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Cecilia Rikap

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REVIEW ARTICLE

From global value chains to corporate production and innovation systems: exploring the rise of intellectual monopoly capitalism

Cecilia Rikap [a,b]

ABSTRACT

This article argues that contemporary leading global corporations are intellectual monopolies that base their power on the systematic concentration (and predation) of knowledge which they turn into intangible assets. By monopolizing access to portions of society's knowledge, these companies' capacity to plan portions of capitalism exceeds their legally owned assets. The article defines each intellectual monopoly's sphere of planning as a corporate production and innovation system that may include several substructures, from global value chains to platforms. Inside corporate production and innovation systems, value and knowledge production are organized and controlled by the intellectual monopoly. Moreover, among intellectual monopolies, those centralizing big data and the machine learning algorithms required to process them will develop greater planning capacities and a further self-expansion of their intellectual monopoly. The emergence of intellectual monopolies has implications for every level within capitalism, including global capital accumulation, effects on labour and peripheries. By briefly referring to these dimensions, the article finishes by presenting a depiction of the geographies of digital capitalism as an era dominated by intellectual monopolies.

ARTICLE HISTORY

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KEYWORDS

global value chains, intellectual monopoly, corporate planning, corporate innovation system, digital capitalism, platforms

摘要

从全球价值链到企业生产和创新系统;探寻知识垄断资本主义的兴起。*Area Development and Policy*. 本文认为,当代领先的全球公司是知识垄断者,其权力建立在知识的系统集中(和掠夺)之上,并将其转化为无形资产。通过垄断获取部分社会知识,这些公司规划资本主义部分的能力超过其合法拥有的资产。本文将每个知识垄断企业的规划范围定义为一个企业生产和创新系统,其中可能包括从全球价值链到平台的多个子结构。在企业生产和创新系统内部,价值和知识生产由知识垄断组织和控制。此外,在知识垄断中,那些将大数据和处理它们所需机器学习算法集中起来的人将发展出更大的规划能力,并进一步扩大其知识垄断。知识垄断的出现对资本主义各个层面都有影响,括全球资本积累、对劳动力和周边地区的影响。通过简要提及这些维度,文章最后描述数字资本主义的地理位置,这是一个由知识垄断主导的时代。

关键词

全球价值链, 知识垄断, 公司规划, 企业创新系统, 数字资本主义, 平台

CONTACT Cecilia Rikap ceciliarikap@gmail.com; cecilia.rikap@city.ac.uk
[a]University of London: City Political Economy Research Centre
[b]Consejo Nacional de Investigaciones Cientificas y Tecnicas

RESUMEN

De las cadenas globales de valores a los sistemas corporativos de producción e innovación: análisis del aumento del capitalismo de los monopolios intelectuales. *Area Development and Policy*. En este artículo se argumenta que las principales corporaciones del mundo actual son monopolios intelectuales cuyos poderes se basan en la concentración (y depredación) sistemática de conocimiento que convierten en activos intangibles. Al monopolizar el acceso a partes del conocimiento de la sociedad, la capacidad de estas empresas para planificar partes del capitalismo excede sus activos de propiedad legal. En este artículo se define cada esfera de planificación del monopolio intelectual como un sistema corporativo de producción e innovación que puede incluir varias subestructuras, desde las cadenas de valores globales a las plataformas. En el marco de los sistemas corporativos de producción e innovación, el monopolio intelectual organiza y controla la producción de valores y conocimientos. Además, aquellos monopolios intelectuales que centralizan los macrodatos, y los algoritmos de aprendizaje automático que se requieren para procesarlos, desarrollarán una mayor capacidad de planificación y una autoexpansión adicional de su monopolio intelectual. La creación de monopolios intelectuales tiene consecuencias en cada nivel del capitalismo, incluyendo la acumulación de capital global, los efectos en el mercado laboral y las periferias. Mediante una breve referencia a estas dimensiones, se concluye este artículo mostrando una representación de las geografías del capitalismo digital como una era dominada por los monopolios intelectuales.

PALABRAS CLAVE

cadenas globales de valores, monopolio intelectual, planificación corporativa, sistema de innovación corporativo, capitalismo digital, plataformas

АННОТАЦИЯ

От глобальных производственно-сбытовых цепочек к корпоративным производственным и инновационным системам: изучение развития капитализма интеллектуальной монополии. *Area Development and Policy*. В этой статье утверждается, что современные ведущие мировые корпорации являются интеллектуальными монополиями, которые основывают свою власть на систематической концентрации (и захвате) знаний, которые они превращают в нематериальные активы. Монополизируя доступ к частям общественных знаний, эти компании контролируют ресурсы, превосходящие их законные активы. В статье определяется сфера планирования каждой интеллектуальной монополии как корпоративная производственная и инновационная система, которая может включать несколько подструктур, от глобальных цепочек создания стоимости до платформ. Внутри корпоративных производственных и инновационных систем производство ценностей и знаний организовано и контролируется интеллектуальной монополией. Более того, среди интеллектуальных монополий те, кто централизует большие данные и алгоритмы машинного обучения, необходимые для их обработки, будут приобретать большие возможности планирования и дальнейшего расширения своей интеллектуальной монополии. Возникновение интеллектуальных монополий имеет последствия на всех уровнях капитализма, включая глобальное накопление капитала, воздействие на рабочую силу и периферию. Кратко коснувшись этих аспектов, статья заканчивается описанием географии цифрового капитализма как эпохи, в которой доминируют интеллектуальные монополии.

КЛЮЧЕВЫЕ СЛОВА

Глобальные цепочки создания стоимости, Интеллектуальная монополия, Корпоративное планирование, Корпоративная инновационная система, Цифровой капитализм, Платформы

INTRODUCTION

Production in capitalism was considered to be organized through two distinct forms of division of labour: the technical one, inside the factory, as in the example of Adam Smith's pin factory (Smith 1950), where production is planned; and the social division of labour one, organized through anarchic market exchanges, anarchic in the sense that there is no central planning or a conscient way to assign what each *producer* should do. In this article I will argue that, at odds with this distinction, planning has trespassed the front door of the factory or, in other words, the technical division of labour has conquered space that was organized through capitalist social division of labour. Portions of capitalism (including both commodities and knowledge production, distribution and extraction) are being organized as in the example of the pin factory. As a result, the frontiers between planning and markets are fuzzier than ever.

The case of Apple, the corporation with the highest market capitalization for most of the last decade, is a case in point. Apple controls every bit of its supply chains, as stated by former employees and suppliers interviewed by Satariano and Burrows (2011, p. 50). It exercises extreme control over its subcontractors and suppliers, appropriating part of their value (Chan et al., 2013; Froud et al., 2012; Haslam et al., 2013; Kraemer et al., 2011; Linden et al., 2009; WIPO, 2017; Xing, 2019). Quite illustrative of its planning behaviour is how Apple changed the screen of the iPhone weeks before it was launched. Foxconn, Apple's main contractor, was forced to overhaul the assembly line. As soon as Apple's managers arrived at its facility, Foxconn managers woke up workers in the middle of the night to fulfil Apple's requirements (Rikap, 2018). This case was no exception. According to Foxconn employees interviewed by Chan et al. (2013), Apple monitors onsite production processes and delivery times. Overall, Apple knows who can complete each step of its different value chains and has the exclusive knowledge to oversee and integrate all its dispersed and outsourced production processes.

Apple is only one among the many firms using exclusive access to knowledge to plan portions of capitalism. Moreover, as I explain in this article, global value chains (GVCs) (Gereffi, 2014; Gereffi et al., 2005, 1994; Ponte et al., 2019; Ponte & Sturgeon, 2014; Sturgeon, 2009) are only one among the many structures used by contemporary leading corporations to – by exercising their planning capacity – appropriate value and knowledge. These companies control and organize what can be defined as production and innovation systems (although they are subsystems in relation to capitalism as a global system). Other structures include platforms (which more often than not represent the creation of a new market), franchising and local subcontracting networks (value chains inside a single country). What they all have in common is that they are structures organized and planned by a leading corporation and integrated by several other subordinate organizations whose production process is controlled by the leading corporation. The latter also captures the majority share of the surplus value that springs from these structures.

From this starting point, this article explains that corporate planning relies on knowledge monopolization. In essence, more than ever knowledge (cum innovation) is power and contemporary capitalism is driven by those monopolizing it. At the corporate level, a handful of leading global corporations base their power on the systematic concentration of intangible assets. By monopolizing access to portions of society's knowledge, these companies' capacity to plan portions of capitalism exceeds their legally owned assets. The article also briefly refers to the different effects of intellectual monopolies, at the level of global capitalism, for labour and peripheries. For a more thorough conceptualization including several case studies and further evidence of this thesis, see Rikap (2021).

The rest of this article is organized as follows. The next section elaborates on the emergence of intellectual monopolies, including the specific case of those that are data driven. Data are the holy grail of any plan. The third section further explains the thesis on these companies' extraordinary planning capacity. The fourth section introduces several dimensions of analysis regarding the implications of intellectual monopoly capitalism. The fifth section concludes.

WHO ARE THESE CORPORATE PLANNERS?

Let us start with some stylized facts. A recent joint Organisation for Economic Co-operation and Development (OECD) and European Union report shows that the top 2000 corporations in business expenditure on research and development (R&D) concentrated 60% of total IP5[1] patents between 2014 and 2016 (Dernis et al., 2019). Furthermore, while in 1975 only 17% of the assets of S&P 500 corporations were intangibles, that figure had risen to 90% by 2020.[2]

In the United States, intangible–intensive industries' rate of profit grew faster than their total assets (Orhangazi, 2018). Yet this is not exclusively a US phenomenon, as shown in an OECD report that analysed 26 countries (the United States and a sample of European and Asian economies) between 2001 and 2014. The report found that mark-ups of firms at the top of the mark-up distribution have grown, and mark-ups are higher in digital-intensive sectors (Calligaris et al., 2018).

In this context, Pagano (2014, p. 1410) coined the term *intellectual monopoly capitalism* and considered it global leading corporations' dominant form of organization, which 'expanded to an unprecedented level the process of concentration of productive knowledge'. While the author's empirical focus is the concentration of intellectual property rights (IPRs), since his seminal contribution others have further elaborated on this concept by including three mechanisms that expand a company's intellectual monopoly: knowledge appropriation (see below), data centralization, and exclusive access to knowledge on how to reintegrate production processes spread in GVCs and other forms of outsourcing (Durand, 2020; Durand & Milberg, 2020; Rikap, 2018, 2021; Rikap & Lundvall, 2020). All these mechanisms expand the intellectual rents that intellectual monopolies garner from turning knowledge into assets.

How did intellectual monopolies originate in the first place?

In essence, intellectual monopolies spring from the continuous monopolization (cum assetization) of knowledge. This means that they rely on a permanent and expanding monopoly over portions of society's knowledge. These companies are not merely one-time innovators. Knowledge is a cumulative process; new knowledge is produced based on, and mobilizing, existing knowledge (Antonelli, 1999; Dosi, 1988; Johnson & Lundvall, 1994). Moreover, the organizations that succeed in innovation will be better positioned to absorb new knowledge, and thus further innovate (Cohen & Levinthal, 1990). These conditions contribute to explaining the perpetuation of intellectual rents in a few hands. Once a firm continuously wins the innovation race, the resulting gap with the rest of its industry widens. It is the capacity to continuously renew its intellectual monopoly that constitutes a source of lasting power.

Although these characteristics of knowledge, as well as those of capitalist competition leading to productive forces advancement (Marx, 1894), are intrinsic features of capitalism, it was not until the late 1970s that institutional, political and technological transformations fostered and accelerated the spread of intellectual monopolies that we see as an accomplished result in the 21st century.

Concerning technological changes, the first phase of the information and communication technology (ICT) revolution accelerated knowledge diffusion, thus favouring those

organizations with greater absorptive capacities. Moreover, in the last decade, data and deep-learning algorithms stand out within intangible assets. Their specificities have contributed to engendering a unique type of intellectual monopoly that is data driven. Big data are processed with machine-learning algorithms producing digital intelligence (UNCTAD, 2019). Within machine-learning techniques, deep learning and neural network approaches enable algorithms to learn and improve themselves as they process more data. This is why Cockburn et al. (2018) consider this technology a new method of invention.

Among intellectual monopolies, those monopolizing access to big data and the algorithms to analyse them are, thus, monopolizing a method of invention. Therefore, they are potentially self-perpetuating and self-expanding their intellectual monopoly (Rikap & Lundvall, 2022). Data-driven intellectual monopolies base their innovations on processing big data with this artificial intelligence (AI) approach. Data-harvesting, centralization and analysis thus foster a cumulative advantage in terms of the ability to innovate. Furthermore, data-driven intellectual monopolies have a relative advantage when it comes to planning because of their exclusive access to data from production, distribution (markets) and consumption. Tech giants are the paradigmatic example. They are on the way to monopolize this method of invention or, more precisely, the benefits accruing from it (Rikap, 2020; Rikap & Lundvall, 2020).

Regarding institutional and political changes, a set of policies and regulations introduced in the United States and later extended to most of the world have been essential to the reshaping of capitalism into intellectual monopoly capitalism. The development of a more stringent and all-embracing IPRs regime stands out. It included a range of measures from the Bayh–Dole Act, which authorized the patenting of public-funded research results and the transfer of this knowledge to private firms by providing them with exclusive licences or creating joint ventures, to other acts that further extended IPRs, such as more severe sanctions for infringements, and the expansion of the definition of what IPRs could protect to include living beings, software and architectural work (Mowery, 2005; Orsi & Coriat, 2006; Pestre, 2003).

Other quite well-known policies that have favoured the accumulation of knowledge and profits by large multinational corporations from core countries included the weakening of antitrust controls (Glick, 2019) and the overlooking of tax loopholes between jurisdictions. This resulted, among other things, in a regressive corporate tax structure where the top 10% of US-listed corporations (defined as those with the highest ratio of net profit to sales) pay a lower worldwide effective income tax rate than all other US-listed corporations (Hager & Baines, 2020).

What is perhaps less known is the role of the US industrial policy, promoting US multinational corporations as a means to limit the ability of other countries to catch-up (from the USSR during the Cold War to Japan in the 1970s and China nowadays) and to sustain US geopolitical hegemony (Weiss, 2014). Disguised by a dominant pro-free-market ideology, US technological supremacy is underpinned by this industrial policy, including moon-shot projects funded by public agencies that enabled the creation of the internet and Global Positioning System (GPS), all of which were crucial for stimulating private sector innovation (Block, 2008; Mazzucato, 2015; Wade, 2017).

Altogether, these changes explain why intellectual monopoly capitalism took so long in establishing itself as the dominant form of capital reproduction. A system based not only on (surplus) value creation but also on appropriation based on unequal access to knowledge.

FROM GVCS TO CORPORATE PRODUCTION AND INNOVATION SYSTEMS

Intellectual monopolies' exclusive access to knowledge enables them to expand their planning sphere, subordinating those organizations that have lost their technical autonomy and rely on

adapting and adopting the techniques developed and required by intellectual monopolies. This form of subordination is, in fact, part of a larger process because intellectual monopolies control capitalism's means of production (including market) coordination.

Going back to GVCs seen as one of the many structures planned by contemporary leading corporations, we can define a corporate production system as a planned system of reproduction and exchange of commodities where the leading corporation – which is an intellectual monopoly – is the central planner. At the contractual level, planning can be understood as signed contracts where subordinate firms can only decide whether to accept or reject the agreement (Levín, 1997). Planning not only implies setting prices but also includes the definition of clauses of exclusivity, commercial credit conditions and quality standards (Rikap, 2021, ch. 2). When information cannot be so easily codified, intellectual monopolies exercise direct coordination or control, as in the example of Apple above. Those who control platforms are also market creators. As such, they are rule-setters. They decide the norms and standards that determine what can and cannot be done and how it can be done inside their controlled platforms (Dolata, 2020). Overall, intellectual monopolies set the rules that govern markets[3] and production.

Corporate production systems can include all or as many structures as leading corporations consider strategic. They may combine GVCs with platforms (as do Apple and Amazon), franchising with GVC and even local networks of suppliers, such as McDonald's and Inditex, and so on. Each intellectual monopoly strategically decides which steps of its production system (and also of its innovation system, as explained below) belong to its core business and should be kept in-house and what should be outsourced. This cannot be universally defined in advance. In abstract terms, the core entails all the activities kept in-house to preserve and expand a corporation's intellectual monopoly.

Some leading corporations include in their core business activities that require large (tangible) in-house capital expenditures. This is the case of Amazon, Microsoft, Google and Facebook in the form of data centres and undersea bandwidth, indispensable to store and process data, and, thus, to assure their data-driven rents (Rikap & Lundvall, 2020). The distribution chain (storage included) is part of Amazon and Inditex[4] core as some of their innovations concern logistics and storage (on Amazon, see Rikap, 2020). Large pharmaceuticals even outsource most of the innovation steps since they can still garner the associated intellectual rents and outsourcing reduces innovations' economic risks (Rikap, 2019).

Summing up, actual industrial structures are diverse, and this diversity questions the idea that research, development, design, technology and business intelligence are the strategic activities to be kept in-house by leading corporations (Serfati, 2008). Even steps from all the latter are outsourced, while some intellectual monopolies keep in-house steps of the production process that had been considered as perfect candidates for outsourcing.

Corporate innovation systems planned by intellectual monopolies evidence that the production unit has been split from the legal ownership of capital. Following Bettelheim (1975, p. 57), there is a fundamental difference between possession and property. Subordinate companies have 'the ability to put the means of production into operation' (possession) but they partially lack 'the power to dispose of the products obtained with the help of these means of production' (property).

Hence, the unit of capital accumulation is no longer defined by ownership because the intellectual monopoly plans its (sub)system of production. This includes governing/controlling several (global) innovation networks (Chaminade et al., 2016; Ernst, 2009). Considered together, an intellectual monopoly's global innovation networks have been defined as a corporate innovation system. These are (usually global) systems each organized and controlled by an intellectual monopoly, constituted also by subordinate organizations (such as innovating companies, universities and public research organizations; Rikap & Lundvall, 2020).

Within a corporate innovation system, the intellectual monopoly defines the general R&D orientations and desired results, without anticipating every step to be followed, and leaving degrees of autonomy to subordinate actors. Intellectual monopolies also influence and to some extent set dominant global research agendas of those disciplines related to their R&D priorities, as was shown by Testoni et al. (2021) for the case of big pharma companies and health and the dominant research agenda of the biomedical sciences.

Subordinate companies participating in corporate innovation systems will typically be the most advanced in specific technologies, but they either produce only steps of larger innovation processes or cannot integrate their creative results into production processes, relying on the overarching planning capacity of the intellectual monopolies to whom they subordinate. So, most of the associated intellectual rents that can be garnered from knowledge produced within

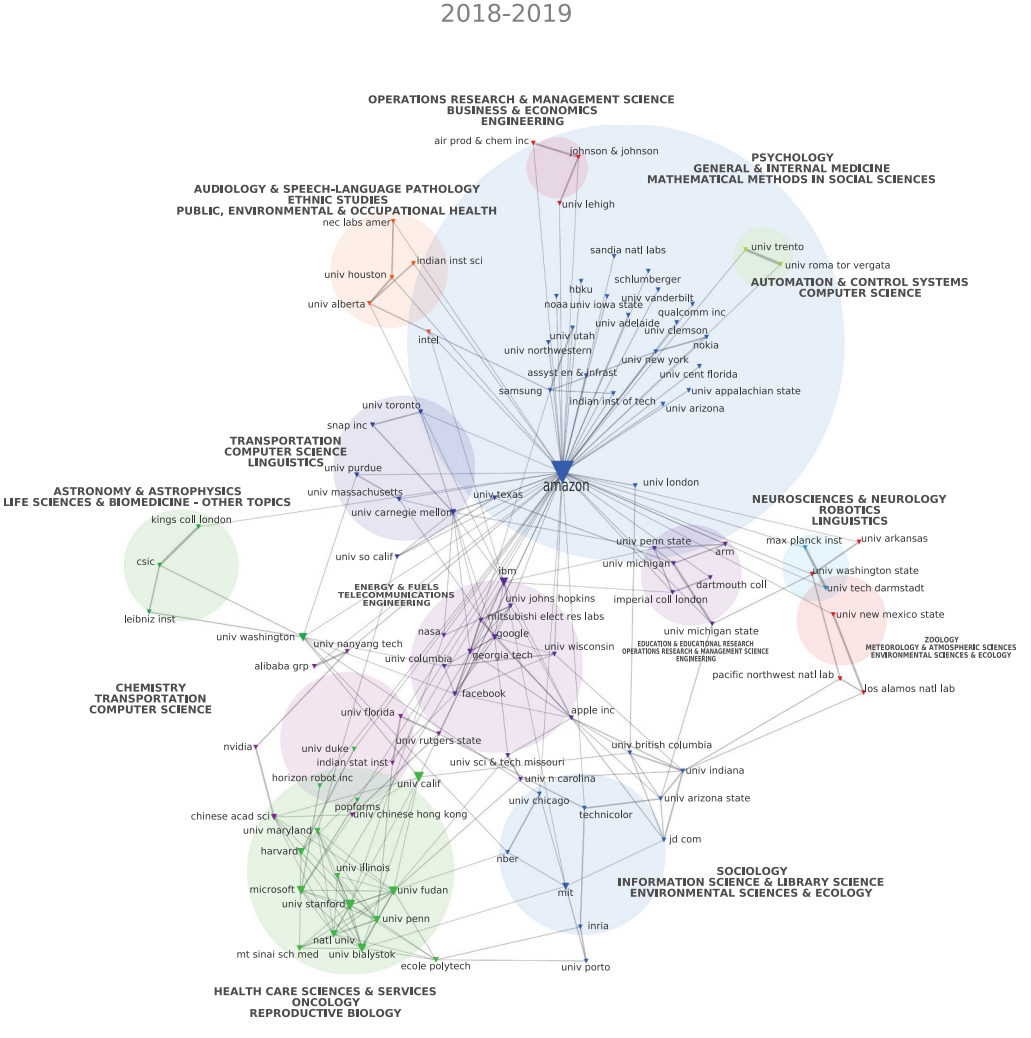

Figure 1. Amazon's network of most frequent co-authors.

Note: For methodological details on how these networks are built, see the author's previous research on Amazon as well as other intellectual monopolies (e.g., Rikap, 2019, 2020, 2021).
Source: Author's analysis based on data extracted from the Web of Science.

corporate innovation systems are appropriated by the intellectual monopoly. Following Veblen's (1899) concept of predation, it may be said that the latter is a knowledge predator since superior force is manifested and exercised through the spoliation of collectively produced knowledge, which is turned into intangible assets by the intellectual monopoly (Rikap, 2020, 2021). Next, I provide evidence of this behaviour for the case of Amazon.

Amazon: a paradigmatic data-driven intellectual monopoly

Using a corpus of Amazon's scientific publications between 2018 and 2019 extracted from the Web of Science, Figure 1 shows Amazon's network of most frequent co-authors. Co-authorships indicate R&D collaborations. By focusing on Amazon's top co-authors, we are looking at institutionalized links. Therefore, we are considering organizations that integrate Amazon's corporate innovation system. However, even if Amazon organizes this system with thousands of other organizations, the latter barely share the property of its patents, providing evidence of predatory behaviour (Rikap, 2020). Amazon also outsources innovation modules for app development (it has declared that it has more than 700,000 developers in its ecosystem) and harvests open-source software (Rikap & Lundvall, 2020).

Amazon also keeps secret the most advanced machine-learning algorithms used in its platforms and offers some of them as a black-box service through Amazon Web Services, its cloud computing business. Another key intangible asset for the reproduction of Amazon's intellectual monopoly that is kept secret is Amazon's harvested data from individuals and organizations. In my research with Professor Lundvall, we showed that Amazon's corporate innovation system, as well as that of the other US and Chinese tech giants, is focused on further developing machine learning and big data innovations (Lundvall & Rikap, 2022). As a data-driven intellectual monopoly, Amazon uses big data processed with machine-learning algorithms to inform and plan production in its current businesses as well as to innovate and enter new markets, thus further expanding its intellectual monopoly and corporate production system. These behaviours, as well as the overall scenario depicted in this paper, engender different overlapping effects, which are briefly discussed in the next section.

THE EFFECTS OF INTELLECTUAL MONOPOLY CAPITALISM

Since predation and rentiership are zero-sum games, intellectual monopoly gains from the behaviours outlined in this article represent a portion of value that someone else is losing; forms of accumulation by dispossession (Harvey, 2007). Regarding rentiership, the assetization of intangible goods deprives others of the possibility of mobilizing that knowledge for production and other purposes, including further advancing knowledge. Predation takes place both when exchanging commodities (as in the case of transactions within a GVC or platform) and within an intellectual monopoly's corporate innovation system. In these cases, a direct manifestation of superiority takes place as the intellectual monopoly appropriates value and knowledge. As Durand (2020) concludes, capital is shifting away from production to focus on predation. At the same time, intellectual monopolies rely on the expanding scale of capital accumulation inside their production systems to assure greater value creation, thus perpetuating sources of predation.

At the level of global capitalism, although we live during the second phase of the ICT revolution (Brixner et al., 2020), the effects of innovation on economic growth seem curtailed. The monopolization of knowledge by and beyond IPRs blocks potentially profitable opportunities, fuelling weak global capital accumulation (Durand & Gueuder, 2018). In other words, under intellectual monopoly capitalism, innovation-driven growth and accumulation are being highjacked.

Moreover, as intellectual monopolies' rentiership and predation redistribute surplus value amongst firms, the hierarchy of power trickles further down and impacts on workers. Since the 1980s in the United States, the share of surplus value in total value-added increased (Rotta, 2018; Stockhammer, 2013). Within workers' share, there have also been further redistributions due to workers' segmentation within and between intellectual monopolies and different subordinate firms (Rikap, 2021, ch. 10). In this respect, the effects on workers from subordinate firms in GVCs, several of them in peripheral countries, have been widely studied (e.g., Selwyn, 2019; Smith, 2016). Similar effects are seen in subordinate firms participating in platforms, franchising and corporate innovation systems organized by leading corporations (Rikap, 2021, ch. 10).

Furthermore, given the internal polarization of capitalism, it is no surprise that intellectual monopolies are mostly concentrated in core countries. When we focus on the peripheries, on top of other pre-existent forms of dependency, two additional forms can be associated with intellectual monopoly capitalism: knowledge extractivism and data extractivism. The former is defined as knowledge (in particular science and technology) from the peripheries that are monetized in core countries, usually by intellectual monopolies. This form of knowledge appropriation particularly affects leading universities and public research organizations from so-called emerging or middle-income countries while the assetization of scientific knowledge also diminishes local communities' knowledge (Rikap, 2021, sect. 3).[5] Moreover, data extractivism generates a new layer in the international division of labour. Net raw data providers pay for digital intelligence while data-driven intellectual monopolies mostly from the United States and China appropriate data and concentrate value from selling products relying on digital intelligence (Rikap, 2021; Rikap & Lundvall, 2020). This context has been conceptualized as data or digital colonialism (Couldry & Mejias, 2019; Kwet, 2019).

In this scenario, the geographies of digital capitalism are quite telling of how value, data, knowledge and nature flow. They also provide crucial insights underlying the main geopolitical conundrums.

The geographies of digital capitalism

Leading digital platforms, in particular those that can be considered data-driven intellectual monopolies, are concentrated in the United States and China. Together, they had accumulated 90% of the market capitalization value of the 70 largest digital platforms of the world by 2019 (UNCTAD, 2019). More recently, UNCTAD (2021) showed that North America (mainly the United States) leads by afar in total value by market capitalization (67%) of the top 100 global digital platforms. Meanwhile, Asia and the Pacific (mainly China), with 45 platforms, lead in the top 100 platforms' ranking by number. The United States hosts 40. Europe structurally lags far behind, as does Latin America – with only Mercado Libre included in the list – and Africa – represented by Naspers and Prosus.

These figures not only speak of the winners of digital capitalism but also contribute to explaining why the United States and its tech giants are so concerned about China's catching-up. As the technological rise of China became apparent, the power of the US state has been mobilized. It extends from massive state support to build infrastructure and promote innovation to embargos on technologies assumed to be of crucial importance for China's further development in relation to AI (Lundvall & Rikap, 2022).

A mission report assigned by the US Congress to an ad-hoc commission, chaired by Eric Schmidt, Google's former chairman, and including the head of Google Cloud Artificial Intelligence division, Microsoft's Chief Scientific Officer and Amazon's Chief Executive Officer, is extremely vocal in its presentation of China as an adversary (National Security Commission on Artificial Intelligence, 2021). The report continuously refers to China's AI threat and the need to dedicate greater efforts to confront China's ambition to be the global

leader in this technology by 2030. This commission illustrates the close cooperation between tech giants and the US state.[6]

Besides the US–China technological war, since knowledge and data are created around the world, the concentration of leading data-driven monopolies in these two countries also speaks of knowledge and data extractivism from the rest of the world. Furthermore, the development of these technologies strengthens nature extractivism mostly from the Global South since the lithium and cobalt markets have been driven by battery demand, primarily from consumer electronics.

Another layer of this geographical snapshot concerns other industries' intellectual monopolies, including here European and Japanese corporations, such as some big pharma companies and Samsung, respectively. These intellectual monopolies are also becoming more data driven. Novartis, which claims to have 2 million patient-years of data, considers data to be 'the crucial asset which will be instrumental going forward as we apply artificial intelligence tools to sift through the data and find hitherto unknown correlations between drugs and diseases'.[7] This same rationale likely motivates Pfizer's agreement with the state of Israel for the provision of its Covid-19 vaccine. The latter agreed to give former anonymized health data of all its citizens (Dyer, 2021). Moreover, among data-driven intellectual monopolies, there is also BlackRock, the world's major asset manager with its financial data platform Aladdin, pointing to the interplay between financialization and intellectual monopoly capitalism (Auvray et al., 2021).[8]

All in all, the geographies of digital capitalism suggest a concentration not only of value but also of nature, data and knowledge by intellectual monopolies from selected core countries. Although some of these phenomena are not new, their deepness together with the specific effects of intellectual monopoly capitalism call for action.

FINAL REMARKS

Capitalism has always been a turbulent social formation. It has hitherto guaranteed the reproduction of human life, but by continually marginalizing a portion of humanity, risking the future of every living being and of our planet as a whole. It has done so with a rhetoric of universalism while it systematically confronts humans. Intellectual monopoly capitalism is probably its harshest episode.

As I have argued in this article by elaborating on my previous research, intellectual monopolies exercise knowledge (including data) and value predation. These leading corporations plan corporate production systems integrated by different structures, including but not limited to GVC and platforms. Not only do they plan portions of commodities' reproduction (and thus exchange) sphere, but they also plan and harvest from knowledge-production processes. They organize global corporate innovation systems turning resulting knowledge into their own intangible assets. Among intellectual monopolies, those exclusively accessing big data and deep neural network algorithms have additional advantages concerning planning – and thus value appropriation – and the perpetuation of their intellectual rents over time.

Furthermore, intellectual monopoly capitalism reinforces underdevelopment, extracting value from peripheries (as in previous capitalist stages) while new and old forms of extractivism spread. Consequences are also especially pervasive for workers, in particular for those in routine jobs or working for subordinate companies that attempt to compensate for the value captured by intellectual monopolies by super-exploiting their workers. The secular stagnation that the Western world is witnessing also reflects the implications of intellectual monopoly capitalism, since the effects of innovation on economic growth are restricted. This disconnection springs from leading corporations' exclusive access to knowledge.

This context and the overall scenario that I briefly described prompt us to discuss how to address a changing world. It requires evolving concepts and theories. We need broad conceptualizations that allow us to provide big pictures while we go in-depth into specific dynamics. And of course, a related and unavoidable question is: What is to be done? This question cannot be answered individually. Collective and democratic debates need to be organized, engaging both individuals and organizations, from unions and social movements to states.

These debates should lead to a reappropriation of planning capacities and knowledge by society as a whole since, as I have argued in this article, planning is already happening at global scale. In a time when ecological disasters put into question the type of growth to be pursued by humanity, deeper enquiries can be conducted into the possibilities of overcoming private business planning with public or commons planning. Plans require integrated sets of short-, mid- and long-term interconnected goals and democratic institutions where in-depth (political) discussions lead to the definition of those goals. This is needed not only to tackle ecological disasters but more broadly to envision a new society where the reproduction of our species is not at the expense of nature, other species and a (growing) portion of humanity. In short, the plan needs to address every dimension of life on Earth in a democratic, coherent and interrelated way. Although we are very far from this scenario, as much as intellectual monopolies are appropriating knowledge, let us not allow them to appropriate or eliminate our capacity to image and create new (and better) worlds.

DISCLOSURE STATEMENT

No potential conflict of interest was reported by the author.

NOTES

1. Patents in the five largest patent offices: European Patent Office (EPO), Japan Patent Office (JPO), Korean Intellectual Property Office (KIPO), National Intellectual Property Administration of the People's Republic of China (CNIPA) and the United States Patent and Trademark Office (USPTO).
2. See www.visualcapitalist.com/the-soaring-value-of-intangible-assets-in-the-sp-500/.
3. At the market level, the capacity of leading corporations to determine transaction conditions even when they operate as buyers has led to conceptualizing contemporary capitalism as a form of (global) monopsony capitalism (Nathan, 2021). Our conceptualization provides an explanation for the emergence of leading corporations with higher market power (as both buyers and sellers) that is also based on capital's technological differentiation (Levín, 1997).
4. On Inditex, see, for instance, https://www.ft.com/content/c2b8e86d-d580-47f6-8f2d-13357b528dde?segmentId=b0d7e653-3467-12ab-c0f0-77e4424cdb4c/.
5. Frequently, intangibles (either knowledge or data) extractivism is a practice that goes unnoticed, as in the case of blind knowledge transfer. A way to measure the latter is by analysing an institution's scientific publications that are cited in international patents not owned by that institution (Ahmadpoor & Jones, 2017; Codner et al., 2012; Codner & Perrota, 2018; Hicks et al., 2001).
6. Tech giants not only influence the overall US AI policy but also surveillance enabled by AI is a specific field where US big tech companies' business and the US state requirements come together (e.g., Kwet, 2020).
7. See https://www.novartis.com/stories/discovery/data42-programme-shows-novartis-intent-go-big-data-and-digital/.

8. See https://www.ft.com/content/5ba6f40e-4e4d-11ea-95a0-43d18ec715f5/.

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