

From the national system of technological innovation to the “New Projectment Economy” in China

Do sistema nacional de inovação tecnológica à “Nova Economia Do Projetoamento” na China

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RESUMO: Profundas mudanças têm caracterizado a China nos últimos dez anos. Cada vez mais as discussões giram em torno da dinâmica de acumulação que tem emergido no país e, até mesmo, sobre qual tipologia enquadrar o atual modelo chinês. Neste artigo propomos uma discussão que relacione o papel do Sistema Nacional de Inovação Tecnológica (SNTI) que se fortaleceu na segunda metade dos anos 2000, com as inovações tecnológicas disruptivas (5G, Inteligência Artificial, Big Data) e o surgimento de novas e superiores formas de planificação econômica no país gerando condições ao surgimento do que chamamos de “Nova Economia do Projetoamento”.

PALAVRAS-CHAVE: China; desenvolvimento; inovação tecnológica; planificação econômica; Nova Economia do Projetoamento.

ABSTRACT: Deep changes have taken place in China over the past ten years. The debate increasingly revolves around its new dynamics of accumulation, even questioning under which typology to frame the current Chinese model. In this paper, we propose to correlate the Chinese national system of technological innovations, reemerged in the first years of this century, disruptive technologies such as 5G internet, Big Data and Artificial Intelligence, and the emergence of new and superior forms of economic planning in that country, sowing the seeds for what we call “New Projectment Economy”.

KEYWORDS: China; development; technological innovation; economic planning; New Projectment Economy.

JEL Classification: O1; O2; P2.

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INTRODUCTION: “WHAT DID WE THINK WE KNEW ABOUT CHINA?”

Naughton (2021, p. 174) posed the question above as an honest piece of self criticism regarding everything influential economists, deemed specialists on the Chinese development process, believed to be true before the tides changed after the financial crisis in 2008, and mainly after the last two years made those beliefs to collapse. The dispute around China has been polarized for four decades between those who saw it becoming a free market economy (Lardy, 2014) and those who saw it as a kind of “State capitalism” (Naughton, 1995). For authors like Heilmann and Melton, with whom we agree, China was undergoing a major strategic reorganization of the State, centered on economic planning. A critique to Naughton’s “growing out of the plan” is presented as follows:

A widely accepted explanation of plan-market dynamics in post-Mao China was given by Barry Naughton in his book *Growing Out of the Plan* (Naughton, 1995). He argued that the rapid growth of the non-planned economy in the 1980s and early 1990s, along with simultaneous stagnation or decline of the state-dominated planned sector, reduced the importance and range of state planning and facilitated the emergence of an increasingly market-dominated economy. The “growing out of the plan” framework is, however, focused on explaining the atrophy or reduction of certain core features of old-style socialist planning, such as innumerable mandatory targets, material supply balances, direct state allocation of resources, and state control over investment, credit, prices, and foreign trade. This narrative is not incorrect, but it is incomplete. (Heilmann e Melton, 2013, p. 582)

Our view aims to develop further the argument raised by Heilmann and Melton. We have been arguing, in opposition to *both orthodox and heterodox mainstream*, that ever since the economic reforms began China is instating waves of institutional innovations in order to rise the State’s role in quality terms, while private sector grew in quantity terms, which led to a new sorts of capabilities in the State (Jabbour and Dantas, 2017; Paula and Jabbour, 2020; Gabriele and Jabbour, 2022). This is one point.

However, two inflections in the historical process are there to be noticed. This first is the immense capacity demonstrated by the Chinese State when it put into action a US\$ 568 billion fiscal package in November 2008, through deliberate decision of their 96 State enterprises and public development banks. Here, the question is not the fiscal package in itself, but the ability to plan and coordinate thousands of projects simultaneously. The second inflection was the extraordinary ability China demonstrated when dealing with Covid-19 challenges. If we are to be faithful to a perspective that does not separate theory and history, we come to the point where Chinese development poses a dramatic challenge to social and human sciences, one that started to be tackled only in a timid fashion, and still under

positivistic influences (visions privileging part in relation to the whole, separating theory and history, as well as subject and object).

Naughton's example points to a deeper understanding of the changes occurring in China. Since 2020, the author has been showing courage to change the course of his analysis on China, stating that the country inaugurates a new kind of economic system, characterized by a growing dominance of the State over the market, using a series of empirical evidence¹. It is interesting that Naughton's both strength and weakness on the matter reside in empiricism. If the separation between theory and history gets diluted, then concepts manifest in the real movement. In this way, it is enough to go beyond the perception of "new" to create a new theoretical and conceptual framework to understand the exact nature of the recent transformations of China. In Naughton, the subject does not penetrate the object, here is his limit.

Blanchette (2020) goes even further by proposing a controversial new paradigm of "State capitalism", which he names "*Chinese Communist Party Inc.*" (CCP Inc.). That would be the result of a larger influence of the Chinese Communist Party over not only the state led companies, but also over private investments, leading him to state that:

(...) the issue is less that China's political economy is riven with "contradictions" (as many market-friendly commentators oft assert), but rather that the analytical frameworks that many of us are using to understand China's economy are stuck in past paradigms that view "state" and "market" as standing in tension. In reality, China's sui generis CCP Inc. system is creating an entirely new political-economic order, and one that is already leaving a deep impression on the global order. Questions surrounding the resiliency (or lack thereof) of China's evolving state capitalist system must proceed with a more calibrated understanding of both sides of the ledger – what the system does well and what it does poorly. More than four decades after the death of Mao Zedong, the CCP has proven itself capable of significant (illiberal) governance innovations, often motivated by fear of losing power. (Blanchette, 2020)

Blanchette cannot overcome the neoclassical paradigm of tension between State and market, but like Naughton, he sees something new. He does not advance his conceptualization, choosing something near to a typical kantian transcendental moral (CCP Inc. as new paradigm of "State capitalism") instead of acknowledging that China is forging a new historical form that cannot fit into traditional categories, resulting in other form of social, political and economic organization.

Weber and Qi (2021) try to advance, with merits, in conceptualizing the novel-

¹ Naughton, B. Is China creating a new type of economic system? Webinar to UMass Amherst Political Economy Workshop, 19/03/2021. Available at: <https://www.youtube.com/watch?v=anVkiq6HI&t=1s>.

ties appearing in China. What they call “a state-constituted market economy” could be resumed to a system capable of creating and organizing markets:

(...) a theorisation of the economic mechanisms that underpin modes of state–market relations. We propose the concept of a state-constituted market economy and argue that through market-constituting activities the Chinese state seeks to ameliorate uncertainties and instabilities in essential spheres of the economy while harnessing the power of market forces. This involves the continuous redefinition of the boundaries of essential and nonessential sectors. The state creates and participates in markets for essentials in order to stabilize and steer the economy as a whole. (Weber e Qi, 2021, p. 16)

This approach is useful because it establishes a dynamics to understand the role of the State in an economy where the private sector tends to play a higher role at a lower microeconomic level. Here, the State would be no more than a “stabilizer”. This analysis lacks politics. When confronted with the new, which should centralize the reasons why that same State elevated its capacity to intervene and the role of its large public assets, they take the usual refuge in interpreting complex phenomenon as new relations between State, market and institutions.

Faced with this current scenario, what is our approach? This paper does not intend to reaffirm what we call market socialism as a “new socioeconomic formation”². This is established. Here, we aim to correlate the Chinese National System of Technological Innovations, accelerated since the second half of the first decade, with disruptive technologies such as 5G internet, Artificial Intelligence and Big Data in the context of new and superior forms of economic planning in the country, which opened way to the emergence of what we call “New Projectment Economy”. It is impossible to understand the new, now manifest in the real movement of the Chinese economy, disregarding totalizing categories. The New Projectment Economy is an extension of a new kind of socioeconomic formation, born in China after the economic reforms of 1978 (Gabriele, 2020; Gabriele and Jabbour, 2022). It is precisely this historical process that was ignored by those great thinkers. That was the reason why they felt caught in surprise upfront with their own assurances.

What happens in China is a superior stage of the human domain over nature (planning) and over the anarchy which is inherent to economies under capitalist orientation. This superior level of planning and all its economic and institutional framework is what we call “New Projectment Economy”, cause and consequence of the central role of Chinese National System of Technological Innovations since the second half of the twentieth century.

Besides this introduction, the paper shall have two other sections. We start by presenting the development and some general considerations on the making of the

² See Jabbour, Dantas and Espíndola (2021).

National System of Technological Innovations in China, and the possibilities it opened in terms of economic planning. By reaching technological frontiers in some critical aspects, and socializing their use to large scale economic planning, this system became the founding core of the New Projectment Economy. This “New Economy”, its characteristics and regularities we discovered will be featured in the further section. Then, we present some final considerations.

STATE, PLANNING AND INDUSTRIAL POLICIES IN CHINA

The long introduction made above meant to showcase the current discussions on the nature of the Chinese economic system, and to what extent they advanced, considering the recent deep changes that occurred. In our view, the majority of recurring mistakes on the Chinese dynamics lies in the excessive debate on the relations among State, market and institutions – implying a separation of three entities that should be understood as a totality – and in the little attention given to a fundamental aspect: their schemes of property and the core of their productive and financial forces. These elements are not less relevant, rather it is all the opposite.

The emergence of a “new socioeconomic formation” carries along a conclusion about what differentiates it from the large capitalist economies in the world: public property dominance in strategic sectors for the accumulation processes, generating chain effects throughout the economy. This diagnosis alone could be enough to change the entire approach regarding both the so-called “comparative economic systems” and the comparison between Chinese innovation system and other capitalist countries’ innovation structures, since in the latter large private monopolies and financialization tend to weaken the innovation systems³. As follows from the quotation below:

In this connection a new model has emerged in recent years, in which the main vehicles of the development of frontier technology are the SOEs. The development of high-speed railway technology is a prominent case. (The state plan to develop large-scale civilian aircraft manufacturing is also in line with this new model.) China started to import world-frontier technology in high-speed rail in 2004, with the targets of building up 200 km/hour trains in the first stage and 250 km/hour trains by 2009. (Lo and Wu, 2014, p. 320)

We started this paper with a clear definition as to how essential is the role of economic planning to understand the Chinese economic dynamics. This applies

³ The relation between financialization and its impact on the national system of technological innovation in the USA is well explained by Mazzucatto (2014).

with even more emphasis to the national innovation system, which is somewhat self-explanatory:

China's specific form of (unevenly developed) market socialism, which can potentially endow its leaders with an outstanding advantage in the crucial area of strategic planning – i.e., the capability to strategically muster national resources in a concentrated form, in order to earmark them towards key goals accordingly to a clear set of priorities. (Gabriele, 2020, p. 147)

The two quotes above are partially sustaining the central hypothesis we bring here: that the Chinese national innovation system is not only a mean to attain goals in terms of improving the productivity levels and performing catch-up, but becomes an instrument that nourishes the State and State-owned productive base with ancillary forces to help inaugurate superior forms of economic planning. This means the ability to focus on large scale projects, as had been seen in the “Soviet model”, as well as the creation of an ecosystem where State-owned assets are both the core of innovation structures and the main communicating vessel to real economy of new productive capacities, going even further to become the driving force to overcome capitalist anarchy as it greatly enables the State to take strategic decisions fastly⁴.

The same principle is put in place when planning and executing large scale interventions on the territory, with no a priori mediation of private capital and its interests⁵. The case of Artificial Intelligence and Big Data as sources of instruments to successfully tackle Covid-19 with fundamental decisions offers uncontested empirical evidence of our hypothesis⁶.

The two main foundations of a National System of Technological Innovation in China

The recent developments of a National System of Technological Innovation, which led China to a rapid catch up of the central capitalist economies, are the product of a cross-factor process, having the 11th Five Year Plan (2006-2010) as its highest moment. Also, its main drive is what Neo-Schumpeterian literature calls

⁴ To a certain extent, Naughton (2021, p. 13) resonates our hypothesis about the aim to use disruptive technological innovations as a way to broaden the State's economic role: “(...) from about 2015-2016, it became clear that artificial intelligence and big data had huge potential economic effects on economies worldwide. As technological change has accelerated, the ambition of China's planners and policy-makers has also expanded, and intervention has continued and increased. Indeed, China's development strategy today may warrant a new name: China aspires to be the first 'government-steered market economy.'”

⁵ It can be said that this relation is yet another fundamental difference between national systems of innovation in capitalism and in socialism.

⁶ See Allan, Dey and Jones (2020).

“Indigenous Innovation” and “Indigenous Capabilities”⁷. However, it would be wrong to set the 11th Five Year Plan as the analytical starting point, hence we must quickly remember two other fundamental processes⁸.

Chinese business system was first driven into *corporatization* during the 9th Five Year Plan (1996-2000). In that case, *corporatization* meant the transformation of state owned companies into large market oriented corporations, leaving behind the rigid administrative functioning generally associated with the “soviet model”. This was a historical turning point, as today these large state owned corporations serve as the core of all the National System of Technological Innovation in China. It meant a breakaway from the rigid “soviet model”, in which research centers and universities were the core cradle of innovation, and where there were no “creative destruction” mechanisms, imposing strategic limitations to the “model”. Challenges were huge:

The main challenge to tackle was the essential contradiction in state companies management: cease to be profitable in a totally protected environment in order to become efficient enough to function as the core of a business system (...) capable to work as the basis for a new class of socioeconomic formations. (Jabbour and Gabriele, 2021, p. 185)

Under the slogan “*grasp the large, let it go of the small*”, China launched a significant process of institutional innovations, a large part of which based on mergers and acquisitions in the state sector economic activities, initially leading to the appearance of 199 large state owned corporations (Gabriele, 2020; Jabbour and Gabriele, 2021; Gabriele and Jabbour, 2022). Today this number is 96, all set up in strategic knots of the Chinese economy⁹.

⁷ This strategy is born out of many factors, including the exhaustion of Chinese dependence on Foreign Direct Investment from USA and Japan to achieve technological innovations.

⁸ It is evident that the spread of research institutes, the remittance of Chinese students abroad and the graduation of thousands of engineers every year are fundamental pillars in the current system of technological innovation. It is also relevant to note that many of the measures taken to improve innovation in China were under the guidance and administration of several relevant and even strategic entities in the Science and Technology field, such as: Ministry of Education (MOE), formally the State Education Committee; Ministry of Science and Technology (MOST), under the official name of State Science and Technology Committee (SSTCC); China Academy of Science (CAS); China Academy of Engineering (CAE); China Academy of Social Science (CASS) and the National Science Foundation Committee (NSFC). These agencies cooperate with other economy-related organisms, who have their own research and project institutes, such as the Ministry of Information Technology Industry (MITI), the State Administration of Machine building Industry (SAMI), formally called Ministry of Machinery Industry (MMI) and the Ministry of Electronics Industry. These entities formulate and implement the programs and policies for Science and Technology in the country (Moreira, 2022).

⁹ This corporatization process is well outlined in the following note on the 9th Five Year Plan: “Institutional reform must be coupled with optimization of investment structure in order to selectively support those who are competitive and strong and allow the fittest to survive and prosper. The weak should be eliminated by merger, acquisition and bankruptcy to improve efficiency and reduce headcount

A specifically important institutional innovation that came up during the corporatization process was the creation of *State Owned Assets Supervision and Administration Commission* (SASAC) in 2003. Its goal is to act as the government's shareholder in the 96 large state owned corporations, leading them toward two apparently opposite directions: operate according to market rule¹⁰ and become an ever stronger entrepreneurial arm of the State and the CCP.

SASAC took the responsibility to overlook and assign the top administration of all the vast corporate domain under State property, relieving the State Council of that burden and thus imposing them financial targets, such as return on assets and stock market decisions, or production growth, innovation and international insertion, just like a major shareholder of any company would normally do (Moreira, 2021, p. 21).

Another fundamental base for the National System of Technological Innovation in China is their widespread and far reaching public financial system, built along the institutional innovations of the 1990s, which culminated in replacing *soft budget constraint* for credit mechanisms based on highly corporatized and long term oriented financial institutions. In short words, these institutional reforms were as follows:

During the 1990s, China established some new institutions to regulate the financial system, such as the China Banking Regulatory Commission (CBRC), the China Securities Regulation Commission (CSRC), and the China Insurance Regulatory Commission (CIRC). Simultaneously, four large state-owned banks were formed over time (the so called “Big Four”) along with a large number of national and regional banks emerging from various types of ownership meeting credit demand concerning agriculture, urban construction, infrastructure, and international trade. There has also been a gradual development of China's capital market. (Paula and Jabbour, 2020, p. 867)

Given the weight public property has in the Chinese economic system, both in the productive and the financial sectors, we can easily distinguish it from any other system in the world today. But that is not all. China has made up an apparatus able to reorient the economy around large projects. This phenomenon has little resonated among western academics, because they chose to observe it through a

(...) A number of key industries and business groups must be properly managed in order to use their capitals to trigger the reform and growth of other enterprises to pump up the entire economy”.

¹⁰ According Jabbour and Gabriele (2021), SASAC is the most important institutional innovation since the reforms in 1978, of which they said is the “manager of Chinese market socialism”. According to Jabbour (2021, p. 21): “Instead the State Council trying to find its way to steer the vast corporate empire nominally under its control, SASAC took the responsibility of assigning the high administration and oversee their fulfilling financial goals, such as the return on assets and stocks, as well as production growth goals, innovation and internationalization processes, just as a major shareholder of any company would normally do.”

rigid thinking or belief, deeming the process as a transition of the Chinese political, social and economic organization into a market economy, or as a kind of “State capitalism”. That is what Naughton (2021) defined as “what we economists thought about China”. So, if we disregard aprioristic visions, China was living a far more complex process of transformation, within which a powerful financial engineering would become a fundamental pillar for their new technological innovation system¹¹.

On the Information Technologies, planning and two large projects

Before we enter the large projects issue (Made in China 2025 and the 14th Five Year Plan), it is important to highlight an element that was prior to the innovation system reform, one that contributed dramatically to enhance the State’s capacity to process information and plan the economy¹². That is the extremely fast incorporation of Information Technology mechanisms by China’s real economy, all sourced in the massive transfer of industrial units from Taiwan (Oliveira, 2011).

If in the first moment this is characterized by the mobile phone industry, highly demanded as a consequence of the fast urbanization, it rapidly spreads out to all levels of the computer industry, which is cause and consequence of a process that encompass reverse engineering, copy and the opening of thousands of start-up companies committed to State implemented strategies. Impacts of internalization of IT is well resumed as follows:

(...) the IT revolution had a singularly concentrated impact in China, occurring almost entirely after the turn of the century and at extraordinary speed. IT technology increased the productivity of many economic processes (downstream). IT hardware became probably the most important component of the enormous expansion of Chinese exports that took place after 2003 (demand-side). Chinese start-ups opened up in close proximity to foreign-invested IT hardware producers, permitting whole new indigenous sectors to emerge (supply-side upgrading). (Naughton, 2021, p. 180)

The key concept to be understood in the quotation above is the emergence of new sectors and frontiers. None of that occurs without the concentration in large projects, given the high complexity involved in the Chinese National Technological Innovation System and in its *market-oriented socialism*. The “New Projectment Economy” is the cause and consequence of IT incorporation and dominium, above all Big Data and Artificial Intelligence technologies.

¹¹ We can grasp how important credit is for Chinese development through the credit to GDP ratio progression over the years, going from 51.1% in 1977 to 125% in 2003, and increasing up to 182,4% in 2020 (World Bank).

¹² It is important highlight that the IT impact on the Chinese economy is more associated with their participation in the global value chains than with its large-scale use in the country’s economic planning.

For example, we can highlight the significant number of correlations made between Big Data emergence and the “rebirth” of economic planning. Wang and Li (2017) refer to Oskar Lange’s contributions on the economic calculus under socialism, in order to propose a new level of “market socialism”, under the general influence of IT, particularly of Big Data:

This kind of economic system should coordinate centralized planning and democratic planning, take big data as technical condition, platform economy as institutional and organizational conditions, to form the big data-based and state-owned enterprises leading operated Internet platform economy. (Wang e Li, 2017, p. 138)

From now on, we approach how the development of these platforms is framed within the Chinese national strategy, as revealed in the Made in China 2025 and the 14th Five Year Plan.

Made in China 2025 and the 14th Five Year Plan

The featuring of large projects in terms of technological innovation in China was a response to something deeper than just the “State’s will”. A whole new social and cultural scenario appeared in the 2000s around the creation of local brands and technologies. An example of that:

A survey carried out on more than 500 chief information officers in the US, Europe, and China provided even more striking results, especially in some areas. Only 32% of US executives and 41% of Europeans said they wanted to be early adopters of new technologies, compared to 70% of Chinese chief information officers. 70% of companies in China were already committing most of their business to web services, against 42% in Europe and 38% in the US (...) (Gabriele, 2020, p. 161)

The launch of Made in China 2025 and the 14th Five Year Plan are part of a process through which China aims to catch up the technological frontier in key sectors. We perceive a political and strategic choice to break away from a very particular pattern of industrial and technological development. Moreira (2021), based on Kroeber (2016), points out that:

(...) their industrialization process had a exclusively Chinese characteristic, not shared to the same extent with other developing Eastern Asian countries or post-communism transitioning economies: a strong dependence of Foreign Direct Investment (FDI). (Moreira, 2022, p. 20)

It is quite possible that, from a standpoint of industrial and innovation policies, *Made in China 2025* (MIC2025) is the plan that captured most of attention when it was made public in 2015. It is the first step to make China a world leading in-

dustrial power, and was considered the Chinese version of Germany's "Industry 4.0" (Wang et al., 2020; Gabriele, 2020)¹³. Its goals are clear: to improve many competitive capabilities, such as ecology, innovation, quality, cost and incorporation of Industrialization and Information (I&I) (Moreira, 2022, p. 20). From a political standpoint, we go further to state that this plan is part of a whole strategy to heighten the State and the CCP's control¹⁴ over highly advanced and strategic economic sectors, and its apex is MIC2025 pursuing to develop the most technology intensive sectors among what is commonly known as "Industry 4.0"¹⁵.

Like in the end of the 1980s and along the 1990s, MIC2025's strategic view is to promote mainly the so-called "Indigenous Capabilities" and "Indigenous Innovation" through a domestic/national policy. Besides the strategy to develop local and national capabilities, MIC2025 also envisions strategically the relations with more advanced economies, their technological potentials and their multinational corporations, with a clear goal to gain access to foreign technologies and drive technological value chains toward the Chinese market, so as to reduce dependence on foreign partners.

For Wang, Wu and Chen (2020), Li (2017) and Zenglein e Holzmann (2019), MIC2025 can be considered a strategy to develop productive structures similar to the "Eastern Asian development models", in which industrial policies aim strategic sectors and a strong government aligns commercial interests (both private and State's) with national targets. Zenglein and Holzmann (2019) see MIC2025 using examples of South Korea, Taiwan, Singapore and Hong Kong to move the more sophisticated parts of the value chain, and high end R&D, to China. If it succeeds, it could replicate the aforementioned acquisitions in electronic technologies in other sectors, such as high technology.

Li (2017) states that MIC2025 is a joint initiative led by the *China's National Development and Reform Commission* (NDRC) and the *Ministry of Science & Technology* (MOST), with additional contributions by the *Ministry of Industry and*

¹³ One of the main differences between MIC2025 and Industry 4.0 regards the goals and stage of development of both countries. Germany's Industry 4.0 is a plan to make their manufacture evolve from 3.0 standard to the current 4.0, whereas China's MIC2025 is a plan to leap from 1.0 or 2.0 productive standards to the current 4.0. Comparing both programs' goals, we can see some similarity, such as the development of technology intensive sectors. However, some goals included in MIC2025 are not focused by Industry 4.0, like the idea of sustainability.

¹⁴ From this pair's point of view, this heightening of political control partly explains the recent Chinese leap in terms of economic planning.

¹⁵ According to Leal, Lima e Filgueiras (2017), the concept of Industry 4.0 would be associated with what is also called Fourth Industrial Revolution, which is characterized by a fusion of technologies in order to blur the borders among physical, digital and biological in the productive structure. Such technologies include artificial intelligence, robotics, internet of things, autonomous vehicles, 3D printing, nanotechnologies, biotechnologies, materials sciences, energy storing and quantum computing. The critical issue regarding this is whether the combination and generalized application of these technologies will result in a liquid positive result for societies and economies in general, as for example, in regards to its impacts on the labor market.

Information Technology (MIIT). MIC2025 is the first stage of a three stage plan that wants to make China a world leading manufacturing power, with the goal to dominate the world's production. The plan focuses on improving the quality of Chinese products, creating national brands, building a solid production capacity through technological frontiers, researching new materials and manufacturing essential parts and components of their own main products. According to the People's Republic of China State Council, ten sectors were prioritized: information technology, automation and numerical control advanced machinery, aerospace and aviation equipment, maritime equipment engineering and high technology vessel manufacture, rail equipment, energy saving vehicles, electrical equipment, new materials, biomedicine and high performance medical equipment, and agricultural equipment.

In Li's view (2018), MIC2025 was initially designed to be performed in three phases. Phase I comprises the period between 2015 and 2025, along which China makes an effort to enter the list of global manufacturing powers. Phase II spans from 2026 to 2035, when the country will reach mid level power in the world manufacturing order. Finally, during Phase III, spanning from 2036 to 2049, the People's Republic of China will celebrate its centennial fulfilling the dream to become a world leading manufacturing power.

MIC2025 is mainly a domestic policy destined to promote "*Indigenous Capabilities*", along with strategic partnerships and joint ventures with foreign companies, to make sure the country can have access to foreign know-how and thus reduce its technological dependence. To reach their ambitious goals of absorbing entire cycles of production, China is seeking a multifaceted approach to foreign partners (Zenglein e Holzmann, 2019). These partners can be separated in the following three groups:

1) **Bargaining chips:** Foreign companies in sectors which Chinese economic planners see less strategic value. It is the case of consumer goods, such as retail or restaurant brands. Automobile manufacture is now in this category, since a significant part of it is already transferred into China, and keeps less importance for new updates. Measures such as the exemption of *joint venture* requirements in the automotive sector are now used by Chinese diplomacy as a bargain element in reciprocity negotiations. However, they are now much less significant for foreign companies than would have been ten years ago.

2) **Willing tech partners:** Chinese government makes efforts to convince foreign companies to transfer the most sophisticated parts of their value chain to China, aiming to promote technological upgrades in national manufacture and, directly or indirectly, to get closer to the desired incorporation of these value chains in the economy. Consumer electronic goods are a successful example of that strategy: China started only assembling products, but now it is able to make more sophisticated technological parts and other relevant components.

3) **Hard-to-get tech targets:** The foreign companies that own the most important part of their value chain out of China are the most difficult to approach. So, in searching their know-how and technologies, Chinese government uses different

strategic approaches, like: a) to attract companies with privileged access to the market, or companies interested in making joint venture agreements with technology transfer; b) to use Chinese foreign direct investment to purchase large companies or critical know-how for the attainment of MIC2025 goals; c) to adopt strategies for technology absorption through copy, or even industrial espionage and cyber attacks.

There is no precise data on the amount of financial resources China is dedicating to make MIC2025 a success, but it is undoubtedly around hundreds of billions of dollars. It goes far beyond the traditional industrial subsidies, since MIC2025 is supported by a wide array of financial tools, from insurance compensation schemes to fiscal incentives, easy finance for small and middle size companies and direct financial support for demonstrational initiatives and pilot projects.

The foremost state-owned banks in the country, such as the *China Construction Bank* (CCB), the *Industrial and Commercial Bank of China* (ICBC) and the *China Development Bank* (CDB), have been increasing the resources available for strategic sectors. In November 2016, CDB committed about 300 billion yuan for MIC2025 in the next five years. In March 2018, there were more than 1,800 governmental investment funds for manufacturing sectors, whose aggregate volume was around three trillion yuan (LI, 2017; Zenglim and Holzamnn, 2019).

On the government side, the *Ministry of Industry and Information Technology* (MIIT) and the *Ministry of Finance* (MOF) created a fund to stimulate the industrial modernization of China. MIIT has announced a set of 25 tasks in its funding strategy in the years of 2017 and 2018, with the aim to boost China's innovation capacities (for example, in semiconductors and smart sensors), as well as to support new materials research and to improve services platforms and supply chain coordination. Some projections accounted for at least 10 billion yuan coming from just these kinds of financial support in 2017. It is important to notice that some innovation indicators express this intensive search for developing and strengthening national innovation capabilities. Growth in the levels of R&D investment, the increasing number of projects related to technological innovation, or the improvement of a dedicated workforce for science and research, are all elements that help to explain the recent higher number of Chinese patents associated with sectors that contribute critically for their technological sovereignty.

State-owned companies still play an essential role for the development of strategic industries and high technological equipment associated with MIC2025. In the so-called key sectors, like telecommunications, vessel construction, aviation and high speed rail, state companies still respond for about 83% of the income. In those sectors identified as pillars by the Chinese government (as are electronics, equipment manufacture and automotive industries), they represent about 45% of the income (Zenglim e Holzamnn, 2019).

Regarding private companies, they also play a strategic role in MIC2025. Along with and complementing the 96 large state-owned enterprises, companies like Alibaba, Baidu, Huawei and Tencent are able to demonstrate the policies made by the CCP in sensitive areas. For instance, the plan to promote 4.0 industries in the country,

with specific emphasis on Artificial Intelligence (AI), was widely pushed by private technology companies (Zenglim e Holzamnn, 2019) which, in accordance to the Chinese model of social, economic and political organization, must be in line with the country's strategic goals. A prominent example of that was the recruitment of a national team of Artificial Intelligence professionals by the *Ministry of Industry and Information Technology* in 2017, involving tech giants Baidu and Alibaba, and AI companies such as iFlyTek e SenseTime.

To a large extent, the 14th Five Year Plan is a wider version of MIC2025, since it was made during a technological war opened by the USA to harm the provision of semiconductors to China. What is being pursued is a change in the economy's fundamental drive, in order to make it a "innovation led" country, which is in full coherence with the current level of evolution of their national system of technological innovation, as well as with the new abilities to intervene on territories as a result of previous innovations on the territory. According to this way to think and conduct the process of transformation of China into a global power, disruptive technologies are on top list of priorities:

We will accelerate and expand industries such as new-generation information technology, biotechnology, new energy, new materials, high-end equipment, new energy vehicles and green and environmentally friendly products, as well as the aerospace and marine equipment industries. We will promote deep integration of the internet, big data, AI, etc., in all industries, promote cluster development (集群发展) in advanced manufacturing industries (14 Five-Year Plan, translation by CSET).

Here lies a fundamental factor for the development of the New Projectment Economy.

A BRIEF REVIEW ON THE NEW PROJECTMENT ECONOMY

So let us retrieve the reasoning proposed in the introduction. We pointed out that China, given the ways it reacted to the financial crisis in 2008 and to Covid-19, presented the world with new and superior forms of economic planning. More recently, it became increasingly evident – through wide use of Big Data and Artificial Intelligence to fight Covid-19 – that those forms had a direct correspondence to the emergence of disruptive technological innovations, since the creation and improving of their national system of technological innovation from 2006.

The large projects commented here, aiming to promote technological innovation, take that hypothesis to a next level. As it now seems clear, the role of large State property on the productive and financial core of the economy complements it. So, we have been faced with a phenomenon that lacks a plausible theoretical explanation in the framework of heterodox and orthodox Economics, and their theories of development.

It was only in an almost forgotten book written by Brazilian economist Ignacio Rangel (1914-1994), entitled *Elements for a Projectment Economy* (1959), that we found the key for an alternative explanation to the recent Chinese development process¹⁶. The very need for a new key to understand the Chinese process is part of a Hegelian premise of non separation between theory and history¹⁷. This premise is clearly present in the following quote on the Chinese case:

China's rapid economic development in recent years is often characterized as "miraculous". (...) But as we have written elsewhere, "theoretical problems have started to emerge with regards to the very existence, content, and prospects of the China model. The key question, then, is what kind of economic theory and strategy underpin this "miracle". China's model has been variously described as a form of neoliberalism, or as a novel kind of Keynesianism. Against these positions, we hold that the country's major recent developmental gains are the achievements of theoretical advances in political economy, originating in China itself (...) (Enfu e Xiaoqin, 2017, p. 13)

Back to Rangel, the Projectment Economy is an economic dynamic that draws its forces out of the fusion of different institutional innovations seen in the Russian Revolution (large scale economic planning), the Keynesian Consensus and the financial capital. Beholding through these lenses, the original Projectment Economy would be the prototype of a theory to be developed alongside the categories and concepts born with the new economic panorama, mainly in the USSR and the central capitalist world, notably Europe; besides, it takes advantage and systematizes successive approaches to problems and solutions proposed by analysts in that historical context (Castro, 2014, p. 206).

To make it short, it means that the historic evolution and its new forms to produce and plan the production of goods open room for new theories, more capable to explain the past and the present time. It is under this light we should perceive, in their due contexts, the Projectment Economy and the New Projectment Economy nowadays (Jabbour and Dantas, 2020, p. 299). As a starting point, we highlight the word of Rangel as he defines cost and benefit as the two key concepts for projectment:

¹⁶ A deep view on the Projectment Economy and Rangel can be found in Castro (2014). About the New Projectment Economy, please see Jabbour, Dantas and Espíndola (2020); Jabbour, Dantas, Espíndola and Vellozo (2020); Jabbour and Dantas (2021); Jabbour, Dantas and Vadell (2021); Jabbour and Rodrigues (2021); Jabbour and Kosinski and Jabbour (2021).

¹⁷ This argument is strengthened with quotes from Rangel himself, for example: "(...) economics is by definition a historical science. This means it is under a twofold evolutionary process: phenomenol and noumenal. Its vulgar practice admits only its phenomenol evolution" (Rangel [1956] 2005, p. 204-205). Or: "everything flows – in the field of the represented object as well as in the field of the representation itself of the object (...). With the Russian Revolution, economic planning became possible and we then had the theories that correspond to this issue" (Rangel [1956] 2005, p. 206).

Cost and benefit, in the sense herein presented, are the fundamental categories of projectment: useful abstractions for addressing implicit problems (...) All theory of projectment is not more than an effort to cut out a precise definition of these two terms, for with them we will construct a reason. (Rangel, [1959] 2005, p. 366, 367)

The fundamental point here, besides the definition of cost and benefit, is the search for a common denominator between them. Hence the word reason appears in a cause-effect relation that is unusual in non planned economies, which are based on the private short sightedness and on entrepreneurial cost-benefit calculations. In other terms, the Projectment Economy would be defined as a human construct. That is, a form of consciously driving the production process based on human reason, instead of market, towards society's general interests. In each large project to be thought and executed, reason would be in command as the common denominator in the cost-benefit relation. The good resolution between cost and benefit is reached by submitting the project to the material and spiritual needs of the nation, and of all the population affected by any specific project (Jabbour and Dantas, 2020, p. 300).

The humanistic approach in Rangel lies in the perception of unemployment as an intrinsic circumstance of capitalism. Our interpretation of Rangel's proposition makes us believe that the Projectment Economy is the overcoming of this circumstance, which leads us to a "macroeconomics of project", an orientation to fully overcome unemployment that is in keeping with a structural transformation centrally based on technological innovation. As follows:

The projectist, when choosing from two techniques, must feel as an agent of society, which requests that he accepts nothing without scrutiny. His action must be guided by a general master plan (...) and this plan shall be different according to whether or not there is unemployment. To that all his actions must be submitted, as the actions of a tactic professional of development that he is. If there is unemployment, he must work to induce full employment; once achieved, he must seek the gradual retreat of labor from the list of production factors. (Rangel [1959] 2005, p. 405)

It is evident that this economy based on large projects, *use value* and sophisticated forms of human intervention on the process of accumulation suffers a huge setback when the Soviet experience ends, as well as with the dominant financialization that follows and with the military keynesianism not more in post-WWII Germany, but in the increasingly intervening USA after the 1990s. Does the first "projectment" experience find its end? It is a good question, but we believe so.

A "New Projectment Economy" in high tech China?

In our view, there is an increasing gap in the conceptual and theoretical framework and its ability to deliver a wholesome vision on what happens in China in

terms of economic development. What we claim must not lead to disregarding all the legacy created by, for instance, the development theories that appeared after World War II. All the opposite, it is about recognizing that history and *movement* itself make theories ever less capable of highlighting what is “universal in the particular”. At best, when new phenomenon appear, established theories can describe fragments of a new reality. For example, there is a good explanation of the Chinese financial system to be found in the contributions of Hyman Minsky (1919-1996). But that is not enough to comprise a wholesome vision on such a huge historical process. The concept of “Projectment Economy” is adequate because it attributes sense to existence within reality, “an ideal unity mediated in its particular moments” (Hegel, 1905 [2001], p. 125). To us:

The inflexion point regarding the dominant concepts, both orthodox and heterodox, lies in the perception that China is coming to a dynamic of accumulation where the overcoming of all sorts of restrictions and the incorporation to the real economy of all sorts of new technologies have opened ways to increase the level of rationality in the productive process, which in turn makes Chinese economy a true machine of large public goods and use value. (Jabbour et al., 2020, p. 20)

We do not need to mention again the high impact and the consequent transformations of the fiscal package launched by the Chinese government in 2008 in response to the financial crisis, nor it is essential to highlight the prompt economic reaction to the challenges put by the Covid-19 crisis, all tackled with disruptive technological innovations by the State. It is beyond doubt that these issues should be seen as signs of the theoretical framework’s limits to understand that reality. Also, it should be enough to point out that between 1990 and 2017:

China added over 120,000 kilometers of railways, 130,000 kilometers of expressways, 3.7 million kilometers of road, and 740,000 kilometers of coastal quay lines to its national transport system. India, a country of similar size, and a private property system in keeping with neoclassical requirements, added 4,320 kilometers of railways from 1990 to 2016. (Jefferies, 2021, p. 311)

Reports publicly presented account that between 2001 and 2020 the country built 40,000 kilometers of high speed rail, which is three times more than the sum of all equivalent rail existing outside its borders. The high speed rail network will come to 50,000 kilometers until the end of the current Five Year Plan (2021-2024), thus connecting all Chinese cities with a population of over 500,000 people¹⁸. The clear goal stated by Rangel in putting job creation as the ground zero of his project-

¹⁸ China’s high-speed railway network exceeds 40,000 km. State Council. Available at: http://english.www.gov.cn/news/topnews/202201/03/content_WS61d22c5fc6d09c94e48a3121.html.

ment economy is evident in China, as it can be seen by numbers such as the creation of 13 million urban jobs every year between 2011 and 2020 (*China Statistical Yearbook*). And that was in spite of a slower economic growth and of the pressing need of technological catching up. This means that the planning of rural to urban migration reached a higher level than the *hukou* regulating system. Without an enormous technological apparatus, this process would be far more complicated.

In truth, this should lead us to make the following questions: 1) given the possibilities opened by the aforementioned disruptive technologies, are not the Chinese on the brink to overcome the *Schumpeterian creative destruction*, and if that is so, would it not be a fundamental characteristic of an economy based both on large projects as on full use of reason as a tool of government?¹⁹; 2) given that public State property is essential in this “new economy”, wouldn’t it put Keynesian uncertainty in question, since the “main” investment decision is taken away from private control?; 3) what is the impact these new tools and phenomenon have on the economic theory, and what Political Economy shall be able to explain the social class and political power dynamics in accordance to what China is delivering in practical and theoretical terms?

It is still to be measured the role played by technologies such as Big Data and AI in the elimination of extreme poverty in China²⁰. But it is increasingly evident that the country has an economy founded on productivity gains originated by the deepening role their national system of technological innovation plays on the economic structure. However, there is another side of it we must point out, and definitely under a historic perspective as before, regarding the forms of planning that emerged and are emerging in China. The transition initiated in 1978 indicated more the adaptation of economic planning practices to a market environment than a direct passing to a market economy. That transition encompassed the formation, as we mentioned before, of a national system of technological innovation which gained strength after the 11th Five Year Plan. We can call that system a *Market-Based Planning*.

What is the form economic planning is taking in China, *vis-à-vis* a “new economy” increasingly based on a wide technical and scientific apparatus which elevates human capacities over nature and over the capital’s anarchy? Our response starts recognizing the immense and varied challenges China undergoes, mainly related to the income unequal distribution over the territory and along society. If we understand the recent Chinese historic dynamic is one of successive waves of institu-

¹⁹ Our empirical research on Chinese territory and dozens of interviews made with officials in significant organisms of public planning allowed us to know of the existence of two million men and women occupied in the planning of this tendency pointed out by Schumpeter. It is an impressive economic fact with little repercussion among western economists.

²⁰ A study led by the Tricontinental Institute points out that: “Big data is used to monitor the situation of each of the nearly 100 million individuals, facilitate information flow between governmental departments, and identify important poverty trends and causes. Mobilizing the people and gaining public support are at the heart of the effort to carry out this work.”

tional innovations that enabled the country to foresee obstacles and propose fast solutions, we can see two current transitions in place. The first is about a series of institutional innovations aiming to change the schemes of property so as to form a *deus ex machina* for income inequality. The slow process that leads the construction industry to be controlled by the state, as well as the private sector losing monopoly in some other sectors, indicate this transition. It is not about a “regulatory wave”. In our view, it goes deeper.

The second transition comprises the consolidation of the New Projectment Economy, since it is about the transformation of the Chinese economy into a machine of public asset construction (use value), in and outside the country. The role of economists and project engineers in a society with such huge challenges tends to a heightened importance. If the *Market-Based Planning* was able to make the country the “world factory”, what we see today is the very explaining core of many issues regarding the Chinese development process, with the emergence of a *Project-Based Planning* all founded on the state public property over production and finance, and the vast national system of technological innovation.

This paper aimed to highlight large projects related to the Chinese national system of technological innovation as part of this whole group of qualitative changes currently taking place in the country. However, for reasons that stretch from the philosophy (Kantian positivism and its “transcendental categories”) that sustains all current economic theories to the clear prejudices against the Chinese experience, we are kept away from understanding it. In this way, the Social Sciences do not advance and could become expendable in a world full of great explanations for challenging issues.

INITIAL CONCLUSIONS

It is unavoidable to admit as a strong empirical evidence that China’s huge public control over productive and financial structures is an advantage in relation to the central capitalist socioeconomic formations, though its dimensions are still to be measured. Alongside with that, the wide and deep reach of their national system of technological innovation has given the State the ability to concentrate information and thus respond rapidly to conditions, as it got clear in at least two events commented in this paper: 2008 financial crisis and Covid-19 pandemics. Our hypothesis about the emergence of a “new economy”, based on the incorporation of disruptive technologies to the State capacities, is becoming the greatest challenge to the Social Sciences of today: what new regularities and what internal coherence are appearing as a result of this new level of human dominance over both nature and the capital’s anarchy?

In this paper, we aimed to take one more step in the way to strengthen the hypothesis of a “New Projectment Economy” emerging in China. When first conceived by Ignacio Rangel (1959), it was about the emergence of a wide human control over the economy after World War II, in the USSR and Western Europe

(central planning in the USSR X effective demand principle in the West). Today, we see the national system of technological innovation as a fundamental element for the resurgence of Rangel's view, now stronger, in the People's Republic of China. This should enhance our horizon to include a view capable of a fusion between theory and history, acknowledging "projectment" not as mere desire. Rather, as would Hegel state, as the very concept manifesting in real movement.

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