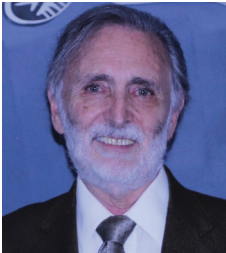


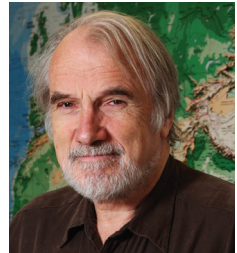
CAPITALIST DEVELOPMENT AND AGRARIAN CHANGE ON THE LATIN AMERICAN PERIPHERY

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Abstract: We are witnessing today a new phase in the national and global development of the productive forces where intellectual property and ownership of patents has become a key component of the imperialist system of domination under the aegis of neoliberal capitalism. This article explores the implications of this development for the agricultural sector and seeks to unravel fundamental features of the restructuring and capitalist development process involved, with particular reference to the new geoeconomics of capital (the evolution of extractive capitalism) in Latin America.

Key words: monopoly capital; agribusiness; patenting; extractive capitalism; resistance

We are witnessing today a new phase in the national and global development of the productive forces where intellectual property and ownership of patents has become a key component of the imperial(ist) system of domination under the aegis of neoliberal capitalism (Rodríguez 2008). This phenomenon is taking place within the institutional and policy framework of a system set up in the 1980s to liberate the “forces of economic freedom” (capital, the market, private enterprise, globalisation) from the regulatory constraints of the welfare-developmental state, a system of “global governance” where the concentration and centralisation of capital has reached unprecedented levels. The diverse and multifaceted dynamics of this process have been extensively studied and analysed in different regional and national contexts. However, a relatively understudied aspect of this process is

the profound restructuring undergone by the system of technological innovation at the heart of the capitalist development process over the last two-and-a-half decades, where the concentration and the private appropriation of the means of knowledge creation and technological innovation—what Marx defined as the general intellect—has reached major proportions. This trend, far from favouring a progressive or revolutionary development of the productive forces of society (in the direction of both development and socialism)—a historic mission that Marx ascribed to capitalism—has placed a number of countries on the periphery of the world system on a regressive path in the advancement of knowledge, exacerbating the propensity of the world system towards crisis, placing at risk the very material bedrock of life, work and nature—a problem that has acquired global and indeed planetary proportions.

The aim of this article is to unravel some fundamental features of this restructuring and capitalist development process in what David Harvey (2005) has described as the neoliberal era and Samir Amin (2013), from a world systems and monopoly capital perspective, has termed the era of generalised monopolies. With reference to the systemic dynamics and forces at work in these conditions, the article is concerned with and has a dual focus on the expansion of corporate capital in the agricultural sector and the advance of resource-seeking, or extractive, capital in this sector. Unlike the system whose dynamics were theorised and analysed by Marx, extractive capitalism is based not so much on the exploitation of labour as the looting and pillage of natural resource wealth. Needless to add, these two forms of capitalism are not exclusive, and at every stage in the evolution of capitalism, they are normally combined and coexist, as do the diverse forms of resistance that capitalist development in any and all of its diverse forms inevitably gives rise to.

Historically, capitalist development of the forces of production has always hinged on the exploitation of surplus labour traditionally or is most often supplied by the agricultural sector, as well as the process of productive and social transformation associated with it. But, as emphasised by Marx in *Capital*, the truly revolutionary pathway towards the accumulation of capital and capitalist development is scientific knowledge and its technological application to production, a process of technological innovation and internal restructuring of the production apparatus in response to conditions of crisis (Marx [1863–1883] 1981, Chapter 10). As Marx saw it, the development of science and technology, or, more generally, knowledge production and technological innovation, not only is the best antidote to the propensity of capitalism towards crisis but also is a revolutionary pathway towards progressive development (Marx [1859] 1977).

The challenge therefore is to establish the intersection of these two dynamics—(1) the exploitation of agricultural labour, the origin and basic source of surplus

value, and (2) technological innovation, a fundamental means of increasing the productivity of labour and thus intensive growth based on the generation of surplus value. Another challenge, which we take up in the article, is to analyse the intersection of these two dynamics with the economic and policy dynamics of natural resource extraction, which include the generation and extraction of ground rent and technological rent with the advance of extractive capital on the periphery of the system (Veltmeyer 2013).

On these points, we advance our argument in four parts. First, we establish the relevance of what we describe as the imperial innovation system and its implications for the agricultural sector. We then briefly discuss the advance of capital on the extractive frontier in the form of agribusiness, with reference to what we view as the imperialist innovation agenda (the appropriation of scientific knowledge and control of production technology) as it plays out in a global context. Third, we bring up and briefly discuss the new geoeconomics of capital, with reference to what in the Latin American context might be viewed as the new political economy of agriculture: agro-extractivism. Fourth, we make a brief detour into what could be described as the political economy of biofuels capitalism on the extractive frontier. We end the article with a brief discussion on the dynamics of the resistance to capitalism and extractivism, highlighting the Zapatista initiative and proposals regarding the possible construction of another world—a world that in their words “encompasses many worlds.”

The central argument advanced in this article is that the political economy of agriculture as well as the new geoeconomics of capital in Latin America can best be understood in terms of the globalising dynamics of forces released in an ongoing capitalist development process. In these terms, the capitalist development process in the region has resulted in the evolution of extractive capitalism, a new phase in the evolution of capital characterised by the extraction of natural resource and technology rent, and the construction of an “innovation system” within a global economy based on monopoly power and the exploitation of accumulated “brain power”—what we conceive of as an imperial innovation system.

The Emergence of Silicon Valley’s Imperial Innovation System

A critical dimension and complex issue of capitalist development in the contemporary era relates to how large multinational corporations in the sector of communications and information technology, many of them headquartered or with venture capital posts in Silicon Valley, have managed to place at their disposal the “human capital” and knowledge production capacity formed in different countries across the world in both the centre and the periphery of the world system. This development—the accumulation of knowledge and skills as a productive resource and a crucial force of production has undergone similar process and is subjected to

the same conditions as capital in other sectors. This includes the concentration and centralisation of capital, a process that works to reduce labour costs, transferring associated risks to noncapitalist producers, and capitalising on the appropriated benefits through the mechanism of patenting, the ownership of patents on the knowledge or social technology embodied in the production process (Delgado Wise 2015; Delgado Wise and Chávez 2016; Míguez 2013).

This capitalist development process over time has resulted in the construction of an “innovation system” within a knowledge-based global economy—what could be conceived of as an imperial innovation system, a system that has five characteristic features:

- (1) The increasing internationalisation and fragmentation of research and development (R&D) activities by means of the organisation and promotion of collective forms innovation such as a crowd-sourcing economy through what can be viewed as open innovation. In contrast to the traditional innovation processes that normally take place “behind closed doors” in R&D departments, internal to large multinational corporations, this trend includes the opening up and spatial redistribution of knowledge-intensive activities with the participation of external partners, activities such as start-ups that operate as privileged cells of the new innovation architecture and the supply of risk capital, headhunters, firms of lawyers, subcontractors, universities, research institutions and so on to create complex “ecosystems” of innovation (Chesbrough 2008).

This new modality of organising this general intellect has given rise to a permanent configuration and reconfiguration of innovation networks that interact within an institutional complex commanded by the large multinational corporations and the Imperial State (see Figure 1) and that, in the particular case of Silicon Valley, transcends with increasing complexity and dynamism at compulsive rhythms hitherto available forms of technological transformation.

- (2) The creation of scientific cities, such as Silicon Valley in the United States and the new “Silicon Valleys” established in recent years in peripheral areas or emerging regions, principally in Asia, where collective synergies are created to accelerate innovation processes (Bruche 2009; Sturgeon 2003). As conceptualised by Annalee Saxenian (2006), this development embodies a new georeferenced paradigm of innovation based on flexibility, decentralisation and the incorporation of new stakeholders that simultaneously interact in local and transnational spaces. Silicon Valley stands as the central pivot of a new global innovation system surrounded by a constellation of scientific maquiladoras that are allocated to peripheral spaces (see Figure 2).

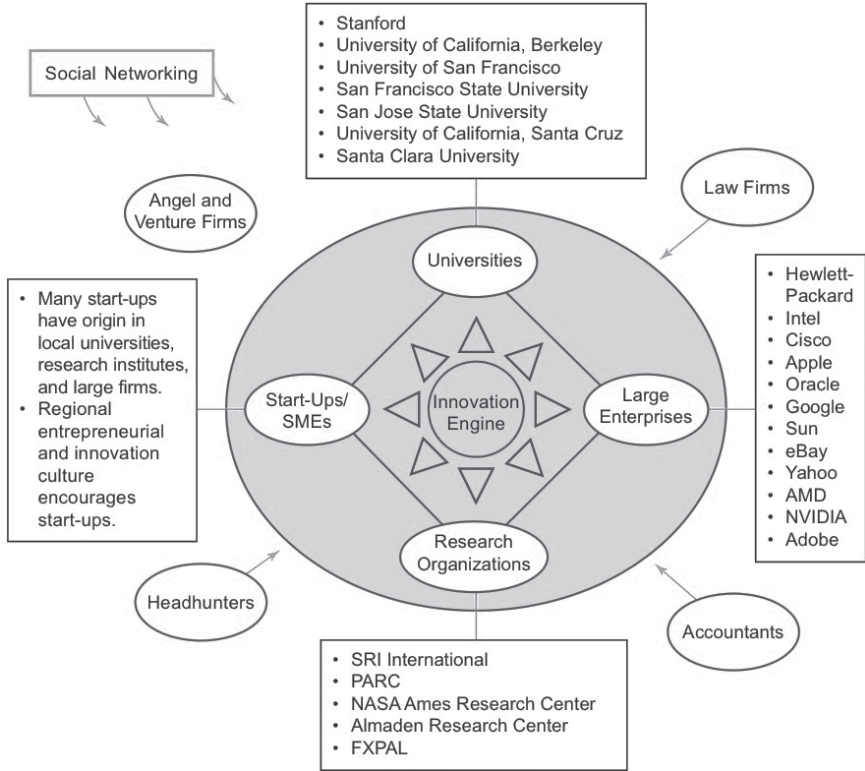


Figure 1 The Silicon Valley Ecosystem

Source: Strategic Business Insights (2017).

- (3) The development of new methods of controlling R&D agendas (through venture capital, partnerships and subcontracting, among others) and appropriating the products of scientific endeavours through the acquisition of patents by large multinational corporations. Indeed, the rhythm of patenting has increased exponentially over the last two decades. Between 1991 and 2011, an overflowing dynamic of patenting has taken place in the United States, where more patents were registered than in 200 years of previous history.
- (4) A rapidly expanding highly skilled workforce—particularly, in the areas of science and engineering formed in the Global South is being tapped by multinationals for R&D in countries on the periphery of the system through recruitment via partnerships, outsourcing and offshoring. In fact, this spatial restructuring of R&D has crystallised into a new geography of

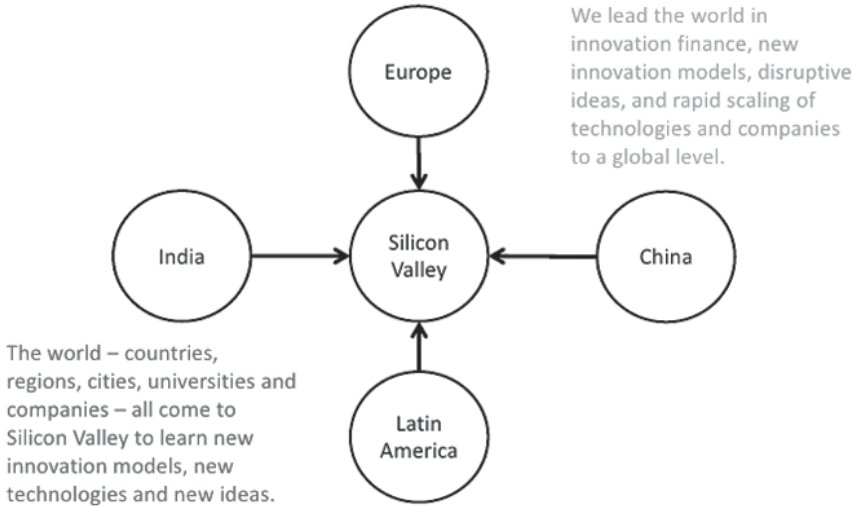


Figure 2 Silicon Valley: Global Centre of Innovation

Source: Our own construction.

innovation, in which R&D—following the pattern of industrial production—is shifting towards peripheral economies. In fact, this trend can be conceived of as a higher stage in the development of the global networks of monopoly capital as the new international division of labour moves up the value-added chain to R&D, and monopoly capital moves to capture the productivity gains and knowledge of a highly skilled workforce in the Global South (Arocena and Sutz 2005). This trend can be traced out in different sectors of the global economy, including agricultural biotechnology and biohegemony in transgenic crops, and the appropriation of indigenous knowledge regarding seed technology (Gutiérrez Escobar and Fitting 2016; Lapegna and Otero 2016; Motta 2016; see Table 1).

- (5) And, most importantly, the creation of an ad hoc institutional framework aimed at the concentration and appropriation of products created by the general intellect through patents, embodied in the World Intellectual Property Organization (WIPO) and the World Trade Organization (WTO; Delgado Wise and Chávez 2016). Since the late 1980s, a trend towards ad hoc legislation has been initiated in the United States, in line with the strategic interests of large multinational corporations regarding intellectual property rights (Messitte 2012). Through regulations promoted by the WTO, this legislation has broadly expanded. Through negotiations for the signing and implementation of the Free Trade Agreements (FTA), these

Table 1 North–South Balance in Patent Applications, 1990–2010

<i>Direction of flows</i>	<i>Period</i> 1990–2010	<i>Year</i>		<i>Growth rate</i>	<i>Per cent distribution</i>		
		1990	2010	1990–2010	1990–2010	1990	2010
Total	820,072	2,922	91,720	18.8	100.0	100.0	100.0
South–North non-OECD to OECD countries ^a	317,946	654	39,936	22.8	38.8	22.4	43.5
North–South OECD to non-OECD countries	23,598	54	3,822	23.7	2.9	1.8	4.2
North–North OECD to OECD countries	464,900	2,208	45,880	16.4	56.7	75.6	50.0
South–South OECD to non-OECD countries	13,628	6	2,082	34.0	1.7	0.2	2.3

Source: Our own calculations, with data from World Intellectual Property Organization (WIPO 2017) and Miguelez and Fink (2012).

^aThe Organisation for Economic Co-operation and Development (OECD) in this context does not include Mexico, Chile and Turkey.

negotiations have been carried out through the Office of the US Trade Representative, who in turn has protected and represented the interests of industries that are intensive in the use of intellectual property. Because of its multilateral nature, intellectual property disputes within the WTO tend to become more complex, so the US strategy also includes bilateral FTA negotiations as a far-reaching means to control markets and increase corporate profits. The regulations established by the Patent Cooperation Treaty—modified in 1984 and 2001—in the framework of WIPO–WTO have contributed significantly to fostering this trend.

All of this has led to the unprecedented appropriation of knowledge, as intangible common goods, giving rise to an abundant expansion, concentration and private appropriation of the products of general intellect, which—far from promoting a progressive path to development in productive forces—has inaugurated a regressive phase in the advancement and application of knowledge. Moreover, sometimes patents are acquired by monopoly capital to prevent or postpone its application with the aim of controlling and regulating markets, giving rise to what Guillermo Foladori (2014) conceives of as “fictitious science” given its speculative character—echoing the notion of fictitious capital coined by Marx.

It is worth adding that in line with the nature and characteristics of the imperial innovation system described above, the United States features as the world’s

Table 2 Patent Applications PCT–WIPO

<i>Country</i>	<i>Patent applications</i>
Total global	4,482,343
Total OECD	4,032,186
Top 10 countries	3,673,953
The United States	1,237,060
Japan	710,516
Germany	627,460
The United Kingdom	216,480
France	212,571
China	208,665
Korea	183,584
Canada	102,917
The Netherlands	93,105
Sweden	81,595

Source: Our own calculations based on data from Miguelez and Fink (2012).

Note: PCT = Patent Cooperation Treaty, WIPO = World Intellectual Property Organization, OECD = Organisation for Economic Co-operation and Development.

leading innovation capitalist power, accounting for 28% of all patent applications through the WIPO system from 1996 to 2010. Taking the total number of Organisation for Economic Co-operation and Development (OECD) countries together (excluding Mexico, Chile and Turkey), they account for 90% of global patent applications (Table 2).

Agribusiness in the Imperialist Innovation Agenda

Over the last two-and-a-half decades, multinational corporations in the agricultural sector (food and farming) have achieved impressive levels of concentration and centralisation worldwide. This process has been led by the so-called big six: Monsanto, Dow, BASF, Bayer, Syngenta and DuPont. The principal areas of investment by these corporations have been pesticides, seeds and biotechnology.

Rather than competing among themselves the big six engage in “cooperative strategies and collusive practices between the few major competitors, notably through the establishment of elaborate cross-licensing structures” (Pesticide Action Network [PAN] 2011). Moreover, “[c]ooperative strategies include licensing, cross-licensing agreements, subcontracting, and other contractual structures

that frame patterns of inter-company alliances.” These are, the authors point out, current practices in agricultural biotechnology. Indeed, “because of the cumulative nature of the genetics and biotechnologies embodied in transgenic varieties, the next innovation is likely to ‘stack’ traits upon those developed in the previous innovation” (PAN 2011).

To avoid encroaching upon each other’s patent entitlements, companies are obliged to enter into licensing and cross-licensing deals. All the leading firms in agricultural biotechnology (including Monsanto) are themselves licensed under various patents, which expire from time to time, covering many products, processes and product uses. Under a cross-licensing agreement, two parties grant a licence to each other for the exploitation of the subject matter claimed in patents. In some cases, cross-licensing is the mutual sharing of patents between companies without even payment of royalties if both patent portfolios are deemed equal in value (UNCTAD 2006, 33–34).

The big six also promote “[v]ertical integration upward along the food chain, with the establishment of food chain clusters that combine agricultural inputs with the grain handlers’ extensive processing and marketing facilities” (PAN 2011).

The unprecedented power secured by the big six allow them to (1) hegemonise the agricultural research agenda; (2) appropriate the fruits of technological advance and production knowledge in the agricultural sector; (3) exercise command over trade agreements and agricultural policies; (4) position their technologies as the “science-based” “solution” for increasing crop yields, feed the hungry and “save the planet”; (5) extend the value chain of corporate capital and corporate control over land, agricultural production and territories; (6) avoid “democratic” and regulatory controls over their activities and the accumulation process; (7) undercut the counterhegemonic and anti-imperialist agenda and struggle for food sovereignty and agroecology advanced by Via Campesina and other forces of resistance in the agricultural sector; and (8) subvert any possibility of promoting competitive markets in line with the hidden neoliberal agenda.

The monopolistic power exerted by the large multinational corporations in the agricultural sector has far-reaching implications regarding “the speed of concentration in the agricultural input sector, associated with the privatization and patenting of biological resources, raises serious competition issues. Further, it raises concerns over social justice and food security” (UNCTAD 2006, 38). We might add here the fundamental concern for environmental justice and food sovereignty, not to mention territorial rights and the private appropriation of nature, technological innovations and the “wealth of nature” or the “global commons” (Barkin, Fuente, and Rosas 2009; De Castro, Hogenboom, and Baud 2016; Porto Goncalves and Leff 2015; Leguizamón 2016; Rodríguez 2008; Rosset 2011).

According to PCT–WIPO statistics in 2015–2016, the number of patent applications by Dow, Bayer, Dupont, BASF, Monsanto and Syngenta were 804, 761, 758, 714, 290 and 108, respectively. This accounted for 22% of the total PCT–WIPO patent applications in this period (see Figure 3).

There are many examples of investments by venture capital groups of Monsanto, Dupont, Dow and Bayer in cutting-edge start-ups in Silicon Valley. Below are a few quotes that show the increasing connection of these corporations to the Silicon Valley innovation ecosystem:

Based in San Francisco, Monsanto’s venture capital group invests in cutting-edge Silicon Valley start-ups and sometimes acquires them. . . . Acquired in 2014 by Climate Corp., the technology subsidiary of Monsanto, 640 Labs soon will be doing business in Europe—an ancillary result of Climate’s recent acquisition of VitalFields, an Estonia-based software company.¹

The Palo Alto R&D Center hosts nearly 200 scientists and engineers conducting enzyme research in biochemistry, molecular biology, protein chemistry, and chemical engineering as well as senior executives, business and regulatory leaders, and intellectual property team members. . . . It is a central site for protein engineering enzyme production systems and pathway engineering for chemicals, and home to applications teams in grain processing, biomass conversion, fabric and household care, and textiles processing.²

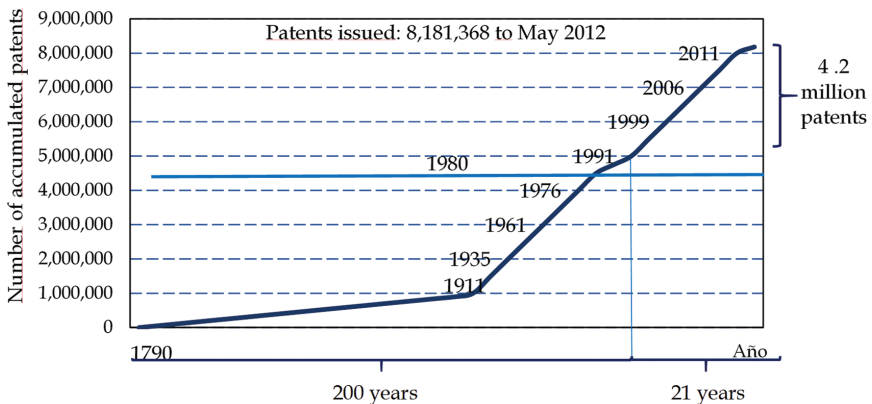


Figure 3 Evolution of Patents Registered in the United States

Source: World Intellectual Property Organization (WIPO 2017).

The Bayer LifeScience iHUB in Silicon Valley is one of several initiatives in order to make sure Bayer leverages digital technologies for its LifeScience businesses. Digital technologies are very important to the future success of Bayer. Bayer is therefore building up competencies in digital technologies, especially with external partners.³

Dow Chemicals is “catching up to Silicon Valley.”⁴

These quotes, and our analysis as to how big capital in the agricultural sector features in a trend towards the concentration of the means of production and the private appropriation of the “wealth of nature” as well as indigenous knowledge, raise a number of questions for closer study and further research, some of which we address below. But one tentative conclusion that can be drawn from this glimpse into these development dynamics is that in many ways the agricultural sector is at the forefront of the contradictions that characterise innovation (and the control and appropriation of knowledge) in the neoliberal era of generalised monopolies.

The New Political Economy of Agriculture: Extractive Capital and Agro-extraction

Silicon Valley is a visible representation of the concentration and centralisation of human capital (scientific knowledge applied to production) in the form of what we term an imperial innovation system, and the appropriation of production-based technologies and patents. However, Silicon Valley and the innovation system of communications and information technologies are not the only centre of human capital formation and scientific knowledge applied to production. As noted above, the cluster of firms that form the “big six” in the agricultural sector constitutes another centre of human capital production, formed in a dynamic process of mergers and acquisitions that characterised the development process in the 1990s and the first decade of the new millennium (UNCTAD 2009).

This monopoly capital dynamic—the concentration and centralisation of capital—is particularly evident in the international trade in grains. But, it is also a dominant feature of what might be described as the new political economy of agriculture based on the expansion and advance of resource-seeking, or extractive, capital. This relates in particular to the formation and expansion of the soy economy in the south-west of Brazil and the north of Argentina, as well as more recently in Bolivia, Paraguay and Uruguay—the so-called Soya Republic (Leguizamón 2016; McKay and Colque 2016; Ezquerro-Cañete 2016).

The formation of this economy on the frontier of extractive capital in South America reflects a pronounced trend towards the expanded flow of resource-seeking foreign investments in the acquisition of land and access to resources in high demand on the world market. This dynamic—the new geoeconomics of capital in the region—is also reflected in a trend towards land-grabbing as a means of gaining direct access to raw materials to supply the market for both agro-food products and biofuels for the production of oil in the food industry, feedstock for animals, and a renewable source of energy (Borras and Franco 2012).

In Latin America, this dynamic, and an associated concentration and centralisation of capital, is particularly evident in the formation of a soy complex in Argentina, Brazil, Bolivia, Paraguay and Uruguay. First, large tracts of arable land have come under ownership of firms in the agro-extraction sector and used to either supply the market for feedstock and edible oil or converted from the production of food to supplying the demand for energy in the form of biomass and other biofuels. On average, since around 2008, an additional 2 million hectares of land in the southern cone, mostly in central west Brazil and north Argentina but also in Bolivia and Paraguay, are being brought into production each year.

Already, in 2008, Brazil and Argentina respectively had 21.3 million and 16.4 million hectares of land under soya cultivation—representing 38.8% of the total global area under soya cultivation and for the production of soybean oil and 46% of total global soya production (Food and Agriculture Organization [FAO] 2010, based on FAOSTAT data). In recent years, other countries in the subregion have also significantly increased their production capacity, driven by the global demand for soybean oil (for use in the food sector), soybean meal (mainly as a source of animal feed protein), but increasingly as feedstock for the production of biodiesel and first-generation biofuels (Schoneveld 2010). Brazil, in this context, exports most of its soybean in unprocessed seed form, while Argentina processes more than 80% of soybean seeds domestically into meal and oil. Currently, approximately 16% of total soybeans harvested in Brazil are used for energy purposes, while approximately 3.5% of the soybean harvest is used to produce biodiesel—most of it exported (Van Gelder and Dros 2002).

The production for export of agrofuels, such as international trade in grains and foreign investments in land and agro-extraction, is highly concentrated and dominated by a small cluster of firms that have acquired an oligopoly in the marketing and sale of their production. This cluster of monopoly or oligopoly capital in the sector of agro-extraction intersects with the big six (Monsanto, Dow, BASF, Bayer, Syngenta and DuPont) in Cargill, the largest privately owned corporation in the United States, but it also includes other firms, and various clusters of capital,

that have combined in a process of mergers and acquisitions or more flexible arrangements such as partnerships, contracts or joint ventures to form a “real cluster of firms” that could monopolise the global trade in grains and soy-based biofuels. Together, this “real cluster of firms”—a cartel in the judgement of economists at the UNCTAD (2009)—together control 52% of the global trade in staple grains, cereals and oilseed. And more importantly, they have a commanding control of seed patents and agricultural production technologies.

This cartel, known as ABCD (Bunge, Cargill . . .), currently finances from 60% to 85% of soybean producers in Brazil, offering farmers credit as well as a technological package that effectively converts them into their agents in the new agricultural economy formed by companies that effectively control conditions for production in the southern cone territory.

Apart from its role as a supplier of surplus labour and cheap wage goods to hold down the cost of labour in the industrial sector, the important role of agriculture in the capitalist development process had been largely overlooked for the five decades prior to the current turn to—or return towards—agro-extraction and a policy of primary commodity exports. In this context, instead of capitalising on the region’s relatively abundant resource endowment and resultant comparative advantage, policymakers used the agricultural sector as a cash cow to be milked to subsidise relatively more inefficient firms in the industrial sector.

There is nothing novel or new about this development; it is well known and has been extensively studied and theorised over the years. Policymakers in this context pursued a strategy of export-led development—exporting primary products—thereby sustaining their assigned or self-assumed role as suppliers to industrial countries. The negative consequences of this strategy have been extensively theorised and analysed, most often from a dependency theory perspective. But in the new millennium—in conditions of the new geoeconomics of capital, that is, the phenomenon of large-scale foreign investments in land and resources—the role of agriculture for development has significantly changed. For one thing, many multinational corporations in the agro-extraction sector, to guarantee a supply of raw materials and resources, shifted away from direct investments in the acquisition of assets to contract farming (UNCTAD 2009, 110). For another, with the growing demand for biofuels and the resulting conversion of land from the production of food to energy, the much debated built-in barriers to the expansion of capital into the agricultural sector have been pushed back within the limits of environmental degradation in the agricultural sector, leading to the increased subsumption of agricultural labour as well as another cycle in the expulsion of the direct producers to fuel the growth of a global reserve army of surplus labour and a global labour force available to monopoly capital for its expansion into its various redoubts of industrial

capital, located mostly in the heartland of the world system. It would seem that here at least agriculture has been pushed back towards its traditional role as a supplier of surplus labour to industrial or monopoly capital.

Until the mid-1990s, the dominant strategy of development economists at the World Bank and other agencies in the UN system was to encourage the masses of dispossessed or “rural landless workers”—the “rural poor” in the lexicon of World Bank economists—to abandon agriculture and their rural communities and to take the development pathway out of rural poverty, namely, migration and labour (World Bank 2008). However, by the mid-1990s, with the evident absence of an industrialisation process and a functioning labour market—and the inability of the urban economy to absorb this excess supply of surplus agricultural labour—this development strategy was turned around in the direction of slowing down the regular outflow of rural migrant labour.

At issue in this new strategy was the problem of reducing the pressures on both governments and the private sector to absorb the excess supply of surplus rural labour, and also what sociologists at the time described as “the new rurality,” namely, the response of the rural poor to the forces of social change and capitalist development in the form of a strategy of diversifying their sources of household income (Kay 2008). Lula’s new social policy of conditional cash transfers to the poor played into this strategy.

However, the expansion of both market-seeking and resource-seeking extractive capital in the agricultural sector, and the rapid growth of both agro-extraction and agribusiness within the circuits and supply chains of monopoly capital, changed conditions regarding the international and regional political economy of agriculture. As noted by UNCTAD in its 2009 report on world investments—with reference to these changed conditions—“[a]fter a long period of decline in . . . [the] participation [of multinational corporations] in agricultural production, a resurgence may . . . be under way” (UNCTAD 2009, 110).

As for the consequences of this resurgence, by a number of accounts they include,

- (i) the expansion and rapid advance of capital on the extractive frontier;
- (ii) the emergence of new modalities for the expansion of capital into the agricultural sector, including landgrabbing, agro-extraction, investment by private equity funds, the formation of wholly owned affiliates, the institution of joint ventures and management contracts, as well as the replacement of foreign direct investments (FDI) with contract farming;
- (iii) a process of cross-border mergers and acquisitions, leading to vertical integration as well as the concentration of capital in both agriculture and associated industries such as food processing (Rastoin 2008);

- (iv) a major rise of investments in agriculture and related activities, particularly, food processing, linked to the inflow of resource-seeking or extractive capital, or agro-extraction (UNCTAD 2009, 113);
- (v) a technological restructuring of agricultural production, particularly, as regards the dynamics of R&D and intellectual property rights and the patenting of technological innovations; as well as a new commanding production structure, based on use of genetically modified crops, agrochemicals and new sowing techniques, which have empowered multinational agribusinesses, leading to their vertical integration along the production chain (Turzi 2007);
- (vi) the use of companies in the agro-extractive sector of their scientific and technological superiority to advance the sale of their agrochemical products, integrating with traders and processors and leveraging scale advantages to establish dominant buying positions by drawing on their financial strength (Turzi 2011);
- (vii) the erosion of national borders on the extractive frontier, which are losing ground to a corporate-driven model of territorial organisation, giving rise to new geopolitical fault lines and the formation of a single unified Soybean Republic (Turzi 2011);
- (viii) the expansion of corporate capital into the agricultural sector, which is reducing the land available for food production, increasing pressures on small-scale peasant production and family farming; and
- (ix) an enclosure of the commons with a consequent expulsion of poor peasants from agriculture and their rural communities on the extractive frontier.

In addition to these developments, renewal of a stalled rural exodus has fuelled the growth of a global workforce and the formation of an industrial reserve army (Delgado Wise and Veltmeyer 2016), and the emergence of new dynamic forces of resistance and alternative development (Zibechei 2007, 2015).

The Political Economy of Biofuels Capitalism

Agro-extractivism assumes diverse forms, but what has dominated the debate surrounding it in Latin America—apart from the meaning of the landgrabbing phenomenon—has been what we might term the political economy of biofuels capitalism: the conversion of farmland and agriculture for food production into the production of agrofuels (the conversion of sugarcane into ethanol and biomass and soybean into biodiesel and liquid fuels). What set off the debate originally was the change in land use in Brazil in the use of corn from a food and feedlot product into

the production of ethanol. But what sparked the current debate was the change in the use of farmland to convert it from food production into the production of soybean as a source of biofuel.

It would appear that biofuels production and related financial speculation has been a major impetus behind landgrabbing, particularly, in Argentina and Brazil, where enormous swathes of farmland have been turned over to soy production. It implicates the emergence and rapid growth in recent decades of new agribusinesses such as the production of soy for export based on transgenic seeds, which, according to the Argentine government, a booster of expanded soy production as a national development strategy, has the potential to grow significantly in the near future (Giarracca and Teubal 2014).

This strategy, together with the emergence of soy production based on transgenic seeds as a key sector of the global food regime, relates to the dramatic expansion in recent years of foreign investment in the acquisition of land, or landgrabbing, and the importance gained by large transnational corporations in controlling key segments of extractivist processes, not to mention the application of new technologies promoted by neoliberal policies implemented throughout the continent.

In this context, the production of biofuels has turned into a major driving force of capitalist development in South America. In the case of Paraguay and Uruguay, more than 60% of the country's arable land is now given over to the production of soybeans for export. In Bolivia, soybean is the most treasured crop in the agricultural sector with over 14,000 producers and 45,000 workers, more than those engaged in the production of coca, the traditional agro-extraction crop. In Argentina, more than 19.5 million hectares of farmland, accounting for 18% of worldwide soy production, is now dedicated to growing soybeans (Giarracca and Teubal 2014, 54–55).

But what is the outcome and what are the consequences of this development? One outcome and a major feature of this land grab—and the associated territorial claim and resource grab—has been increased foreign ownership of land as well as the concentration of capital in the agricultural sector, adding another twist to the century-long land struggle (Moyo and Yeros 2005; UNCTAD 2011, 110–111). Other dimensions of the landgrabbing process include the following: the privatisation and commodification of land, and with it, the transformation of a system of customary rights in regard to land usage into legal and written titles to land ownership; rationalisation of the use of such demarcated landed property as a form of capital (land as a commodity) at the service of “original” and expanded capital accumulation; the proletarianisation of the peasant farmers and agricultural producers in the form of rural outmigration—by means of enclosing the commons, thus reducing the access of the rural poor to land and the global commons (Cotula, Dyer, and Vermeulen 2008), creating thereby a mobile rural

and periurban semiproletariat concentrated in the urban centres of what has become the world economy (Araghi 2010), and, more specifically, in regard to extractive capitalism; the forced displacement of the “rural poor,” the dispossessed and semiproletarianised inhabitants of the rural communities contiguous to the major sites of extractive capital; and the emergence of new forces of resistance on capitalism’s extractive frontier—resistance against the negative socioenvironmental impacts of capitalism and extractivism, and the mobilisation of these forces by a new generation of social movements with their social base in the indigenous and peasant farming communities that make up the new proletariat or what Barkin and Sánchez (2017) describe as a “collective revolutionary subject” (new forms of social transformation).

The Dynamics of the Resistance: The Zapatista Initiative

At the end of the 20th century, in conditions of momentous change in both the global economy and domestic politics (a reconfiguration of economic power with the ascension of China, a seaford of regime change leading to a policy of “inclusionary state activism”), Latin America became fertile ground for the construction of alternative forms and models of development, and for some academics and activists, a new dawning of antisystemic movements at the global level. Among the main characteristics of these movements, which can be traced back to the Zapatista uprising on January 1, 1994, are a concern for territorial rights and integrity, radical autonomy (material and political sovereignty), direct or participatory democracy, the reaffirmation of traditional culture and identity, the creation of their own education and health systems, the education and formation of their own intellectuals, gender equality, collective and horizontal organisation of work and the drive for an alternative form of development (or an alternative to development) based on relations of social solidarity and harmony with nature (Acosta 2012; Gudynas 2013a, 2013b; Zibechi 2007, 2015).

The Zapatista movement, formed in the mountains of the southeast of Mexico in conditions of the turn of many governments in the region towards free market capitalism, has played a leading role in this new period of antisystemic resistance and rebellion. In fact, the Zapatistas have radically redefined the traditional concept of resistance (passive and reactive), changing “the resistance struggle into a transformative struggle” capable of building anew a society free of exploitation, deprivation, oppression and repression in the reclaimed geographic space under its control. But this not only requires the creation of islands or local spaces of popular resistance, but rather archipelagos (see the Sixth Declaration of the Lacandon Jungle) that challenge the capitalist system with an emancipatory vision and a liberating and revolutionary praxis.

To transcend or move beyond capitalism—Marx cautioned us in *Capital* (Marx [1866] 1975)—not only implies the transformation of the existing social relations of production, ending all kinds of exploitation of “man by man” but also implies the need to create a new mode of production in accordance with new social relations. Just as capitalism in its early stages inherited a technical mode of production from feudalism and transformed it according to its own norms and logic, moving from humanity’s prehistory—with reference to all forms of social organisation divided into classes—to history, that is, towards a society without classes, necessarily requires moving from the capitalist technical mode of production to one that transcends it. This need becomes even more imperative in the current phase of capitalist development, characterised by the dominance of monopoly capital, which, in its insatiable pursuit of profit and the appropriation of the wealth of nations turns the progressive character that Marx attributed to the capitalist development of the forces of production on its head.

From this emancipatory and revolutionary perspective, Zapatismo, like other antisystemic social movements that are oriented towards an alternative future, an alternative to “development” as we have come to know it, that is, as capitalist development, proposes to foster development of the productive forces in a way that privileges their use value and that is based on the fundamental principles of social solidarity and in harmony with nature. As the Zapatistas see it, education is a fundamental part of this process of constructing a social and solidarity economy in the provision of a “realistic and true curriculum, that conveys what the people truly need for their liberation.” In addition, education can be liberating in the “fostering [of] . . . scientific consciousness and critical thinking, intellectual weapons of the resistance [in] the struggle of . . . communities for a new world beyond capitalism, a world that encompasses many worlds” (Aguirre Rojas 2008, 189).

With reference to this “revolutionary praxis” based on a critical thinking, the Zapatista rebellion can be seen or is seen by some (e.g., Burbach 1994) “as the first postmodern movement in history.” As Villoro (2016, 18), a Mexican chronicler of the widespread albeit largely subterranean popular resistance to capitalism in its current form, puts it,

Zapatismo is contemporary in the way in which it has raised a social opposition to that which has lasted far too long. It does not seek to roll back the wheel of the days travelled toward some lost arcadia, that nostalgic moment of creation, nor derail the train of progress. It seeks something more concrete and ambitious: a new age.

In this connection, with a view not so much to mobilise the forces of resistance against capitalism and extractivism but to advance an effective knowledge-based

dialogue with representatives of the “hard sciences,” the Zapatistas in December 2016 organised a national “encounter” in San Cristóbal de las Casas, Chiapas. In the context of this encounter with opposing viewpoints—“The Zapatistas and the ConCiencias for Humanity”—spokesperson Subcomandante Insurgente Galeano (2016) made the following comment:

... if the children that 25–30 years ago were born during the preparation for the uprising and those that were born 15–20 years ago were born in resistance and rebellion; those born in the last 10–15 years were born in a process of consolidated autonomy, with new characteristics, among which is the need for Science.

This comment reveals the deep meaning of the Zapatista initiative to establish a bridge between a world in resistance where noncapitalist social relations have been incubated and those who personify the advances achieved by knowledge under capitalist modernity in hopes of opening routes towards an alternative path of the development of knowledge for transformative change. And although this is only a first tentative step towards transforming the technical mode of capitalist production and reorienting towards an alternative modernity, it is nevertheless an effort with enormous potential to advance emerging antisystemic social movements seeking a world beyond capitalism and extractivism, reaffirming for them the strategic as well as symbolic importance of Zapatismo.

Conclusion

The installation in the 1980s of what was then a “new world order” ushered in and brought about a new phase in the capitalist development of the forces of production described by David Harvey as a “brief history of neoliberalism.” As in all such transitions this brief 30-year interlude in the evolution of capitalism resulted in a major restructuring of the system, releasing and giving rise to dynamic forces of change at the level of both production and politics. Systemwide, these forces of change included (1) an expansion of productive capital in the form of FDI freed from regulatory constraint; (2) globalisation in the form of national economies being integrated into the world capitalist system under the new rules of engagement; (3) the deregulation of markets and the liberalisation of both international trade and the flow of productive capital; (4) a shift in the sectoral distribution of productive capital flows, marked by a relatively greater expansion of “extractive” or “resource-seeking” investment capital in the search of opportunities for super-profits provided by the market demand for natural resources and primary commodities; (5) the financialisation of the economy, leading to an expansion of capital markets relative to product markets and the hegemony of financial capital,

as well as a growing disconnect between the economy based on capital markets and the real economy based on production, and a steady increase in the systemic propensity towards crisis; and (6) increased propensity towards the concentration and centralisation of capital, leading to the growth of monopoly power over product markets as well as the hegemony of financial capital.

As for the Latin American periphery of the system where the neoliberal policy agenda was implemented more forcefully than elsewhere, these forces of change took form as (1) a dramatic increase in the flow of extractive or resource-seeking capital and associated “developments” that include a turn of some governments (predominantly in South America) towards an extractivist strategy of national development, a strategy that combines a “post-neoliberal form of ‘inclusionary state activism’ with a strategy of primary commodity exports” (Veltmeyer 2013, 91); (2) the formation of a large rural semiproletariat of landless or near-landless “peasants” or rural workers, many of whom are compelled to take the “development pathway” out of rural poverty, namely, labour and migration (Delgado Wise and Veltmeyer 2016); an expansion of agro-extraction as a strategy deployed by capital under conditions of “large-scale foreign investments in land,” the monopoly power of corporate agribusiness, a renewed dependency (the “new dependency”) of the state and local governments on FDI, with an associated coincidence of economic interests (superprofits for capital, resource rents and windfall revenues for the state); (3) widespread implementation of a neoliberal policy regime based on a policy of privatisation and actions designed or with the effect of restricting access to the “global commons” as well as means of production and a livelihood based on agriculture; and (4) widespread rejection in the popular sector of the neoliberal policy agenda, as well as active resistance in the form of antisystemic social movements to the advances of both corporate or monopoly capital and extractive capital.

These developments have been widely studied and are part of an ongoing debate. However, although they necessitate closer study, this article has a more limited concern with two particular issues of agrarian political economy. One is the role of technological innovation in the capitalist development process, an exploration of the restructuring dynamics associated with what we describe as the “imperial system of innovation.” This concept and theme are characterised by an absence in contemporary studies of imperialism, hence our aim to highlight and draw attention to them and to explain the associated dynamics. The second concern of the article is to advance the concept of agro-extraction as a new way of addressing the agrarian question today. Our conclusion is that both the concept of an imperial innovation system and the concept of agro-extractivism are keys to an understanding of the contemporary dynamics of capitalism in the Latin American context.

Notes

1. See <http://www.chicagotribune.com/business/ct-monsanto-growth-ventures-1209-biz-20161209-story.html>.
2. See <http://siliconvikings.com/blog/2017/12/21/silicon-valley-challenges-ahead>.
3. See <https://innovate.bayer.com/what-we-offer/lifescience-ihub/>.
4. See <http://fortune.com/2015/07/15/dow-chief-chemical-science/>.

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