighi (2008),

> [...] took advantage of the economic expansion trolley, which [foreign capital] did not initiate or lead. [...] In any case, even then foreign capital (mainly that of the United States) needed China more than China needed foreign capital. American companies, from Intel to General Motors, ‘are faced with a simple requirement: invest in China to take advantage of cheap labor and the rapid growth of the country's economy or lose the race to their rivals’. China, which used to be just a

> manufacturing center, has become the right place to manufacture and sell high-tech products. (ARRIGHI, 2008, p. 359, own translation)

What attracted foreign investment, therefore, was a conjuncture of factors already present in the country, and with intense participation of the Chinese State. Together with the ZEEs, the establishment of Economic and Technological Development Zones (ZDET) created spaces for learning new techniques and production methods, technologies and management models (PIRES; MATTOS, *op.cit*., p. 77), such as joint ventures with foreign companies.

As noted earlier, more than merely the entry of foreign capital into the Chinese economy was responsible for its sustained economic growth in recent decades. Arrighi highlights

> The most attractive feature, as we will argue, was the high quality of this reserve [of labor] in terms of health, education and self-management capacity, combined with the rapid expansion of supply and demand conditions for the productive mobilization of this reserve within China itself. Furthermore, this combination was not created by foreign capital, but by a development process based on native traditions - including the revolutionary tradition that gave rise to the PRC. Foreign capital intervened late in the process, supporting it in some directions, but undermining it in others. (ARRIGHI, *op.cit*., p. 357, own translation)

With the advent of the 2000s and its entry into the World Trade Organization (WTO), Chinese development stood out as the first leading producer and exporter of manufactured goods, being the main source of imports from the European Union and the United States (WTO, 2018). Nevertheless, the country is the largest creditor of US Treasury bonds, with US$3 trillion accumulated in international reserves in 2019 (PBC, 2019), which places China in a prominent position in liquidity and backing its economic development. Likewise, there is the strengthening of the Renminbi as a rising international currency option, currently the fifth largest stock registered by the International Monetary Fund (IMF, 2019). These results demonstrate a successful process of four decades of rise, in an international system of fierce competition for resources and insertion of high added value in the world economy.

In the following chapters, this article intends, from the historical perspectives of Arrighi, Chang, and Mazzucato, to discuss the origins, strategies and catalysts of the Chinese development process, based on the role of the Chinese State not only as an intervener, but as an “entrepreneurial promoter” of development.

2. Arrighi and the Dynamics of Chinese Ascension

In his analysis of the fundamentals of the Chinese ascension in the 21st century, Arrighi highlights how the Chinese process of opening did not happen under the precepts of the Washington Consensus[2], in a clash in which the author highlights Smith against Friedman: being a process led by the State, it has its own characteristics, apart from the liberalization of the economies of the West. In order to guarantee their insertion and presence in the largest middle class in the world (BAI, 2018), transnational companies transfer technology to joint ventures with Chinese companies, according to requirements regulated by the State. The opening process was regulated so that it would generate international competitiveness in Chinese industry, not technological losses and dependence on foreign capital. As the author points out,

> More generally, deregulation and privatization have been much more selective and have progressed at a much slower pace than in the countries which followed the neoliberal recipe. In fact, the main reform was not privatization, but the exposure of state-owned companies to competition against each other, with large foreign companies and, above all, with a basket of newly created private, semi-private and community companies. [...] the role of the Chinese government in promoting development has not diminished. On the contrary, the government has invested enormous amounts in the development of new sectors, in the creation of new Export Processing Zones (ZPEs), in the expansion and modernization of higher education and in large infrastructure projects, to an unprecedented level in any country of comparable per capita income. (ARRIGHI, op. cit., p. 362, own translation)

Therefore, in contrast to the neoliberal prescription of "shock therapies" - in which the state is reduced to the minimum and macroeconomic policies are relegated to private agents and their interests - the Chinese development process stands out for its gradual process of economic openness, keeping certain guidelines of national development strategies and international insertion. When competition is stimulated between agents of capitalist production - and not only among workers, who receive incentives for technological qualification and employment - higher levels of productivity, scale, and technological degree are obtained, which generates an economic activity with the capacity

[2] The Washington Consensus is understood as the liberalizing economic measures advocated by the United States since the 1980s, such as: fiscal and tax reforms, generalized deregulation and privatization, in addition to the uncompromising defense of property rights (Williamson, 1990). Such measures are ubiquitous in the current “austerity measures” in several tax reforms underway worldwide.

for hegemonic competition in an interstate level. Currently, the increasing qualification and growth of labor income in China makes industrial wages comparable to those of Portugal (YAN, 2017), whereas, since 2016, Chinese wages in all sectors are higher than Brazilians and represent around 70% of the salaries in lowest incomes countries of the European Union. At the same time, despite the trends of manufacturing relocation to countries with lower labor costs, such as Sri Lanka and Vietnam (DUFFIN, 2019), the size of the Chinese domestic market counterbalances this situation, since in many sectors the country will represent about 20% of the global market - similar to the North American and Western Europe markets -, largely due to the consumption capacity generated by the same appreciation of the domestic market (FT, 2017).

The international implications of the Chinese rise are highlighted in an ongoing hegemonic dispute[3] with the United States, which has shown a path of relative decline in its influence. The internal motivating elements which originate such a dispute are based on the "Chinese Dream", the conclusion of the development process registered in the last decades. The country pursues the goals of moderate prosperity until 2021, the centenary of the Chinese Communist Party (PCCh); and fully developed by 2049, the centenary of the People's Republic of China (PRC). According to Xi Jinping, China seeks

> [...] achieving the goal which in the founding centenary of the Communist Party of China we will culminate in the integral construction of a modestly accommodated society and that in the founding centenary of New China we will come to transform our country into a modern, prosperous socialist country, powerful, democratic, civilized, and harmonious, thus making the dream of the great revitalization of the Chinese nation come true. (XI, 2014, p. 38, own translation)

In this search for development, as an ideal for the revitalization of the Chinese nation, economic instruments are used as a means to reach new levels of material accumulation and relative position in the international system. According to Losurdo (2017), the development of Chinese socialism is characterized by the exercise of political power from the Chinese Communist Party, despite the different forms of ownership existing in the Chinese economy, and therefore, in economic power. In this case,

[3] In references to hegemonic disputes, the Gramscian concept of hegemony is used in international relations, in which it is established that the norms and principles governing international politics are agents of conviction and/or coercion (AGNEW, 2005, p. 57). Thus, the exercise of power is not exclusive to economic, political, and military circles, but also part of a geopolitical idea of an international order, in which rival strategies can compete with each other - which currently occurs between China and the USA.

economic power is sustained as an instrument for the political cause of strengthening Chinese socialism. The author points out that

> This is a model characterized, at the economic level, by the coexistence of different forms of ownership; [...] unlike 'political capital', the economic capital of the [Chinese] bourgeoisie shall not be the object of total expropriation, at least while it serves the development of the national economy, and therefore, indirectly, to the socialist cause. [...] The fact remains that the coexistence of different forms of ownership is offset by the strict State control managed by the Chinese Communist Party. (LOSURDO, 2017, pp. 18-20, own translation)

The developments in the international system of the Chinese ascension put the dominant and emerging powers in conflict of interest. Therefore, in order to forge an international order which brings more benefits to China and its allies, the Chinese Dream aims to attract other emerging powers, based in a logic of "benefits to other countries". Such benefits are generally linked to trade intensification and infrastructure construction, proposed by China to different regions, such as the land and sea routes established by the Belt and Road Initiative (BRI), especially in Eurasia, Africa, and more recently the movements for the inclusion of Latin America through China-Celac Forum. Other developments of a competing international strategy include initiatives of alternative financial structures, such as the BRICS New Development Bank (NBD), the Asian Infrastructure Investment Bank (AIIB) and the growing international reserves in Renmimbi.

In summary, Arrighi highlights the process of the Chinese rise in internal factors, identified and encouraged over the decades of establishment of the PRC based on the Chinese Communist Party guidelines. The Chinese State, based on various support mechanisms, such as the establishment of foreign trade zones; attraction of technological innovation through joint ventures; strengthening of the domestic market by raising labor income; expansion with quality of higher education; and incentives for the return of capital and workers from the Chinese diaspora, promoted the development and rise of the country in the international system over the last four decades of Reform and Opening. This process, due to its magnitude, results in changes in the correlation of forces in the international system. The ongoing hegemonic dispute with the United States, mainly in the establishment of zones of influence and in the race for the state of the art of new

technological standards of the Fourth Industrial Revolution - the so-called Industry 4.0 - is a result of the Chinese development strategy.

In the next chapter, from the perspective of Mazzucato, it will be analyzed how the Chinese State has become a purposeful actor in such a technological dispute, and how this process has corroborated for a national promotion of development.

3. Mazzucato and the Chinese Entrepreneurial State

In her views on the State catalytic role in the development process, Mazzucato highlights how public funding is crucial in the scientific research process which opens opportunities for innovation. The author advocates for

> [...] the fact that public sector financing usually ends up doing more than correcting market failures. [...] the public sector can in fact create new products and its corresponding markets. Two examples include his role in the dream that made the internet or nanotechnology possible when those terms did not even exist. When envisioning new spaces, [...] the State leads the growth process instead of just encouraging or stabilizing it. (MAZZUCATO, 2014, p. 91-92, own translation)

Basic research, that is, scientific research for the public good, made available from universities, elaborates the accumulation of knowledge necessary for complex applications made available in new markets, of disruptive technology - the one which permanently raises productivity levels. The Schumpeterian “creative destruction” of disruptive technologies seeks to raise industrial productivity with each new technological cycles. However, the State is an essential actor in the process, due to the uncertain nature of innovation, which makes the private sector averse to investment. Also according to Mazzucato,

> [...] the steam engine, the railway, electricity, electronics, the car, the computer, the internet. Each had its share of destruction and creation, but each also led to an increase in global wealth. [...] Technological change is a good example of a truly unique situation. [...] Investment in basic research is a typical example of a ‘market failure’: it is a situation where the market alone would not produce enough basic research, so the government needs to intervene. (MAZZUCATO, op. cit., p. 93-94, own translation)

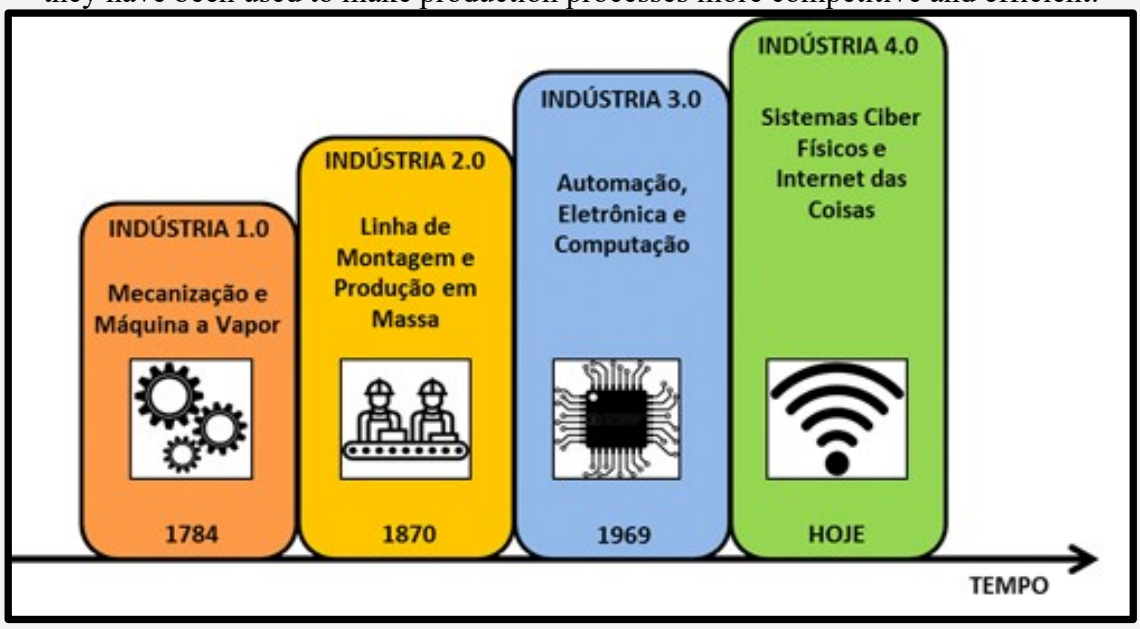
Currently, the disruptive technological cycle in dispute is the so-called Industry 4.0 - allusion to the Fourth Industrial Revolution -, which consists of several General Purpose Technologies (GPTs), such as Cyber-Physical Systems (CPS), Big Data, Cloud

computing, Internet of Things (IoT), 5G, artificial intelligence, among others (IEDI, 2017, p. 2; PEDERNEIRAS, 2019). Such technologies are disruptive and trigger a new technological-industrial cycle, as they are capable of infiltration by various sectors; improve over time and reduce scale costs; in addition to facilitating the generation of other new products and processes (MAZZUCATO, *op. cit*., p. 97). GPTs have the ability to digitally connect the entire production chain, in order to increase productivity and competitiveness through greater integration of value chains. Its applications, among other technologies, are very diverse:

a) Cyber-Physical Systems are used to improve efficiency in production lines;
b) Internet of Things, combined with 5G, allows data traffic capable of coordinating networks of autonomous vehicles;
c) Artificial Intelligence allows unprecedented levels of automation (MUNIZ; NASCIMENTO, 2018).

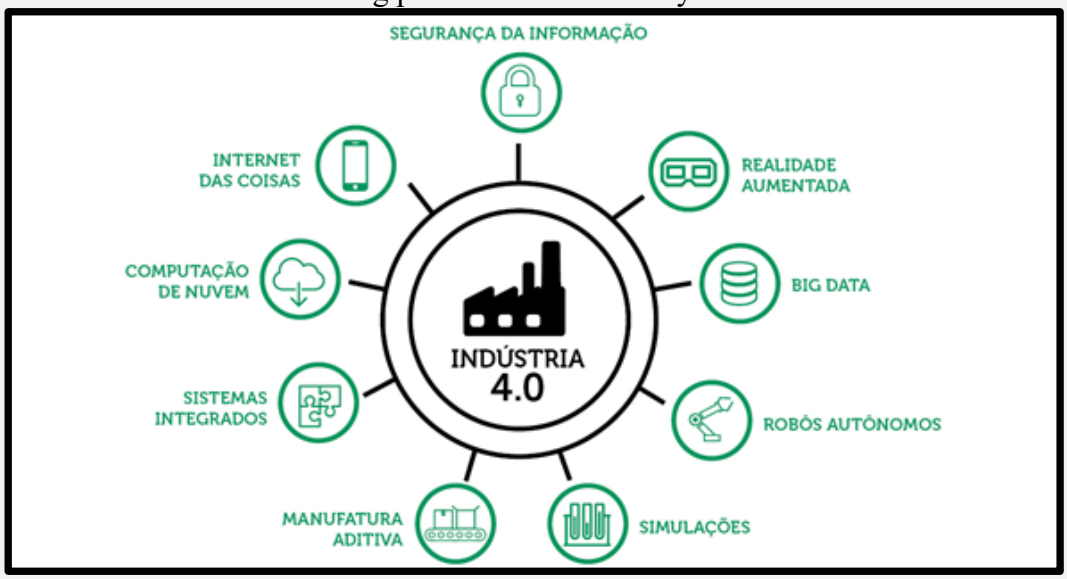
Such technological innovations have the capacity to become GPTs with the potential to support new levels of production for organizations and countries which invest in their applications.

Figure 01: Timeline of industrial revolutions, according to their main GPTs. Over time, they have been used to make production processes more competitive and efficient.



Source: MUNIZ; BIRTH, *op. cit*.

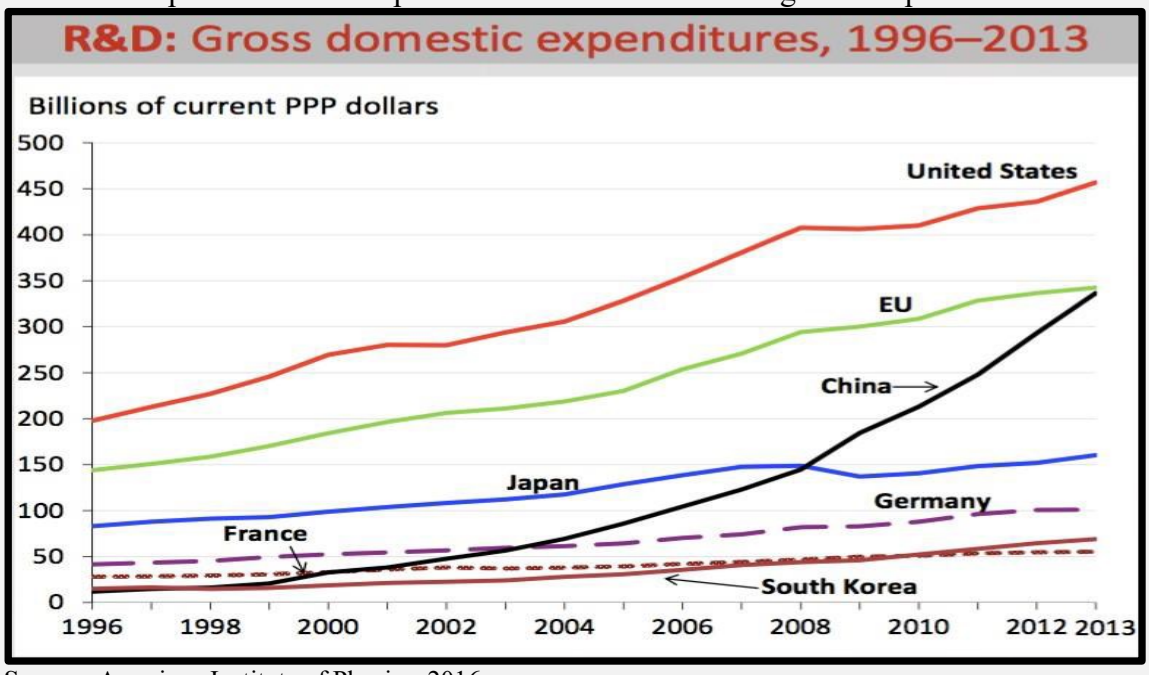
Figure 02: Informative scheme, showing the main GPTs associated with the Fourth Industrial Revolution. This set of innovations is capable of impacting both the manufacturing processes and the daily life of home users.



Source: MUNIZ; BIRTH, *op. cit.*

In order to compete for the leadership of the ongoing technological cycle, investment in research and development (R&D) is becoming increasingly greater among the main powers of the international system.

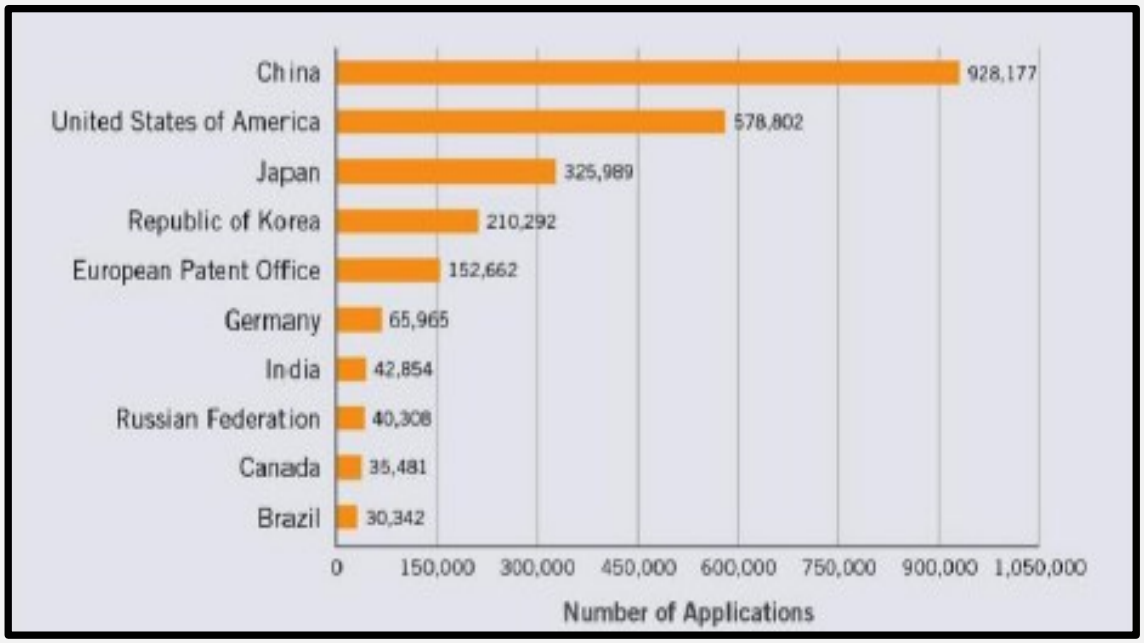
Figure 03: Larger gross investments in R&D, in billions of dollars by purchasing power parity (PPP), from 1996 to 2013. The massive growth of Chinese investment since 2000 stands out, which demonstrates the Chinese commitment to dispute the leadership of the international technological competition.



Source: American Institute of Physics, 2016.

In order to lead the state of the art of technological competition in the 21st century, Chinese investment in R&D grows exponentially, with emphasis on the technologies of Industry 4.0. The governmental program Made in China 2025 focuses on the digitization and automation of production process, in order to deepen the objectives of the Five-Year Plan 2016-2020 and the Medium and Long Term Program for the Development of S&T 2006-2020 (MLP 2006-2020). The governmental strategy aims mainly at: innovation as a development strategy; support for advanced manufacturing; focus on the emerging industries of information technology, as well as strategic ones - aerospace, nuclear and biological; and maintaining the investment goals of 2.5% of GDP for R&D, 60% of the economic growth derived from advanced technologies, and the limit of dependence on foreign technologies at 30% (ARBIX; MIRANDA; TOLEDO; ZANCUL, 2018, pp. 149-150). To achieve these goals, competition for the intellectual property standard - the international patent registration - is also a field of dispute between the powers of the international innovation system.

Figure 04: The top ten countries in terms of patent applications in 2014. The productivity of Chinese investment in technology is highlighted, being the isolated leader in patent applications, while disputing the second position for R&D investments.



Source: WIPO, 2016, p. 23.

Although the total gross investment in R&D is still not the largest available, in some areas China is already leading the efforts of powers to implement the new

technological standards of Industry 4.0. The largest financing in artificial intelligence, the largest patent registration, and the largest volume of scientific articles published in this field are already assumed by the Chinese position, in addition to an industry valued at US$ 150 billion (ROBLES, 2018).

As long as investment in science and technology rises, China is expected to compete for technological leadership with the United States in the 21st century. The American position on this dispute is rhetorically ambiguous, but regarding State practice, it is as the Chinese. Mazzucato highlights

> [...] the State proactive approach on shaping a market in order to drive innovation. [...] the United States is also a place where the State plays an entrepreneurial role, making investments in radically new areas. The State provided financing in early stages when venture capital fled, while commissioning a highly innovative activity in the private sector which would not have happened without public policies with a defined vision and strategy. (MAZZUCATO, *op. cit*., p. 109, own translation)

International development experiences show the role of the State in promoting technological innovation and forming new markets with greater added value. Despite the *laissez faire*-style rhetoric in favor of economic liberalism, State support for sensitive and strategic areas for maintaining its economic power is also part of the American reality, one of the crucial pillars for sustaining its hegemony. Still according to Mazzucato,

> [...] at the frontiers of knowledge, the mere existence of a national innovation system is not enough. Over time, more expressive results can be achieved when the State acts as an important player in this system. [...] the State, through its numerous agencies and laboratories, has the potential to disseminate new ideas quickly. It can also be skilled, using its regulatory functions and its ability to commission and acquire to shape markets and drive technological development. In this way, it acts as a catalyst for change, the spark that ignites the fire. (MAZZUCATO, *op. cit*, p. 110, own translation)

Among the government agencies and legal systems favorable to technological innovation with State leadership in the USA, the Defense Advanced Research Projects Agency (DARPA) stands out, responsible for promoting the defense industry, an important manufacturer of General Purpose Technologies (GPTs); Small Business Innovation Research (SBIR), a program to foster innovation in small companies, based on the supply of products established as necessary by the US government; the Orphan Drug Act, which together with the National Institutes of Health (NIH) produces new

drugs and highly complex biomedical research, favoring the chemical-pharmaceutical complex; and the National Nanotechnology Initiative (NNI), in which several government agencies coordinate research for the application of nanotechnology as solutions for several areas, in order to benefit commercial and public use. Along with State support and its promotion of R&D, collaboration between such government agencies has resulted in several technologies which underpin American economic power, such as computers, jets, nuclear energy and biotechnology. (MAZZUCATO, *op. cit*., p. 110)

Industry 4.0 demands a high volume of investment in resources, so that gains in scale result in higher levels of productivity, which restricts most of its industrial applications, at first, to the great powers in science and technology. The records of intellectual property of GPTs, in the coming decades, will determine the main competing powers for the technological standard to be used in industry worldwide in this century; Based on the initiatives of the Chinese State in the modernization of its industrial system, the Chinese insertion in such a process is at an advanced stage, which provokes competition with the US innovation industry.

Such technological dispute is evidenced in the ongoing Sino-American trade war. The case of Huawei, a Chinese technology company, explains the growing tensions between the two main technological powers worldwide. The dispute over the establishment of 5G technology has caused clashes between the US government and the company; from extradition requests from high-ranking officials (Al Jazeera, 2018), to laws banning the use of their technology in sensitive areas, on charges of possible espionage. The United Kingdom and the European Union are examples of possible reticent partners in relation to the use of Chinese technology in areas such as defense systems and nuclear energy (STEVIS-GRIDNEFF, 2020).

4. Climbing the Ladder: Chang and Chinese Development

In his postulations on development strategies from a historical perspective, Ha-Joon Chang argues that, in order to make their technological superiority prevail, the great industrial powers advocate “free trade” in the international economy, industrial and fiscal policy strategies weak or nonexistent, in order to prevent the development of competitors in the long run. After a protectionist trajectory in the historical period of their nascent industry, the so-called developed countries (PADs for Chang) practice low tariffs, since

their superiority of productive scale makes their products highly competitive internationally; such products, present in less competitive countries, find ease of insertion - due to "free trade" - amidst local industries with less productive capacity. The author highlights how, in their historical development trajectories, at the end of the 19th century,

> [...] many European countries have substantially abolished tariff protection. At the same time, most of the rest of the world was forced to practice free trade by colonialism. [...] and, in the case of some nations nominally 'independent' (such as Latin American countries, China, Thailand, Iran, and Turkey), through unequal treaties. (CHANG, 2004, p. 34, own translation)

Therefore, the liberal discourse of non-state intervention, in fact, is a rhetoric used to facilitate competition in the international division of labor. In the Chinese case, European colonialism resulted in a later recovery process called the "rejuvenation" of the Chinese Dream. The Opium Wars[4] (1840-1842) are described as the decline of Chinese society, representing the foreign domination, and that "socialism with Chinese characteristics" is the result of the historical overcoming of this period, which began more than 170 years ago (XI, *op. cit*., p. 37). Thus, the Chinese historical development perspective is the search for autonomy in international economic competition; and as already demonstrated, with an active State policy to promote industry, science and technology. On the similarity of policies adopted by different development strategies, Chang affirms how

> [...] virtually all PADs actively used interventionist industrial, commercial and technological (ICT) policies to promote the nascent industry during the catch-up period. [...] The State both subsidized industry and resorted to various public investment programs, especially in infrastructure, but also in manufacturing. The development of internal technological capacity was encouraged through financial support for research and development, education, and training. [...] In addition, some governments have created institutional mechanisms to facilitate public-private partnerships (for example, public-private joint ventures and industrial associations closely linked to the State). (CHANG, *op. cit*., pp. 35-37, own translation)

[4] Xi strongly describes the Opium Wars as a "war of aggression" and an "unequal treaty", a historic process in which China must seek sovereign insertion as a developing country: "The Opium Wars were a British war of aggression against China from 1840 to 1842. In 1840, in response to Chinese opposition to the import of opium from British merchants, the British government sent troops to invade China on the grounds of protecting trade. [...] In 1842, British troops invaded the Yangtze River area and forced the Qing government to sign the Nanjing Treaty, the first unequal treaty in the history of modern China." (XI, *op. cit*., p. 39, own translation)

The Chinese development strategy includes and applies all the policies mentioned by Chang as characteristics of a country in an advanced stage of catch-up, with some attributes, including PADs: use of advanced techniques in industrial production; large volume of participation in international trade - China is the country with the largest participation in world trade, responsible for 12.4% of transactions in 2017 (China Power, 2019); high public investment, both in production and R&D development; in addition to active market shares - only two of the twenty-five largest Chinese companies are private; of these, twenty-three are among the hundred largest in the world (Fortune, 2019).

The intense participation of the State in any national development strategy is undeniable. State capacity to coordinate fiscal policies to promote research, innovation and technology; investment in State-owned companies - or participation in mixed companies - which introduce new techniques and procedures in production; and support for national production up to the maturity stage for international competition; it is a common element among countries which have engineered successful development trajectories; ironically, it is common for many of the PADs to defend the consumption of their products by countries with less competitiveness, while the latter are the same ones which follow the recommendations not pursued by the formulators of minimum State measures, such as those of the Washington Consensus.

5. Final Considerations

This article sought to analyze how, since the 1970s, China has stood out for its impressive economic growth, up to double digits per year. The development strategy coordinated by the Chinese State, with high rates of industrial, educational and technological investment - associated with foreign capital -, led the country, in three and a half decades, to the highest world GDP in terms of purchasing power, in 2014.

The theoretical perspectives of Arrighi highlight the dynamics of the Chinese ascension, based on the strategies of establishing Special Economic Zones (ZEEs) and Economic and Technological Development Zones (ZDET) - the State direction for economic growth and development -, along with investment from the Chinese Diaspora and foreign investment. Educational investments in research and technology have kept pace with the capital investments needed to maintain Chinese impressive growth for decades.

The paradigm of the Entrepreneurial State of Mazzucato, when dealing with the role of the State in technological development, highlights the importance of public investment in the innovation process, which leads to higher levels of productivity and competitiveness in the world economy. Long-term State planning identifies key areas for strategic investment, coordinates efforts and sets goals. The Five-Year Plans, as well as strategic studies, such as Made in China 2025, show the Chinese State active and purposeful role in establishing a national development strategy with objectives, methods and results; such planning is essential to the Chinese process of international rise.

Based on Chang and his position on State intervention in promoting development, with active ICT policies, the Chinese State has a crucial role as a promoter of economic, scientific, and technological development, and a leader in implementing the techniques and processes of the Fourth Industrial Revolution. The current PADs have adopted strategies similar to the Chinese in their historical development trajectories, with intense participation and investment in industrial, technological and protection policies for their nascent production networks in the face of intense international competition.

In a context of intense interstate competition for the accumulation of resources and access to markets, the PRC projects itself as a great power, with a gradual economic and technological capacity to dispute hegemony in the international system. Its current successful national development strategy allows the country to have a privileged international insertion in economic, scientific, and technological terms.

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