Uber-production.
From global networks to digital platforms

Forthcoming in *Environment and Planning A*, 2020, Volume 52

Gernot Grabher | Erwin van Tuijl
Urban and Regional Economics
HafenCity University Hamburg
20457 Hamburg | Germany
gernot.grabher@hcu-hamburg.de

Abstract

Economic geography has engaged with the new digital capitalism primarily in terms of the so-called sharing economy and focused on peer-to-peer platforms like Airbnb and Uber. The digital transformation of business-to-business interaction, so far, has attracted less attention. The present Exchange confronts this challenge by juxtaposing platform conceptions with the preeminent framework to conceptualize business-to-business relations in economic geography: global production networks (GPN). Specifically, this Exchange addresses challenges posed by the platform approach for the GPN framework in the four dimensions; value (from owning assets to granting access), governance (from make-or-buy to employ-or-enable), management (from back-end to front-end) and labor (from employment to gig).

Key words

Digital platforms, Global Production Networks, multi-sided markets, innovation ecosystems

From *Nike*-fication to *Uber*-ization

'Disruption' is the new black. The usual lexicon of transformation and change, in fact, seems no longer sufficient for proclaiming the current revolutionary breakthrough in capitalist development. Aspiring to innovation beyond established trajectories and market constellations, disruption aims at the displacement of established markets, firms and products (Christensen et al., 2015). The Silicon Valley-mantra "move fast and break things" (Mark Zuckerberg; CEO of Facebook) captures the spirit of disruption, and the model of the platform provides the vehicle for deranging the established economic order (Kenney and Zysman, 2020). And in fact, the platform, within a few years, has evolved into emblem and embodiment of the new digital capitalism (Langley and Leyshon, 2017a; Parker et al., 2016; Srnicek, 2016; Kenney et al., 2019).

With this indicative quality, the *platform* signifies the latest stage of capitalist development that took off with the breakthrough of the factory-system (Grabher and König, 2020). By superseding the notoriously unreliable *putting-out* system (Lazerson, 1995), the *factory* unleashed the economic dynamics of industrialization: Prometheus had been unbound (Landes, 1969; see also Polanyi, 1945). The emergence of the *corporation* precipitated a thoroughgoing rationalization and ushered in the phase of organizational modernization (Schumpeter, 1942; Chandler, 1977). By expanding from the solitary entity towards federated ensembles, *networks* – either conceptualized as global commodity chains (Gereffi, 1996) or global production networks (Henderson et al., 2002) – eventually came to shape globalization.

The current amalgamation of globalization and digitalization, propelled by a shift from networks to platforms or, phrased differently, from *Nikefication* to *Uberization* (Davis, 2016a, b), has also started to attract attention in economic geography (Langley and Leyshon, 2017b). The engagement with the, as some argue, already maturing platform economy (Kenney et al., 2019) in our field, so far, has primarily been focused on peer-to-peer (P2P) and business-to-consumer (B2C) platforms in the domains of accommodation (for example, Stabrowski, 2017; Ferreri and Sanyal, 2018; Wachsmuth and Weisler, 2018), transport (Braun et al., 2016; Attoh et al., 2019) and digital labor (Graham et al., 2017; Wood et al., 2019; Woodcock and Graham, 2019). The emergence of platforms in the realm of business-to-business transactions (B2B), in contrast, thus far has hardly been examined in economic geography in a systematic fashion (for important exceptions, see Langley and Leyshon 2017a, b).

This Exchange seeks to address this gap by juxtaposing platform conceptions with the theoretical framework that plays a preeminent role in the economic geographic reasoning on business-to-business relations: global production networks (GPN) (Henderson et al., 2002; Yeung and Coe, 2015; Coe and Yeung, 2019; Humphrey, 2019). This confrontation is motivated by heuristic considerations: the current juxtaposition of 'ideal types' (Weber, 1968: 191) is emphatically partial. Rather than producing granular descriptions, this analytical strategy is aimed at elucidating criteria for categorical distinction and at identifying promising

corridors for future research. We are keenly aware that this analytical strategy impossibly can do justice to the wealth and ramifications of both bodies of research[1]. However, we believe that it is worthwhile to assume the risks associated with construing dichotomies - if heuristic surplus can realistically be expected.

More specifically, we shall identify key conceptual challenges posed by the emergence of platforms by confronting the GPN approach with pertinent theoretical contributions in economics and business studies (Gawer and Cusumano, 2002; Rochet and Tirole, 2003; Parker et al., 2016; Cusumano, 2019; Kirchner and Schüßler, 2020; Shipilov and Gawer, 2020), sociology (Arcidiacono et al., 2018; Wood et al., 2019; Vallas and Schor, 2020), social media studies (Gillespie, 2010; 2018; Dijck et al., 2018; Plantin and Punathambekar, 2019; Zuboff, 2019) and economic geography (Davies et al., 2017; Frenken, 2017; Graham et al., 2017; Langley and Leyshon, 2017a,b; Stabrowski 2017; Grabher and König 2020).

We proceed as follows. First, we briefly synthesize key advancements in the theoretical framing of platforms, preliminarily conceived as digital architectures for economic transactions among different groups. Subsequently, we juxtapose this framing of platforms with the GPN approach by, in turn, addressing the key challenges in the four dimensions that are also pertinent in the GPN-literature: value, governance, management, and labor. Finally, we elucidate the potential as well as the limitations of the platform concept to conceptually frame and to empirically explore the emerging modes of economic organization and transaction in the B2B-realm

Making sense of platforms: Match-making and ecosystems

The prevailing conceptualizations of platforms echo the distinctive concerns of the respective disciplinary traditions. In economics, platforms are primarily conceptualized as *multi-sided markets* (Rochet and Tirole, 2003). Multi-sided markets are anything but novel, but in fact designate the interface configuration of businesses like credit cards, for example, in which the credit card provider affords an interface between the market of consumers (who use the card) and the market of companies (who accept the card as payment device) (Hagiu and Wright, 2015). Platforms in this perspective operate as 'match-makers' (Evans and Schmalensee, 2016) between previously fragmented and unconnected groups of users. In the course of pervasive digitalization, platforms have fundamentally transformed domains as diverse as the markets for goods (e.g., Amazon, eBay), mobility (e.g., Uber, Lyft), labor (e.g. Upwork, TaskRabbit), funding (e.g. Kickstarter, Prosper) (Evans and Gawer, 2016; Langley and Leyshon, 2017b) and, of course, the entire field of online search, socializing and content production (e.g. Facebook, Google, YouTube) (Dijck et al., 2018; Zuboff, 2019).

In business studies, platforms have primarily been perceived as *ecosystems* that encompass a group of interdependent actors that jointly develop a set of complementary assets (Gawer and

[1] The differentiation between GPN 1.0 and GPN 2.0 (Yeung and Coe, 2015) is but one indication of the ramifications of this wide-ranging strand of inquiry.

Cusumano, 2002; Gawer and Cusumano, 2014; Jacobides et al., 2018; Cusumano et al., 2019). A prime example in the B2C realm is Apple's ecosystem in which Apple (the platform operator), software developers and individuals (platform users) jointly use and co-develop complementary software and hardware products (Teece, 2018). Amongst the pioneering ecosystems in the field of B2B are the Bosch IoT-Suite, General Electric (GE) Predix, IBM Watson, Microsoft Azure, SAP Leonardo and Siemens Mindsphere which are aimed at enhancing the efficiency and reliability of industrial processes (Butollo, 2019: 10; Cusumano et al., 2019; Menon et al., 2019). The quintessential feature of ecosystems, complementarity (Kapoor, 2018: 7-8; Rietveld et al., 2019), implies that an increase in the demand for product A (e.g., smartphones or sensors) leads to an increased demand for product B (e.g., apps or manufacturing software). What is more, platforms enable providers of complementary products to interact with each other and with other platform users to create value that, ideally, is higher than the sum of the individual values of the products traded outside platforms (Lan et al., 2019).

In the blurred economic reality of diversified multi-platform companies, the role of the match-maker and of the ecosystem orchestrator frequently interpenetrate each other (Jacobides et al., 2018: 6-9; Butollo, 2019: 12-15; Shipilov and Gawer 2020: 96). More importantly, despite these two different logics, platform operators embody the same two principles of platform economies. First, platform operators, regardless if as match-maker or as ecosystem orchestrator, seek to leverage the singular most powerful escalating platform dynamics. Once platforms "reach a critical inflection point, *network effects* kick in and growth follows an exponential trajectory" (Hagiu and Rothman, 2016: 2; own emphasis). The more users a platform operator can attract on to its demand side, the more users will be drawn to the supply-side which, subsequently, turns the platform into an even more lucrative option for demand-side users, and so on (Rochet and Tirole, 2003): the 'winner takes all'-logic of platforms (Parker et al., 2016).

Second, and despite contrary corporate assertions, platform operators act as *non-neutral intermediaries* between different groups of users (Evans and Schmalensee, 2016; Gillespie, 2018). Rather than simply providing a neutral infrastructure as *match-makers*, platform operators in fact act as *market-makers* (Kirchner and Schüßler, 2020; Grabher and König, 2020). Instead of displaying prices established through demand- and supply coordination in a passive fashion, platform operators actively forge price regimes (Parker et al., 2016). In order to get both sides of a platform on board at the same time, operators pursue cross-subsidizing strategies (Rochet and Tirole, 2003: 990) by charging a higher fee for one side on the platform (i.e., 'profit maker') while subsidizing participation on the other side (the 'loss-leader'). Moreover, platform operators through both explicit and codified Terms of Service (ToS) as well as through less visible, black-boxed algorithmic governance define and police quality standards and platform participation (Dijck et al., 2018; Zuboff, 2019). Through end-to-end algorithmic monitoring as well as pervasive rating systems, platforms afford an 'evaluative

infrastructure' (Kornberger et al., 2017). Every transaction feeds into the online reputation[2] that determines the corridors of platform participation ranging from user stratification (e.g., Airbnb 'Superhosts') to complete debarment from participation (e.g. of Uber drivers whose rating consistently falls short of a predefined minimum threshold of 'star'-ratings) (Attoh et al., 2019).

In an attempt to synthesize the pertinent debate on features and models, we extend our preliminary understanding and define a platform as a programmable digital architecture where different groups of interdependent users[3] interact with each other to develop and trade complementary products (Dijck et al., 2018). Platform operators act as non-neutral intermediaries that aim to leverage network effects (Evans and Schmalensee, 2016). In the next section, we seek to identify key challenges that the proliferation of platforms poses for the conceptualization of economic organization and transaction as GPN. Again, we would like to stress that our juxtaposition of 'ideal types' (Weber, 1968) unavoidably glances over the diversity within the broad spectrum of empirical manifestations of GPN (Yeung, 2016; Grabs and Ponte 2019) as well as of platforms (Srnicek 2016; Cusumano et al., 2019).

Challenging the GPN approach: the transformation of value, governance, management and labor

Value: from owning assets to granting access

GPN seek to create value across all stages of the value chain, ranging from raw material extraction over manufacturing and marketing products (Henderson et al., 2002; Yeung and Coe, 2015; Gibson and Warren, 2016). Value in GPN, then, is derived from production and supply-side economies and based on the ownership of strategic assets that are essential for leveraging those production economies. More specifically, value is calculated with the standard metrics that assess the worth of tangible assets like production facilities and human capital or intangible assets like extraction rights and intellectual property (Van Alsytne et al., 2016: 5). Platforms, of course, are not devoid of tangible assets. Quite to the contrary, Airbnb relies on the availability of housing stock, Uber is dependent on an available fleet of vehicles, the business prospects of Siemens Mindsphere and GE Predix hinge on access to the manufacturing equipment at the their clients. The value of platforms, crucially however, is not based on the ownership of these particular tangible assets but, quite diametrically opposed, on the ability to evade ownership and the respective responsibilities of owning assets (Davis, 2016b)[4].

[2] Facebook, of course, is a central arbiter of online reputation and, in fact, performs the role of a 'central bank for social capital' (Schwarz, 2019). Performing the role of a central bank, Facebook can charge commissions, block currency transfer (converting online reputation across different platforms) and confiscate social capital (through exclusion from platform participation).

[3] These groups, of course, are not limited to individual users of P2P or B2C-platforms, but also might comprise companies transacting on B2B platforms (like, for example, road haulers on the Mobile Stationary Interface-platform (Saadatmand et al., 2019).

[4] How much valuation is dependent on the ability of platform operators to *avoid* accountability for assets has been demonstrated by the spectacularly failed IPO of WeWork, an Airbnb for office space in business parlance. In contrast to Airbnb, however, WeWork had entered contractual commitments over tangible assets (office buildings). The extent of these long-term obligation revealed in the IPO-prospectus elicited fundamental

Despite considerable diversity, GPN typically connect 'asset-heavy' firms, whereas the 'asset-light' company is the epitome of platforms (Parker et al., 2016: 68-70). Whereas the globally leading hotel group, Marriott International (176,000 employees), for example, owns 6,906 properties with approximately 1,3 million guest rooms (Marriott Inc., 2018), the hospitality platform operator Airbnb (12,000 employees) does not own a single hotel room and yet enabled 115 million stays in over 7 million listings at the end of 2017 (*Forbes Magazine*, 2018). Rather than on the supply-side economies of *owning assets*, the value of platforms is based on demand-side economies of *granting access*. The metrics of valuation, indeed, shift from control over assets to the orchestration of crowds[5], from the ability of managing resources to the creativity in managing relationships (Van Alstyne and Parker, 2017: 26). GPN, then, resonate with the resource-logic of 'making things '(with assets) while platforms leverage the network-effects of 'making matches' (within a crowd).

Governance: from make-or-buy to employ-or-enable

Governance in the GPN approach is fundamentally framed in the relational terms of networks, firmly located between the poles of markets and hierarchies (Henderson et al., 2002; Yeung and Coe, 2015). The platform, in contrast, amalgamates market and hierarchy into a new hybrid (Sundararajan, 2016; McIntyre and Srinivasan, 2017) that blends the 'visible hand' of corporate hierarchy with the 'invisible hand' of the market into a 'translucent hand' (Altman et al., 2019) that orchestrates rather than commands communities of platform users. Platforms, phrased differently, imply a shift from "dictating processes" to "persuading participants" (Van Alstyne et al., 2016: 5), from hierarchical *instructions* to economic *incentives*. In contrast to the hierarchically controlling lead-firms in GPN, platform operators face the arduous challenge to suspend some control over resources in order to leverage the motivation of complementors to contribute to the ecosystem (Watkins and Stark, 2018). As the case of GE Predix illustrates, the suspension of control proves particularly challenging for companies who seek to transform themselves from a GPN lead firm into platform operator: "The natural tendency for an established giant such as GE was to control everything. Yet building a successful platform was about enabling others, and not control. GE initially fell into this trap ... GE had reversed course: It abandoned its own cloud infrastructure in favor of running Predix on top of Amazon's AWS and Microsoft's Azure Cloud" (Cusumano et al., 2019: 163)

The governance of platforms, hence, requests a heedful navigation between, on the one hand, too strict control (that weakens incentives for complementors to contribute) and too little control

skepticism on the viability of this asset-heavy business model and, together with other concerns, sent the market capitalization from $104bn (in August 2019 by Morgan Stanley) to a sobering $8bn in February 2020 (*Financial Times*, 2020).

[5] The crowd of platform users, of course, provides not only supply of and demand for goods and services, but also produces data that can be transformed into tradeable commodities (Crain, 2018; Dijck et al., 2018; Butollo, 2019: 7; Grabher and König, 2020: 12-14).

(that entices power asymmetries and conflicts between complementors)[6] (Saadatmand et al., 2019: 4). Volkswagen (VW), for instance, assigns Siemens Mindsphere a crucial operative role in the VW Industrial Cloud (that enhances interconnectivity of manufacturing equipment), but, at the same time, VW is adamant not to relinquish overall platform control to Siemens (Butollo, 2019:14). Platform operators, then, have to "craft rules and shape the ecosystem development to tie in complements and make complementors abide to them" (Jacobides et al., 2018: 2263). Moreover, instead of concealing strategic knowledge, protecting intellectual property (through patents) and of caching data, platform operators are also pressurized to share critical knowledge as well as vital data (Altman et al., 2019) [7]. The relative openness in knowledge governance, evidently, is not an expression of a deliberately democratic mode of control (see, for example, Hippel, 2005), but rather a manifestation of an inexorable business imperative of the platform model (Schmeiss et al., 2019).[8]

Shifting from GPN to platform also implies to move from the classical '*make-or-buy*' calculation to an '*employ-or-enable*' assessment. Whereas GPN-lead firms in a make-or-buy framework usually have direct contractual relationships with transaction partners, platform operators confronting the employ-or-enable decision enable contractual relationships with transaction partners without being (legally accountable) party themselves (Hagiu and Wright, 2015). Platform users, then, are affiliated with rather than contracted to the platform (Hagiu and Wright, 2015) and, due to the low switching-costs, can participate in various platforms at the same time. Through the ensuing practice of 'multi-homing' (Rochet and Tirole, 2003: 993), independent complementors thus generate interdependencies within increasingly complex 'ecologies of platforms' (Hilbolling et al., 2019: 27).

Management: from back-end to front-end

Whereas management in the GPN approach is based on ownership of strategic assets (Coe et al., 2004; Humphrey, 2019), the key concern of management of platforms is the orchestration of complementors (Van Alstyne and Parker, 2017). The focus, phrased differently, shifts from the organization of internal resources and the optimization of the supply chain to the management of external resources (Shipilov and Gawer, 2019). The managerial challenge of moving from 'making things' to 'making matches' involves no less than a reconfiguration of the business organization from reaping supply-side economies of scale through production

[6] Too little control raises the risk that complementors may set new standards and, thus, take over leadership over a platform. In the PC industry, for instance, Microsoft and Intel took over control of IBM's platform by setting new standards for software (Windows operating system) and hardware (processors), respectively (Moore, 1993: 80-81; Gawer and Cusumano, 2014: 426).

[7] The spectrum of sharing arrangements with regard to data ranges from GE who grants users the right to retain ownership of their data processed on the Predix platform (Cusumano et al., 2019: 165) to Microsoft's Azure and IBM's Watson which preclude complementors from aggregating user data (Menon et al., 2019: 16).

[8] Against the primacy of business imperatives, the rather euphemistic denomination of this mode of governance as 'shepherding communities' (Altman et al., 2019) appears rather misconstrued.

efficiencies to leveraging demand-side economies of market aggregation (Van Alstyne et al., 2016: 5).

In terms of operations management this reorientation also entails a recalibration of managerial priorities and organizational hierarchies. Whereas in the context of a GPN, back-office operations like Enterprise Resource Management (ERP) are of strategic importance, platform operators attach higher significance to front-office operations and Customer Relationship Management (CRM) (Parker et al., 2016). Moreover, the key imperative in the design of critical digital infrastructures and information systems is no longer confined to smoothen transactions within the production network. Rather, information systems in platforms have to assure interoperability between complementors through a standardized interface (e.g., Application Programming Interface, API) (Jacobides et al., 2018). In the realm of B2B interoperability is a particularly daunting challenge since corporate platform users symptomatically operate with rather idiosyncratic, densely-layered 'legacy systems' (Agarwal and Brem, 2015: 205; Saadatmand et al., 2019). Finally, the management of transactive infrastructures in GPN traditionally was concerned with providing efficient (physical) logistics for shipping goods and distributing services. In line with their 'asset-light' business model, platform operators shift the responsibility for physical logistics onto the users and, instead, primarily rely on the (digital) infrastructure of cloud computing, big data and algorithmic control (Kenney and Zysman, 2016)[9]. These digital infrastructures, in fact, have turned into a strategic asset of platforms in their own right (McAfee and Brynjolfsson, 2017: 137-8; Plantin and Punathambekar, 2019).

Labor: from jobs to gigs

The juxtaposition between 'asset-heavy' GPN firms and 'asset light' platform operators is presumably most starkly evinced in the politically charged debates on the status of the asset labor (Frenken et al., 2018; Kirchner and Schüßler, 2020). Whereas the production-logic of GPN implies that labor is employed and, at least in the controlling echelons of the network, is regarded as critical asset (Coe and Yeung, 2019), the very essence of the match-making logic of platforms is to refuse contracted labor the status of employees (Frenken et al., 2018). Platform operators insist in the role of the neutral intermediary that solely matches supply of and demand for independent contractors (Graham et al., 2017). By emphatically maintaining this claim (through a multitude of litigation cases across a multitude of jurisdictions)[10], platform operators seek to avoid basic entitlements resulting from employment contracts like social security, minimum wages as well as work time and security regulations. The fervor of the legal

[9] We are, of course, aware that the cloud and 'software-as-a-service' have also become indispensable for the management of GPN (as, in fact, for any business venture). We rather would like to accentuate the relative importance of the physical and digital infrastructures within GPN and platforms respectively.

[10] A key arena for legal disputes over the status of so-called gig workers in the platform economy are the United States. Whereas, for example, the US Labor Department on April 29th, 2019 created a precedent by ruling that an indicted platform operator is not obliged to offer federal minimum wages or social security (*New York Times* 2019a), California legislators on September 11th, 2019 passed a landmark bill under which workers are likely to be employees if the company directs their tasks and the respective work is part of the company's main business (*New York Times* 2019b).

disputes over the status of labor as well as the clash between the lobbying campaigns of platform operators (see, for example, Rauch and Schleicher, 2015) on the one hand, initiatives to organize and protect labor (Johnston and Land-Kazlauskas, 2018; Graham et al., 2020) on the other, reveal the centrality of this constituent of the platform model: the categorical distinction between protected employee and independent contractor is also stylized as the threshold between deepening losses and (prospects of) future profits (Davis, 2015; De Ruyter and Brown, 2019)[11].

GPN, in terms of labor market governance, materialize as hierarchical global layering of the factory system (with a spatially concentrated labor force) whereas platforms rather resemble a global archipelago of putting-out system (with a spatially dispersed labor force) (see also Kenney and Zysman, 2016: 62; Kenney and Zysman, 2020). In terms of employment regimes, platforms accelerate the 'vanishing of the corporation' (Davis, 2016a) and expedite the secular shift from (long-term) employment relations over (short-term) jobs to (discrete) gigs (Davis 2016b; Kenney and Zysman, 2019). This 'taskification' of work (Sundararjan, 2016: 173) transforms professional careers governed by (offline) accumulated human capital into contractual portfolios shaped by (online) reputation capital (Grabher and König 2017; see also Neff, 2012). With regard to labor, platforms then in fact achieve the 'disruption' they are celebrated for.

Conclusion: Recalibrating governance

As emblem and embodiment of the new digital capitalism, the emergence of platforms indeed has incited a sweeping transformation of the governance, organization and regulation of the economy (Parker et al., 2016; Srnicek, 2016; Montalban et al., 2019; Kirchner and Schüßler, 2020). The platform might even be placed in the succession of transformative stages of modern capitalism taking off with the breakthrough of the factory (Landes, 1969) to the rise of the corporation (Chandler, 1977) and the proliferation of (global production) networks (Henderson et al., 2002).

This Exchange set out to identify conceptual challenges that the proliferation of platforms posed for the conceptualization of global production networks. By juxtaposing key tenets of the GPN literature with initial robust insights from platform research, we elucidated changes catalyzed by the advent of platforms in particular in the dimensions value, governance, management and labor. With this preliminary assessment we, of course, do *not* intend to insinuate a substitution of the GPN framework by a platform approach. Rather, we are interested in directing attention to dimensions in which we suspect a morphing of GPN within various arenas of consolidation and combination as well of critical lines of friction and conflict with platform models (Humphrey, 2018; Butollo, 2019; Shipilov and Gawer, 2020).

[11] In February 2020, Uber presented the prospect of profitability of its ride-hailing service in the fourth quarter of 2020; Lyft expects to turn a profit in 2021 (*The Wall Street Journal*, 2020).

On a more general level, we propose to advance a recalibration of key governance mechanisms (Kapoor, 2018). Whereas the GPN approach championed the preeminent role of networks, platforms invite a reappreciation of markets. Our suggestion, however, is not aimed at a (re)engagement with classical (one-sided) markets as one of us has suggested against the background of the 'projectification' of organization in the more recent past (Grabher, 2004). Instead, we propose, on the one hand, to further explore the relevance and limitations of the model of multi-sided markets (Hagiu and Wright, 2015; Parker et al., 2016) for the economic geographic theorizing of the B2B-realm. Pertinent debates in our field, so far, primarily have focused on transformations in the P2P and B2C domains of the so-called sharing economy (for example, Stabrowski, 2017; Ferreri and Sanyal, 2018; Attoh et al., 2019; Wood et al., 2019).

On the other hand, we would suggest to advance beyond an economistic reasoning on markets (regardless if one- or multi-sided) and to further explore and conceptualize how platform operators are not simply match-makers but instead veritable market-makers. As market-makers, platform operators do not only enable individual transactions, but actually frame and co-develop the entire institutional and regulatory framework of the platform economy (Frenken et al., 2018; Kirchner and Schüßler, 2020). In Polanyian terms (1945), platform operators, then, codevelop their own institutional and societal embeddedness (Grabher and König 2020).

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