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UNEVEN AND COMBINED DEVELOPMENT AS A
METHODOLOGICAL TOOL: A DYNAMIC APPROACH AFTER A
DIALOGUE BETWEEN KONDRATIEV AND TROTSKY(*)

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Abstract

This paper suggests that Trotsky's elaboration on uneven and combined development can be a methodological tool to understand contemporary capitalism. A dialogue with Kondratiev is a starting point, as each new technological revolution creates a new level of unevenness. Technological revolutions also transform channels through which combination takes place. As both *unevenness* and *combination* change over time, it is possible to have a dynamic approach to the process of uneven and combined development. This dynamic approach is a methodology to investigate how new amalgams between modern and archaic forms shape varieties of capitalism at the periphery and transform the global dynamic of capitalism.

Keywords: technological revolutions; center-periphery divide; varieties of capitalism; expansion of global capitalism

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Introduction

Triggered by the British Industrial Revolution, the global expansion of capitalism is not a smooth process, it is not a sequential and repeated appearance of replicas of original institutional formations. Instead, the process of expansion of global capitalism structures different institutional arrangements that characterize current capitalism.

A snapshot of the global economy shows at the center of global capitalism very different institutional arrangements, based on different innovation systems (NELSON, 1993) or on different welfare systems (ESPING-ANDERSON, 1990). At the periphery there are different forms of capitalism, with very specific economic dynamics: Latin America (FURTADO, 1970), South Africa (FINE *et alii*, 1996), Middle East and North of Africa – MENA – (ACHCAR, 2013), India (DRÈZE & SEN, 2002), China (NAUGHTON, 2007) and Russia (DJANKOV, 2015) show how heterogeneity at the periphery is a key feature of global capitalism (RIBEIRO *et alii*, 2015)¹.

This heterogeneity might be rooted in the process of the expansion of capitalism. The British Industrial Revolution provoked impacts throughout the whole global economy. Marx (1867) articulates the British Industrial Revolution with a “new and international division of labour” (*ibidem*, p. 579) that “converts one part of the globe into a chiefly agricultural field of production for supplying the other part, which remains a pre-eminently industrial field” (*ibidem*, p. 580). This new international division of labor shows the impact of the British Industrial Revolution on the reconfiguration of global economy between a center and a periphery (FURTADO, 1987).

¹ This identification of heterogeneity as a feature of capitalism at the periphery does not imply that there is homogeneity within capitalism at the center. Structural heterogeneity is present in industrial and economic sectors in developed countries, as inequality is part of its structural conditions. However, as the center heterogeneity does not involve pre-capitalist economic forms or their residues, heterogeneity is limited to institutions, economic forms and features from capitalist relations. I would like to thank one referee of this journal for making this point.

The *big bang* triggered by the British Industrial Revolution (PEREZ, 2010, p. 190) took place in a world populated by different societies and different historical backgrounds: India, China, Africa, new countries like USA, Canada, Australia and in Latin America.

This process was captured by Trotsky's (1930, chapter 1) elaboration on uneven and combined development. The initial result of those new pressures coming from more advanced countries – “the whip of external necessity” – is a process that brings together “a combination of separate stages, an *amalgam* of archaic with most modern forms” (TROTSKY, 1930, p. 25)². Trotsky was focusing on the “peculiarities of Russian development”, but this insight can be further extended to all backward countries. This amalgam, a result from a combination of archaic and modern forms, is not homogeneous. There is a gradient of levels of backwardness, a temporal order showing when each society was summoned to participate in the global economy: “second, third or tenth” moments (*ibidem*, p. 25)³.

The impact of the Industrial Revolution at the periphery is not limited to a reconfiguration of the center-periphery divide (FURTADO, 1987), but also to a creation of a heterogeneous periphery from the start: different amalgams, different combinations of archaic and modern forms – heterogeneity within regions and among countries. This heterogeneity is a consequence of the nature of the society and the economy that received the “whip of external necessity”. Those societies and historical formations received the impacts of those shock waves initiated by the Industrial Revolution in different ways, depending upon the degree and form of their previous integration in this emerging global economy, their level of development, their previous role in the international division of labor, their perceptions of the changes

² The presence of archaic forms in those amalgams at the periphery is a difference vis-à-vis the heterogeneity at the center.

³ This insight from Trotsky might have inspired Gerschenkron's well-known concept of “gradation of economic backwardness” (GERSCHENKRON, 1952; SELWIN, 2007; LINDEN, 2012).

taking place in Western Europe and their resources to deal with this new revolutionary change⁴.

Therefore, the British Industrial Revolution transformed the global economy, inaugurated a new international division of labor, reconfigured the center-periphery divide and generated many different amalgams between the new industrial era and the old established societies at the periphery.

However, this global scenario – a center and a heterogeneous periphery – is just the starting point of a new global dynamics. Since the first technological revolution – the British Industrial Revolution – this global system generated five other technological revolutions (PEREZ, 2010, for the first five technological revolutions; the invention of the World Wide Web in 1991 might be the starting point of a sixth). Each of those new technological revolutions had a *big bang* that triggered new waves that shocked the whole world. But those impacts had a peculiar dynamics, as each new technological revolution impacted countries as amalgams of modern and archaic forms generated by previous *big bangs*. Societies transformed by the impact of previous technological revolutions came again under pressure of the “whip of external necessity” triggered by newer technological revolutions.

⁴ Regions of India were British Colonies since the XVIIIth Century and the initial impact of the Industrial Revolution destroyed its position as the “textile workshop of the world” (DARWIN, 2007, p. 193), changing her role in the international division of labor, “an astonishing reversal”, with India becoming an importer of British cotton manufactures (ibidem, p. 196). The nature of the initial articulation of industrial capital and Indian social formation is described by Raychaudhuri (1983). China’s traditional economy (MYERS & WANG, 2002) had a later and different initial impact, stronger after the military defeat in the Opium Wars (1840s) and the Treaty System (FAIRBANK, 1978) that established localized and limited entry points – “Treaty ports” – for an introduction of modern capitalism in China (BERGÈRE, 1983, p. 724). The delayed and slow perception of local elites about the impact of Industrial Revolution also shapes China’s initial inclusion in the global economy (KUO & LIU, 1978). Russia had a strong state that intervened in the process of industrialization – “[c]apitalism seemed to be an offspring of the State” (TROTSKY, 1906, chapter 1, p. 4). Japan, isolated and following the Opium Wars and their consequences, was transformed by a political revolution – in 1868 – that reorganized the state and initiated industrial development (OHKAWA & KOHAMA, 1989, pp. 250-260). Latin America and South Africa were integrated to the global economy as suppliers of agricultural and mineral resources. Those different initial impacts and different forms of assimilation of the Industrial Revolution shaped different amalgams that molded the economic paths followed by those countries during the XXth Century.

The process of uneven and combined development might have a dynamics that is affected in both sides of its development – both *unevenness* and *combination* change over time.

On the one hand, *unevenness* is not static.

Kondratiev (1926a, 1926b, 1928) suggests how technological innovations are among starting points to new “cycles” of capitalist development, processes that lead to permanent transformation at the center. Kondratiev contribution was later elaborated by J. A. Schumpeter (1939), E. Mandel (1972) and C. Freeman and F. Louçã (2001), among others. Unevenness is permanently introduced and renewed in the global system by “successive industrial revolutions” (FREEMAN & LOUÇÃ, 2001, pp. 137-370), by a sequence of technological revolutions.

On the other hand, *combination* also changes.

First, the forms of combination change over time, through new forms of internationalization. Initially, at the time of the British Industrial Revolution, foreign trade and colonial adventures were the main connectors of different countries in different stages of development. As the succession of technological revolutions reshaped economies again and again, new forms of internationalization emerged, as the transnational corporations and the World Wide Web show. Those new connections between different countries change the ways that unevenness can be combined. Those new connections, changes in the combined side of the process, also present new possibilities for new features of contemporary capitalism: how the periphery affects current transformation of global capitalism (MARQUES, 2014).

Second, different amalgams arise, as those technological revolutions trigger processes of diffusion of new technologies and limited catch up processes that change the economy and the society in backward countries, again and again. At the periphery, those renewed changes – new spurts of global unevenness – mean new amalgams of old and inherited forms with

new forms generated by more recent technological revolutions. However, those inherited forms were generated by older technological revolutions, which impacted previous social and economic structures. Now they are shaken by a new technological revolution at the center that transforms a previous “peculiar combination of different stages”. Today, this “peculiar combination of different stages” might show, at the periphery, a combination of technologies from the last six technological revolutions overlapped with even more traditional forms of society. To understand this specific overlapping is an important research topic for investigations of contemporary capitalism at the periphery.

The objective of this paper is to explore how the uneven and combined development may be a methodological tool to investigate contemporary capitalism. A dynamic view of uneven and combined development is a prerequisite for this methodological contribution. The first section organizes a dialogue between Kondratiev and Trotsky as a first step for this dynamic approach, focusing in their debates about the role of the inclusion of new regions for capitalism. The second section is built upon this dialogue, as an interpretation of capitalism permanently reshaped by technological revolutions shows how new levels of unevenness are created over time. The third section deals with changes in combination, discussed as a two-sided component of Trotsky’s concept. The fourth section investigates the contemporary phase of post-www capitalism from the point of view of uneven and combined development. The last section concludes this paper summarizing why uneven and combined development may be a methodological tool for investigations of contemporary capitalism.

I. Kondratiev and Trotsky: technological revolutions and the process of uneven and combined development

The elaboration of the concept of uneven and combined development evolved mainly through three books: *Results and prospects* (TROTSKY, 1906), *1905* (TROTSKY, 1907) and *The History of Russian Revolution* (TROTSKY, 1930). This theoretical development is a well-studied topic and Knei-Paz (1978, especially chapter 3) tracks Trotsky's elaboration process. The end result is a very sophisticated and condensed exposition in the first chapter of *The History of Russian Revolution*: a nine-dimensional concept that summarizes the peculiarities and specificities of development of global capitalism to include backward regions⁶.

How and why Trotsky sharpened his views on uneven and combined development might be a subject of a very interesting research agenda. Every informed reader knows what happens between 1906 and 1930 in Trotsky's life – all those epoch-making events might have contributed to a more accurate view of world's events.

However, between those two phases there was a series of debates that may have gone unnoticed by important writers as I. Deutscher and Knei-Paz, but it is important for the argument of this paper: in the 1920s there were debates between Trotsky and Kondratiev, regarding the long term dynamics of global capitalism. Notes on those debates are available in Day (1976), Barnett (1994), Louçã (1999, pp. 181-185) and Mustafin (2018, pp. 7-8).

⁵ A review of existing studies is not a goal of this paper. One starting point to gather the wealth of studies and debates may be the list of writings prepared by the website *Uneven and combined development* (<https://unevenandcombineddevelopment.wordpress.com/writings/>).

⁶ Those nine dimensions may be summarised as follows: 1) diffusion of capitalism does not follow one single model; 2) uneven development, pushed by advances at the leading capitalist countries; 3) combined development, accelerated by the rise of capitalist relations and the expansionist drive of their dynamics; 4) by assimilating advances generated at the center, backward countries create very specific combinations of modern and archaic forms, condensed in amalgams that may show specific varieties of capitalism at the periphery; 5) this amalgam is not a dualist juxtaposition of modern and archaic forms, but an integrated form; 6) privilege of backwardness, for the opportunity to skip intermediate stages; 7) possibility of forging ahead (USA and Germany "outstripping" UK) and hegemonic transitions; 8) possibility of strengthening of regressive social forms; 9) late industrialization with very peculiar sequence, not repeating the sequence in developed countries (TROTSKY, 1930, chapter 1).

Those debates may have contributed to improve Trotsky's elaboration on uneven and combined development.

Those debates between Trotsky and Kondratiev have many different issues, but there is one specific issue that should be highlighted: the inclusion of new regions and countries and its role in the expansion of capitalism.

In June 1923 Trotsky had studied Kondratiev's work (DAY, 1976, p. 71) – at that time Kondratiev had published his first book: *The world economy and its conjunctures during and after the war* (KONDRATIEV, 1922). According to Barnett (1998, p. 105), this was the first time that Kondratiev exposed his views on long cycles of the conjuncture. Kondratiev's elaboration on long cycles of 50 years was important to investigate the crisis of 1920-1921 (KONDRATIEV, 1922, p. 289) and its perspectives: he mentions two long cycles between 1789 and 1896 (*idem ibidem*) and a third cycle that began in 1896, with “two complete and one incomplete minor cycles” (*ibidem*, p. 290).

Trotsky presented the reports on the global conjuncture in the Third (1921) and Fourth (1922) Congresses of the Third International (DEUTSCHER, 1959, pp. 73; 76), therefore his interest in Kondratiev's analysis of the crisis of 1921-1922. Trotsky refers explicitly and critically to his elaboration:

[a]s regards the large segments of the capitalist curve of development (fifty years) which Professor Kondratiev incautiously proposes to designate also as cycles, their character and duration are determined not by the internal interplay of capitalist forces but by those external conditions through whose channel capitalist development flows. The acquisition by capitalism of new countries and continents, the discovery of new natural resources, and, in the wake of these, such major facts of ‘superstructural’ order as wars and revolutions, determine the character and the replacement of ascending, stagnating or declining epochs of capitalist development. (TROTSKY, 1923)

R. Day (1978, p. 77) and Mustafin (2018, p. 8) mention a meeting that took place in 18 January 1926, that both Kondratiev and Trotsky were present. According to R. Day, among other topics, Trotsky returned to the issue of long cycles and their causes, stressing that they are not consequences of the

internal dynamic of the system, but from external causes such as “opening of new continents, colonies and markets for capitalist activity” (DAY, 1978, p. 78).

There are no transcripts of Kondratiev’s answer, but R. Day mentions another round of debates, in 6 February 1926, at the Institute of Economics of the Russian Association of Social Sciences research institutes (MAKASHEVA *et alii*, 1998, volume 1, p. 24). In that opportunity, Kondratiev commented Trotsky’s paper (KONDRATIEV, 1926b, p. 28) as one analysis that recognizes long cycles of the conjuncture. Kondratiev presents a more grounded vision of long cycles, induced by “1- changes in technology; 2- wars and revolutions; 3- the involvement of new territories in the orbit of the world economy; 4- fluctuations in gold mining” (p. 49). Dealing with the “involvement of new countries”, Kondratiev articulates this expansion with the “need of new materials and raw materials” (p. 50) and with the upward phase that “by quickening the pace of economic dynamics of capitalist countries, makes it necessary and possible to exploit new countries and new markets and new raw materials” (p. 51).

Later in the debate, Bogdanov (MAKASHEVA *et alii*, 1998, volume 1, pp. 116-117) commented Kondratiev’s implicit answer to Trotsky – “the opening of new markets” as a “factor determining the oscillation of the curve of capitalist development” –, which received a new answer from Kondratiev (*ibidem*, pp. 142-143), stressing the economic prerequisites for the inclusion of new countries in the world market system⁷.

⁷ As an example of the feedbacks between technological change, economic factors and inclusion of new regions in the global economy, the case of Middle East and North Africa’s “variant of capitalism” (ACHCAR, 2013) may be presented. The peculiarities of development of MENA would become clear later than other regions (as suggested in the Introduction): during inter-war years “the steady rise in their output of oil” increased the importance of the region for the British Empire (DARWIN, 2009, p. 470). This process is linked to “the spectacular growth of automobile industry” in the US between 1910 and 1930 (ROSENBERG, 1998, p. 180): “After 1920 the history of chemical engineering simply became inseparable from the history of petroleum refining”. Those technological changes and the new role for oil inaugurated “antagonism of the Great Powers” in the region (ACHCAR, 2013, p. 97) and a new role in the international division of labor: an oil-supplying region. A long term process established in the MENA a “specific variant” of capitalism (*ibidem*, p. 67): “patrimonial regimes” (*ibidem*, p. 78). In this variety of capitalism “[t]he primary form of state rent ...is mining rent - oil, gas, minerals” (*ibidem*, p. 72).

Kondratiev's remarks may have stimulated Trotsky to broaden his elaboration on how those new countries and territories were included, pushing him to think beyond the Russian case. The reference of the gradient of backwardness in his elaboration of the 1930s may be one of the consequences of new reflections – “without this law, to be taken of course, in its whole material content, it is impossible to understand the history of Russia, and indeed of any country of the second, third or tenth cultural class” (TROTSKY, 1930, p. 25).

Beyond the potential mutual influence of those debates, a dialogue between Kondratiev and Trotsky may broaden the methodological scope of the concept of uneven and combined development. Kondratiev in 1926 stressed the role of “changes in technology” as a cause of long cycles. More specifically, Kondratiev (1926b, pp. 38) associates each long cycle with “far-reaching changes in manufacturing techniques and capacity (which, in turn, are preceded by significant technical inventions and discoveries). He listed those changes in relation to each long cycle: 1) in the first cycle “the industrial revolution affected almost all the main industrial sectors: spinning and weaving, the chemical industry, the metallurgic industry, and so on” (*ibidem*, p. 39); 2) the second long cycle was “preceded by a series of technical inventions”, among them “significant improvement of the steam engine (1824), the invention of the turbine (1824-1827), [...] the construction of the harvester reaping-machine (1831), [...] the invention of electromagnetic telegraphy (1832)” (*idem ibidem*); 3) “the rising third wave” was preceded by “Gramme’s DC dynamo (1875), [...] the gas engine (1876), DC power transmission (1877), electric telephone (1877), Thomas’s method for producing steel (1878), [...] petrol engines (1885)...” (*ibidem*, p. 40).⁸

How can this succession of major technological changes be articulated with Trotsky’s uneven and combined development? “A backward country

⁸ Each of those three cycles is connected, by Kondratiev, with expansion of the involvement of new countries, as “[t]he start of long cycles usually coincides with the broadening of the orbit of world economic relationships” (*ibidem*, p. 41): USA in the first cycle (*ibidem*, p. 39), “strengthening of the role of the USA” in the second (*ibidem*, p. 40), “Australia, Argentina, Chile and Canada” in the third (*ibidem*, p. 41).

assimilates the material and intellectual conquests of the advanced countries” (TROTSKY, 1930, p. 24). Those material and intellectual conquests change over time, and in 1905 Trotsky shows at least three different technological phases: “Russian manufactures to supply the army”, an army created by the Petrine state, started a process in which “new branches of industry were frequently imported from abroad (TROTSKY, 1907, chapter 2, p. 1). Later, “during the first half of nineteenth century the textile industry broke the circle of serf labor and state regimentation” (*ibidem*, p. 2). Then, “[t]he first railway (between Moscow and Petersburg) was opened in 1851” (*idem ibidem*).

Manufactures, textile industry, railway – a backward country like Russia is assimilating “material and intellectual conquests of the advanced countries” (Trotsky) following a developmental pattern dictated by “major technological changes” (Kondratiev). Those major technological changes are a source of uneven development. Their assimilation establishes the possibility of combined development – modern and archaic forms amalgamated in peculiar economic and social conditions. The upswing of long cycles provides energy – and new technologies, especially in transport and communication – to include new regions in global capitalism. But this inclusion is not a repetition of previous paths.

This dialogue between Kondratiev and Trotsky, therefore, might provide basis for a dynamic view of the uneven and combined development – unevenness and combination change over time.

2. Unevenness recreated: technological revolutions, new and wider gaps

One dimension of the uneven and combined development is the possibility of hegemonic transitions: “The fact that Germany and the United States have now economically outstripped England was made possible by the very backwardness of their capitalist development” (TROTSKY, 1930, p. 24).

This process of “forging ahead” was discussed earlier by Trotsky (1926): “[t]hese last years, the economic axis of the world has been radically displaced. The relations between the USA and Europe have become drastically altered.... The new relation of roles of nations is determined by the new relation between their respective wealths”.

In this speech, Trotsky presents a very insightful evaluation on the “power of American capital, to which nothing in the past can compare”. In two paragraphs Trotsky summarizes the evolution of capitalism and “social organization of labor” in the United States, from the discovery in the “near the close of the 15th Century” to “the conveyor line, which furnishes the transport within the factory and whose supreme model is the Ford organization”. Those two paragraphs illustrate a sentence in *The History of Russian Revolution*: “The European colonists in America did not begin history all over again from the beginning” (TROTSKY, 1930, p. 24).

In an insight that later will be documented and elaborated by scholars like Nathan Rosenberg (1972, p. 25), Trotsky analyses the role of labor scarcity in the United States for the definition of trajectories of technical innovation and for the drive towards the “mechanization of labor” – a different technological path vis-à-vis Europe. Trotsky highlights, therefore, the “conveyor belt”: Ford’s factory and model.

This new technological change – the conveyor belt – reshapes the uneven and combined development, since, as Trotsky suggests in *Europe and America*, it will serve as “the instructor. In a very short time a young peasant from southern Europe, the Balkans or the Ukraine is transformed into an industrial worker”. In other words, the young peasants from less developed parts of Europe will not face outdated technologies from England, but the more developed technologies created in the new leading country of global capitalism.

Furthermore, what Trotsky is describing here is exactly an emerging technology, that would be a key technological innovation related to the

fourth long wave – Perez (2010, p. 190) identifies Ford’s model T as the *big bang* of the fourth long wave.

In *Europe and America* Trotsky describes the new role of the United States, their achievements in new sectors and in labor productivity: “Serial production as well as standardization is bound to American technology: that is mass production”. The United States provides a new benchmark for this comparison in *The History of Russian Revolution*: Trotsky (1930, p. 28) compares “national income per capita” of Russia with the USA, and stresses that the “basic criterion of the economic level of a nation is the productivity of labor”.

Those reflections on *Europe and America* were prepared in 1925, therefore before the second round of debates with Kondratiev. Trotsky describes signs of emerging technologies, documenting new technological changes. Those changes affect one side of his elaboration on uneven and combined development, as each new major technological change creates new source of unevenness – or new material and intellectual conquests of humankind that may later be assimilated by backward countries. Between Trotsky’s initial writings on uneven and combined development and his fuller concept in *The History of Russian Revolution* (in 1930) there were important insights on the role of new major innovations in the metamorphoses of capitalism (FURTADO, 2002).

This dynamics of technological change in capitalism has been investigated by Schumpeter (1939), Mandel (1972), Freeman and Louçã (2001) and Perez (2010), documenting the endless technological changes produced by capitalist dynamics. Those investigations, that adopted the concept of long waves instead of Kondratiev’s long cycles, led to a scheme prepared by Perez (2010, p. 190) that summarizes five technological revolutions with five *big bangs* that reshaped global capitalism, a process that started with the British Industrial Revolution. Probably, in terms of the long waves approach, it is possible to mention a new *big bang*, triggered by the invention of the World Wide Web (www).

Long waves are subjected to strong skepticism and criticism, but this line of investigation contributed to a consensus regarding the succession of major technological changes in capitalist dynamics. Each major technological change means a new peak that widens unevenness. Unevenness is created and recreated by this permanent dynamics of technological innovation.

Probably, the technological dynamics is more turbulent than a scheme presented by Perez would suggest. Ribeiro *et alii* (2017, pp. 295-296), using a Fourier transform to decompose the cyclical movements of the rate of profit in the United States, find a combination of cycles in that dynamics: cycles of 23-, 20-, 70- and 35-year-long as the most important. This dynamics may be related to a more turbulent emergence of *general purpose technologies* (ROSENBERG, 1998; BRESNAHAN, 2010). This approach may be a better way to present those technologies related to those long cycles listed by Kondratiev (1926b, pp. 39-40) and those technologies and forms of production developed in the United States listed by Trotsky (1926).

General purpose technologies (GPTs) would suggest a more turbulent technological dynamics, with a more frequent creation of major new technologies that are source of unevenness. Each of those new GPTs, new sources of unevenness, would create new challenges and opportunities to backward countries: new “material and intellectual conquests” to be assimilated.

However, this sequence of major new technologies adds another dimension to the uneven and combined development, since the level of backwardness changes over time. Each new major new technology means

⁸ Essa nota foi definida como 450 pontos (próxima à média do exame) e nota da redação diferente de zero.

⁹ Apesar disso, de acordo com Castellano (2016), entre 2010 e o primeiro semestre de 2015, 92% dos contratos foram realizados por alunos com até 2,5 s.m., não tendo essa limitação por renda, portanto, impactado de forma tão significativa a faixa de público do programa.

¹⁰ Para detalhes de seu funcionamento interno, ver Ministério da Fazenda *et alii* (2017).

¹¹ O FNDE retém à CCG 5,6%, ou 6,2% dos 90% do valor do financiamento estudantil devido às IES privadas (MINISTÉRIO DA FAZENDA *et alii*, 2017).

a wider gap between advanced and backward countries: it increases the size of the leaps that backward countries might and can make. It means a longer sequence of intermediate stages that could be skipped. But, already in *The History of Russian Revolution*, Trotsky (1930, p. 25) warned that “the possibility of skipping over intermediate steps is of course by no means absolute. Its degree is determined in the long run by the economic and cultural capacities of the country”: each new major technological change in advanced countries demands stronger “economic and cultural capacities” from backward countries.

Each technological revolution also disrupts domestic and global economies in a way that opens “windows of opportunity” for catch up processes (PEREZ & SOETE, 1988). This disruption is part of processes like those that pushed Germany and the United States to have “economically outstripped England”.

If unevenness is created and recreated all the time, the process of uneven and combined development is dynamically reshaped all the time.

3. Combined development: a two-sided dynamics

Unevenness brings pressure, external pressure for backward regions and countries. In *Results and prospects* Trotsky introduces the “peculiarities of Russian historical development” stressing that Russia “had not remained isolated and under the influence of inner tendencies only”. On the contrary, Russia was “under the influence, even under the pressure, of its social-historical milieu” (TROTSKY, 1906, chapter 1, p. 2).

The emergence and consolidation of capitalism is a turning point. In 1905 Trotsky writes that “[d]uring pre-capitalist epoch, the influence of Europe on Russian economy was, of necessity, limited. [...] But when capitalist relations became predominant in Europe [...] the situation changed utterly” (TROTSKY, 1907, chapter 1, p. 3). In *The History of Russian Revolution* Trotsky highlights the new dynamics inaugurated by a new mode of production:

“[a] certain repetition of cultural stages in ever new settlements was in fact bound up with the provincial and episodic character of that whole process. Capitalism means, however, an overcoming of those conditions. It prepares and in a certain sense realizes the universality and permanence of man’s development” (TROTSKY, 1930, p. 24).

The inspiration for this may be Marx and Engels’ *Manifesto*,⁹ that have shown Trotsky how the “development of capitalism has so closely knit all sections of our planet, both ‘civilized’ and ‘uncivilized’” (TROTSKY, 1937).

Unevenness, in capitalism defined by technological revolutions, has mutual feedbacks with combination. But combined development has two sides.

On the one hand, there are the connections that articulate advanced and backward countries: new technologies mean new forms of combination of uneven development. New technologies of transport and communication, new organizational forms of capitalist institutions multiply the channels through which different stages of development meet in societies and economies. New technologies change the ways through which the “whips of external necessity” materialize, create new channels for “drawing together of the different stages of the journey”.

On the other hand, there is a form through which backward countries assimilate the last material and intellectual conquests; it is a combination of different phases of development in one single entity – amalgams. Modern and archaic combined in social formations, varieties of capitalism at the periphery.

At the periphery, combined development has one international side and one domestic side.

⁹ “Modern industry has established the world market [...]. In place of the old local and national seclusion and self-sufficiency, we have intercourse in every direction, universal inter-dependence of nations” (MARX & ENGELS, 1848).

3.1. An international dynamics: new connections

Combination, as a source of pressure from more advanced capitalism, changes over time. Trotsky, in 1905, shows those initial changes, comparing two moments of Russian history: one moment when “economic contacts with Europe were still limited to the importation of craftsmen and machines”, and another when “free foreign capital, in its race for a high level of profits, flung itself upon Russia’s territory” (1907, chapter 2, p. 4). In *The History of the Russian Revolution* the role of foreign capital is further explained:

Heavy industry (metal, coal, oil) was almost wholly under the control of foreign finance capital, which had created for itself an auxiliary and intermediate system of banks in Russia. Light industry was following the same road. Foreigners owned in general about 40 per cent of all the stock capital of Russia, but in the leading branches of industry that percentage was still higher. (TROTSKY, 1930, p. 29)

In *The History of the Russian Revolution* Trotsky describes the presence of European foreign capital in pre-1917 Russia. In *Europe and America* Trotsky identifies the rise of USA and a new global dynamics. The role of technological change is clear, as Trotsky stresses that while the coal industry was the keystone of English capitalism, in the United States capitalism “still advances the productive forces”. More stable than European capitalism, its expansive dynamics is stronger, “[c]onsequently, as time goes on, America’s need to expand grows greater and greater; that is, she must invest her surplus resources in Latin America, Europe, Asia, Australia, Africa” (TROTSKY, 1926)¹⁰. This could be a third moment in the dynamics of combination: the main source of foreign capital has moved to a new center, and its reach is broader now – qualitative and quantitative changes.

Those comparisons illustrate three different moments in the mechanics of capitalist expansion: expansion through foreign trade, expansion through

¹⁰ Panitch and Gindin (2012, pp. 49-52) describe the middle 1920s economic conjuncture in the USA as a prelude to the “project for a global capitalism”: USA’s hegemony would transform the motive forces for a global capitalism.

foreign capital investments from Europe and through foreign capital investments from America. Inclusion of new regions and countries in global capitalism was an important subject in the debates between Kondratiev and Trotsky during the 1920s, but they did not elaborate about potential changes within this expansionary process.

Capitalist development in the United States presented new technological and organizational features, as Chandler (1977) describes, the most important the evolution of the modern multidivisional firms. Multidivisional firms were starting point of a later institutional innovation: the modern multinational firm (HYMER, 1960; DUNNING & LUNDAN, 2008). The emergence of the modern multinational firm is related to other technological changes – “aeronautical and electronic revolutions” (HYMER, 1970, p. 443) – and other institutional changes, as foreign direct investment stimulates the growth of international finance (HYMER, 1972, p. 91)¹¹.

The rise of the modern transnational corporation and the revolutionary changes in technologies of transport, information and communication mean new sources of combined development, new sources of external pressure and external-driven change on backward economies.

Those developments change the international side of combined development, which is articulated with changes in the international division of labor. In a short summary of those changes, at least 5 stages can be suggested: 1) international trade and colonial expansion (TROTSKY, 1907, chapter 2, p. 4); 2) flows of foreign capital (TROTSKY, 1930, p. 29); 3) the emergence of modern transnational corporation (HYMER, 1966); 4) transformation of transnational corporations in global economic systems (CANTWELL, 2009) and the emergence of global innovation networks (ERNST, 1997); 5) rudiments of an international innovation system (BRITTO *et alii*, 2013). Alongside with those changes, the new hegemonic

¹¹ The rise of transnational corporations has consequences for increased heterogeneity of capitalism at the periphery. Amsden organizes a typology of countries at the “rest” that includes how the country deals with foreign direct investment: there are “independents” and “integrationists” (AMSDEN, 2001, p. 201).

country after the Second World War, the USA, had a strong state operating as a manager for global capitalism (PANITCH & GINDIN, 2012), a political force for combined development.

In sum: the number of channels through which different countries and regions may be connected increases over time and the number of connections also grows. International sources of combined development expand.

3.2. Dynamics within backward countries: new amalgams

As the technological revolutions succeed, they become a source of processes of falling behind in backward countries, and they may be one of the sources of the persistence of middle-income traps during the XXth Century. Each technological revolution or each GPT introduced in a leading country widens the gap between advanced and backward countries.

But each new technological revolution updates the stock of material and intellectual conquests potentially assimilable by backward countries.

A dynamic approach to changes in the uneven side of Trotsky's concept opens room for a dynamic view on types of amalgams that can be generated by "a drawing together of the different stages of the journey, a combining of the separate steps". Each new *big bang* will spread from the leading country and will face backward countries that are not anymore organized according to pre-Industrial Revolution traditional structures, but backward countries with social organizations that are amalgams of assimilation of previous technological revolutions combined with archaic forms.

This approach shows four different processes.

First, there are new technologies available – since the beginning of the XXth Century, electricity, combustion engines, computers, www, and mobile phones. Those new technologies may reshape one country's landscape, but while a backward country completes, at least partially, a catch-up in one technology, a more modern one demands a new catch-up.

Second, new technological revolutions, generating new modern forms, face previous amalgams generated by previous combination of different stages. The juxtaposition of modern and archaic forms has a specific dynamics that changes both sides of the combination. Furtado (1987) suggests a polarity modernization-marginalization as a structural feature of underdevelopment, an approach that helps to investigate this dynamic, as both poles – modernization and marginalization – change after each technological revolution.

Third, as the assimilation of intellectual and material conquests of humankind depends on domestic capabilities in backward countries – elaborated more generally as absorptive capabilities (COHEN & LEVINTHAL, 1989) –, other source of differentiation among backward countries is their different capabilities to take advantage of those new technologies and of windows of opportunity.

Fourth, this dynamics uncovers how underdevelopment has various lock-ins that trap the economic path of countries at the periphery in trajectories that preserve or widen the gap vis-à-vis developed countries. Catch-up processes show how to escape those traps and how organized processes of skipping intermediate stages are possible: Japan (OHKAWA & KOHAMA, 1989), South Korea (AMSDEN, 1989; LEE, 2013) and Taiwan (WADE, 1990) are XXth Century examples of this possibility.

The mosaic of forms to generate new amalgams opens room for a big variety of different social organizations, expanding the heterogeneity of capitalism at the periphery. This means more nuclei of capitalist accumulation at the periphery, which increases the varieties of capitalism and multiplies the complications for the management of the global system.

4. Uneven and combined development in a post-WWW capitalism

The *big bang* triggered by the invention of the World Wide Web began to reshape a global economy reorganized by the previous five technological revolutions. After the re-inclusion of China (late 1970s),¹² Russia and other countries of East Europe (late 1980s), there are now multiple nuclei of capital accumulation spread through the whole world – different amalgams, different varieties of capitalism. The revolution of information and communication and the WWW consolidate the transnational firm as basic microeconomic unit of the system.

The WWW opened a new continent for capital accumulation. This new continent is already occupied by new firms and by incumbent firms of high-tech sectors that were able to restructure to compete in the new digital space: they are the leading firms (Google, Facebook, Microsoft, IBM, Baidu, Tencent, Amazon etc.). The inventions related to how to navigate in the exponentially expanding WWW were almost simultaneous, and led to the creation of two firms in two different countries – Google (USA) and Baidu (China)¹³ –, an expression of a new international context, of current changes in the geopolitical scenario. In this case, China could “skip intermediate stages” and jump to a new sector emerging after the invention of WWW – the industry of search engines.

Each new technological revolution creates a new level of unevenness, widening the gap vis-à-vis backward countries¹⁴. New firms, new

¹² Davidson (2006, p.216) indicates 1978 as the year when “uneven and combined development resumed”.

¹³ See US Patent 5,920,859 (filed 5 February 1997), with Yanhong as inventor, later founder of Baidu, and US Patent 6,285,999 (filed 9 January 1998), with Page as inventor, later founder of Google (GREENSTEIN, 2015, p. 369).

¹⁴ There are new indicators for capturing those new inequalities: level of internet use, mobile phone users etc.

capabilities and new challenges are put forward to backward regions. This new level of unevenness puts new pressure on all backward countries – in fact, puts pressure in all countries, even developed countries that were not in the leading positions of this new *big bang*.

Unevenness comes together with new possibilities of combined development, new amalgams – the list of uses of digital technologies by traditional sectors of backward economies is long. One illustration comes from *The Economist*, articulating illiteracy in Africa and diffusion of new technology invented in 2009 – WhatsApp: “In the West it is common for people to use multiple platforms such as Facebook and Twitter but in African countries, where money is tighter and internet connections patchy, WhatsApp is an efficient one-stop-shop. The ability to leave audio notes makes it popular among illiterate people” (July 20, 2019). The title of this article is very illustrative: “mobile phones” (last technological revolution) “are more common than access to electricity” (third technological revolution)¹⁵.

The WWW establishes a new level of combination, in its international dimension, as new resources for connections between different nations and regions, a new height for Marx’s “intercourse in every direction, universal inter-dependence of nations”. The WWW is related to new forms of organization of transnational corporations (CANTWELL, 2009), of global value chains (UNCTAD, 2013) and an intensification in the international knowledge flows (RIBEIRO *et alii*, 2018; BRITTO *et alii*, 2019) that interconnect and tension different national systems of innovation.

The growth in interconnectedness of the whole system is an important structural change in current global capitalism. But this does not mean a homogeneous form of capitalism spreading globally. The WWW and the dynamics of capital accumulation in this digital continent have generated similar problems as older industries: high industrial concentration, but

¹⁵ <https://www.economist.com/graphic-detail/2017/11/08/in-much-of-sub-saharan-africa-mobile-phones-are-more-common-than-access-to-electricity>

now concentration in global markets: according to *The Economist* - Special Report: Fixing the internet (June 30, 2018, p. 11), Google's global market share in search is 91%; Apple, 45% of web traffic on smartphones; Facebook, 66% of social media; and Amazon, 37% of online retail.

This strong tool for combination is also a strong creator of unevenness. Therefore, instead of a more homogeneous global capitalism, it might be developing a new set of different varieties of capitalism after the new juxtaposition of modern digital technologies and previous social formations generated by the five earlier technological revolutions.

The post-WWW capitalism is witnessing a myriad of emerging new technologies (OECD, 2016, p. 79) that presuppose the digital world to develop: artificial intelligence, machine learning, flexible automation, big data etc. Using the conclusions of Frey and Osborne (2017), there was a flood of forecasts about the future of labor and about how nations will be impacted by those potential new technologies (MCKINSEY GLOBAL INSTITUTE, 2017; OECD, 2017; WORLD BANK, 2016): they forecast a more differentiated global capitalism, given the unequal impact of future robotization in different countries. Frey (2019, pp. 320-331) presents a more balanced interpretation of those conclusions¹⁶, but his analysis includes institutional and technological variables that open room for a more heterogeneous world.

For the periphery, the emergence of the WWW may be a source of new opportunities, beyond the room opened by disruptive technologies for new firms and backward countries. Now there are six layers of different technological ages. Those six layers represent different feasible combinations of different technologies that may broaden options for backward countries to choose how to upgrade their economic position. As new branches of production are created, they offer different stairways to development (LEE & MALERBA, 2017). Regions and countries may choose even to reorganize

¹⁶ For a statement about misunderstandings of Frey's analysis, see "An accidental doom-monger" (The Economist, June 29, 2019)

old sectors using new technologies – new forms of producing clothes, to deal with remains of the first technological revolution. Backward countries have a large portfolio of alternative paths for sectorial catch-up that can lead to choices based on their existing strengths as starting points for “skipping intermediate steps”.

Finally, there are changes in the international division of labor stimulated by the WWW. One type of reorganization of international division of labor can be seen in statistics such as the distribution of app (Android) developers across the world – firms in advanced countries mobilize developers from many different countries¹⁷. Growth in the global mobility of labor, including of more educated people (GEUNA, 2017; KERR *et alii*, 2016), connected with new opportunities for relocation of economic activities, opens room for other forms of combined development, that include advanced countries. Furthermore, there is a *boomerang effect* (MARQUES, 2014): developments at the periphery are impacting the current reconfiguration of global capitalism, probably influenced by the WWW¹⁸. This boomerang effect might be related to some ideas put forward by E. Said: “[b]oth London and Paris have large immigrant populations from former colonies, which themselves have a large residue of British and French culture in their daily life” (SAID, 1993, p. 15). There is “network of interdependent histories” (*ibidem*, p. 19) on the “North-South relationship” (*ibidem*, p. 17). The WWW might intensify and accelerate the “overlapping territories”, the “intertwinement of histories” (*ibidem*, chapter 1).

¹⁷ <https://www.statista.com/statistics/271988/android-app-developer-country/>

¹⁸ This boomerang effect, with new impacts of the periphery upon the center, may be one new source of heterogeneity within developed countries.

5. Uneven and combined development as a methodological tool for contemporary research

Contemporary capitalism is a heterogeneous system, with a broad periphery heterogeneously composed by different varieties of capitalism. Those varieties of capitalism are amalgams created by the combination of modern forms generated by six different technological revolutions that impacted previous traditional societies and have been transforming those societies and those amalgams again and again.

How to investigate those changes and other incoming changes derived from new technologies emerging now and diffusing sometime in the future? Uneven and combined development is a methodological tool for this investigation because it has a dynamics. This dynamics might be derived from the integration between Trotsky's concept and Kondratiev's insights of systematic technological change. Each new technological revolution, or each new GPT, created new levels of unevenness that start, repeatedly, exerting new external pressures on backward countries, feeding processes that create new amalgams between existing social formations and more modern forms. Technological revolutions also change the channels for combination, multiplying channels that break seclusion and feed interdependence – combined development assumes new forms and broader impacts. The process of inclusion of new countries and regions in global capitalism is far more complete today than during the debates between Kondratiev and Trotsky in the 1920s. A dynamic view of the uneven and combined development suggests that it is still operating, with new forms given the spread of nuclei of capital accumulation throughout the whole world.

In sum: dynamically, the results of uneven and combined process until now help the understanding of this process operating today – and globally reshaping the economic system. There are the expansion of global capitalism, other processes of hegemonic transition, new varieties of capitalism, including forms derived from a transition from non-capitalist

economies (command economies as Stalinism and Maoism) towards new varieties of capitalism, possibilities of combination of new technologies with regressive social forms, possibilities of planned and organized processes of skipping intermediate stages and many unforeseen and unpredictable processes and new challenges.

One specific feature of economic dynamics at the periphery is the almost universal presence of traps and lock-ins that block development and feed process of falling behind. The literature of middle income trap (reviewed by DIAS, 2018) is an indicator of this global problem. The use of uneven and combined development as a methodological tool may help the investigation of this phenomenon because it gives the researchers ways to look to different aspects of this process. First, technological revolutions and new GPTs create new levels of unevenness, widening gaps with backward countries and triggering process of falling behind despite domestic policies of those countries at the periphery. Second, historical roots established by previous amalgams formed by the combination of modern forms with archaic forms may be the source of those lock-ins: previous income concentration in Latin American countries and South Africa or residues of the caste system in India are integrated in resulting amalgams that define a path that repeats itself over time, always blocking or limiting the inclusion of larger parts of their populations in the economy, squashing the expansion of domestic economies. Those amalgams will be impacted by new technological revolutions but the new outcomes can preserve the paths that in the past have blocked catch-up processes. Finally, technological revolutions at the center open opportunities to backward countries to build new sequences in the process of development, tailoring specific combinations of all available technologies to their absorptive capabilities.

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